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Turkish Journal of Surgery (Turk J Surg) is the official, peer reviewed, open access publication of the Turkish Surgical Society and Turkish surgical community. The journal is published quarterly on March, June, September and December and its publication language is English.

The aim of the Turkish Journal of Surgery is to publish high quality research articles, review articles on current topics and rare case reports in the field of general surgery. Additionally, expert opinions, letters to the editor, scientific letters and manuscripts on surgical techniques are accepted for publication, and various manuscripts on medicine and surgery history and ethics, surgical education and the field of forensic medicine are included in the journal.

As a surgical journal, the Turkish Journal of Surgery covers all specialties, and its target audience includes scholars, practitioners, specialists and students from all specialties of surgery.

The editorial and publication processes of the journal are shaped in accordance with the guidelines of the International Committee of Medical Journal Editors (ICMJE), World Association of Medical Editors (WAME), Council of Science Editors (CSE), Committee on Publication Ethics (COPE), European Association of Science Editors (EASE), and National Information Standards Organization (NISO). The journal is in conformity with the Principles of Transparency and Best Practice in Scholarly Publishing (doaj.org/bestpractice).

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Processing and publication are free of charge. No fees are requested from the authors at any point throughout the evaluation and publication process. All expenses of the journal are covered by the Turkish Surgical Society.

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1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of the data for the work;
2. Drafting the work or revising it critically for important intellectual content;
3. Final approval of the version to be published; AND
4. Agreement to be accountable for all aspects of the work, and ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

In addition to being accountable for the parts of the work he/she has done, an author should be able to identify which co-authors are responsible for other specific parts of the work. In addition, authors should have confidence in the integrity of the contributions of their co-authors.

All those designated as authors should meet all four criteria for authorship, and all who meet the four criteria should be identified as authors. Those who do not meet all four criteria should be acknowledged in the title page of the manuscript.

Turkish Journal of Surgery requires corresponding authors to submit a signed and scanned version of the authorship contribution form (available for download through www.turkjsurg.com) during the initial submission process in order to act appropriately on authorship rights and to prevent ghost or honorary authorship. If the editorial board suspects a case of "gift authorship," the submission will be rejected without further review. As part of the submission of the manuscript, the corresponding author should also send a short statement declaring that he/she accepts to undertake all responsibility for authorship during the submission and review stages of the manuscript.

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Manuscripts submitted to the journal will first go through a technical evaluation process by the editorial office staff to ensure that the manuscript has been prepared and submitted in accordance with the journal's guidelines. Submissions that do not conform to the journal's guidelines will be returned to the submitting author with technical correction requests.

Authors are required to submit the following:

- Copyright Transfer Form,

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- Author Contributions Form, and
- ICMJE Potential Conflict of Interest Disclosure Form (should be filled in by all contributing authors)

during the initial submission. These forms are available for download at www.turkjsurg.com.

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Title page: A separate title page should be submitted with all submissions, which should include:

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- Name(s), affiliations, and highest academic degree(s) of the author(s),
- Grant information and detailed information on the other sources of support,
- Name, address, telephone (including the mobile phone number) and fax numbers, and email address of the corresponding author,
- Acknowledgment of the individuals who contributed to the preparation of the manuscript but who do not fulfill the authorship criteria.

Abstract: English abstract should be submitted with all submissions except for Letters to the Editor. The abstract of Original Articles should be structured with subheadings (Objective, Material and Methods, Results, and Conclusion). Please check Table 1 below for word count specifications.

Keywords: Each submission must be accompanied by a minimum of three to a maximum of six keywords for subject indexing at the end of the abstract. The keywords should be listed in full without abbreviations. The keywords should be selected from the National Library of Medicine, Medical Subject Headings database (https://www.nlm.nih.gov/mesh/MBrowser.html).

Manuscript Types

Original Articles: This is the most important type of article since it provides new information based on original research. The main text of original articles should be structured with Introduction, Material and Methods (with subheadings), Results, Discussion, Conclusion subheadings. Please check Table 1 for the limitations for Original Articles.

Statistical analysis to support conclusions is usually necessary. Statistical analyses must be conducted in accordance with international statistical reporting standards (Altman DG, Gore SM, Gardner MJ, Pocock SJ. Statistical guidelines for contributors to medical journals. Br Med J 1983; 7: 1489-93). Information on statistical analyses should be provided with a separate subheading under the Material and Methods section and the statistical software that was used during the process must be specified.

Units should be prepared in accordance with the International System of Units (SI).

Expert Opinions: Editorial comments aim to provide a brief critical commentary by reviewers with expertise or with high reputation in the topic of the research article published in the journal. Authors are selected and invited by the journal to provide such comments. Abstract, Keywords, Tables, Figures, Images, and other media are not included.

Review Articles: Reviews with high citation potential prepared by authors with extensive knowledge on a particular field and whose scientific background has already been proven by a high number of publications in the related field are welcomed. These authors may even be invited by the journal. Reviews should describe, discuss, and evaluate the current level of knowledge of a topic in clinical practice and should guide future studies. The main text should contain Introduction, Clinical and Research Consequences, and Conclusion sections. Please check Table 1 for the limitations for Review Articles.

Case Reports: There is limited space for case reports in the journal, and reports on rare cases or conditions constituting challenges in diagnosis and treatment, those offering new therapies or revealing insight not included in the literature, and interesting and educative case reports are accepted for publication. The text should include Introduction, Case Presentation, Discussion, and Conclusion subheadings. Please check Table 1 for the limitations for Case Reports.

Surgical Methods: Images of remarkable, striking and rare cases that emphasize the basic mechanisms of diagnosis and treatment of diseases, express discrepancies and extraordinary situations and explain new treatment techniques and options are evaluated for publication. Display items are important in this type of manuscripts, and supporting the manuscript with video (in WMV, AVI or MPEG formats) images can facilitate a faster evaluation process and increase the possibility of publication.

Letters to the Editor: This type of manuscript discusses important parts, overlooked aspects, or lacking parts of a previously published article. Articles on subjects within the scope of the journal that might attract the readers' attention, particularly educative cases, may also be submitted in the form of a "Letter to the Editor." Readers can also present their comments on the published manuscripts in the form of a "Letter to the Editor." Abstract, Keywords, Tables, Figures, Images, and other media should not be included. The text should be unstructured. The article being commented on must be properly cited within this manuscript.

Human Subjects Research

All research involving human participants must have been approved by the authors' Institutional Review Board (IRB) or by equivalent ethics committee(s) and must have been conducted according to the principles expressed in the Declaration of Helsinki. Authors should be able to submit, upon request, a statement from the IRB or ethics committee indicating approval of the research. The Journal reserves the right to reject work believed to have not been conducted in a high ethical standard, even when formal approval has been obtained.

Subjects must have been properly instructed and have indicated that they consent to participate by signing the appropriate informed consent paperwork. Authors may be asked to submit a blank, sample copy of a subject consent form. If consent was verbal instead of written, or if consent could not be obtained, the authors must explain the reason in the manuscript, and the use of verbal consent or the lack of consent must have been approved by the IRB or ethics committee.

Animal Research

All animal research must have approval from the authors' Institutional Animal Care and Use Committee (IACUC) or equivalent ethics committee(s), and the research must have been conducted according to applicable national and international guidelines. Approval must be received prior to beginning the research.

Table 1. Limitations for each manuscript type

Type of manuscript	Word limit	Abstract word limit	Reference limit	Table limit	Figure limit
Original Article	5000	250 (Structured)	50	6	7 or total of 15 images
Review Article	5000	250	50	6	10 or total of 20 images
Case Report	1500	250	15	No tables	10 or total of 20 images
Surgical Methods	500	No abstract	5	No tables	10 or total of 20 images
Letter to the Editor	500	No abstract	5	No tables	No media

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Manuscripts reporting animal research must state in the Methods section: The full name of the relevant ethics committee that approved the work, and the associated permit number(s). Where ethical approval is not required, the manuscript should include a clear statement of this and the reason why. The author should provide any relevant regulations under which the study is exempt from the requirement of approval.

Tables

Tables should be included in the main document, presented after the reference list, and numbered consecutively in the order they are referred to within the main text. A descriptive title must be placed above the tables. Abbreviations used in the tables should be defined below the tables by footnotes (even if they are defined within the main text). Tables should be created using the "insert table" command of the word processing software and they should be arranged clearly to provide easy reading. Data presented in the tables should not be a repetition of the data presented within the main text but should be supporting the main text.

Figures and Figure Legends

Figures, graphics, and photographs should be submitted as separate files (in TIFF or JPEG format) through the submission system. The files should not be embedded in a Word document or the main document. When there are figure subunits, the subunits should not be merged to form a single image. Each subunit should be submitted separately through the submission system. Images should not be labeled (a, b, c, etc.) to indicate figure subunits. Thick and thin arrows, arrowheads, stars, asterisks, and similar marks can be used on the images to support figure legends. Like the rest of the submission, the figures too should be blind. Any information within the images that may indicate an individual or institution should be blinded. The minimum resolution of each submitted figure should be 300 DPI. To prevent delays in the evaluation process, all submitted figures should be clear in resolution and large in size (minimum dimensions: 100 × 100 mm). Figure legends should be listed at the end of the main document.

All acronyms and abbreviations used in the manuscript should be defined at first use, both in the abstract and in the main text. The abbreviation should be provided in parentheses following the definition.

When a drug, product, hardware, or software program is mentioned within the main text, product information, including the name of the product, the producer of the product, and city and the country of the company (including the state if in the USA) should be provided in parentheses in the following format: "Discovery St PET/CT scanner (General Electric, Milwaukee, WI, USA)"

All references, tables, and figures should be referred to within the main text and numbered consecutively in the order they are referred to within the main text.

Limitations, drawbacks, and the shortcomings of original articles should be mentioned in the Discussion section before the conclusion paragraph.

References

While citing publications, preference should be given to the latest, most up-to-date publications. If an ahead-of-print publication is cited, the DOI number should be provided. Authors are responsible for the accuracy of references. Only references cited in the text should be included in the reference list. The reference list must be numbered according to the order of mention of the references in the text. In the main text of the manuscript, references should be cited using Arabic numbers in parentheses. Journal titles should be abbreviated in accordance with the journal abbreviations in Index Medicus/MEDLINE/PubMed. When there are six or fewer authors, all authors should be listed. If there are seven or more authors, the first six authors should be listed followed by "et al." The reference styles for different types of publications are presented in the following examples.

Journal Article: Rankovic A, Rancic N, Jovanovic M, Ivanović M, Gajović O, Lazić Z, et al. Impact of imaging diagnostics on the budget - Are we spending too much? Vojnosanit Pregl 2013; 70: 709-11.

Book Section: Suh KN, Keystone JS. Malaria and babesiosis. Gorbach SL, Barlett JG, Blacklow NR, editors. Infectious Diseases. Philadelphia: Lippincott Williams; 2004. pp. 2290-308.

Books with a Single Author: Sweetman SC. Martindale the Complete Drug Reference. 34th ed. London: Pharmaceutical Press; 2005.

Editor(s) as Author: Huizing EH, de Groot JAM, editors. Functional reconstructive nasal surgery. Stuttgart-New York: Thieme; 2003.

Conference Proceedings: Bengisson S. Sothemin BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sept 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992. pp. 1561-5.

Scientific or Technical Report: Cusick M, Chew EY, Hoogwerf B, Agrón E, Wu L, Lindley A, et al. Early Treatment Diabetic Retinopathy Study Research Group. Risk factors for renal replacement therapy in the Early Treatment Diabetic Retinopathy Study (ETDRS), Early Treatment Diabetic Retinopathy Study Kidney Int: 2004. Report No: 26.

Thesis: Yılmaz B. Ankara Üniversitesindeki Öğrencilerin Beslenme Durumları, Fiziksel Aktiviteleri ve Beden Kitle İndeksleri Kan Lipidleri Arasındaki Ilişkiler. H.Ü. Sağlık Bilimleri Enstitüsü, Doktora Tezi. 2007.

Manuscripts Accepted for Publication, Not Published Yet: Slots J. The microflora of black stain on human primary teeth. Scand J Dent Res. 1974.

Epub Ahead of Print Articles: Cai L, Yeh BM, Westphalen AC, Roberts JP, Wang ZJ. Adult living donor liver imaging. Diagn Interv Radiol 2016 Feb 24. doi: 10.5152/dir.2016.15323. [Epub ahead of print].

Manuscripts Published in Electronic Format: Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis (serial online) 1995 Jan-Mar (cited 1996 June 5): 1(1): (24 screens). Available from: URL: http:/ www.cdc.gov/ncidodlEID/cid.htm.

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When submitting a revised version of a paper, the author must submit a detailed "Response to the reviewers" that states point by point how each issue raised by the reviewers has been covered and where it can be found (each reviewer's comment, followed by the author's reply and line numbers where the changes have been made) as well as an annotated copy of the main document. Revised manuscripts must be submitted within 30 days from the date of the decision letter. If the revised version of the manuscript is not submitted within the allocated time, the revision option may be canceled. If the submitting author(s) believe that additional time is required, they should request this extension before the initial 30-day period is over.

Accepted manuscripts are copy-edited for grammar, punctuation, and format. Once the publication process of a manuscript is completed, it is published online on the journal's webpage as an ahead-of-print publication before it is included in its scheduled issue. A PDF proof of the accepted manuscript is sent to the corresponding author and their publication approval is requested within 2 days of their receipt of the proof.

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FROM THE EDITOR'S DESK
Turk J Surg 2021; 37 (4): IX-X
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Medical Research and Publishing During The Pandemic: Uncertainty and Responsibility

Dear Colleagues,

The last issues of medical journals are always a good opportunity for the editors to take a look at what happened in this particular year. Therewith, the editors can make a balance sheet between the achievements and failures of their journal. These re-considerations bring to the editorial team the feedback to improve the journal in any terms.

I am sure that many editors of medical journals have a lot to discuss for the year 2020. Just like the previous one, 2020 was also a turbulent year for healthcare providers, researchers as well as medical publishers. In this short editorial, I would try to make a summary of direct as well as secondary impacts of the pandemic on medical publishing.

The COVID-19 pandemic is undoubtedly the biggest global health threat that our generation has witnessed. As of November 2021, there have been over 250 million cases worldwide with over 5 million deaths (1). Despite all of our tremendous achievements in medicine, this virus continues to be a lethal threat for all humanity. As a result, there have been important consequences on medical publishing.

Firstly, the COVID-19 pandemic has deeply affected the execution of medical research. During unpredictable conditions of the pandemic, there was no easy way to design a study, especially prospective ones. Researchers, who tried to set up a study method, could not foresee what would happen during the study period. A new wave of the pandemic would eventually change all critical factors such as manpower, institution resources, patient admissions, and etc. Even though we do not have solid data, there was a declining tendency for submissions of prospective studies. Medical journals are stages of scientific research, and the quality of the journal is closely related with the quality of the papers being published. The unpredictable nature of a global pandemic has undoubtedly affected this point, which defines the "uncertainty" side of the pandemic in terms of research. I do hope that the readers consider it when they assess the current tough situation of the medical journals. One must not forget that the quality of the journals is strongly related to the submissions they receive.

On the other hand, we should remember the responsibility of the researchers and the editors. Since the beginning of the pandemic, there has been a clear trend to conduct research regarding COVID-19, which is quite comprehensible. The rapid onset of the pandemic has led the scientists to perform studies in this field. There has also been a tendency to shift in providing grants to research on COVID-19, especially in the rich countries of the world (2). This significant scientific action is not comparable with other examples in the past, which actually did not affect the richest parts of the world. For instance, there were only 42 papers on Ebola from the Authors with Guinean affiliation in the 2 years following the outbreak (3). This number was 312 for Brazil during the Zika outbreak.

However, we can only name our experience in the COVID-19 pandemic a "rainfall of publications". If you had typed "COVID-19" on the search engine of PubMed as of the beginning of November 2021, you would have seen about 198.650 results. This huge number is a perfect demonstration of the mass production of COVID-19 papers. For one thing, it is good to retrieve diverse important information for physicians, and for the other, it is confusing for them in taking urgent decisions in their daily works.

Turkish Journal of Surgery has also received a significant number of submissions regarding the COVID pandemic for the last two years. This increase of submissions seems to be a global fact. Ball and Harvey have reported their experience in the Canadian Journal of Surgery during the pandemic (2). They have observed a prompt shift towards COVID-19, in regards to submission topics. Due to the exceptional feature of the pandemic, they have facilitated the reviewing process for the submissions about this new global threat. Therefore, in the Turkish Journal of Surgery, we did the same thing too, and opened our pages to some prominent studies or guidelines about COVID-19. Of course, the rules and limits of a single scientific journal do not allow to publish all of the submissions. It is just impossible. On the other hand, the editors also have the responsibility to take part in the fight against infodemic and misinformation, which is nowadays extremely common. The power of misinformation through social media should not be underestimated. This is not only confusing but also dangerous. As it was emphasized in the joint statement of prominent global institutions in September 2020, "misinformation costs lives" (4). Scientific journals should support - on their turn – to spread true information. We consider it our mission.

Anyway, a year is over again. Let's hope for a better and healthful new year.

On behalf of the editorial team and the Journal's staff, we wish you a happy new year 2022!

Kindest regards,

Kaya SARIBEYOĞLU

Editor-in-Chief
Turkish Journal of Surgery

REFERENCES

1. *WORLDOMETERS. Available from: https://www.worldometers.info/coronavirus.*
2. *Ball CG, Harvey EJ. Medical research during a pandemic. Can J Surg 2020; 63(3): E313.*
3. *Kilmarx PH, Glass RI. Building global health research capacity to address research imperatives following the COVID-19 pandemic. PLoS Med 2021; 18(8): e1003753.*
4. *WHO, UN, UNICEF, UNDP, UNESCO, UNAIDS, ITU, UN Global Pulse, and IFRC. Managing the COVID-19 infodemic: Promoting healthy behaviours and mitigating the harm from misinformation and disinformation. Geneva: World Health Organization; 2020. Available from: https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation.*

ORIGINAL ARTICLE
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The comparison of short-term results of marsupialization method in operated patients with acute pilonidal abscess and chronic pilonidal sinus

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ABSTRACT

Objective: This study aimed to compare the short term results of the marsupialization method for the treatment of patients with acute pilonidal abscess and chronic pilonidal sinus disease treated in single step and to investigate the feasibility of final pilonidal sinus treatment in single step in patients with pilonidal abscess.

Material and Methods: A total of 58 patients who were operated on using the marsupialization method were included in this study. Patients with acute pilonidal abscess were included in Group 1 (23 patients) and those with chronic pilonidal sinus disease were included in Group 2 (35 patients). Pilonidal sinus was excised as a whole by a vertical elliptic incision, with some surrounding intact tissue. After excision, the wound edges were sutured to the postsacral fascia. Daily dressings were performed by relatives at home. The patients were instructed to visit the hospital for follow-up 1-2 times a week. Student's t-test was used to compare the parameters between the groups.

Results: The mean wound length was 73.4 and 61.7 mm in Group 1 and Group 2, respectively. The mean duration of wound closure was 59.3 and 54.1 days in Group 1 and Group 2, respectively. There was no significant difference between the groups in terms of age, operation time, hospital stay, and duration of wound closure; however, wound length was significantly shorter in Group 2 than in Group 1.

Conclusion: The definitive treatment of acute pilonidal abscess can be achieved in single step by using marsupialization method as well as in patients with chronic pilonidal disease.

Keywords: Pilonidal sinus, pilonidal abscess, marsupialization

INTRODUCTION

Pilonidal sinus is a chronic disease seen mostly in the sacral region of young men and manifests with pits and discharges. Pilonidal sinus disease can be acute or chronic. Patients with chronic disease complain of swelling and discharge in the sacral region, whereas those with acute disease exhibit infection and/or abscess. In the conventional treatment of acute pilonidal abscess, the abscess is drained first, and then the disease is treated with a definitive surgery within 1-2 months after drainage of the abscess (1). However, after simple drainage, chronic pilonidal disease develops in 16-92.5% of the patients and requires surgical treatment (1-3).

For treating acute pilonidal abscess, initial drainage of the abscess and the subsequent definitive surgery are two separate procedures, resulting in loss of time and labor as well as an increase in costs. The tendency to perform less invasive and less aggressive methods in the treatment of pilonidal disease is increasing (4,5). Therefore, in patients with abscesses, combining both the treatment of acute disease and the concomitant definitive treatment may save time, cost, and labor.

A previous retrospective study has found that drainage and marsupialization can be used to successfully treat pilonidal abscess (6-9); however, further studies on this topic that will change the surgeons' approach toward the treatment of the disease may be needed. In the present study, we compared the short-term results of patients with acute pilonidal abscess and chronic pilonidal sinus disease treated with the marsupialization method in a single session and investigated the feasibility of definitive pilonidal sinus treatment in a single session in patients with pilonidal abscess.

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MATERIAL and METHODS

A total of 58 patients who underwent marsupialization at our hospital were included in this prospective study. Patients with acute pilonidal abscess were included in Group 1 (23 patients) and those with chronic pilonidal sinus disease were included in Group 2 (35 patients). Patients' age, operation time, hospital stay, wound length, and healing time were recorded. The results of the two groups were compared postoperatively.

Patient Selection

Patients treated for chronic pilonidal sinus and acute pilonidal abscess with the excision and marsupialization method were included in this study. Ethics committee approval was obtained for the study. Patients were informed about the surgical method as well as postoperative care, and their written consent was obtained for the study. Whether the disease was primary or recurrent was not an inclusion criterion for the study. Patients treated with methods other than marsupialization and patients who discontinued follow-up without completing the healing period were excluded from the study.

Surgical Method

Patients underwent surgery under general anesthesia. Patients with abscesses were administered antibiotics (single-dose intravenous Cefazolin 1g) 30 min preoperatively, whereas no antibiotics were administered to patients with chronic pilonidal sinus. Patients were laid on the operating table in prone position, and the hips were not stretched with a plaster to allow minimal tissue excision (Figure 1). Pilonidal sinus was excised as a whole by a vertical elliptic incision, while keeping some surrounding tissue intact. In patients with abscesses, excision was performed without a separate abscess drainage (Figure 2). After excision, hemostasis was performed, wound edges were sutured to the postsacral fascia with Prolene suture, and wound defect was minimized (Figure 3). Bupivacaine (Injection Marcaine 0.5%

Figure 1. The appearance of pilonidal abscess in the prone position without stretching the buttocks.

Figure 2. The appearance of the wound after excision.

Figure 3. The appearance of the wound after marsupialization is complete.

Table 1. Comparison of results of the patient groups

	Group 1 (n: 23)	Group 2 (n: 35)	p
Age (year)	28.5 (18-41)	26.8 (14-47)	0.184
Operation time (min.)	26.7 (10-45)	25.5 (15-40)	0.284
Wound length (mm)	73.4 (45-100)	61.7 (10-110)	0.029
Period of hospital stay (hour)	22.2 (8-24)	21.6 (4-72)	0.395
Period of wound closure (day)	59.3 (28-123)	54.1 (20-140)	0.230
(The values are mean with minimum and maximum)			

solution; AstraZeneca, Türkiye İlaç Sanayi ve Ticaret Ltd. Şti.) was applied to the wound edges. At the end of the procedure, the length of the wound was measured and recorded; and as the hips were not fixed, the width of the wound was not considered a criterion. Excised tissues were sent for pathological examination. Antibiotic therapy was not administered after surgery.

In the marsupialization method described in previous studies, the anterior wall of the pilonidal cyst is excised with the skin, the inside of the cyst is cleansed, and the posterior wall is sutured to the skin (7,10). In our method, the pilonidal cyst was completely excised without leaving any walls, and the skin was sutured to the postsacral fascia.

Patient Follow-Up

Patients were discharged the day after surgery, and daily dressings were applied by relatives at home. The patients were instructed to visit the hospital for follow-up 1-2 times a week. They returned to work after 7-10 days of rest. During the rest period, only sitting restriction was instructed; there were no restrictions on toilet and bathroom use as well as on walking and sleeping. Early wound dehiscence occurred in three patients in each group (13% in Group 1 and 8.5% in Group 2) after wound epithelialization. These wounds also healed with redressing; the period after second dressing was added to the healing time of the patients. Sutures were removed between days 12-15. Dressings were continued until the wound was completely healed. The healing time was determined as the number of days after surgery until the wound was completely healed, there was no need for dressing, and epithelialization was completed. The complications observed and wound healing problems were recorded.

Patients were prescribed analgesics during the postoperative period as needed. When discharged, they were given oral painkillers and topical painkillers for use in dressing.

Long term patient follow-up was not performed after wound healing since it was beyond the aim of this study.

Statistical Analysis

Student's t-test was used to compare the parameters between the groups. P-value of <0.05 was considered significant.

RESULTS

A total of 58 patients (23 in Group 1 and 35 in Group 2) were included in the study. All patients were male, except for one female patient in Group 1. Mean age was 28.5 and 26.8 years in Group 1 and Group 2, respectively (p= 0.184). Mean operation time was 26.7 and 25.5 min in Group 1 and Group 2, respectively (p= 0.284). Mean wound length was 73.4 and 61.7 mm in Group 1 and Group 2, respectively (p= 0.029). Mean period of hospital stay was 22.2 and 21.6 h in Group 1 and Group 2, respectively (p= 0.395). Mean duration of wound closure was 59.3 and 54.1 days in Group 1 and Group 2, respectively (p= 0.230).

All patients were followed-up until their wounds had completely healed. During this period, no patient developed chronic pilonidal sinus disease. In a patient in Group 1, allergic dermatitis developed on the skin, and the patient was treated in consultation with a dermatologist. Wound dehiscence occurred in three patients in each group following initial closure, daily dressing was re-applied to these patients, and the wounds were healed.

There was no statistically significant difference between the groups in terms of age, operation time, duration of hospital stay, and duration of wound closure; however, wound length was significantly shorter in Group 2 than in Group 1 (p= 0.029) (Table 1).

DISCUSSION

Although pilonidal sinus disease is often considered a chronic disease with discharge, 30% of the patients may be hospitalized for acute disease with inflammation and/or abscess. Methods of surgical treatment for chronic disease are numerous, and there is enough time for these to be performed. However, in case of acute disease, treatment options are fewer, and treatment should be immediately provided.

Different methods of treatment have been utilized for acute pilonidal abscess: incision and drainage, aspiration, unroofing-curettage, drainage and negative pressure wound therapy, and partial primary closure (11-16).

Acute pilonidal abscess can be treated sufficiently with incision and drainage. Moreover, it can be performed even in office settings under local anesthesia. Patients' complaints are resolved

in a short time, and they recover. However, previous studies have reported that the incision and drainage process results in relapse or development of chronic disease in 21%-70% of cases (11,16-20). Moreover, recurrence rates increase with the increase in follow-up period (21).

After pilonidal sinus excision, leaving the wound to secondary recovery results in a longer healing period than using wound closure methods; however, recurrence rates are lower (22,23). The marsupialization method has a short operation time, shorter return-to-work time, lesser pain, fewer complications, and lower recurrence rates (6,24,25); however, the recovery period is longer than other closure methods (26). In a Cochrane review, recurrence rates have been found lower in surgeries that were left open than in other closure methods (27). During the follow-up period in our study, recurrence or transformation into chronic disease was not observed in any of the patients.

In a study in which the marsupialization method was performed for pilonidal abscesses, it has been reported that 95% of the patients showed improvement in 3-10 weeks, 52% developed chronic disease, and 15% had recurrence during follow-up (7,8). In another study, the results of early surgery (unroofing-curettage) and elective surgery (Karydakis flap technique) of pilonidal abscesses have been compared, and healing time has been found shorter in the Karydakis group (28). In a study in which pilonidal abscesses were included, it has been reported that healing time was 32 days in the group that underwent only incision-drainage and secondary recovery, whereas it was 10 days in the group that underwent delayed excision and primary closure after incision and drainage (29). In our study, wound healing period was 59.3 days in Group 1 and 54.1 days in Group 2, and there was no difference between the groups. This healing period is consistent with the period determined in other studies. However, with close follow-up of patients and meticulous dressing, wound healing can be quickly achieved.

The most significant disadvantage of secondary recovery is delayed return to daily life. However, this is the case in all surgical methods requiring incision. Moreover, this period is limited to 7-10 days, after which all daily activities can be performed even if the dressings are continued.

In the case of infected pilonidal sinus disease, some surgeons prefer treating the infection and draining the abscess first, followed by definitive surgery. This is because treating the infection first provides a favorable environment for primary closure or flap surgeries. However, performing a single-session surgery using the marsupialization method can save time and cost. In a previous study on this topic, the disease was successfully treated in 81% of the patients (8).

In patients with pilonidal abscess, there may be concerns that the excision area will be larger than necessary, and therefore, wound healing period will be longer. According to our results, wound length was longer in patients with pilonidal abscesses (Group 1) when the marsupialization method was used; however, there was no difference between the durations of wound closure.

Drainage followed by definitive surgery on pilonidal sinus abscess is an accepted method. However, during this waiting period, some patients may experience recurrence of the abscess or develop chronic disease. To avoid these complications and reduce costs and labor loss, surgery can be performed in one session.

CONCLUSION

Marsupialization method can be used safely and effectively in patients with pilonidal abscess as well as in patients with chronic pilonidal disease. However, wound length is slightly shorter in patients with chronic pilonidal.

In patients with pilonidal abscesses, the definitive treatment of the disease can be achieved in one step. Acute pilonidal abscess can be treated using the marsupialization method without causing a larger wound and without a longer healing period.

(The values are mean with minimum and maximum).

Ethics Committee Approval: This study approval was obtained from Fatih University Faculty of Medicine Hospital Ethical Evaulation Committee (Decision No: 207, Date: 05.08.2014).

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REFERENCES

1. *Yıldırım D, Sunamak O, Pergel A, Mounla M. Combined single step definitive treatment in acute pilonidal sinus abscess running head: single step treatment of pilonidal abscess. Surgical Science 2010; 1: 24-6.*
2. *Abramson DJ. Simple marsupialization technic for treatment of pilonidal sinus: long-term follow up. Ann Surg 1960; 151(2): 261-7.*
3. *Watters N, Macdonald IB. Marsupialization of pilonidal sinus and abscess: a report of 50 cases. Can Med Assoc J 1958; 79(4): 236-40.*
4. *Vahedian J, Nabavizadeh F, Nakhaee N, Vahedian M, Sadeghpour A. Comparison between drainage and curettage in the treatment of acute pilonidal abscess. Saudi Med J 2005; 26(4): 553-5.*
5. *Lasithiotakis K, Aghahoseini A, Volanaki D, Peter M, Alexander D. Aspiration for acute pilonidal abscess-a cohort study. J Surg Res 2018; 223: 123-7.*
6. *Khalil PN, Brand D, Siebeck M, Hallfeldt K, Mutschler W, Kanz KG. Aspiration and injection-based technique for incision and drainage of a sacrococcygeal pilonidal abscess. Emerg Med 2009; 36(1): 60-3.*

7. *Kepenekci I, Demirkan A, Celasin H, Gecim IE. Unroofing and curettage for the treatment of acute and chronic pilonidal disease. World J Surg 2010; 34(1): 153-7.*
8. *Kanat BH, Girgin M, İlhan YS, Aksu A. Effects of the Nanova™ therapy system in unroofing-curettage and secondary intention healing of pilonidal abscesses. Turk J Colorectal Dis 2017; 27(3): 89-93.*
9. *Lasheen A, Safwat K, Morsy M, Fiad A, Elmoregy A. Excision and partial primary closure of wound for pilonidal disease. Surgical Science 2012; 3: 366-70.*
10. *Jensen SL, Harling H. Prognosis after simple incision and drainage for a first-episode acute pilonidal abscess. Br J Surg 1988; 75(1): 60-1.*
11. *Eryilmaz R, Sahin M, Alimoglu O, Kaya B. The comparison of incision and drainage with skin excision and curettage in the treatment of acute pilonidal abscess. Ulus Travma Derg 2003; 9(2): 120-3.*
12. *Matter I, Kunin J, Schein M, Eldar S. Total excision versus non-resectional methods in the treatment of acute and chronic pilonidal disease. Br J Surg 1995; 82(6): 752-3.*
13. *Allen-Mersh TG. Pilonidal sinus: finding the right track for treatment. Br J Surg 1990; 77(2): 123-32.*
14. *Stauffer VK, Luedi MM, Kauf P, Schmid M, Diekmann M, Wieferich K, et al. Common surgical procedures in pilonidal sinus disease: a meta-analysis, merged data analysis, and comprehensive study on recurrence. Sci Rep 2018; 8(1): 3058.*
15. *Sahsamanis G, Samaras S, Mitsopoulos G, Deverakis T, Dimitrakopoulos G, Pinialidis D. Semi-closed surgical technique for treatment of pilonidal sinus disease. Ann Med Surg 2017; 15: 47-51.*
16. *Brasel KJ, Gottesman L, Vasilevsky CA. Members of the evidence-based reviews in surgery group. Meta-analysis comparing healing by primary closure and open healing after surgery for pilonidal sinus. J Am Coll Surg 2010; 211(3): 431-4.*
17. *Burney RE. Treatment of pilonidal disease by minimal surgical excision under local anesthesia with healing by secondary intention: Results in over 500 patients. Surgery 2018; 164(6): 1217-22.*
18. *Karakayali F, Karagulle E, Karabulut Z, Oksuz E, Moray G, Haberal M. Unroofing and marsupialization vs. rhomboid excision and limberg flap in pilonidal disease: a prospective, randomized, clinical trial. Dis Colon Rectum 2009; 52(3): 496-502.*
19. *Gencosmanoglu R, Inceoglu R. Modified lay-open (incision, curettage, partial lateral wall excision and marsupialization) versus total excision with primary closure in the treatment of chronic sacrococcygeal pilonidal sinus: a prospective, randomized clinical trial with a complete two-year follow-up. Int J Colorectal Dis 2005; 20(5): 415-22.*
20. *Al-Khamis A, McCallum I, King PM, Bruce J. Healing by primary versus secondary intention after surgical treatment for pilonidal sinus. Cochrane Database Syst Rev 2010; 20(1): CD006213.*
21. *Licheri S, Pisano G, Erdas E, Farci S, Pomata M, Daniele GM. Radical treatment of acute pilonidal abscess by marsupialization. G Chir 2004; 25(11-12): 414-6.*
22. *Kanat BH, Bozan MB, Yazar FM, Yur M, Erol F, Özkan Z, et al. Comparison of early surgery (unroofing-curettage) and elective surgery (Karydakis flap technique) in pilonidal sinus abscess cases. Ulus Travma Acil Cerrahi Derg 2014; 20(5): 366-70.*
23. *Sakr MF, Ramadan MA, Hamed HM, Kantoush HE. Secondary healing versus delayed excision and direct closure after incision and drainage of acute pilonidal abscess: a controlled randomized trial. Arch Clin Exp Surg 2012; 1(1): 8-13.*
24. *Goodall P. The etiology and treatment of pilonidal sinus: a review of 163 patients. Br J Surg 1961; 49: 212-8.*
25. *Musella M, Milone M, De Palma GD, Milone F, Sosa Fernandez LM. Minimally invasive pilonidal sinus treatment: a narrative review. Open Med (Wars) 2019; 14: 532-6.*
26. *Gökbuget ZM, Özcan R, Karagöz A, Tütüncü AÇ, Topuzlu Tekant G. Endoscopic pilonidal sinus treatment (EPSiT) in the pediatric age group: Short-term results. Ulus Travma Acil Cerrahi Derg 2021; 27(4): 443-8.*
27. *Matter I, Kunin J, Schein M, et al. Total excision versus non-resectional methods in the treatment of acute and chronic pilonidal disease. Br J Surg 1995; 82(6): 752-3.*
28. *Surrell JA. Pilonidal disease. Surg Clin North Am 1994; 74(6): 1309-15.*
29. *Cavanagh CR, Schnug GE, Girvin GW, McGonigle DJ. Definitive marsupialization of the acute pilonidal abscess. Am Surg 1970; 36(10): 650-1.*

ORİJİNAL ÇALIŞMA-ÖZET
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Ameliyat edilen akut pilonidal apse ve kronik pilonidal sinüs hastalarında marsupiyelizasyon yönteminin erken dönem sonuçlarının karşılaştırılması

Alaattin Öztürk

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ÖZET

Giriş ve Amaç: Marsupiyelizasyon yöntemi ile tek seansta tedavi edilen, akut pilonidal apse ile kronik pilonidal sinüs hastalığı olan hastalarda yöntemin erken dönem sonuçlarını karşılaştırmayı ve pilonidal apsesi olan hastaların tek seansta nihai pilonidal sinüs tedavisinin yapılabilirliğini araştırmayı amaçladık.

Gereç ve Yöntem: Marsupiyelizasyon yöntemi ile ameliyat edilen 58 hasta bu çalışmaya alındı. Akut pilonidal apsesi olan hastalar Grup 1 (23 hasta), kronik pilonidal sinüs hastalığı olanlar Grup 2 (35 hasta) şeklinde ayrıldı. Pilonidal sinüs, vertikal eliptik insizyonla, bir miktar sağlam doku ile bir bütün olarak eksize edildi. Eksizyondan sonra yara kenarları postsakral fasyaya dikildi. Günlük pansumanlarını genellikle evde bir yakını yaptı. Haftada 1-2 kez hastaneye kontrole çağrıldılar. Her iki grup arasında parametrelerin karşılaştırılması için Student T testi kullanıldı.

Bulgular: Yaranın ortalama boyu Grup 1'de 73.4 mm, Grup 2'de 61.7 mm idi (p= 0,029). Yaranın ortalama kapanma süresi Grup 1 hastalarında 59.3 gün, Grup 2 hastalarında 54.1 gün idi (p= 0,230). Gruplar karşılaştırıldığında, yaş, ameliyat süresi, hastanede kalış süresi ve yaranın kapanma süreleri arasında istatistiksel olarak fark bulunmadı; yara boyu Grup 2 hastalarında istatistiksel olarak anlamlı olarak daha kısa bulundu (p= 0,029).

Sonuç: Kronik pilonidal sinüs ameliyatında olduğu gibi akut pilonidal apseli hastalarda da marsupiyelizasyon yöntemi ile tek seansta hastalığın nihai tedavisi yapılabilir.

Anahtar Kelimeler: Pilonidal sinus, pilonidal apse, marsupiyelizasyon

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ORIGINAL ARTICLE
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Pediatric renal transplantation; 10 years experience

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ABSTRACT

Objective: Although renal transplantation (RT) is the first treatment option for children with end-stage renal failure, the number of transplanted children remains low compared to adults. Experience of the individual pediatric transplant center is very important in the prognosis of pediatric transplant recipients. In this study, our pediatric RT experience was presented.

Material and Methods: We retrospectively analyzed the data of 27 patients who had RT in our clinic between April 2009 and April 2019.

Results: Fifteen of the patients were males, and mean age of all patients was 12.36 ± 4.18 years (range 4-17 years). The most frequent etiology for end-stage renal disease (ESRD) was vesicourethral reflux. Eighteen (66.7%) of the transplanted kidneys came from cadaveric donors and 9 (33.3%) from live donors. One patient had preemptive RT and one patient had a re-RT. Twenty-two patients were on peritoneal dialysis program and four patients were on hemodialysis program. Mean dialysis time before transplantation was 29 (3-104) months. Bleeding was the most common surgical complication. Delayed graft function developed in four patients, and all of their grafts were from cadaveric donors. Rejection developed in 12 of our patients, graft loss was observed in only four of them. Considering all patients, graft survival rates were 100% in the 1st and 3rd years, and 92% in the 5th year.

Conclusion: Pediatric RT program is difficult to establish, maintain and develop. Complications after transplantation are not uncommon; therefore, early detection and appropriate management are needed. Strategies are still needed to increase post-transplant success.

Keywords: Pediatric, end-stage renal disease, renal transplantation

INTRODUCTION

Chronic kidney disease (CKD) refers to a condition associated with irreversible kidney damage that can progress to end-stage renal failure (ESRD). Although it is relatively rare in children, it can be regarded as an independent clinical condition in part due to its distinct features. Today, progression to ESRD can result in cardiovascular and developmental problems, which can be devastating and can even lead to mortality. Each year, approximately 5-10 children per million in the age-related population are initiated on renal replacement therapy (RRT), and mortality in children with ESRD may be 30 times higher than in the healthy age-related population (1,2). As in the adult age group, the permanent treatment of ESRD in the pediatric group is kidney transplantation. Significant developments have been made in this area recently. The availability of better immunosuppressant drugs, advances in perioperative care and infection management are the main reasons for increased success (3,4). In addition, the frequency of complications such as delayed graft function (DGF), acute rejection (AR) and postoperative infection rates have decreased in the last 20 years (5). Long-term results of pediatric renal transplantation (RT) have been an important problem requiring adequate treatment and follow-up for years (6-9). An important question posed by clinicians is how pediatric transplant recipients will be managed in the long term once they reach adulthood. The answer is not clear yet, and data on the long-term outcomes of pediatric RT are still limited. The aim of this study was to share our 10-year pediatric renal transplant results.

MATERIAL and METHODS

Study Design

In the retrospective analysis of pediatric RT patients followed in our center between April 2009 and April 2019, follow-up data were collected until April 2021. Demographic features (number of patients, gender, age of recipient at transplantation), clinical

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data (end-stage renal failure etiology, previous RRT type, donor type, length of hospital stay, follow-up time after RT, lowest creatinine values, graft loss and death) and complications (perioperative and postoperative surgical complications) were analyzed.

Definitions

DGF was defined as the need for dialysis in the first week after transplantation. The cases considered as rejection were included in the analysis. Graft loss was defined as permanent conversion to dialysis.

Statistical Analysis

A descriptive statistical analysis was performed. Categorical variables were presented as frequency and percentage. All statistical analyzes were performed using SPSS software version 22 for Windows (SPSS Inc., Chicago, IL, USA). Approval was obtained from the ethics committee of our center for this retrospective study.

RESULTS

In our center, RT was performed in 27 pediatric patients in the last 10 years. Cadaveric donor RT was performed in 18 of 27 patients. Basic demographic data and clinical characteristics of the patients are given in Table 1. Mean age at the time of transplantation was 12.36 ± 4.18.

ESRD etiologies are shown in Table 2. The most common reason of ESRD was vesicourethral reflux. Twenty-two patients were on peritoneal dialysis (PD) and four patients were on hemodialysis (HD) program. Mean dialysis time was 29 (3-104) months. A patient who developed ESRD due to Alport Syndrome underwent preemptive transplantation.

Table 1. Pre-transplant patient characteristics

Female/Male	12/15
Transplantation age	12,4 (2-17)
Hemodialysis (HD) Peritoneum dialysis (PD) Preemptive transplantation	4 22 1
Mean HD/PD time (month)	36.3
Living donor Deceased donor	9 18

Table 2. CKD etiology of transplanted children (Number of patients)

Vesicoureteral reflux	8
Unknown etiology	5
Polycystic kidney disease	3
Cystinosis	2
Urological disorders	2
MPGN Type 2 FSGS	1 1
Alport Syndrome	1
Nephronophthisis	1
Hypertension	1
Distal renal tubular acidosis	1

One of our patients had a RT in another center four years ago due to polycystic kidney disease, and a RT was performed again in our clinic after graft loss.

Perioperative surgical complication was seen in one patient, and a re-anastomosis was performed after thrombosis developed following arterial anastomosis. Five patients needed surgery again due to bleeding during hospitalization. Three of these patients were operated in the first 24 hours postoperatively. Only one of the bleeding was from vascular anastomosis, and four patients had leakage from the operation area. In one of our patients, venous drainage problem developed due to vascular torsion in the transplanted kidney, and no additional intervention was required after de-torsion.

DGF was seen in four patients, all of them were cadaveric transplants. At the same time, three of the patients with DGF needed reoperation in the first 24 hours due to bleeding.

Median length of hospital stay was 7 (4-21) days. One of our patients, who underwent reoperation due to bleeding and developed a lymphocele, was hospitalized for 21 days. Mean follow-up period of the recipients was 66.07 ± 37.97 months, 12 patients had rejection and five patients had graft loss. While the reason of graft loss was chronic rejection in 4 of the patients, one patient returned to dialysis due to focal segmental glomerulosclerosis (FSGS) recurrence. Protocol biopsy was not performed in any of our patients during clinical follow-up, our diagnoses were supported by biopsy in patients who were considered rejection and were unresponsive to treatment. Of those who experienced loss of graft due to rejection, three were living donors. Considering all patients, graft survival rates were 100% in the 1st and 3rd year and 92% in the 5th year.

During follow-up, five patients needed reoperation. The most common indication for reoperation was transplanted kidney ureter pathologies. In four of these patients, the cause of ESRD was VUR. Three patients had ureteral stricture, and two patients had reflux into the transplanted ureter. In patients with stenosis, ureteroneocystostomy was performed as a surgical treatment, and graft loss occurred in two of these three patients in the long term.

DISCUSSION

RT is the most effective treatment for children with ESRD (10). All over the world, there is a prominent increase not only in frequency but also in success in pediatric RT in parallel with the advances in immunosuppression and surgical techniques. The most important causes of ESRD in the pediatric group are chronic pyelonephritis and vesicoureteral reflux (VUR). Other common causes are chronic glomerulonephritis and FSGS (11).

The effect of etiology on graft survival has been reported in some studies (12), but not in others (13). The pathology that causes ESRD and the risk of recurrence may have significant effects on the need for additional urological intervention and donor selection. Although hemodialysis seems to be a more common treatment method before RT, the number of PD patients in our center is increasing in parallel with the advances in PD programs. Although PD is more physiological than HD, its use depends on many external factors. Various factors related to parental willingness, insufficient asepsis conditions in home environments, lack of necessary materials and solutions, limit the practice of PD. PD is associated with a lower risk of DGF and cardiovascular mortality in adult transplant recipients, but with a higher risk of infectious complications (14) and increased graft loss due to vascular thrombosis (15). Preemptive RT is considered the most suitable choice for adult and pediatric patients with ESRD. In this study, 3% of our patients had not undergone dialysis before RT. Amaral et al. have reported better results in terms of graft and patient survival in children with preemptive transplants compared to children exposed to dialysis. To reach RT earlier, appropriate patients, educated parents and timely hospital admission are required (16). Different dialysis time intervals before transplantation have been reported in the literature. Haberal et al. have reported 7.6 months and Mir et al. 22 months (11). This period was 29 months in our series. Although pediatric RT has generally been reported to be limited to older children in developing countries, the youngest child transplanted in our cohort was four years old. Other 26 patients were over five years of age. The pediatric RT center, located in a pediatric hospital with multidisciplinary facilities, is especially necessary for younger patients. (even to infants weighing <5 kg or <6 months) (17).

Living donor transplants, having fewer technical failures than cadaveric donor transplants, are also associated with longer term graft survival. Early graft function was excellent in most of our patients (85.1%). While DGF was observed in four patients, the primary nonfunctioning graft did not occur. It has been clearly reported that both the cadaveric donor and the pediatric population have a significant effect on the incidence of DGF (18). Fortunately, only one of our patients with DGF experienced graft loss.

Surgical complications, acute or chronic rejections and post-transplant infections are the main causes of mortality and morbidity. Vascular thrombosis and stenosis in the transplant renal artery have been well known in pediatrics since the emergence of RT. In our series, one patient developed perioperative renal artery thrombosis. After the diagnosis was made by Doppler ultrasonography, re-anastomosis was performed. The patient who did not develop DGF was discharged on the postoperative 15th day. Another patient was re-operated upon the detection of a venous drainage problem causing DGF, and torsion was observed in the transplanted kidney. Since the arterial and venous flow was uneventful after detorsion, no additional vascular intervention was performed. There was no graft loss due to vascular complications in either recipient. Our vascular complication rate (7.4%) is lower than that reported by Gargah et al. as 8.5% (19).

Acute and chronic rejection has been reported to be associated with decreased graft survival rates (20). Many studies have reported AR rates between 15% and 39% (21). In our series, 12 patients developed rejection, and graft loss occurred in four of these patients. One of the patients with graft loss was with a cadaveric donor. Five-year graft survival rate was 83%, the average graft life was 59.2 months. There was no AR attack in our patients, the reason for graft loss was chronic rejection processes. In one of our patients who underwent transplantation due to FSGS, recurrence developed in the 5th year of the follow-up, and graft loss occurred in the 7th year of the follow-up.

Urinary tract infection (UTI) was the most common post-transplant bacterial infection in our series (seen in 22% of the patients). In previous pediatric reports, the prevalence of post-transplant UTI ranges from 15% to 33% (22).

Several reports show that despite acute graft dysfunction during febrile UTI, long-term renal function is not different between patients with and without infection (23). Other reports reveal worse outcomes in patients with UTI, especially those with recurrent UTIs (24). In our series, only one of the patients who experienced graft loss had recurrent urinary tract infections, but it may not be enough to explain the graft loss with urinary bacterial infection. The effect of UTI on long-term graft outcome continues to be a point where further studies are needed.

Children with ESRD have a shorter life expectancy compared to children without ESRD, and survival rates of these children are approximately 30 times lower than their healthy peers (1). Although recent data show a reduction in mortality for children receiving chronic dialysis, RT remains the treatment of choice for maximizing survival and quality of life (25). Children with ESRD now die mainly from cardiovascular causes and infection rather than kidney failure. The survival rate of our patients was 100%. No transplantation-related mortality was seen in patients whose follow-up was continued after graft loss.

CONCLUSION

Pediatric RT program is difficult to establish, maintain and develop. Complications after transplantation are not uncommon; therefore, early detection and appropriate management are needed. Strategies are still needed to increase post-transplant success. Possible areas for improvement include increasing adherence to medications and follow-up includes systematic surveillance for malignancies and cardiovascular risk, as well as

early effective management of infectious complications that occur during follow-up.

Ethics Committee Approval: This study approval was obtained from İnönü University Health Sciences Non-Invasive Clinical Researches Ethics Committee (Decision No: 2020/932, 14.07.2020).

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - G.O.; Design - G.O.; Supervision - S.M.D.; Materials - G.M.D.; Data Collection and/or Processing - G.O., G.M.D.; Analysis and/or Interpretation - S.M.D.; Literature Search - S.M.D.; Writing Manuscript - G.O.; Critical Reviews - G.M.D.

Conflict of Interest: The authors have no conflicts of interest to declare.

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REFERENCES

1. *McDonald SP, Craig JC; Australian and New Zealand Paediatric Nephrology Association. Long-term survival of children with end-stage renal disease. N Engl J Med 2004; 350(26): 2654-62.*
2. *Chesnaye N, Bonthuis M, Schaefer F, Groothoff JW, Verrina E, Heaf JG, et al. Demographics of paediatric renal replacement therapy in Europe: a report of the ESPN/ERA-EDTA registry. Pediatr Nephrol 2014; 29(12): 2403-10.*
3. *Shapiro R. Living donor kidney transplantation in pediatric recipients. Pediatr Transplant 2006; 10(7): 844-50.*
4. *Herthelius M, Celsi G, Edström Halling S, Krmar RT, Sandberg J, Tydén G, et al. Renal transplantation in infants and small children. Pediatr Nephrol 2012; 27(1): 145-50.*
5. *Van Arendonk KJ, Boyarsky BJ, Orandi BJ, James NT, Smith JM, Colombani PM, et al. National trends over 25 years in pediatric kidney transplant outcomes. Pediatrics 2014; 133(4): 594-601.*
6. *Harambat J, Ranchin B, Bertholet-Thomas A, Mestrallet G, Bacchetta J, Badet L, et al. Long-term critical issues in pediatric renal transplant recipients: a single-center experience. Transpl Int 2013; 26(2): 154-61.*
7. *Rees L, Shroff R, Hutchinson C, Fernando ON, Trompeter RS. Long-term outcome of paediatric renal transplantation: Follow-up of 300 children from 1973 to 2000. Nephron Clin Pract 2007; 105(2): c68-c76.*
8. *Tangeraas T, Bjerre A, Lien B, Kyte A, Monn E, Cvancarova M, et al. Long-term outcome of pediatric renal transplantation: The Norwegian experience in three eras 1970-2006. Pediatr Transplant 2008; 12(7): 762-8.*
9. *Groothoff JW, Cransberg K, Offringa M, van de Kar NJ, Lilien MR, Davin JC, et al. Long-term follow-up of renal transplantation in children: a Dutch cohort study. Transplantation 2004; 78(3): 453-60.*
10. *Fine RN, Salusky IB, Ettenger RB. The therapeutic approach to the infant, child, and adolescent with end-stage renal disease. Pediatr Clin North Am 1987; 34(3): 789-801.*
11. *Mir S, Erdoğan H, Serdaroğlu E, Kabasakal C, Hoşcoşkun C. Pediatric renal transplantation: Single center experience. Pediatr Transplant 2005; 9(1): 56-61.*
12. *Van Arendonk KJ, Boyarsky BJ, Orandi BJ, James NT, Smith JM, Colombani PM, et al. National trends over 25 years in pediatric kidney transplant outcomes. Pediatrics 2014; 133(4): 594-601.*
13. *Sert I, Yavascan O, Tugmen C, Kara OD, Kilinc S, Dogan SM, et al. A retrospective analysis of longterm graft survival in 61 pediatric renal transplant recipients: A single-center experience. Ann Transplant 2013; 18: 497-504.*
14. *Jain D, Haddad DB, Goel N. Choice of dialysis modality prior to kidney transplantation: Does it matter? World J Nephrol 2019; 8(1): 1-10.*
15. *Vats AN, Donaldson L, Fine RN, Chavers BM. Pretransplant dialysis status and outcome of renal transplantation in North American children: a NAPRTCS Study. North American Pediatric Renal Transplant Cooperative Study. Transplantation 2000; 69(7): 1414-9.*
16. *Amaral S, Sayed BA, Kutner N, Patzer RE. Preemptive kidney transplantation is associated with survival benefits among pediatric patients with end stage renal disease. Kidney Int 2016; 90(5): 1100-8.*
17. *Salvatierra Jr O, Millan M, Concepcion W. Pediatric renal transplantation with considerations for successful outcomes. Semin Pediatr Surg 2006; 15(3): 208-17.*
18. *Grenda R. Delayed graft function and its management in children. Pediatr Nephrol 2017; 32(7): 1157-67.*
19. *Gargah T, Abidi K, Rajhi H, Ben Abdallah T, Chebil M, Lakhoua MR. Vascular complications after pediatric kidney transplantation. Tunis Med 2011; 89(5): 458-61.*
20. *Otukesh H, Hoseini R, Rahimzadeh N, Fereshtehnejad Seyed-Mohammad, Simfroosh N, Basiri A, et al. Outcome of renal transplantation in children: a multicenter national report from Iran. Pediatr Transplant 2011; 15(5): 533-8.*
21. *Branco F, Almeida F, Cavadas V, Ribeiro S, Osório L, Rocha A, et al. Pediatric kidney transplantation: A single center experience with 134 procedures. Transplant Proc 2013; 45(3): 1057-9.*
22. *Mueller T, Resinger C, Ruffingshofer D, Arbeiter K, Balzar E, Aufricht C. Urinary tract infections beyond the early post-transplant period in pediatric renal graft recipients. Wien Klin Wochenschr 2003; 115(11): 385-8.*
23. *John U, Everding AS, Kuwertz-Broking E, Bulla M, Müller-Wiefel DE, Misselwitz J, et al. High prevalence of febrile urinary tract infections after paediatric renal transplantation. Nephrol Dial Transplant 2006; 21(11): 3269-74.*
24. *Herthelius M, Oborn H. Urinary tract infections and bladder dysfunction after renal transplantation in children. J Urol 2007; 177(5): 1883-6.*
25. *Saran R, Robinson B, Abbott KC, YC Agodoa L, Bhave N, Bragg-Gresham J, et al. US Renal Data System 2017 Annual Data Report: Epidemiology of kidney disease in the United States. Am J Kidney Dis 2018; 71(3 Suppl 1): A7.*

ORİJİNAL ÇALIŞMA-ÖZET
Turk J Surg 2021; 37 (4): 313-317

Pediatrik böbrek nakli: 10 yıllık deneyim

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ÖZET

Giriş ve Amaç: Böbrek nakli (BN), son dönem böbrek yetmezliği olan çocuklar için ilk tedavi seçeneği olmasına rağmen, nakledilen çocuk sayısı yetişkinlere göre düşük kalmaktadır. Bireysel pediatrik nakil merkezinin deneyimi pediatrik nakil alıcılarının sonuçlarında çok önemlidir. Bu çalışmada pediatrik böbrek nakli deneyimimiz sunulmuştur.

Gereç ve Yöntem: Nisan 2009 ile Nisan 2019 arasında merkezimizde böbrek nakli yapılan 27 pediatrik hastamızın verilerini retrospektif olarak inceledik.

Bulgular: 15'i erkek hasta ve ortalama BN yaşları 12,36 ± 4,18 yıl (dağılım 4-17 yıl) idi. En sık son dönem böbrek yetmezliği endikasyonu vezikoüretral reflüydü. Transplante edilen böbreklerin on sekizi (%66,7) kadavra donörden, 9'u (%33,3) canlı donöründen geldi. Bir hastaya preemptif BN ve bir hastaya da ikinci kez transplant yapıldı. 22 hasta periton diyalizi, 4 hasta hemodiyaliz programındaydı. Ortalama diyaliz süresi 29 (3-104) aydı. Kanama en sık görülen cerrahi komplikasyondu. Dört hastada gecikmiş greft fonksiyonu gelişti, hepsi kadaverik vericiliydi. 12 hastada rejeksiyon gelişirken buna bağlı greft kaybı 4 hastada görüldü. Tüm hastalar göz önüne bulundurulduğunda greft sağkalım oranları 1. ve 3. yılda %100, 5. yılda ise %92'ydi.

Sonuç: Pediatrik BN programının oluşturulması, sürdürülmesi ve geliştirilmesi zordur. Transplantasyondan sonra komplikasyonlar nadir değildir; bu nedenle erken tespit ve uygun yönetime ihtiyaç vardır. Nakil sonrası başarıyı arttırmak için hâlâ stratejilere ihtiyaç duyulmaktadır.

Anahtar Kelimeler: Pediatrik, son dönem böbrek hastalığı, böbrek nakli

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ORIGINAL ARTICLE
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An indirect effect of COVID-19 pandemic: Increased pediatric perforated appendicitis rate due to delayed admission

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ABSTRACT

Objective: Appendicitis is a common surgical emergency among children. The coronavirus pandemic affected the system of hospitals more than any other field, and great amount of people were concerned about visiting the hospitals for any reason. In this study, it was aimed to evaluate the profile of appendicitis by emphasizing perforated and acute appendicitis in the pandemic period and to compare the rates with previous three years.

Material and Methods: Charts of the children who underwent laparoscopic appendectomy due to appendicitis between March 11-September 30 between 2017-2020 were retrospectively analyzed in terms of demographic data, duration of symptoms, duration between hospital admission and surgery, radiologic imaging and perioperative outcomes.

Results: This study includes 467 children who underwent laparoscopic appendectomy. There were 97 procedures in 2020, 111 in 2019, 146 in 2018 and 113 in 2017. Multiple comparison tests revealed that age did not show difference; but onset of symptoms in admission ($p= 0.004$), hospitalization time before surgery ($p< 0.001$), total hospitalization time ($p< 0.001$) showed statistically significant difference between years. Pairwise comparisons showed that these parameters were increased in 2020 compared to other years. Perforated appendicitis rate was significantly increased in 2020 when compared to previous years.

Conclusion: Although there is no direct relation between appendicitis and COVID-19 infection in the current knowledge, perforated appendicitis was found to be increased in children during the COVID pandemic. Reason of the higher rate of perforated appendicitis may be multifactorial; however, the pandemic appears to have a role in increased morbidity in children with appendicitis indirectly due to delay of hospital admissions.

Keywords: Appendicitis, child, coronavirus, pandemic, pediatric surgery

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INTRODUCTION

Appendicitis is a common surgical emergency among children (1). It may present as acute appendicitis (AA) or perforated appendicitis (PA). AA constitutes 1-8% of the cases among children admitted to the emergency department with complaints of abdominal pain (2). PA is not as common as AA, but it remains to contain majority of appendicitis cases in children under three years of age (1).

Widely accepted treatment of AA includes laparoscopic or open appendectomy, but recently studies on non-operative treatment with parenteral antibiotics have been documented (1,3). Non-operative treatment has not been established yet in PA except appendiceal plastron in which the peritoneal dissemination of intestinal content is limited by the omentum and intestines. Morbidity of PA is much higher than AA, as expected (4). It also has the risks of increased hospital stay, longer use of parenteral antibiotics, sepsis and even death (5).

As we all know, the coronavirus pandemic affected the system of hospitals more than any other field. Outpatient clinics nearly stopped for few months in our country as well as others, and all attention was canalized to emergency and infectious diseases. "Stay at home" policy was also valid for patients in the need of routine controls, and at some point, a great amount of people were concerned about visiting the hospitals for any reason even though the situation was urgent or necessary.

In these extraordinary conditions, we thought that PA rate might have increased due to multiple reasons such as delayed apply to hospital, immunocompromised status of the child, children's tendency to hide the pain from their parents due to anxiety, experiencing difficulties of reaching healthcare, and etc. Even though we could not evaluate all these factors; the basic hypothesis of the study was that PA incidence might be higher in pandemic conditions when compared to the same periods of past years independently from patient age.

MATERIAL and METHODS

The study was performed in adherence to the latest version of Declaration of Helsinki, and ethics approval was obtained.

Dates

March 11, 2020 was accepted as the set point for the study as it was the day when the first case infected with coronavirus was publicized in Turkey. Charts of the children who underwent laparoscopic appendectomy due to appendicitis between March 11-September 30 were retrospectively analyzed for the years of 2017, 2018, 2019 and 2020.

Patients

Children who underwent LA were included in this study. Since the beginning of the pandemic, all children underwent COVID-19 PCR test, and they were questioned for contact with people infected with COVID-19 preoperatively. The COVID-19 PCR tests ensued in between 6-24 hours, and meanwhile intravenous antibiotherapy was administered to the children while awaiting the PCR test results after diagnosis of appendicitis. Children with positive PCR test and suspicious contact of COVID-19 were managed conservatively and they were excluded from the study (n= 6). Children with additional diseases which may cause prolonged hospitalization were excluded. Incidental and interval appendectomies were also excluded.

Surgical Method

All children with a prediagnosis of appendicitis- PA or AA underwent LA with three ports in case of absence of suspicious contact of COVID-19 or COVID-19 PCR positivity.

Data

Demographic data of the children were recorded. Presence of appendiceal perforation was determined according to operation notes or histopathologic examination. Perforated appendicitis was defined as a visible hole on the appendix wall and/or fecaliths in the abdominal cavity during the surgery. A hole on the appendix wall in pathologic examination was also accepted perforated appendicitis. Hospitalization before surgery was defined as the period from hospital admission to surgery. Hospital stay was described as the period from surgery to discharge. PA rates were also recorded.

Evaluation: PA rates in the same periods of 2017 to 2019 were evaluated combinedly and separately for each year and compared to 2020.

Statistical Analysis

Before comparative analysis, continuous variables were evaluated for normal distribution by histogram graphs and Kolmogorov-Smirnov test. Variables (age, total hospitalization time, hospitalization before surgery) which did not have normal distribution were evaluated by the Kruskal-Wallis test, and normally distributed data were analyzed by Anova test in terms of the presence of difference between years. Post-hoc tests were performed to evaluate the difference between groups. Chi-Square test was conducted for association of years and diagnosis. p value <0.05 was considered statistically significant. Benferoni correction was used for multiple comparisons. Statistical Package for the Social Sciences (SPSS), version 16.0 (IBM®, Chicago, USA) was used for analysis.

RESULTS

This study included 467 children who underwent LA due to AA or PA. One hundred and seventy-four (37.3%) were females and 293 (62.7%) were males. Mean age of the children was 11.4 years (1-18 years). There were 97 LA procedures in 2020, 111 in 2019, 146 in 2018 and 113 in 2017. Mean onset of symptoms at admission was 29.5 hours (4 hours-14 days). Mean hospitalization time before surgery and total hospitalization time were 9.5 hours (1-24 hours) and 1.7 days (1-13 days), respectively. Multiple comparison tests revealed that ages of the children in each year were not different; but time between onset of the symptoms and hospital admission, hospitalization time before surgery and total hospitalization time showed statistically significant difference between the years (Table 1). Pairwise comparisons showed that these variables increased in 2020 compared to other years (Table 2). PA rate was significantly increased in 2020 compared to previous years (Table 3, Figure 1). PA diagnosis on ultrasound was concordant with intraoperative findings for 18 of 30 children for perforated appendicitis in 2020, 6/13 in 2019, 14/18 in 2018 and 5/13 in 2017, and no difference was found between years statistically (p= 0.117) (Table 4).

DISCUSSION

First COVID-19 case was reported from China at the end of 2019, and the disease rapidly spread all around the world in few months and was declared as a pandemic by WHO in March 2020 (6). In Turkey, the first COVID-19 case was detected on March 11,

Table 1. Multigroup comparisons between years

Years	Age (year)		Onset of symptoms time at admission (hours)		Hospitalization before surgery (hours)		Total hospitalization (days)	
Variables	**Mean(SD)**	**p**	**Mean (SD)**	**p**	**Mean (SD)**	**p**	**Mean (SD)**	**p**
2020 (n= 97)	11.6 (3.7)	0.784	40 (38.8)	0.04	18.3 (7.1)	<0.001	1.9 (0.2)	<0.001
2019 (n= 111)	11.8 (3.5)		26.6 (24.0)		7.6 (2.0)		1.7 (1.3)	
2018 (n= 146)	11.4 (4.0)		28.6 (26.3)		6.7 (1.7)		1.7 (1.6)	
2017 (n= 113)	10.8 (4.0)		24.6 (15.6)		7.2 (1.8)		1.6 (1.07)	

Table 2. Pairwise comparisons for 2020 vs 2019, 2018 and 2017

Variables	Onset of symptoms time at admission (hours)		Hospitalization before surgery (hours)		Total hospitalization (days)	
Years	**Mean**	**p**	**Mean**	**p**	**Mean**	**p**
2020 vs 2019	40-26.6	0.002	18.3-7.6	<0.001	1.9-1.7	<0.001
2020 vs 2018	40-28.6	0.008	18.3-6.7	<0.001	1.9-1.7	<0.001
2020 vs 2017	40-24.6	<0.001	18.3-7.2	<0.001	1.9-1.6	<0.001

Table 3. Perforated appendicitis rates (2020 vs 2019, 2018 and 2017 respectively)

Years		Perforated appendicitis rate (%) (2020 vs year)	p
2020	2017	30/11	0.001
	2018	30/12	0.001
	2019	30/12	0.001

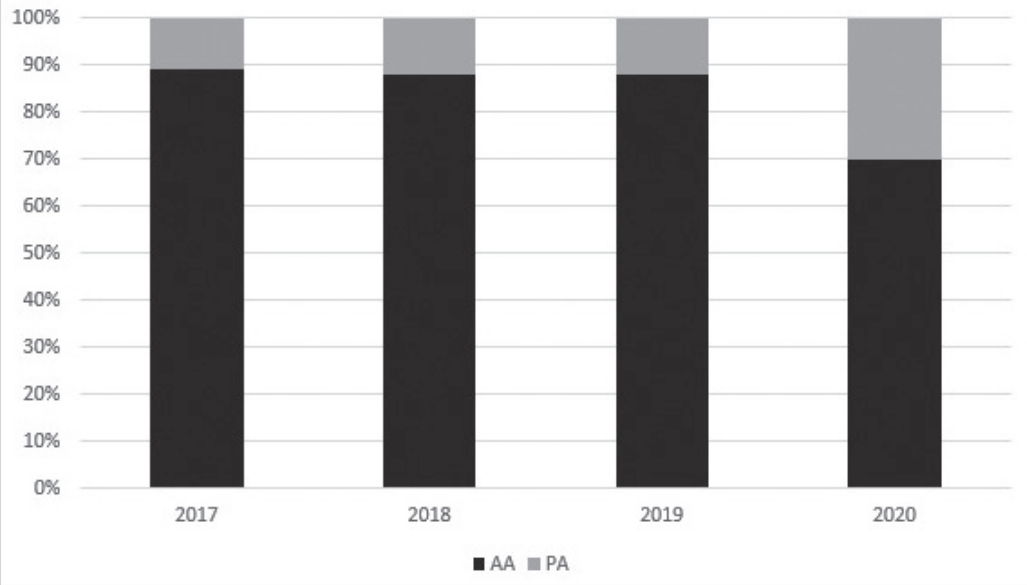

Figure 1. Rates of acute and perforated appendicitis.

2020 and increased by days (7). The disease affect children as well, but in contrary with adult population, they usually stay asymptomatic (8). Surveillance data from Turkey has revealed that 0.8% of children had severe disease (7). Despite Multisystem Inflammatory Syndrome (MISC) which was described in children after COVID-19 infection; they still seem to be less symptomatic and fatal comparing to adults (7,9).

Table 4. Ultrasound/Intraoperative perforation correlation

Year	Ultrasound prediction rate of PA (%)	p
2020	60	0.117
2019	46	
2018	78	
2017	38	

The primary outcome of the study was to find out whether PA rates increased in pediatric population during the COVID pandemic. With similar means of ages in children in the above-mentioned years, PA rates was found to be increased in 2020 compared to prior years. Onset of symptoms at admission, total hospitalization time, time before surgery were also higher in 2020.

Conventionally, perforation of the appendix is considered to occur within 24 to 36 hours after the onset of symptoms (10). PA consists approximately 20% of children with appendicitis aged 10-17 years, and it is more common in younger children (10). Delayed presentation is the most important factor leading PA, and PA rates increases linearly with duration of symptoms (9,11). In the present study, despite the fact that age of the patients, which is a risk factor for increased PA rates, was not different between years, PA rates were found significantly increased in 2020 compared to previous three years. Duration of symptoms in admission was higher than prior years (40 hours vs 26.6, 28.6, 24.6 in 2020, 2019, 2018, 2017, respectively, p= 0.04). Total hospitalization time was also increased in this period, as expected. In concordant to present study, Fisher et al. have reported that PA rates was increased during 10 weeks of outbreak which can reflect the acute period of pandemic, comparing to their earlier practice in New York City (9). Parents' concerns of exposure to COVID-19 in hospital may lead to delay presentation of children with appendicitis. Even though COVID-19 cases have reduced, and limited normalization policies have been mentioned in Turkey, in the tenth month of pandemic, delayed apply to hospital seems to be an important problem that may have caused increased morbidity and prolonged hospitalization in children with appendicitis.

As a result of waiting for the COVID PCR test results for the operation, time before surgery was longer in 2020 compared to prior years. We evaluated duration of symptoms and ultrasound findings of children in admission for appendicitis suspicion to distinguish whether high PA rates arose from preoperative waiting time for PCR results or delayed apply. When the prediction rates of perforation via ultrasonography were analyzed for each year, it was found that there was not a statistically significant difference in 2020 with other years (p= 0.117). Regarding these data, we concluded that waiting for COVID PCR tests after sonographic evaluation is not related to the increase in PA rates. Comparison of sonographic evaluation with intraoperative findings revealed that each year sonographic evaluation may miss some amount of PA. Excluding this waiting time duration lead uled correlate the increase in PA with delayed apply to the hospital. Mean time before surgery was 18.7 hours in 2020 and it was longer compared to years before the COVID-19 pandemic (7.6 hours, 6.7 hours, 7.2 hours in 2019, 2018, 2017 respectively, p< 0.001). Given the present data, it seems feasible and harmless to wait for confirmation of COVID-PCR negativity to prevent virus exposure to airway providers and surgical team during the airway management and surgery.

Clinical features of COVID-19 in children include fever and cough, gastrointestinal symptoms; however, most of the infected children appear to be asymptomatic (12). Furthermore, gastrointestinal manifestations may develop both in COVID-19 infection and appendicitis (9,10,12). It may also confuse the physicians in this unusual conditions. Thus, we strongly recommend to wait for PCR results in children planned to undergo appendectomy procedure.

Non-operative management was described for non-perforated appendicitis in children with a success rate of 58%-82 (13,14). Interval appendectomy and non-operative management have been discussed even in complicated appendicitis by some authors (15,16). Kvasnovsky et al. have reported experience of non-operative management for appendicitis with a success rate of 86% during the pandemic in New York City and they found no difference in length of hospital stay between children who were managed non-operatively and children who underwent surgery due to simple appendicitis (17). The safety of anesthesia in patients with positive PCR for COVID-19 is unclear, but early reports suggest a possible relation with increased perioperative complications (18,19). In case of proven or high risk of COVID-19 infection which is concomitant to appendicitis, we strongly recommend considering non-surgical treatment as an option for both; the child and the surgical team.

Retrospective nature of the study is one of the most significant limitations. Also, our clinical observation on increase of PA rates in this period may cause bias even though the analysis of the data was performed by two separate researchers who were blinded to the years. Although same months of the years were selected for elimination of seasonal variability of PA, usage of uncontrolled data from the hospital database may decrease the

veracity of the data, and it was not possible to reach out all parents and check the medical histories of children. Even though the number of the patients was satisfactory, the analysis was based on timing but not very detailed in other aspects. Thus, it was not possible to evaluate other reasons that may have played role in appendiceal perforation. Also, perforation prediction rates were basically based on sonographic imaging which may be classified as a subjective imaging method.

CONCLUSION

PA rates seem to be increased in pandemic conditions. In addition, duration of symptoms before hospital admission was higher in this period. Hospital stays were longer due to waiting for PCR tests, but it seems it did not increase PA rate much more than previous years.

Ethics Committee Approval: This study approval was obtained from Ankara University Human Researches Ethical Committee (Decision No: İ1-67-21, Date: 28.01.2021).

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REFERENCES

1. *Rentea RM, St. Peter SD. Pediatric appendicitis. Surg Clin North Am 2017; 97(1), 93-112.*
2. *Scholer SJ, Pituch K, Orr DP, Dittus RS. Clinical outcomes of children with acute abdominal pain. Pediatrics 1996; 98(4 Pt 1), 680-5.*
3. *López JJ, Deans KJ, Minneci PC. Nonoperative management of appendicitis in children. Curr Opin Pediatr 2017; 29(3): 358-62.*
4. *Gerall CD, DeFazio JR, Kahan AM, Fan W, Fallon ME, Middlesworth W, et al. Delayed presentation and sub-optimal outcomes of pediatric patients with acute appendicitis during the COVID-19 pandemic. J Pediatr Surg 2021; 56(5): 905-10.*
5. *Schmidt YM, Wendling-Keim D, von Schweinitz D, Hubertus J, Berger M. Prophylactic drain placement in childhood perforated appendicitis: Does spillage matter? Front Pediatr 2020; 8: 588109.*
6. *World Health Organization. Novel Coronavirus (2019-NCoV); 2020.*
7. *Tezer H, Bedir Demirdağ T. Novel coronavirus disease (COVID-19) in children. Turk J Med Sci 2020; 50(SI-1): 592-603.*
8. *She J, Liu L, Liu W. COVID-19 epidemic: Disease characteristics in children. J Med Virol 2020; 92(7): 747-54.*
9. *Fisher JC, Tomita SS, Ginsburg HB, Gordon A, Walker D, Kuenzler KA. Increase in pediatric perforated appendicitis in the New York City metropolitan region at the epicenter of the COVID-19 outbreak. Ann Surg 2021; 273(3): 410-5.*
10. *Pearl RH, Hale DA, Molloy M, Schutt DC, Jaques DP. Pediatric appendectomy. J Pediatr Surg 1995; 30(2): 173-8.*
11. *Narsule CK, Kahle EJ, Kim DS, Anderson AC, Luks FI. Effect of delay in presentation on rate of perforation in children with appendicitis. Am J Emerg Med 2011; 29(8): 890-3.*
12. *Balasubramanian S, Rao NM, Goenka A, Roderick M, Ramanan AV. Coronavirus Disease 2019 (COVID-19) in children - What we know so far and what we do not. Indian Pediatr 2020; 57(5): 435-42.*
13. *Caruso AM, Pane A, Garau R, Atzori P, Podda M, Casuccio A, et al. Acute appendicitis in children: Not only surgical treatment. J Pediatr Surg 2017; 52(3): 444-8.*
14. *Georgiou R, Eaton S, Stanton MP, Pierro A, Hall NJ. Efficacy and safety of nonoperative treatment for acute appendicitis: A meta-analysis. Pediatrics 2017; 139(3): e20163003.*
15. *Zhang HL, Bai YZ, Zhou X, Wang WL. Nonoperative management of appendiceal phlegmon or abscess with an appendicolith in children. J Gastrointest Surg 2013; 17(4): 766-70.*
16. *González MC, Rodríguez JCB, Moore EH, Atanay DA. Predictors of recurrent appendicitis after non-operative management of children with perforated appendicitis presenting with an appendicular inflammatory mass. Arch Dis Child 2014; 99(2): 154-7.*
17. *Kvasnovsky CL, Shi Y, Rich BS, Glick RD, Soffer SZ, Lipskar AM, et. al. Limiting hospital resources for acute appendicitis in children: Lessons learned from the U.S. epicenter of the COVID-19 pandemic. J Pediatr Surg 2021; 56(5): 900-04.*
18. *Chen R, Zhang Y, Huang L, Cheng Bi-Heng, Xia Zhong-Yuan, Meng Qing-Tao. Safety and efficacy of different anesthetic regimens for parturients with COVID-19 undergoing Cesarean delivery: a case series of 17 patients. Can J Anaesth 2020; 67(6): 655-63.*
19. *Lei S, Jiang F, Su W, Chen C, Chen J, Mei W, et al. Clinical characteristics and outcomes of patients undergoing surgeries during the incubation period of COVID-19 infection. E Clinical Medicine 2020; 21: 100331.*

ORİJİNAL ÇALIŞMA-ÖZET
Turk J Surg 2021; 37 (4): 318-323

COVID-19 pandemisinin indirekt etkisi: Çocuklarda geç başvuruya bağlı perfore apendisit sayısında artış

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ÖZET

Giriş ve Amaç: Apandisit, çocuklarda yaygın bir acil cerrahi girişim sebebidir. Koronavirüs pandemisi, herhangi bir alandan daha çok hastane sistemlerini etkilemiş ve insanların birçoğu herhangi bir sebep ile hastane başvuruları yapmak konusunda tereddütte kalmışlardır. Bu çalışmanın amacı, pandemi boyunca karşılaşılan perfore ve akut apandisit olgularının üzerinde durarak apandisit profillerini değerlendirmek ve önceki üç yıla ait oranlarla karşılaştırma yapmaktır.

Gereç ve Yöntem: 11 Mart - 30 Eylül, 2017-2020 tarihleri arasında apandisit sebebiyle laparoskopik apendektomi uygulanan çocukların dosyaları, demografik veriler, bulguların süresi, hastaneye yatış ve cerrahi arasında geçen süre, radyolojik görüntüleme ve perioperatif sonuçlar bakımından retrospektif olarak incelendi.

Bulgular: Çalışmaya laparoskopik apendektomi uygulanan 467 çocuk hasta dahil edildi. 2020 yılında 97, 2019 yılında 11, 2018 yılında 146 ve 2017 yılında 113 cerrahi işlem mevcuttu. Çoklu karşılaştırma testleri yaşın farklılık göstermediğini ancak yıllar arasında istatiksel olarak anlamlı farklılıkların başvuruda bulguların başlangıcı (p= 0,004), ameliyat öncesi hastanede yatış süresi (p< 0,001) ve toplam hastanede yatış süresi p< 0,001) değişkenlerinde olduğunu ortaya koydu. İkili karşılaştırmalar bu parametrelerin diğer yıllara oranla 2020 yılında arttığını gösterdi. Perfore apandisit oranı, diğer yıllara kıyasla 2020 yılında anlamlı derecede yüksek bulundu.

Sonuç: Mevcut bilgiler ışığında COVID-19 enfeksiyonu ve apandisit arasında doğrudan bir ilişki bulunmasa da perfore apandisit çocuk olgularının COVID-19 pandemisi süresince arttığı bulundu. Perfore apandisitteki bu yüksek oranın sebebi çok bileşenli olsa da pandemi döneminde hastaneye başvuruların gecikmesi ile birlikte pandeminin apandisitli çocuklarda dolaylı olarak morbiditeyi artırıcı bir rolü olduğu dikkati çekmiştir.

Anahtar Kelimeler: Apandisit, çocuk, koronavirüs, pandemi, pediatrik cerrahi

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ORIGINAL ARTICLE
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Early and intermediate term outcomes after laparoscopic one-anastomosis gastric bypass for morbidly obese patients: a single center experience

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ABSTRACT

Objective: To evaluate our outcomes of laparoscopic one-anastomosis gastric bypass (LOAGB) as a primary weight loss procedure. We evaluated the impact of biliary reflux by combination of upper endoscopy (UGIE), ambulatory pH metry, and ambulatory biliary reflux monitoring.

Material and Methods: We reviewed the data of patients who underwent LOAGB during the period between July 2015 till August 2018.

Results: Forty consecutive patients were included in the study. Thirty-seven patients (92.5%) had obesity related comorbidities. The median follow-up duration was 18 months (6-36 months). The 1-, 2-, and 3-years excess weight loss percentages were 53.1%, 60.4%, and 62.3%. At three years follow-up, complete remission of diabetes mellitus occurred in 7/7 patients (100%) and of hypertension in 4/7 patients (57.1%). Eighteen patients (45%) accepted to undergo UGIE with routine biopsies and evaluation of acidic and biliary reflux. All examined patients had negative acid reflux results according to ambulatory PH metry with median DeMeester score of 2 (0.3-8.7). According to ambulatory biliary reflux monitoring, 17/18 patients (94.1%) had positive result. Only 6/18 patients (33.3%) had symptoms of biliary reflux and had positive symptom index on bilimetric study. Regarding UGIE, all patients had just gastritis and reflux esophagitis with no evidence of gross mucosal changes. Pathological examination of all routine biopsies did not show any sign of faveolar hyperplasia, atypia or malignancy.

Conclusion: LOAGB is a safe and efficient bariatric procedure with acceptable morbidity rate. LOAGB is not associated with significant biliary reflux or pathological changes in the esophagogastric mucosa.

Keywords: One-anastomosis gastric bypass, morbid obesity, early outcomes

INTRODUCTION

Emerging as a costly burden on the global healthcare system, obesity has currently attracted worldwide attention due to its continuously rising incidence (1). Obesity is commonly accompanied by a variety of comorbidities, especially type 2 diabetes mellitus (DM), hypertension, and obstructive sleep apnea syndrome (OSAS) (2).

Bariatric surgery has been increasingly performed as a promising intervention to improve long-term outcomes and quality of life in individuals with obesity (3,4). Bariatric surgical procedures are classified into restrictive, malabsorptive or both (5). One-anastomosis gastric bypass (OAGB), first reported by Rutledge, is a bariatric procedure which utilizes a divided vertical tube gastroplasty in conjunction with a loop intestinal bypass, which causes weight loss by both restriction and malabsorption (6).

OAGB has its own unique advantages compared to the gold standard Roux-en-Y gastric bypass (RYGB). Advantages of OAGB include shorter operation time, fewer sites for anastomotic leaks, shorter learning curve, easy reversibility with equivalent results in terms of weight loss and comorbidities resolution (7,8). However, its uptake by the bariatric community, even in Egypt where sleeve gastrectomy is more preferred, has been slow and controversial. Significant reflux of bile needing revisional operation, increased marginal ulceration and increased hazard of gastric malignancy because of chronic reflux of the bile are common controversies which

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are still unproven (7). Also, dyspepsia, gastric ulcers and anemia are the most common complication in the long run (9).

The current study was conducted to evaluate our center's experience of laparoscopic one-anastomosis gastric bypass (LOAGB) as a primary weight loss procedure for patients with morbid obesity. We aimed to evaluate the early and intermediate outcomes of LOAGB in terms of weight loss, quality of life and comorbidities resolution. Additionally, we evaluated the impact of biliary reflux on gastric tube and lower esophagus by combination of upper gastrointestinal endoscopy (UGIE), ambulatory pH metry, and ambulatory biliary reflux monitoring (BILITEC 2000).

MATERIAL and METHODS

Study Design

We reviewed the data of patients with morbid obesity who underwent LOAGB as a primary weight loss procedure during the period between July 2015 and August 2018. Patient data were reviewed from a prospectively maintained data base for all bariatric surgery patients. This study was approved by the local ethics committee and institutional review board.

Inclusion criteria were essentially the recommendations of the National Institutes of Health Consensus Development Panel of 1991 (10). Patients were eligible for inclusion in this study if they had morbid obesity with a body mass index (BMI) >40 kg/m^2 or BMI >35 kg/m^2 when associated with at least one comorbidity such as type II DM, hypertension, OSAS and hyperlipidemia. Included patients had history of failure of conservative measures for obesity, and the age was restricted to patients from 18 to 60 years old.

Preoperative Evaluation

All patients were evaluated by a multidisciplinary surgical and medical team. Preoperative evaluation included detailed history, physical examination, detailed demographic data, and associated comorbidities evaluation. Detailed laboratory evaluation including hormonal profile was performed. Also, cardiopulmonary assessment was routinely performed. Abdominal ultrasonography and UGIE were routinely performed. Preoperative low molecular-weight heparin was used 12 hours preoperatively and at the night of the operation, then once daily till the patient was discharged in order to guard against deep venous thrombosis.

All patients were asked to sign an informed consent after meeting the surgeon and explaining all the possible benefits and risks of the procedure and stressing on the importance of regular follow up visits.

Operative Technique

All surgeries were performed by the same bariatric surgery team. The patient was placed in reverse Trendlenberg position with split legs. The main surgeon stood between the patient's legs, the main assistant stood to the left side of the patient, and the camera operator stood on the right side of the patient. Standard five trocars were utilized as described by Rutledge (6).

A long and narrow gastric tube is created parallel to the lesser curvature. The gastric tube was sleeved using laparoscopic linear staplers (Endo GIA™ Universal Straight 45-mm, blue cartridge) starting just distal to the incisura (distal to the crow's foot) perpendicular to the lesser curvature then upwards parallel to the lesser curvature (Endo GIA™ Universal Straight 60-mm, blue cartridges) till reaching the angle of His after insertion of gastric calibration tube (bougie 36 Fr).

A 150-200 cm jejunal loop (biliopancreatic limb) was measured from the ligament of Trietz and was anastomosed to the back of the gastric tube. The length of the biliopancreatic limb was tailored according to the patient preoperative BMI, age and presence or absence of comorbidities. Anastomosis was done in an antecolic Billroth II-type loop (side-to-side fashion) gastroenterostomy using linear stapler (Endo GIA™ Universal Straight 45-mm, blue cartridge). The opening for the stapler was closed using 3/0 absorbable suture material in a single continuous layer. We applied a hanging suture between the gastric tube and the biliopancreatic limb to be higher than the efferent limb. Leakage test by methylene blue was routinely performed to detect any leakage intraoperative. Abdominal drainage was inserted depending on the surgeon's preference.

Postoperative Care and Follow Up

Patients were transferred to ward or intensive care unit (ICU) according to the anesthetic recommendations for close monitoring of the vital signs, urine output, abdominal drain. Patients were encouraged for early ambulation after surgery. Oral contrast study was routinely performed on the first postoperative day to assess gastric tube configuration and exclusion of leakage, obstruction or twist. Clear fluids were allowed after documenting a normal oral contrast study.

Patients were discharged if hemodynamically stable, pain free and in absence of post-operative complications with instructions to receive clear fluids for the first postoperative week, followed by soft diet for another three weeks. Subsequently, a long-term solid diet (hypo-caloric, protein-enriched) was maintained. Daily oral supplements of vitamins, minerals and monthly administration of intramuscular vitamin B12 were given to all patients for long term.

Patients were followed up regularly at the outpatient clinic every three months during the first year after surgery, then every six months afterwards or on patient's demand. Follow up visits included evaluation of weight loss progression, changes in associated comorbidities, development of postoperative complications, detailed laboratory evaluation to assess the nutritional status, and answered questionnaire evaluation the quality of

life using Bariatric Analysis and Reporting Outcome System (BAROS) questionnaire.

As biliary reflux is one of the most important points of criticism to this procedure, specific evaluation was conducted to assess the incidence of biliary reflux and its possible effect on mucosal lining of esophagus, gastric tube and the site of anastomosis. All patients were asked to perform ambulatory duodeno-gastric biliary reflux monitoring system using, BILITEC 2000 (Synectics Medical, Sweden), and ambulatory PH monitoring (Digtrapper MKIII, Synectics Medical, Sweden). In addition, we performed UGIE with routine biopsy from lower esophagus, gastric tube and the site of anastomosis to assess any mucosal changes due to biliary reflux.

Study Definitions

Post-operative complications were recorded in a prospectively maintained database and graded according to Clavian-Dindo grading system (11). Changes of preoperative associated co-morbidities were recorded according to standardization out-come reporting of metabolic and bariatric surgery (12).

Biliary reflux was assessed by subjective and objective methods. Subjectively, the patient was diagnosed with biliary reflux when complaining of hurt burn, epigastric pain and sore taste either denovo or aggravated after surgery. Objectively, the patient was diagnosed with biliary reflux when percentage of bilirubin by BILITEC 2000 was >0.14% while Demester Score and total time reflux by PH metry was normal. Patient was diagnosed as symptomatized biliary reflux when patient had positive symptom index with bilimetric study and endoscopic finding related to reflux esophagitis.

Statistical Analysis

Shapiro-Wilk test was used to assess the normality of the data. Categorical variables were expressed as numbers and percentage and continuous variables were expressed as mean ± standard deviation or median and range. Statistical analysis was performed by IBM-SPSS software for Windows (SPSS Inc., Chicago, IL, USA).

RESULTS

During the study period, 40 patients underwent LOAGB as a primary weight loss procedure and were included in the study.

Patients' Demographics

Preoperative demographic data are shown in Table 1. Median age of the patients was 44.5 years (16-60). Most of the patients were females (77.5%). Thirty-seven patients (92.5%) had obesity related comorbidities. All preoperative laboratory studies including hormonal profiles were within the normal range for all patients.

Operative Data

Operative data of the study patients are shown in Table 2. Laparoscopic approach was utilized in all patients. Only one case (2.5%) required open conversion due to splenic injury. Stapling failure during creation of the gastric tube occurred in one case (2.5%), and leakage on methylene blue test occurred in another case (2.5%). Both required enforcement of the staple line with absorbable sutures.

Postoperative Data

Median length of hospital stay was four days (2-7). All patients had a smooth postoperative course and oral clear fluids were started on the first postoperative day. Only one patient (2.5%) developed intra-abdominal bleeding on the same day of the operation. Laparoscopic exploration was done and bleeding from the staple line was controlled by metallic clips. On 5th postoperative day, this patient developed persistent fever and pelvic tenderness. Follow up abdominal ultrasound revealed an infected abdominal hematoma and ultrasound guided tube drainage was done. It should be noted that none of the study patients developed postoperative leakage or life-threatening morbidities.

Early and Intermediate Follow Up

Median follow-up duration was 18 months (6-36 months). Some patients were lost from follow up either due to travelling abroad or difficulty to communicate due to change of phone number or address. At six months postoperatively, 34/40 patients (85%) were available for follow up. At one year postoperatively, 34/40 patients (85%) were available for follow up. At 18 months postoperatively, 25/32 patients (78.1%) were available for follow up. At two years postoperatively, 18/21 patients (85.7%) were available for follow up. Similarly, at three years postoperatively, 18/21 patients (85.7%) were available for follow up.

*** Weight Loss**

Changes of body weight, BMI, excess weight loss (EWL), and excess BMI loss (EBMIL) are shown in Table 3 and Figure 1.

* Changes in Obesity Related Comorbidities

Diabetes Mellitus

Seventeen patients (42.5%) of the study patients had DM. Changes in DM in the study patients is shown in Table 4. At 1 year of postoperative follow up, complete remission of DM was achieved by 8/13 patients (61.5%) and improvement of DM was achieved by 4/13 patients (30.8%). At two years of postoperative follow up, complete remission of DM was achieved in 6/7 patients (85.7%) and improvement of DM was achieved by 1/7 patients (14.3%). At three years of postoperative follow up, complete remission of DM was achieved in 7/7 patients (100%).

It should be noted that only one patient had preoperative type I DM. This patient had unchanged status of DM after one year of postoperative follow up.

Table 1. Demographic data of the study patients	
Variables	**Data**
Age (years)	44.5 (18-60)
Sex Male Female	 9 (22.5%) 31 (77.5%)
Weight (kg)	144.5 (1.06-250)
Height (m)	1.65 (1.45-2)
Body mass index (kg/m^2)	54.1 (41.4-84.4)
Previous attempts to weight loss • No • Diet control • Intragastric balloon	 3 (7.5%) 36 (90%) 1 (2.5%)
Comorbidities • Diabetes mellitus ° Type I ° Type II • Systemic hypertension • Obstructive sleep apnea • Hyperlipidaemia • Osteoarthritis • Reflux esophagitis	 17 (42.5) 1 (2.5%) 16 (40%) 15 (37.5%) 25 (62.5%) 10 (25%) 37 (92.5%) 14 (35%)
Associated gall bladder stones	5 (12.5%)
Previous abdominal surgery Surgery type • Cholecystectomy • Lower abdominal operations	46 (65%) 4 (10%) 22 (55%)
Upper gastrointestinal endoscopy • Done	 40 (100%)
Upper endoscopy finding • Free • Reflux esophagitis • Gastritis • Reflux esophagitis and gastritis	 9 (22.5%) 2 (5%) 17 (42.5%) 12 (30%)

Table 2. Operative data of the study cases	
Variables	**Data**
Operation time (minutes)	120 (60-360)
Blood loss (ml)	100 (40-700)
Blood transfusion	1 (2.5%)
Length of bypassed small bowel • 150 cm • 180 cm • 200 cm	200 (150-200) 5 (12.5%) 11 (27.5%) 24 (60%)
Intraoperative complications Complications types: • Stapling failure • Leak on methylene blue test • Injury to the spleen	3 (7.5%) 1 (2.5%) 1 (2.5%) 1 (2.5%)

Table 3. Changes in body weight, body mass index, excess weight loss and excess body mass index loss during follow up period

	6 months	12 months	18 months	24 months	36 months
Weight (kg)	117 (85-195)	102.5 (75-180)	97 (75-147)	93 (71-140)	90 (68-120)
Body mass index (kg/m^2)	42.6 (33.2-72.2)	37.3 (30.1-66.1)	34.8 (28.3-59.6)	35.1 (30.3-56.8)	34.7 (29.1-42.5)
Excess weight loss (%)	35.3 (19.2-53.3)	53.1 (25-72.1)	59.5 (32.3-82.9)	60.4 (41.6-75.1)	62.3 (42.5-77.8)
Excess body mass index loss (%)	38.4 (20.5-61.1)	59.3 (27.8-79.8)	66.9 (35.9-88.2)	67.2 (46.3-83.9)	68.3 (48.5-85.6)

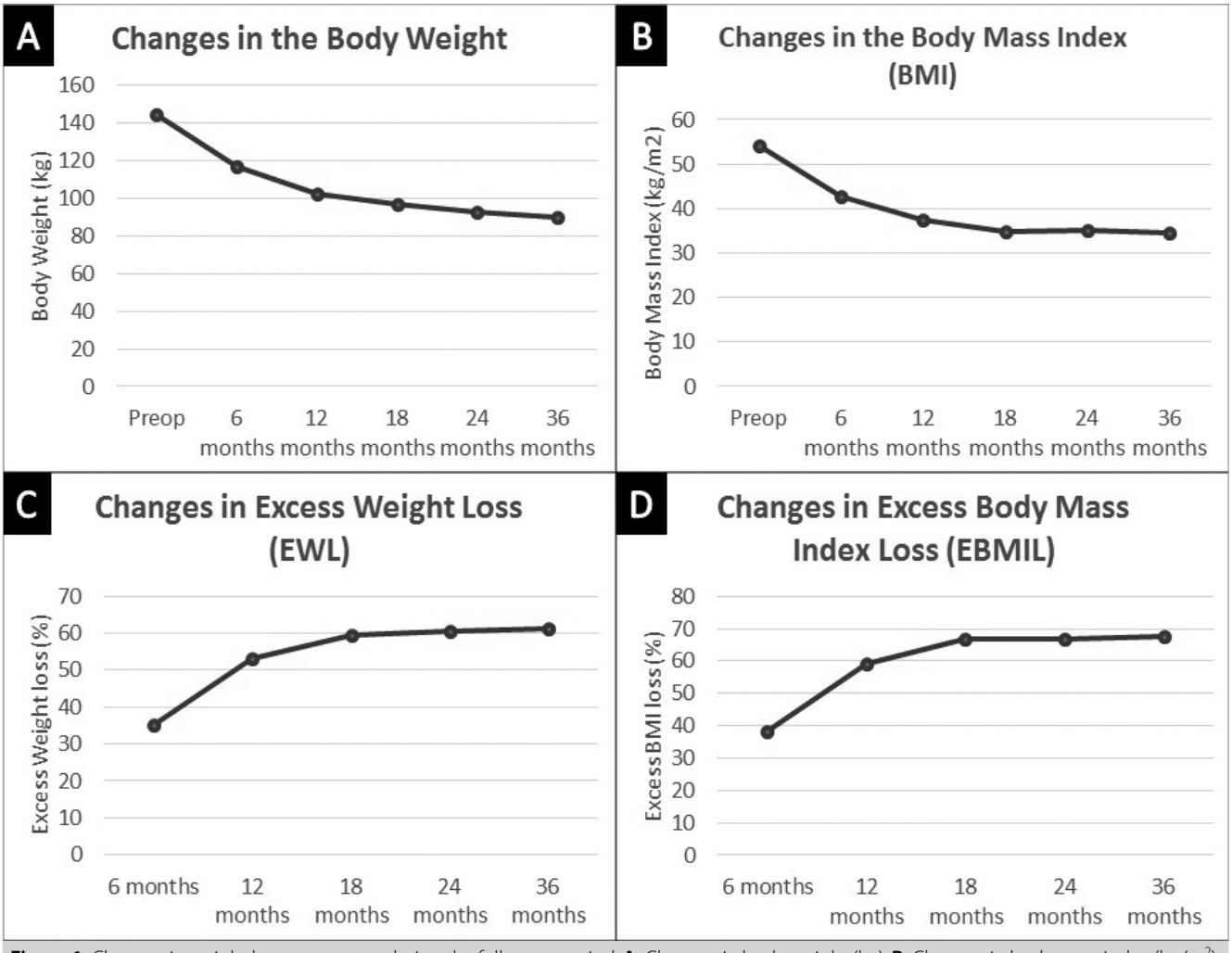

Figure 1. Changes in weight loss parameters during the follow up period. **A.** Changes in body weight (kg). **B.** Changes in body mass index (kg/m^2). **C.** Changes in excess weight loss (%). **D.** Changes in excess body mass index loss (%).

Hypertension

Fifteen patients (37.5%) of the study patients had hypertension. Changes in hypertension in the study patients are shown in Table 4. At one year of postoperative follow up, complete remission of hypertension was achieved by 6/11 patients (54.5%) and improvement of hypertension was achieved by 4/11 patients (36.4%). At 18 months of postoperative follow up, one patient (1/9-11.1%) showed recurrence of hypertension after complete remission and required re-use of antihypertensive medications. At two years of postoperative follow up, complete remission of hypertension was achieved in 3/7 patients (42.9%) and improvement of hypertension was achieved by 3/7 patients (42.9%). At three years of postoperative follow up, complete remission of hypertension was achieved in 4/7 patients (57.1%), and improvement of hypertension was achieved by 2/7 patients (28.6%).

Obstructive Sleep Apnea Syndrome and Osteoarthritis

In our study, we depended on a subjective method to evaluate the improvement of OSAS and osteoarthritis symptoms. All

Table 4. Changes in diabetes mellitus and hypertension status during the follow up period

	6 months	12 months	18 months	24 months	36 months
Change in Diabetes Mellitus Status During Follow-up (n= 17)					
Patients number	17/17 (100%)	17/17 (100%)	13/17 (76.5%)	10/17 (58.8%)	10/17 (58.8%)
Patients available on follow up	13/17 (76.5%)	13/17 (76.5%)	9/13 (69.2%)	7/10 (70%)	7/10 (70%)
Complete remission	6 (46.2%)	8 (61.5%)	6 (66.7%)	6 (85.7%)	7 (100%)
Improvement	6 (46.2%)	4 (30.8%)	3 (33.3%)	1 (14.3%)	0
Unchanged	1 (7.7%)	1 (7.1%)	0	0	0
Change in Hypertension Status During Follow-up (n= 15)					
Patients number	15/15 (100%)	15/15 (100%)	13/15 (86.7%)	10/15 (66.7%)	10/15 (66.7%)
Patients available on follow up	11/15 (73.3%)	11/15 (73.3%)	9/13 (69.2%)	7/10 (70%)	7/10 (70%)
Complete remission	1 (9.1%)	6 (54.5%)	4 (44.4%)	3 (42.9%)	4 (57.1%)
Improvement	9 (81.8%)	4 (36.4%)	3 (33.4%)	3 (42.9%)	2 (28.6%)
Unchanged	1 (9.1%)	1 (9.1%)	1 (11.1%)	0	0
Recurrence	0	0	1 (11.1%)	1 (14.3%)	1 (14.3%)

patients (100%) had improvement of OSAS symptoms after 12 months follow up, while 28 patients (90.3 %) had improvement of osteoarthritis symptoms after 12 months follow up. Only three patients (9.7%) had unchanged status of osteoarthritis symptoms. These patients had previous history of knee and hip arthropathy and were planned for knee and hip joint replacement.

Reflux Esophagitis

Eighteen patients (45%) accepted to undergo UGIE with biopsy and evaluation of acidic and biliary reflux. Thirteen patients (32.5%) refused to undergo this evaluation protocol as they did not complain from any reflux symptoms, eight patients (15%) were missed follow up, and one patient (2.5%) underwent undoing of LOAGB at the time of the study. Results of endoscopic evaluation, ambulatory PH monitoring and biliary reflux monitoring (BILITEC 2000) are shown in Table 5.

According to ambulatory PH recorder, all examined patients had negative results. The median DeMeester score was 2 (0.3-8.7), so, there was no acidic reflux esophagitis in all examined patients. Nevertheless, according to ambulatory biliary reflux monitoring system, 17/18 patients (94.1%) had positive result and only 1/18 patient (5.9%) had negative result. Only 6/18 patients (33.3%) had symptoms of biliary reflux and had positive symptom index on bilimetric study Figure 2.

Regarding UGIE, all patients had just gastritis and reflux esophagitis with no evidence of gross changes or any signs of malignancy Figure 3. Also, pathological examination of all routine biopsies did not show any sign of foveolar hyperplasia, atypia or malignancy Figure 4.

Quality of Life

Thirty-four patients, who were approached at the 12th month postoperatively, were asked to fill a quality of life questionnaire (BAROS Score). The commonest score was "very good", which was found in 18/34 patients (55%). Results of BAROS quality of life questionnaire are shown in Table 6.

Late Complications

After a median follow up period of 18 months (6-36 months), 12/40 patients (30%) experienced late postoperative complications. Malnutrition, in the form of protein malnutrition, occurred in 2 patients (5%). One patient was managed conservatively by strict nutritional support and the other patient required undoing of LOAGB. Two patients (5%) presented with iron deficiency anemia and were managed conservatively by oral iron therapy.

Biliary reflux, as defined by combined positive symptoms and Bilitek results, occurred in six patients (15%). All patients were managed by medical therapy with proton pump inhibitors, prokinetics and ursodeoxycholic acid. No patients required any revisional surgery for biliary reflux.

Marginal ulcer occurred in one patient (2.5%). This patient had long history of analgesics intake for chronic lumbar disc prolapse. She was complaining from epigastric pain and diagnosed by UGIE at 12 months postoperatively. She was managed medically with proton pump inhibitors.

Failure of weight loss occurred in one patient (2.5%) at 12 months postoperatively. Investigation revealed the presence of gastro-gastric fistula. The patient underwent completion of LOAGB and division of the gastro-gastric fistula.

Table 5. Results of BILITEC study, ambulatory PH monitoring, and upper gastrointestinal endoscopy of the study patients

Variables	Data
Ambulatory biliary reflux monitoring (BILITEC 2000)	
Bilirubin percentage	70.2 (0.5-90%)
Bilitek symptom index (%)	
o 0	12 (66.6%)
o 40	1 (5.55%)
o 50	1 (5.55%)
o 100	4 (22.22%)
Bilitek result	
o Positive	17 (94.1%)
o Negative	1 (5.9%)
Ambulatory PH monitoring	
Total reflux	
o 0	1 (5.55%)
o 0.1	13 (72.2%)
o 0.2	3 (16.66%)
o 0.3	1 (5.55%)
DeMeester score	2 (0.3-8.7)
PH metry symptom index (%)	
o 0	18 (100%)
PH metry result	
o Positive	0
o Negative	18 (100%)
Upper Gastrointestinal Endoscopy	
Esophagus	
o Normal	2 (5%)
o Hyperemia	7 (17.5%)
o Grade I reflux	3 (7.5%)
o Grade II reflux	5 (12.5%)
o Grade III reflux	1 (5.6%)
Cardia	
o Normal	6 (33.3%)
o Wide	9 (50%)
o Wide with small sliding hiatus hernia	3 (16.7%)
Gastric tube	
o Mild gastritis	12 (66.7%)
o Severe gastritis	6 (33.3%)
Gastro-jejunostomy stoma	
o Normal	9 (50%)
o Hyperemia	9 (50%)
Pathological Results of Endoscopic Biopsies	
Esophageal biopsy	
o Normal	4 (22.2%)
o Inflammatory	14 (77.8%)
Gastric pouch biopsy	
o Normal	3 (16.7%)
o Inflammatory	15 (83.3%)
Stoma biopsy	
o Normal	4 (22.2%)
o Inflammatory	14 (77.8%)

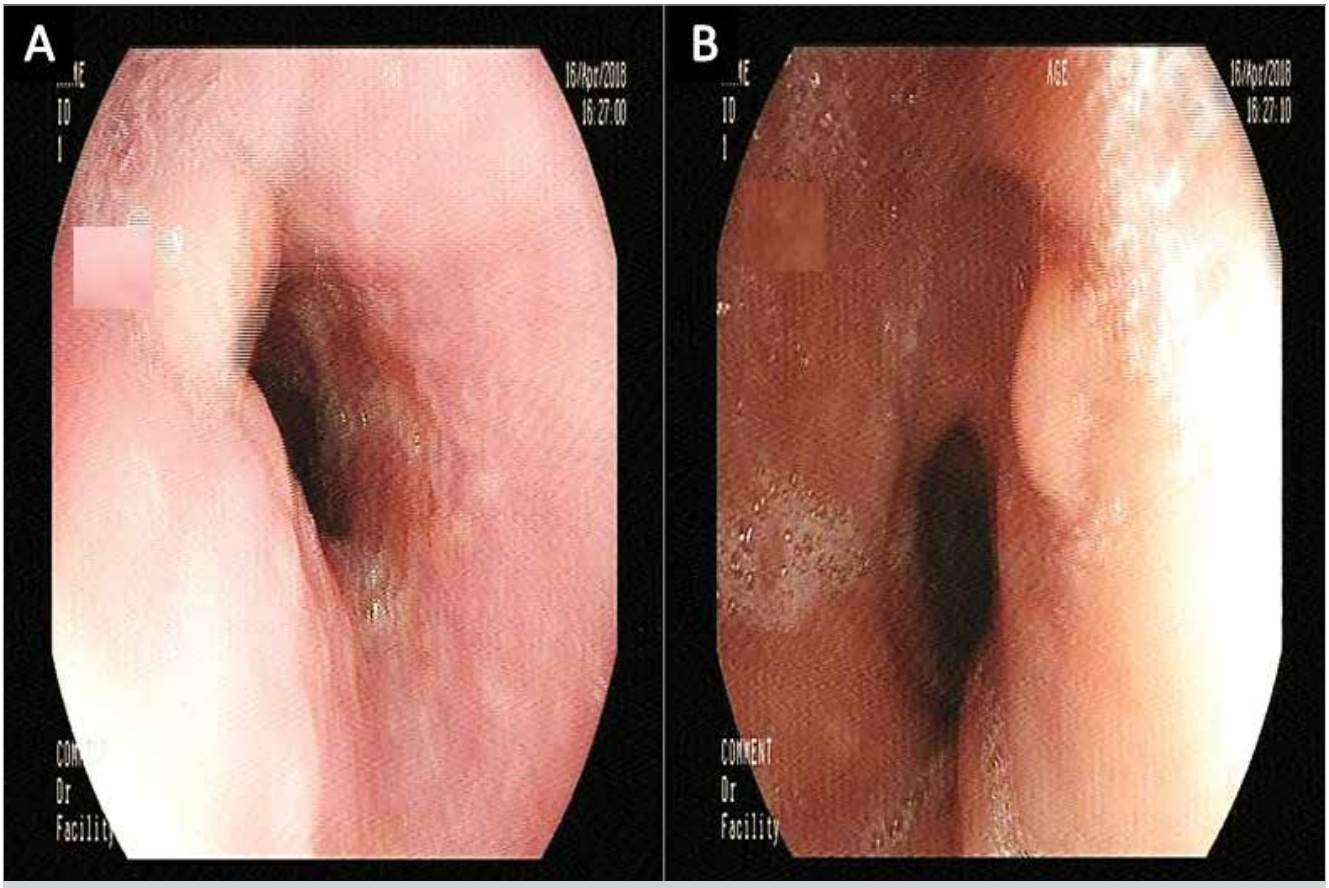

Figure 2. Line Graph from result of ambulatory PH monitoring and ambulatory biliary reflux monitoring (BILITEC 2000) revealing positive symptoms index (arrows) in alkaline PH and combined with rising of percentage of bilirubin in distal esophagus.

DISCUSSION

OAGB was first described by Rutledge as a simple, safe, and easy procedure with short operative time (6). Studies have shown that MGB is effective in accomplishing adequate weight reduction and improvement of obesity related comorbidities which are comparable to the results of RYGB. Moreover, MGB is associated with shorter learning curve, shorter operation time, less development of major surgical complications, and improvement of the quality of life of patients (7,8,13-15).

In this study, we evaluated the short and intermediate term outcomes of our initial experience of LOAGB as a primary weight loss procedure for patients with morbid obesity. LOAGB is not a commonly selected procedure among our morbidly obese patients who prefer to undergo a laparoscopic sleeve gastrectomy or its modifications. This is attributed to the patients' worries regarding failure of achievement of satisfactory weight loss and the development of severe biliary reflux. In our surgical practice, we followed the original technique proposed by Rutledge for LOAGB (6). We used to measure the length of the bypassed limb from duodeno-jejunal junction and its length varied from 150 cm to 200 cm according to patient age, BMI and associated comorbidities. However, the length of the bypassed limb is greatly heterogenous between different studies (16,17). Median operative time in our study was 120 minutes, which is relatively longer than operation time reported by other studies (6,16,18,19). This could be explained by the early experience of our team in performing LOAGB. With accumulation of surgical experience regarding LOAGB, the operation time became shorter. The operation time decreased to a median of 90 minutes in the last 10 cases of the current series.

Previous studies regarding LOAGB have reported postoperative morbidity rate ranging between 5.9 to 13.5%, which is less than reported for RYGB (6,8,19,20). In our study, only one patient (2.5%) developed postoperative morbidity in the form of internal hemorrhage requiring re-operation to control bleeding from staple line. The lower incidence of morbidity rate in our study can be attributed to the small number of cases included in our study. Also, we included cases who only had a primary weight loss procedure while revisional bariatric cases were excluded.

Leakage following bariatric procedures remains the most serious complication as it is associated with high incidence of

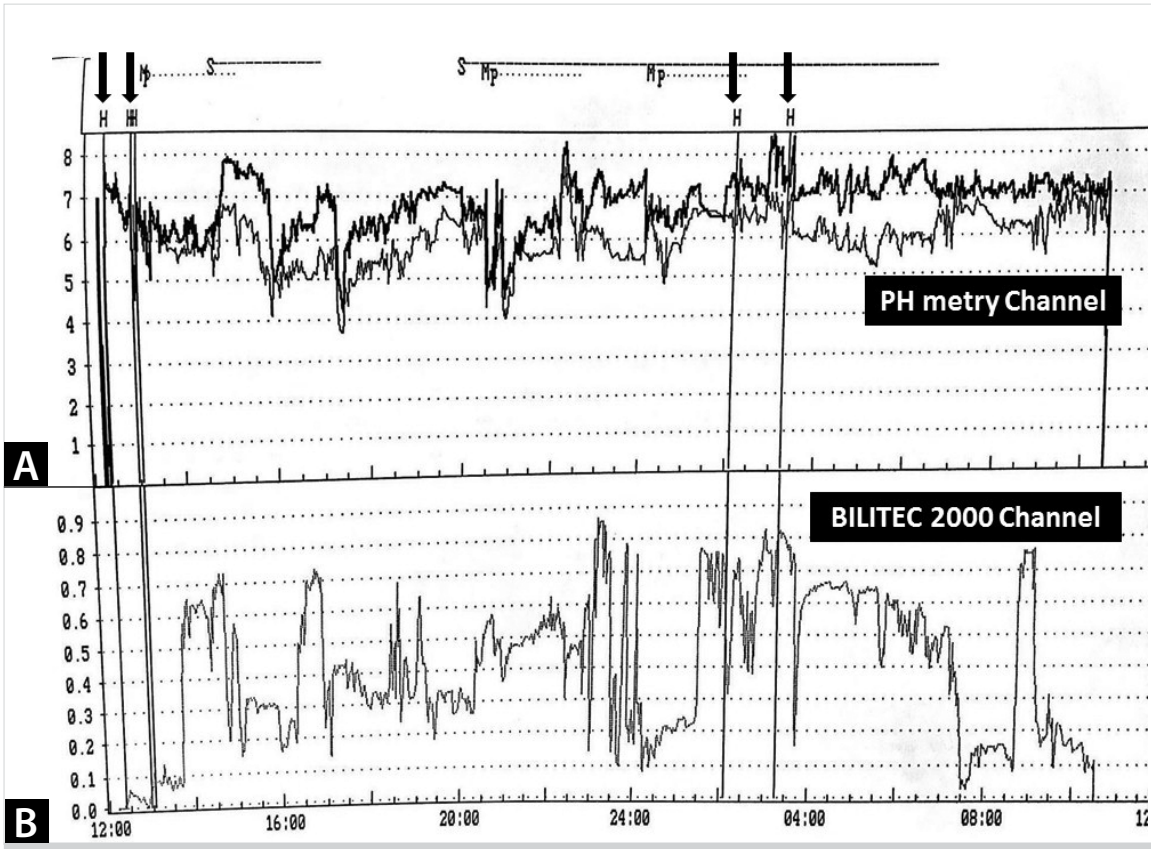

Figure 3. Endoscopic view showing: **A.** Mild inflamed mucosa of the lower esophagus. **B.** Diffusely inflamed mucosa of the gastric tube.

postoperative mortality (21). Incidence of leakage after LOAGB varies between 0.1-1.08%, which is lower when compared to RYGB and sleeve gastrectomy. It can occur from gastro-jejunostomy, gastric pouch or excluded stomach (6,17,19). In the current study we did not experience any cases of postoperative leakage.

LOAGB offers effective and long-term weight loss results with almost 75% of EWL at the first year postoperatively (6,22,23). Also, it provides comparable EWL to RYGB (72.9% vs 60.1%) (8). In the current study, LOAGB achieved good weight loss in most patients, with 92.5% of patients achieving more than 50% of EWL at their first year. However, the percentage of EWL at first year was only 53.1%, which could be attributed to our initial experience with the procedure so we did not go for measurement of the whole small bowel length. Thus, the exact percentage of the bypassed bowel was uncertain. In addition, we selected LOAGB for patients with relatively high preoperative BMI. Median preoperative BMI among our patients was 54.1 kg/m^2 (41.4-84.4 kg/m^2).

Bariatric surgery is effective in not only weight loss but also remission of obesity associated comorbidities such as DM and hypertension (24). LOAGB alters the gastrointestinal hormonal status, and results in improvement of most of the associated comorbidities, especially DM, and this considered one of the most attractive advantages reported for LOAGB. Complete remission of type II DM ranges between 83% to 90% as reported in large LOAGB series (6,8,18,19,20,23,25,26). In the current study, complete remission rate of type II DM was 85.7% after two years of follow-up and reached 100% after three years of follow up. Similarly, systemic hypertension remission. Previous series of LOAGB have shown remission rate of hypertension after LOAGB ranging between 29% to 91.6% (18-20,23). In the current study, remission rate of hypertension was 57.1%, which is very similar to the series reported by Chevallier et al. (20).

Biliary reflux remains the most controversial problem of LOAGB with increased hazard of esophageal or gastric mucosal changes (22). In the current study, we evaluated the impact of biliary reflux on gastric tube and lower esophagus by combination of UGIE, ambulatory pH metry, and ambulatory biliary reflux monitoring (BILITEC 2000). Six patients (15%) in our study experienced bile reflux based on combinations of patient symptoms, results of bilimetric studies, and UGIE. Musella et al. had 28 patients (4%) with biliary reflux but only four patients required revisional surgery (25). Chevallier et al. had lower rate of biliary

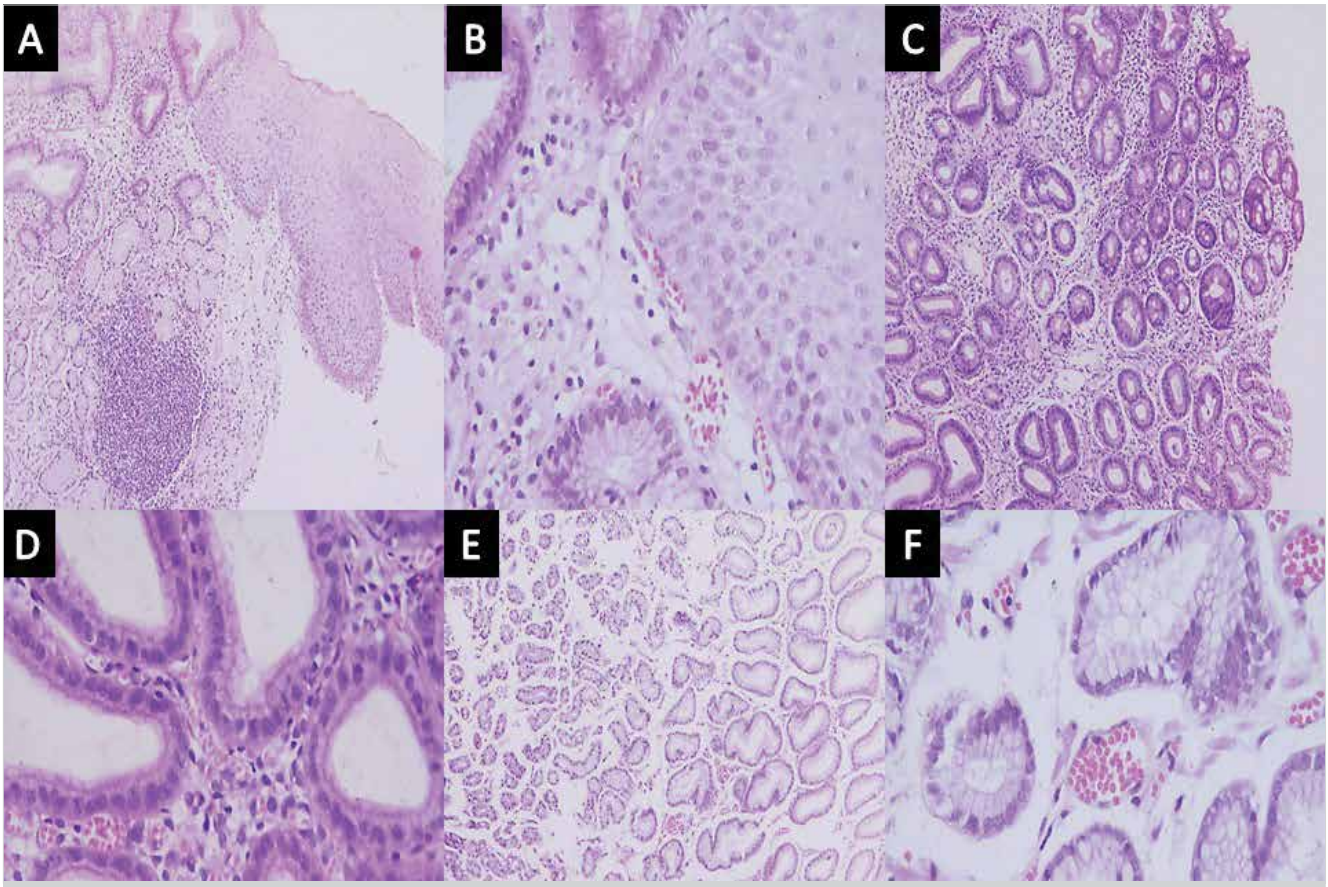

Figure 4. Photomicrograph of routine endoscopic biopsies: **A, B.** Biopsies from cardio-esophageal junction showing mild reflux esophagitis. **A.** The esophageal mucosa showing mild basal cell hyperplasia with elongation of lamina propria papillae. The lamina shows lymphoplasmacytic infiltrate and lymphoid aggregate (H&E ×200). The lamina shows lymphoplasmacytic infiltrate' mild edema and congested capillaries (H&E ×400). **C, D.** Biopsies from the gastric tube showing mild superficial gastritis. **C.** The lamina shows mild to moderate mixed inflammatory infiltrate and congested capillaries (H&E ×200). **D.** The lamina shows mild to moderate mixed lymphoplasmacytic infiltrate with edema and congested capillaries (H&E ×400). **E, F.** Biopsies from the gastro-jejunostomy stoma showing mild inflammatory changes. **E.** Multiple snips of gastric mucosa with lamina showing mild mixed inflammatory infiltrate and congested capillaries (H&E ×200). **F.** The lamina shows mild lymphoplasmacytic infiltrate with edema and congested capillaries (H&E ×400).

Table 6. BAROS quality of life score of the study patients at 12 months postoperatively

BAROS Score	Number of patients (n= 34)
Fair	4 (11.7%)
Good	9 (26.5 %)
Very good	18 (53%)
Excellent	3 (8.8 %)

reflux (0.7%) but all of their patients required conversion to RYGB (20). On the other hand, Carbajo et al. had no incidence of biliary reflux in their study and they explained this by their specific technique for one anastomosis gastric bypass which differs from LOAGB by its anti-reflux mechanism (26). The incidence of biliary reflux in the current study is relatively higher than reported by other series, which could be explained by our interest to document biliary reflux by both subjective and objective methods. Furthermore, we did not combine our technique with any anti-reflux procedures. It should be noted that all of our cases had mild degree of biliary reflux and were managed medically without the need for any revisional surgeries.

Several late postoperative complications have been reported after LOAGB including marginal ulcers, failure of weight loss and severe malnutrition. Anastomotic marginal ulcers are one of the most dangerous complications after bypass surgeries. Incidence

of marginal ulcer with LOAGB is lower than RYGB as bile reflux is buffering the acid ulcerating action (20). Previous studies regarding LOAGB have reported incidence ranging between 0.2% and 4% (6,18-20). In the current study, only one patient (2.5%) had marginal ulcer and managed medically. This patient had long history of NSAIDs due to chronic vertebral disc prolapse.

Failure of weight loss is defined by achieving EWL <50% at the first year post-operatively (27). This is mostly associated with the early learning curve, and is due to pouch size and bypassed loop length (20). In the current study, only one patient (2.5%) had failed to lose >50% of EWL due to the presence of gastro-gastric fistula. The patient underwent laparoscopic completion of LOAGB and division of fistula. On the other hand, malnutrition is one of the serious complications after LOAGB. The length of bypassed jejunal loop and its malabsorption effect has always been claimed to be the cause of malnutrition and excessive weight loss after LOAGB (28). Incidence of malnutrition after LOAGB varied from one surgeon to other and their management also varied (25). Reported incidence of malnutrition after LOAGB varies between 0.1% to 0.2% (6,18-20). All reported cases experienced severe malnutrition and required revisional surgery. In the current study, two patients (5%) were complicated with malnutrition. One patient (2.5%) required undoing of LOAGB, while the other (2.5%) was managed conservatively with strict nutritional program with dietician. The higher incidence of malnutrition in our study is attributed to many factors like rough method of measurement of the bypassed limb percentage, the socioeconomic status of the patients in our country and their strict compliance with postoperative multivitamins and nutritional supplements.

Our study has several limitations including that it is a retrospective and single center experience. Also, our study is limited by the small number of patients included but as explained before, this is our initial experience for a non-popular procedure among our obesity patients. Final limitation is the short duration of follow up of our patients.

CONCLUSION

In conclusion, LOAGB is a safe and efficient bariatric procedure with acceptable morbidity rate. LOAGB is not associated with a significant incidence of postoperative biliary reflux, or pathological changes in the esophagogastric mucosa. A future prospective comparative study including a larger number of patients is ongoing which will help to elucidate the merits and drawbacks of LOAGB.

Ethics Committee Approval: The approval for this study was obtained from Mansoura University Institutional Research Board (Proposal No: MS.18.03.82, Date: 25.03.2018).

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Conflict of Interest: The authors have no conflicts of interest to declare.

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REFERENCES

1. *Dietz WH, Baur LA, Hall K, Puhl RM, Taveras EM, Uauy R, et al. Management of obesity: improvement of health-care training and systems for prevention and care. Lancet 2015; 385(9986): 2521-33.*
2. *Yanovski SZ, Yanovski JA. Long-term drug treatment for obesity: a systematic and clinical review. JAMA 2014; 311(1): 74-86.*
3. *Sjostrom L, Lindroos AK, Peltonen M, Torgerson J, Bouchard C, Carlsson B, et al. Lifestyle, diabetes, and cardiovascular risk factors 10 years after bariatric surgery. N Engl J Med 2004; 351(26): 2683-93.*
4. *Arterburn DE, Courcoulas AP. Bariatric surgery for obesity and metabolic conditions in adults. BMJ 2014; 349: 3961.*
5. *Perna MJ, Byrne TK, Pullattrana CC. Bariatric surgery for treatment of obesity. In: Shiromani PJ, Horvath T, Redline S, Cauter EV (eds). Sleep Loss and Obesity: Intersecting Epidemics. New York, Springer Media. 2012.*
6. *Rutledge R. The mini-gastric bypass: experience with the first 1,274 cases. Obes Surg 2001; 11(3): 276-80.*
7. *Mahawar KK, Carr WR, Balupuri S, Small PK. Controversy surrounding 'mini' gastric bypass. Obes Surg 2014; 24(2): 324-33.*
8. *Lee Wei-Jei, Ser Kong-Han, Lee Yi-Chih, Tsou Jun-Juin, Chen Shu-Chun, Chen Jung-Chien. Laparoscopic vs. minigastric bypass for the treatment of morbid obesity: a 10-year experience. Obes Surg 2012; 22(12): 1827-34.*
9. *Mahawar KK, Jennings N, Balupuri S, and Small PK. Sleeve Gastrectomy and gastro-oesophageal reflux disease: a complex relationship. Obes Surg 2013; 23(7): 987-91.*
10. *Gastrointestinal surgery for severe obesity: National Institutes of Health Consensus Development Conference Statement. Am J Clin Nutr 1992; 55(2 Suppl): 615S-619S.*
11. *Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004; 240(2): 205-13.*
12. *Brethauer SA, Kim J, El Chaar M, Papasavas P, Eisenberg D, Rogers A, et al. Standardized outcomes reporting in metabolic and bariatric surgery. Obes Surg 2015; 25(4): 587-606.*
13. *Buchwald H, Oien DM. Metabolic/bariatric surgery worldwide 2011. Obes Surg 2013; 23(4): 427-36.*
14. *Wei-Jei L, Po-Jui Y, Wang W, Tai-Chi C, Po-Li W, Ming-Te H, et al. Laparoscopic versus mini-gastric bypass for the treatment of morbid obesity: a prospective randomized controlled clinical trial. Ann Surg 2005; 242(1): 20-8.*
15. *Mahawar KK, Kumar P, Carr WR, Jennings N, Schroeder N, Balupuri S, et al. Current status of minigastric bypass. J Minim Access Surg 2016; 12(4): 305-10.*
16. *Noun R, Skaff J, Riachi E, Daher R, Antoun NA, Nasret M. One thousand consecutive mini-gastric bypass: short-and long-term outcome. Obes Surg 2012; 22(5): 697-703.*

17. *Carbajo MA, Luque-de-León E. Mini-gastric bypass/one-anastomosis gastric bypass-standardizing the name. Obesity Surgery 2015; 25(5): 858-9.*

18. *Taha O, Abdelaal M, Abozeid M, Askalany A, Alaa M. Outcomes of omega loop gastric bypass, 6-years experience of 1520 cases. Obes Surg 2017; 27(8): 1952-60.*

19. *Kular KS, Manchanda N, Rutledge R. A 6-year experience with 1,054 mini-gastric bypasses-first study from Indian subcontinent. Obesity Surgery 2014; 24(9): 1430-5.*

20. *Chevallier JM, Arman GA, Guenzi M, Rau C, Bruzzi M, Beaupel N, et al. One thousand single anastomosis (omega loop) gastric bypasses to treat morbid obesity in a 7-year period: outcomes show few complications and good efficacy. Obes Surg 2015; 25(6): 951-8.*

21. *Alizadeh RF, Li S, Inaba C, Penalosa P, Hinojosa MW, Smith BR, et al. Risk factors for gastrointestinal leak after bariatric surgery: MBASQIP analysis. JACS 2018; 227(1): 135-41.*

22. *Carbajo MA, Jiménez JM, Luque-de-León E, Cao María-José, López M, García S, et al. Evaluation of weight loss indicators and laparoscopic one-anastomosis gastric bypass outcomes. Scientific Reports 2018; 8(1): 1961.*

23. *Mahawar KK, Parmar C, Carr WR, Jennings N, Schroeder N, Small PK. Impact of biliopancreatic limb length on severe protein-calorie malnutrition requiring revisional surgery after one anastomosis (mini) gastric bypass. J Minim Access Surg 2018; 14(1): 37.*

24. *Benaiges D, Más-Lorenzo A, Goday A, Ramon JM, Chillarón JJ, Pedro-Botet J, et al. Laparoscopic sleeve gastrectomy: more than a restrictive bariatric surgery procedure? World Journal of Gastroenterology 2015; 21(41): 11804-14.*

25. *Musella M, Susa A, Manno E, de Luca M, Greco F, Raffaelli M, et al. Complications following the mini/one anastomosis gastric bypass (MGB/OAGB): a multi-institutional survey on 2678 patients with a mid-term (5 years) follow-up. Obes Surg 2017; 27(11): 2956-67.*

26. *Carbajo MA, Luque-de-León E, Jiménez JM, Ortiz-de-Solórzano J, Pérez-Miranda M, Castro-Alija MJ. Laparoscopic one-anastomosis gastric bypass: technique, results, and long-term follow-up in 1200 patients. Obes Surg 2017; 27(5): 1153-67.*

27. *Halverson JD, Zuckerman GR, Koehler RE, Gentry K, Michael HE, K DeSchryver-Kecskemeti K. Gastric bypass for morbid obesity: a medical-surgical assessment. Ann Surg 1981; 194(2): 152-60.*

28. *Rutledge R, Kular K, Manchanda N. The mini-gastric bypass original technique. Int J Surg 2019; 61: 38-41.*

ORİJİNAL ÇALIŞMA-ÖZET
Turk J Surg 2021; 37 (4): 324-335

Morbid obez hastalarda laparoskopik tek anastomoz gastrik bypass sonrası erken ve orta dönem sonuçları: Tek merkez deneyimi

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ÖZET

Giriş ve Amaç: Bu çalışmada, birincil kilo verme işlemi olarak laparoskopik tek anastomozlu gastrik bypass (mini gastrik bypass) (LTAGB) sonuçlarımızı değerlendirmeyi amaçladık. Üst endoskopi (ÜGSE), ambulatuvar pH metre ve ambulatuvar biliyer reflü takibi kombinasyonu ile biliyer reflü etkisini değerlendirdik.

Gereç ve Yöntem: Temmuz 2015 ve Ağustos 2018 arasında LTAGB cerrahisi geçiren hastaların verileri incelendi.

Bulgular: Ardışık 40 hasta çalışmaya dahil edildi. Otuz yedi (%92,5) hastanın obezite ilişkili komorbiditesi mevcuttu. Ortanca takip süresi 18 aydı (6-36 ay). Birinci, ikinci ve üçüncü yıl fazlalık olan kilo kaybı yüzdeleri sırasıyla %53,1, %60,4 ve %62,3 idi. Üç yıllık takip süresince 7/7 hastada (%100) diabetes mellitus tamamen düzelirken hipertansiyon ise 4/7 hastada (%57,1) düzeldi. Rutin biyopsi ve asidik ve biliyer reflü ile birlikte on 18 hasta (%45) ÜGSE yaptırmayı da kabul etti. Ambulatuvar pH metre ve ortanca 2'lik DeMeester skoru (0,3-8,7) ile tüm incelenen hastalarda negatif asit reflü sonuçları elde edildi. Ambulatuvar biliyer reflü takibine göre, 17/18 hastada (%94,1) pozitif sonuç tespit edildi. Sadece 6/18 (%33,3) hastada biliyer reflü semptomları ve bilimetrik analizde pozitif semptom indeksi mevcuttu. ÜGSE açısından gros mukozal değişiklik gösteren herhangi bir belirti olmadan tüm hastalarda sadece gastrit ve reflü özofajit vardı. Rutin biyopsilerin hepsine uygulanan patolojik incelemede foveolar hiperplazi, atipi veya malignite belirtisi yoktu.

Sonuç: LTAGB, kabul edilebilir mortalite oranıyla güvenilir ve etkin bir bariyatrik işlemdir. LTAGB ciddi biliyer reflü veya özofagogastrik mukozada patolojik değişiklikler ile ilişkili değildir.

Anahtar Kelimeler: Tek anastomozlu gastrik bypass, morbid obezite, erken sonuçlar, biliyer reflü

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ORIGINAL ARTICLE
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Impact of curative parathyroidectomy on left ventricular functions assessed with 2D ECHO and MUGA study

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ABSTRACT

Objective: Primary hyperparathyroidism (PHPT) is associated with increased cardiovascular morbidity and mortality with inconsistent results on the reversibility of cardiovascular changes after parathyroidectomy (PTx). The present study was undertaken to evaluate both structural and functional cardiac changes and their reversal after PTx in patients with PHPT.

Material and Methods: Thirty patients of symptomatic PHPT without cardiovascular risk factors were evaluated prospectively by means of 2D echocardiography (ECHO) and Multigated Acquisition (MUGA) study before surgery and six months after curative parahyroidectomy.

Results: Nine of 30 patients had hypertension which improved in two after PTx (p 0.20). Two patients had left ventricle hypertrophy on 2D ECHO preoperatively which improved after PTx (p< 0.001). Left ventricular ejection fraction (LVEF) did not show significant change before and after PTx on 2D ECHO. Nine out of 30 patients had hypertension which improved in two after PTx (p 0.20). Two patients with left ventricle hypertrophy on 2D ECHO preoperatively improved after PTx (p< 0.001). Left ventricular ejection fraction (EF) did not depict significant change before and after PTx on 2D ECHO. Whereas, four out of six patients with preoperative EF <50% representing systolic dysfunction on MUGA study showed improvement after PTx. On 2D ECHO, eight patients depicted diastolic dysfunction which improved in six patients after curative surgery (p= 0.07). However, on MUGA study, 13 patients presented with tTPF >180 ms indicating diastolic dysfunction, of which ten showed improvement after PTx (p= 0.007).

Conclusion: The present study analyzed preoperative and postoperative cardiac function using both 2D ECHO and MUGA study. MUGA study provided a more objective assessment of the cardiac function by determining left ventricular ejection fraction and diastolic dysfunction.

Keywords: Muga study, primary hyperparathyroidism, left ventricular dysfunction, 2D ECHO, parathyroidectomy, cardiac manifestations

INTRODUCTION

Primary hyperparathyroidism (PHPT) is the third most common endocrine disorder characterized by raised serum calcium and parathyroid hormone (PTH) levels; and is mainly asymptomatic at the time of diagnosis in western countries (1,2). However, in India, most of the PHPT patients are symptomatic with nephrolithiasis, osteoporosis, cardiovascular disorders and other symptoms related to hypercalcemia (3).

Hypercalcemic PHPT is associated with increased cardiovascular morbidity and mortality as elevated levels of both PTH and calcium have direct positive ionotropic effect on the heart (4). Patients with PHPT may have both structural and functional cardiovascular changes like increased left ventricular mass index and impaired left ventricular function (diastolic dysfunction, abnormal left ventricular ejection fraction). There are conflicting reports for the clinical significance of cardiovascular co-morbidities in PHPT as according to the 4th international guidelines for the management of asymptomatic PHPT, cardiovascular involvement is not an indication for parathyroidectomy (PTx) (5). In addition; there are inconsistent results on the reversibility of cardiovascular changes after PTx (6-8).

Cardiovascular changes in PHPT have been assessed by 2D echocardiography (2D ECHO) in various studies. Although, 2D ECHO is easy to perform and does not impart any radiation to the patient, the procedure is highly operator-dependent and has several limitations, especially in obese patients. Multigated Acquisition (MUGA) study is a noninvasive established modality for the evaluation of left ventricle systolic and diastolic function. It is more specific in detecting regional wall motion

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abnormality with a specificity of more than 90% even in obese patients. It has been used in patients with known or suspected coronary heart disease, lesions in heart valves, congestive heart failure, patients taking cardiotoxic drugs to detect abnormalities in ventricular wall motion or systolic dysfunction. Therefore, the aim of this study was to evaluate both structural and functional cardiac changes in patients of PHPT without cardiovascular risk factors, using 2D ECHO and MUGA study. The study also aimed to assess any improvement in these parameters after curative PTx.

MATERIAL and METHODS

This prospective study was conducted in the department of General Surgery and department of Nuclear Medicine from July 1st, 2018 to December 31st, 2019. Thirty patients who underwent curative PTx for PHPT were included after obtaining ethics approval from the institute (INT/IEC/2019/001000). A written informed consent was taken from all patients. Patients with pre-existing cardiac disease and a body mass index of >28 kg/m^2 were excluded from the study.

All patients underwent 2D echocardiography and MUGA study prior to surgery and six months after PTx. Echocardiography was performed using Philips EPIQ 7 ultrasound machine by an experienced cardiologist. On 2D ECHO, mitral and aortic valve calcification, left ventricular hypertrophy (LVH), left ventricular ejection fraction (EF), inter ventricular septal thickness (IVST), and posterior wall thickness (PWT) were assessed. LVH was diagnosed using IVST and PWT on 2D ECHO; 9-11 mm thickness was considered normal, 12-13 mm was considered as mild LVH, 14-17 mm was considered as moderate LVH and >17 mm was considered as severe LVH. Systolic dysfunction was considered if EF was <50%. Diastolic dysfunction was diagnosed on 2D ECHO by measuring early filling to atrial filling ratio (E/A).

MUGA Study Protocol

Patients were given potassium perchlorate salt (10 mg/kg body weight) orally with intravenous injection of 1 ml of DTPA. After a waiting period of 20 minutes, patients were injected with 20 mCi of ^{99m}Tc sodium pertechnetate. Imaging was obtained with a gamma camera after 20 minutes of injection to achieve the equilibrium. ECG gating was carried out using R wave as a trigger. The cardiac cycle was divided into 32 frames. Scan was acquired in the left anterior oblique with best septal view (in which the interventricular septum is best visualized delineating both right and left ventricular blood pool). The review and analysis of the data were undertaken both by qualitative and quantitative modes with regard to the ventricular contraction and wall motion. After initial visual assessment, a region of interest (ROI) was drawn around the left ventricular blood pool with background ROI to generate the generated left ventricular ejection fraction, peak filling rate (PFR) and time to peak filling (tTPF) with the aid of software. PFR was expressed in EDV/s, and tPFR was expressed in ms. Diastolic dysfunction was assessed on MUGA study by measuring PFR and tTPF. Diastolic dysfunction was considered if PFR was <2.5 EDV/s and tTPF was >180 ms.

Parathyroidectomy was considered curative if patient's serum calcium and PTH levels stayed in the normal range six months after PTx.

Stastistical Analysis

Data was analyzed using SPSS (version 26). All quantitative variables were estimated using measures of mean, median, standard deviation (SD) and interquartile range (IQR). Normality of data was checked by measures of skewness and Kolmogorov Smirnov tests of normality. For normally distributed data, mean was compared using Student's T-Test. For skewed data, Mann-Whitney test was applied. Categorical variables were described as frequencies and proportions. Proportions were compared using Chi square or Fisher's exact test. All p values were considered significant when they were ≤0.05.

RESULTS

Thirty PHPT patients with a single gland disease were enrolled in the study. Mean age was determined to be 49.87 years (49.8 ± 10.9), in the range of 25-73 years. In this group, only three were males while 27 were female patients. All patients of PHPT were symptomatic for the disease; majority had nephrolithiasis (80%) followed by bone disease (66.6%) (Table 1). Preoperative median serum PTH was 1018 pg/ml (1st IQR 169, 3rd IQR 1514), median serum calcium was 11.88 mg% (1st IQR 11.03, 3rd IQR 13.42) and median vitamin-D was 28.13 ng/ml. All underwent curative PTx with median serum PTH of 33.5 pg/ml (1st IQR 23, 3rd IQR 41) and median serum calcium of 9.15 mg% (1st IQR 8.9, 3rd IQR 9.7) after six months of PTx (Table 2).

Table 1. Demographic profile of patients of Primary Hyperparathyroidism (n= 30)

Age (years)	49.87+10.9
Sex (M:F)	3:27
Symptoms (n,%)	
-Renal stones	24 (80)
-Bone pain	20 (66.6)
-Fractures	06 (20)
-Pancreatitis	01 (3.3)
-Acid peptic disease	01 (3.3)
-Behavioral problems	01 (3.3)
Serum PTH (pg/ml) Median (1st IQR, 3rd IQR)	1018 (169, 1514)
Serum Calcium (mg/dl) Median (1st IQR, 3rd IQR)	11.88 (11.03, 13.42)
Vitamin-D (ng/ml) Median (1st IQR, 3rd IQR)	28.13 (15.35, 44.5)

Table 2. Pre-and six month post-operative biochemical, 2D ECHO and MUGA study parameters in primary hyperparathyroidism patients (n 30)

	Pre-operative	Post-operative	p
Serum PTH (pg/ml) Median (1st IQR, 3rd IQR)	1018 (169, 1514)	33.5 (23,41)	<0.0001
Serum calcium (mg/dL) Median (1st IQR, 3rd IQR)	11.88 (11.03, 13.42)	9.15 (8.9, 9.7)	<0.001
Hypertension (n)	09/30	07/30	0.20
2D ECHO			**Fischer's Exact Value**
EF (%)	0/30	0/30	-
LVH (n)	02/30	0/30	0.49
Mitral valve calcification	03/30	03/30	-
Aortic valve calcification	04/30	04/30	-
Diastolic dysfunction atrial filling ratio (E/A)	08/30	02/30	0.07
MUGA study			
			Fischer's Exact Value
EF (%)	06/30	02/30	0.25
tTPF (ms)	13/30	03/30	0.007

PTH: Parathormone, EF: Ejection Fraction, LVH: Left Ventricular Hypertrophy, PFR: Peak filling rate, tTPF: Time to peak filling rate.

Nine out of 30 patients of PHPT were hypertensive and were prescribed anti-hypertensive medications. After curative PTx, hypertension improved in two of these nine patients on follow up at six months, and they did not require anti-hypertensive medications subsequently (p= 0.20) (Table 2).

Left Ventricular Hypertrophy and Valvular Calcification

On 2D ECHO, two of 30 patients had moderate LVH with wall thickness of 14 mm (6.7%). LVH improved in both these patients post operatively at six months (p 0.49) with decrease in left ventricular wall thickness to 10 mm. Valvular calcifications were present in seven patients (23.3%); four patients depicted aortic and three developed mitral valve calcifications. There was no change in valvular calcification after PTx (Table 2).

Systolic Dysfunction

On 2D ECHO, no patient had systolic dysfunction (EF <50%). Preoperative mean EF was 55.8 ± 2.9% and six months after PTx mean EF was 55.4 ± 3.8% without any significant difference (p= 0.379) (Table 2). However, on MUGA study, six patients had EF <50% representing systolic dysfunction. After curative PTx, EF was improved in four of these six patients (p= 0.25).

Diastolic Dysfunction

On 2D ECHO, eight patients had diastolic dysfunction which improved in six of them after curative surgery (p 0.07). However, on MUGA study, mean PFR before and after six months of PTx was 3.48 ± 0.82 and 3.18 ± 0.74 respectively (p= 0.058). PFR was in the normal range both pre- and post-operatively. Preoperative mean tTPF was 171 ± 41.75 ms and after six months post-operatively mean tTPF was 156.63 ± 34.23 ms (Table 2). Thirteen of 30 patients depicted tTPF >180 ms indicative of diastolic dysfunction and ten of these patients presented with improvement in tTPF to <180 ms after six months of PTx; signifying improvement in diastolic function after curative surgery (p= 0.007).

When preoperative serum calcium and PTH levels were compared among patients with or without systolic and diastolic dysfunction, it was observed that there was no correlation of left ventricle dysfunction with serum PTH and serum calcium levels (Table 3).

DISCUSSION

In this study, pre- and post-operative cardiac function in PHPT patients using both 2D ECHO and MUGA study were compared. MUGA study provided an enhanced objective assessment of cardiac function by determining left ventricular ejection fraction and diastolic dysfunction; which also showed improvement in left ventricular function after PTx. Presence of systolic and diastolic dysfunction and their reversal also depends upon the duration of hypercalcemia, the level of serum PTH, and whether patient was symptomatic or asymptomatic. However, association of raised serum calcium and PTH levels with left ventricular dysfunction could not be established. All PHPT patients in this study were symptomatic which may be the reason that the cardiovascular changes may exist for a prolonged duration of time, resulting in a delayed reversal or may not occur at all.

Cardiovascular involvement in PHPT patients may be as hypertension, left ventricular hypertrophy, diastolic dysfunction and valvular or myocardial calcification. Hedback et al. (9) have re-

Table 3. Correlation of left ventricle dysfunction with serum PTH and serum calcium levels (n 30)

	Ejection Fraction on MUGA study			Diastolic dysfunction on 2D ECHO			Diastolic dysfunction on MUGA study		
	>50% (n 24)	<50% (n 6)	p	Normal (n 22)	Dysfunction (n 8)	p	<180ms (n 17)	>180ms (n 13)	p
Serum Calcium (mg %) Median (1st IQR, 3rd IQR)	12 (10.95, 13.60)	11.68 (11.20, 12.34)	0.19	12.1 (11.5, 13.27)	11.35 (10.67, 12.16)	0.66	12 (11.54, 13.36)	11.67 (11.30, 13.60)	0.37
Serum PTH (pg/ml) Median (1st IQR, 3rd IQR)	1096.5 (185, 1735.75)	756 (201.5, 1159)	0.24	1018 (169, 1343)	756 (231.25, 1773.5)	0.83	405 (161, 1290.5)	696 (193, 1291)	0.76

PTH: Parathormone.

ported increased cardiovascular deaths in 4461 PHPT patients with risk ratio of 1.71 among men and 1.85 in women. In the present study, hypertension improved in two of nine patients after PTx, subsequently they did not require anti-hypertensive medication. Improvement in blood pressure has been reported by various studies (10-12). However, there are reports in the literature where there is no improvement in blood pressure after PTx (13,14).

LVH, which is a significant predictor of cardiac morbidity and mortality in PHPT patients, was present on 2D ECHO in two patients in this study; which improved after six months of surgery by decrease in left ventricular wall thickness from 13 mm to 10 mm in both these patients. In a meta-analysis by Mc Maohnet al, 457 PHPT patients from 15 studies have been analyzed and they have reported that there was decrease in left ventricular mass by 12.5% six months after PTx (15). They have also hypothesized that PTH rather than calcium may be the casual factor leading to LVH in PHPT. On the contrary, there are reports in the literature where no significant regression of LVH is observed after 6-24 months of PTx (13,16,17).

Left ventricular function is the most important factor for predicting cardiovascular morbidity in patients' with PHPT; and echocardiography is an easy, inexpensive, and non-invasive method. In this study, echocardiography was used for assessing the effect of PHPT on systolic and diastolic function; none of the patients showed systolic dysfunction on 2D ECHO as EF remained the same both pre and postoperatively. However, diastolic dysfunction was detected in eight patients and six of them showed improvement after PTx. In a recent meta-analysis by Best et al., echocardiogram changes after PTx in PHPT have analyzed, and they have concluded that there was no significant difference in left ventricular ejection fraction, diastolic dysfunction, IVST, and PWT pre and post- PTx (18). Nappi et al. have evaluated systolic and diastolic dysfunction by Doppler and M mode echo in patients with PHPT before and after PTx (17). They have reported LVH and significant impairment of LV diastolic function but only trivial impairment of LV systolic function; and after PTx there was no substantial improvement in structure and function even after attaining normocalcemia. Farahnak et al., in 51 PHPT patients, have also reported that systolic function (EF) on 2D ECHO stayed the same even after one year of PTx (19). On the contrary, Agarwal et al. have demonstrated left ventricular systolic function on 2D ECHO with significant improvement after six months of surgery (p< 0.001) (20).

MUGA study is a noninvasive diagnostic test which aids in accurate and reproducible evaluation of left ventricular ejection fraction in addition to assesses the diastolic dysfunction such as peak filling rate and time to peak filling rate. Assessment of ventricular function with 2D ECHO requires mathematical assumption about geometry of the ventricle and such assumptions work well only when ventricle shape is maintained. However, MUGA study results in higher reproducibility as there is no geometric assumption and has the advantage of being operator independent (21).

MUGA study documented systolic dysfunction (EF <50%) in six patients pre-operatively whereas there was no systolic dysfunction on 2D ECHO in these patients. Hence, MUGA study provided a more objective assessment of cardiac function as compared to 2D ECHO. Similarly, MUGA study also documented diastolic dysfunction (tTPF >180 ms) in 43.33% (n 13) PHPT patients in comparison to eight patients on 2D ECHO; with significant improvement in ten of these patients after surgery (p= 0.007). Whereas Stefenelli et al. (15), in 53 PHPT patients, have not observed any improvement in diastolic function by 2D ECHO over a 12 month follow-up. However, there are contradictory reports available in the literature showing improvement in diastolic dysfunction after PTx (20).

Cardiovascular involvement is still not considered as an indication for PTx despite the fact that PHPT is associated with increased cardiovascular morbidity and mortality. This may be based upon the variable incidence or presence of cardiovascular changes as mentioned in the literature. However, in this study, it was determined that MUGA study provided additional objective assessment of cardiac function in PHPT patients with demonstrable improvement in left ventricular function after PTx. Therefore, presence of cardiac dysfunction can be considered as one of the indications for surgical intervention.

Limitations

In this study, both sample size and follow-up were small. Further randomized control trials with larger number of patients are required including both symptomatic and asymptomatic patients with PHPT to assess the changes in cardiac function at regular intervals over a longer period of time.

CONCLUSION

The present study compared pre- and post-operative cardiac function using both 2D ECHO and MUGA study in PHPT patients without any pre-existing cardiovascular co-morbidities. MUGA study provided a more objective assessment of cardiac function by determining left ventricular systolic and diastolic dysfunction. MUGA study is limited to academic centers only, which might be a prohibitive factor for its use.

Ethics Committee Approval: This study approval was obtained from Postgraduate Institute of Medical Education and Research (PGIMER) (Decision No: NK/4667/MS/731, Date: 27.03.2019).

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Conflict of Interest: The authors have no conflicts of interest to declare.

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REFERENCES

1. *Yeh MW, Ituarte PH, Zhou HC, Nishimoto S, Liu IL, Harari A, et al. Incidence and prevalence of primary hyperparathyroidism in a racially mixed population. J Clin Endocrinol Metab 2013; 98(3): 1122-9.*
2. *Berger C, Almohareb O, Langsetmo L, Hanley DA, Kovacs CS, Josse RG, et al. Characteristics of hyperparathyroid states in the Canadian multicentre osteoporosis study (CaMos) and relationship to skeletal markers. Clin Endocrinol (Oxf) 2015; 82(3): 359-68.*
3. *Shah VN, Bhadada S, Bhansali A, Behera A, Mittal BR. Changes in clinical & biochemical presentations of primary hyperparathyroidism in India over a period of 20 years. Indian J Med Res 2014; 139(5): 694-9.*
4. *Brown SJ, Ruppe MD, Tabatabai LS. The parathyroid gland and heart disease. Methodist Debakey Cardiovasc J 2017; 13(2): 49-54.*
5. *Bilezikian JP, Brandi ML, Eastell R, Silverberg SJ, Udelsman R, Marcocci C, et al. Guidelines for the management of asymptomatic primary hyperparathyroidism: summary statement from the Fourth International Workshop. J Clin Endocrinol Metab 2014; 99(10): 3561-9.*
6. *Bollerslev J, Rosen T, Mollerup CL, Nordenstrom J, Baranowski M, Franco C, et al. Effect of surgery on cardiovascular risk factors in mild primary hyperparathyroidism. J Clin Endocrinol Metab 2009; 94(7): 2255-61.*
7. *Walker MD, Rundek T, Homma S, DiTullio M, Iwata S, Lee JA, et al. Effect of parathyroidectomy on subclinical cardiovascular disease in mild primary hyperparathyroidism. Eur J Endocrinol 2012; 167(2): 277-85.*
8. *Persson A, Bollerslev J, Rosen T, Mollerup CL, Franco C, Isaksen GA, et al. Effect of surgery on cardiac structure and function in mild primary hyperparathyroidism. Clin Endocrinol (Oxf) 2011; 74(2): 174-80.*
9. *Hedback G, Oden A. Increased risk of death from primary hyperparathyroidism-an update. Eur J Clin Invest 1998; 28(4): 271-6.*
10. *Schiffl H, Lang SM. Hypertension secondary to PHPT: Cause or coincidence? Int J Endocrinol 2011; 2011: 1-6.*
11. *Brown J, de Boer IH, Robinson-Cohen C, Siscovick DS, Kestenbaum B, Allison M, et al. Aldosterone, parathyroid hormone, and the use of renin-angiotensin-aldosterone system inhibitors: the multi-ethnic study of atherosclerosis. J Clin Endocrinol Metab 2015; 100(2): 490-9.*
12. *Broulik P, Brouliková A, Adámek S, Libanský P, Tvrdoň J, Broulikova K, et al. Improvement of hypertension after parathyroidectomy of patients suffering from primary hyperparathyroidism. Int J Endocrinol 2011; 2011: 309068.*
13. *Dalberg K, Brodin L, Juhlin-Dannfelt A, Farnebo L. Cardiac function in primary hyperparathyroidism before and after operation. An echocardiographic study. Eur J Surg 1996; 162(3): 171-6.*
14. *Salahudeen A, Thomas T, Sellars L, Tapster S, Keavey P, Farndon J, et al. Hypertension and renal dysfunction in primary hyperparathyroidism: effect of parathyroidectomy. Clinical Science 1989; 76(3): 289-96.*
15. *McMahon DJ, Carrelli A, Palmeri N, Zhang C, DiTullio M, Silverberg SJ, et al. Effect of parathyroidectomy upon left ventricular mass in primary hyperparathyroidism: a meta-analysis. J Clin Endocrinol Metab 2015; 100(12): 4399-407.*
16. *Kepez A, Yasar M, Sunbul M, Ileri C, Deyneli O, Mutlu B, et al. Evaluation of left ventricular functions in patients with primary hyperparathyroidism: Is there any effect of parathyroidectomy? Wien Klin Wochenschr 2017; 129(9-10): 329-36.*
17. *Nappi S, Saha H, Virtanen V, Limnell V, Sand J, Salmi J, et al. Left ventricular structure and function in primary hyperparathyroidism before and after parathyroidectomy. Cardiology 2000; 93(4): 229-33.*
18. *Best CAE, KIN HBA, Krishnan R, Malvankar-Mehta S, MacNeil D. Echocardiogram changes following parathyroidectomy for primary hyperparathyroidism. Medicine 2017; 96(43): e7255.*
19. *Farahnak P, Ring M, Caidahl K, Farnebo L, Eriksson M, Nilsson I. Cardiac function in mild primary hyperparathyroidism and the outcome after parathyroidectomy. Eur J Endocrinol 2010; 163(3): 461-7.*
20. *Agarwal G, Nanda G, Kapoor A, Singh KR, Chand G, Mishra A, et al. Cardiovascular dysfunction in symptomatic primary hyperparathyroidism and its reversal after curative parathyroidectomy: results of a prospective case control study. Surgery 2013; 154(6): 1394-404.*
21. *Mitra D, Basu S. Equilibrium radionuclide angiocardiography: Its usefulness in current practice and potential future applications. World J Radiol 2012; 4(10): 421-30.*

ORİJİNAL ÇALIŞMA-ÖZET
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Küratif paratiroidektominin sol ventrikül fonksiyonları üzerindeki etkisi 2D ECHO ve MUGA çalışması ile değerlendirildi

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ÖZET

Giriş ve Amaç: Primer hiperparatiroidizm (PHPT), artmış kardiyovasküler morbidite ve mortalite ile ilişkilidir ve paratiroidektomi (PTx) sonrası kardiyovasküler değişikliklerin geri döndürülebilirliği ile ilgili tutarsız sonuçlara sahiptir. Bu çalışma, PHPT'li hastalarda hem yapısal hem de fonksiyonel kardiyak değişiklikleri ve bunların PTx sonrası geri dönüşünü değerlendirmek için yapılmıştır.

Gereç ve Yöntem: Kardiyovasküler risk faktörleri bulunmayan 30 semptomatik PHPT hastası, ameliyattan önce ve küratif PTx'den altı ay sonra 2 Dechocardiography (ECHO) ve Multigated Acquisition (MUGA) çalışması ile prospektif olarak değerlendirildi.

Bulgular: 30 hastanın dokuzunda hipertansiyon vardı ve ikisinde PTx sonrası düzeldi (p 0,20). Preoperatif 2D ECHO'da sol ventrikül hipertrofisi olan iki hastada PTx sonrası iyileşme görüldü (p< 0,001). Sol ventriküler ejeksiyon fraksiyonu (EF), 2D ECHO'da PTx'ten önce ve sonra önemli bir değişiklik göstermedi. Oysa MUGA çalışmasında preoperatif EF <%50 olan altı hastadan dördü sistolik disfonksiyonu temsil etmektedir; PTx sonrası gelişme gösterdi. 2D ECHO'da sekiz hasta, küratif cerrahiden sonra altı hastada düzelen diyastolik disfonksiyon gösterdi (p= 0,07). Bununla birlikte, MUGA çalışmasında, diyastolik disfonksiyona işaret eden tTPF >180 ms ile başvuran 13 hasta, on hasta PTx sonrası iyileşme gösterdi (p= 0,008).

Sonuç: Bu çalışma, hem 2D ECHO hem de MUGA çalışmasını kullanarak preoperatif ve postoperatif kardiyak fonksiyonu analiz etti. MUGA çalışması, sol ventrikül ejeksiyon fraksiyonunu ve diyastolik disfonksiyonu belirleyerek kalp fonksiyonunun daha objektif bir değerlendirmesini sağlamıştır.

Anahtar Kelimeler: Muga çalışması, birincil hiperparatiroidizm, sol ventrikül disfonksiyonu, 2D yankı, paratiroidektomi, kardiyak belirtiler

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Esophageal perforation: diagnosis, management and decision-making – a retrospective tertiary centre study

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ABSTRACT

Objective: Perforation of the esophagus is an extremely rare but life-threatening emergency associated with a high morbidity and mortality. Therefore, time-management is of utmost importance and it is crucial to have an algorithm for diagnostic methods and the subsequent decision-making process.

Material and Methods: All patients who were diagnosed with an esophageal perforation between 2010 and 2020 at our university hospital were retrospectively analysed. In addition to patient demographics, the diagnostic method, treatment strategy, defect size and location, etiology and mortality were recorded.

Results: A total of 27 patients were identified with an esophageal perforation. All patients were diagnosed through a computed tomography initiating the treatment algorithm 18 patients underwent conservative/endoscopic treatment, while 9 patients received primary surgery for event-related complications. The overall mortality rate was 25.9%, 11.1% within the endoscopic group and 55% within the surgical group.

Conclusion: A timely diagnosis in cases of an esophageal perforation is of utmost importance. Therefore, every patient should undergo an emergency computed tomography (CT) with oral and intravenous contrast followed by an upper endoscopy if event-related complications are ruled out in the CT.

Keywords: Esophagus, perforation, Boerhaave, endoscopy

INTRODUCTION

Perforation of the esophagus is an extremely rare but life-threatening emergency associated with a high morbidity and mortality. The incidence is extremely low with a reported age-standard incidence of 3.1/1000000 a year (1). The time-management is of utmost importance regarding this patient collective, as the reported mortality increases dramatically with time passed after diagnosis. Across several studies, the mortality ranges between 10% to 25% within the first 24h after perforation and increases to 40% to 60% if the treatment is delayed beyond this point. One of the main reasons of this vastly increasing mortality with time seems to be the anatomical configuration and location of the esophagus (2). Due to the absence of immunocompetent tissue, bacteria and digestive enzymes have an easy entry to the mediastinum leading to the development of complications such as sepsis, empyema, mediastinitis and organ failures. To combat that problem, several studies tried to create a treatment algorithm, however, up to this date is is no clear consensus (3).

Perforation of the esophagus can be due to different etiologies. The most common cause by far is iatrogenic. Iatrogenic causes amount up to 70% of esophageal perforations (4). Endoscopic procedures are the most common cause of iatrogenic causes with a reported risk of 0.03%. This, however, increases by a manifold if therapeutic procedures are carried out during the time of endoscopy. The risk of perforation for endoscopic laser therapy and esophageal stent placement is 4.6% and 5-25% respectively (4). Other causes include trauma to the chest and upper abdomen, blunt injuries, spontaneous perforation of the esophagus first described by the Dutch physician Hermann Boerhaave in 1724 (5) and foreign bodies.

Due to its anatomical structure, perforation of the esophagus has a higher chance of occurring at four predisposing positions: 1) the Killian-Triangle; a muscle free

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zone in the proximal third of the esophagus, 2) the crossing at the aortic arch, 3) the connection to the left main bronchus and 4) the esophagogastric junction.

Diagnosis and management of esophageal perforations are crucial. However, diagnostic errors are prevalent due to the presenting symptom of acute chest pain leading often to misdiagnosis such as a perforated ulcer, followed by myocardial infarction, pulmonary embolism, dissection aneurysm and pancreatitis. A triad of vomiting, chest pain and emphysema known as the Mackler triad should be used while taking the initial history. The extent of the defect, the localisation of the defect and the time passed between the event and begin of therapy should all be used in the decision making process (2).

The aim of this study is to help to determine the most appropriate diagnostic and therapeutic approach for surgical and non-surgical centres confronted with the possible diagnosis of an esophageal perforation

MATERIAL and METHODS

All patients who were diagnosed with an esophageal perforation between 2010 and 2020 were included in this study. The dataset was retrospectively analysed. In addition to patient demographics following parameters were analysed: diagnostic method of choice, etiology, location and size of the defect, treatment strategy and mortality.

Statistical Analysis

The statistical analysis was performed with IBM SPSS Statistics Version 24 64-Bit-Version for Mac OS. Continuous variables were exposed as medians. Categorical variables were compared using Fisher's exact test or chi-square test.

Ethical Considerations

As this study is a retrospective and non-randomized study ethical approval was waived by the ethics committee. As all data was anonymyzed no patients consent was necessary.

RESULTS

A total of 27 patients were identified that were diagnosed with and treated for an esophageal perforation. The median age was 70 (range: 29-86 years). The median ASA classification was 3 (range: 2-4). Out of 27 patients, n= 15 were male (55.6%) and n= 12 were female (44.4%). The etiology consisted of three main events: Iatrogenic causes, Boerhaave Syndrome and foreign body ingestion with a distribution of 44.4%, 44.4% and 11.1% respectively. The most common iatrogenic cause was endoscopy in combination with a treatment (66%). 17 patients were diagnosed and treated within 24h, while 9 patients were diagnosed and treated after 24h. All 9 patients who had a delayed treatment response were referred to us from different hospitals. Out of 27 patients, n= 17 had a defect size of 1-3 cm and n= 10 patients a defect size of >3 cm. All patients were diagnosed with an initial computed tomography (CT) followed by an upper endoscopy (UE) to asses the size of the defect, the localisation and to asses if a conservative or surgical treatment is necessary. n= 18 patients were treated conservatively, in n= 9 cases surgery was performed. Patient demographics can be seen in Table 1.

Conservative Treatment

A total of 18/27 patients were treated conservatively through endoscopic stent placement, clipping of the defect or endoscopic vacuum-therapy. n= 13 of those conservative treated patients were treated within 24 hours, n= 5 were treated after 24h. The defect was located in n= 13 patients in the distal third, in n= 2 in the middle third and in n= 3 in the proximal third of the esophagus. 13 patients had a defect of 1-3 cm and 5 patients had a defect > 3 cm. All out of two patients survived, the mortality rate within the conservative group is 11.1%.

Surgical Treatment

A total of 9/27 patients were treated surgically. n= 4 were treated within 24 hours and n= 5 were treated after 24h. The defect was located in n= 7 patients in the distal thirds, in n= 1 in the middle third and in n= 1 in the proximal third of the esophagus. 4 patients had a defect size of 1-3 cm while 5 patients had a defect size of >3 cm. 5 out of 9 patients died postoperatively, with a respectively mortality rate of 55% within the surgical treatment group.

Mortality

A total of 27 patients underwent treatment for an esophageal perforation. The overall mortality rate is 7/27, 25.9% respectively. The mortality rate within the conservative treatment group is lower compared to the mortality group within the surgical treatment group. Out of those 7 patients, 5 had a defect size >3 cm while only 2 had a defect size <3 cm. A total of n= 6 patients who did not survive were treated after 24 hours. Statistical analysis revealed that there is a statistical significance between surgical treatment and mortality (p= 0.023).

DISCUSSION

As mentioned above, perforation of the esophagus happens on an extremely rare occasion and is therefore not easily diagnosed and often misdiagnosed. Thus, a timely diagnosis and appropriate management is of utmost importance but remains challenging to this date. In case of a diagnosis it is crucial to refer patients to large teaching or university hospitals as a multidisciplinary team is at hand and a fast consensus on further treatment can be achieved (6). As the esophagus is not covered by immunocompetent tissue such as other structures in the abdomen, the infectious and inflammatory response after a perforation can disseminate very quickly leading to complications such as mediastinitis, sepsis, empyema and even organ failure and death. In the case of an advanced local inflamma-

Table 1. Shows the retrospectively evaluated data of patients in this cohort study

Patient	Etiology	Diagnostic	Localization	Defect	Time to Management	Treatment	Referral	Mortality
1	ERCP	CT+UE	Distal third	4 cm	<24h	Surgical	Y	Y
2	Incarcerated Hernia	CT+UE	Distal third	1 cm	<24h	Surgical	N	Y
3	Boerhaave	CT+UE	Distal third	4 cm	<24h	Surgical	Y	N
4	Boerhaave	CT+UE	Distal third	5 cm	<24h	Surgical	Y	N
5	Baloondilatation	CT+UE	Distal third	2 cm	<24h	Endoscopic	Y	N
6	ESR	CT+UE	Distal third	1 cm	<24h	Endoscopic	N	N
7	Boerhaave	CT+UE	Distal third	1 cm	<24h	Endoscopic	N	N
8	Boerhaave	CT+UE	Distal third	1.2 cm	<24h	Surgical	N	N
9	Boerhaave	CT+UE	Distal third	1 cm	<24h	Endoscopic	N	N
10	Panendoscopy	CT+UE	Distal third	1.5 cm	<24h	Endoscopic	N	N
11	Boerhaave	CT+UE	Distal third	2.5 cm	<24h	Endoscopic	N	N
12	Boerhaave	CT+UE	Middle third	3 cm	<24h	Endoscopic	N	N
13	Boerhaave	CT+UE	Distal third	1 cm	<24h	Endoscopic	N	N
14	TEE	CT+UE	Distal third	2 cm	<24h	Endoscopic	N	N
15	Boerhaave	CT+UE	Proximal third	1 cm	>24h	Endoscopic	Y	N
16	Boerhaave	CT+UE	Distal third	4 cm	>24h	Endoscopic	Y	N
17	TEE	CT+UE	Distal third	8 cm	>24h	Endoscopic	Y	Y
18	Baloondilatation	CT+UE	Proximal third	5 cm	>24h	Endoscopic	Y	N
19	Boerhaave	CT+UE	Proximal third	1 cm	>24h	Conservative	Y	N
20	EMR	CT+UE	Distal third	3 cm	>24h	Endoscopic	Y	Y
21	Foreign Body	CT+UE	Middle third	0.6 cm	<24h	Endoscopic	N	N
22	Dilatation	CT+UE	Middle third	0.3 cm	>24h	Surgical	Y	N
23	Fundoplicatio	CT+UE	Distal third	1 cm	<24h	Endoscopic	N	N
24	Foreign Body	CT+UE	Distal third	1 cm	>24h	Surgical	N	Y
25	Foreing Body	CT+UE	Distal third	5 cm	>24h	Conservative	Y	N
26	Feeding-Tube	CT+UE	Distal third	5 cm	<24h	Surgical	Y	
27	Boerhaave	CT+UE	Proximal third	2 cm	>24h	Surgical	Y	Y

CT: Computed tomography, UE: Upper endoscopy, TEE: Transesophageal echocardiography, ESR: Endoscopic submucosal resection, ERCP: Endoscopic retrograde cholangio pancreatography.

tion, one must consider primary surgery with the placement of multiple drains to warrant a successful outcome (7). In the case of "fresh" perforations without any signs of event-related complications or sepsis a conservative or endoscopic treatment should be preferred (8). The results of our retrospective and descriptive analysis matches those of the already available literature on the management and treatment of esophageal perforations. Our data suggests, that patients with a large defect and where treatment was initiated 24 hours after the initial event have a poorer outcome compared to those with a small defect and when treatment was initiated within 24 hours. In addition, patients who needed to undergo surgery due to event-related complications had a poorer outcome as well, as those patients were in most cases septic. This was also shown by Ryom P et al. 2011 and Bhatia P et al. 2011 (9). Proven predictors for a negative outcome are malignant associated perforations and an existing mediastinitis at the point of diagnosis (10,11). Boerhaavee syndrome compared to iatrogenic perforations or perforations caused by foreign bodies is very difficult to diagnose and often primarily misdiagnosed leading to a time delay before treatment is initiated thus leading to an increased mortality when compared to iatrogenic perforations (12) as those perforations are identified most often during the intervention and can be timely managed so that event associated complications do not arise. This is also in concordance with our date, as most patients who died suffered from Boerhaave syndrome.

The available literature suggests, that all patients with an esophageal perforation should undergo a computed tomography (Figure 1 and 2) followed by an upper endoscopy (Figure 3). If

Figure 1. CT showing free air in the mediastinum lateral to the esophagus.

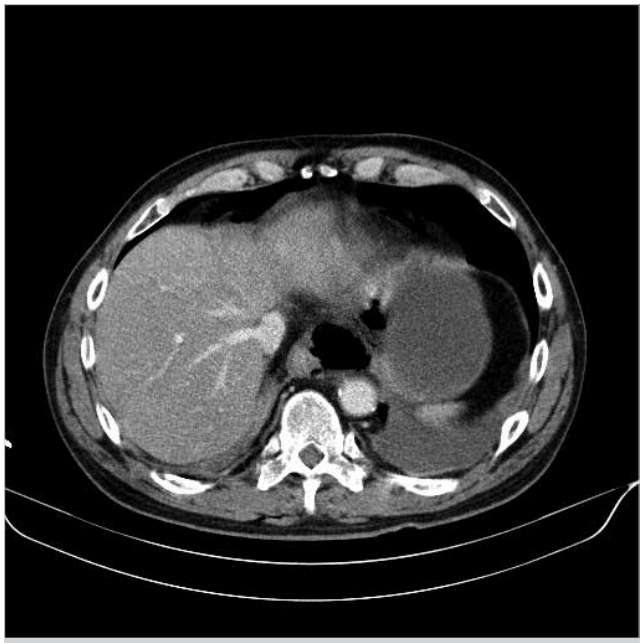

Figure 2. CT showing massive free air in the mediastinum lateral to the esophagus with subsequent mediastinitis.

a CT shows an esophageal perforation without any complications such as mediastinitis or empyema, a conservative or endoscopic treatment can be successful. In case of large defects in combination with complications and sepsis a surgery is necessary. Therefore, a computed tomography with contrast is the best option as it is able to illustrate the perforation as well as a surrounding inflammatory process (De Lutio di Castelguidone E et al, Radiol Med 2005).

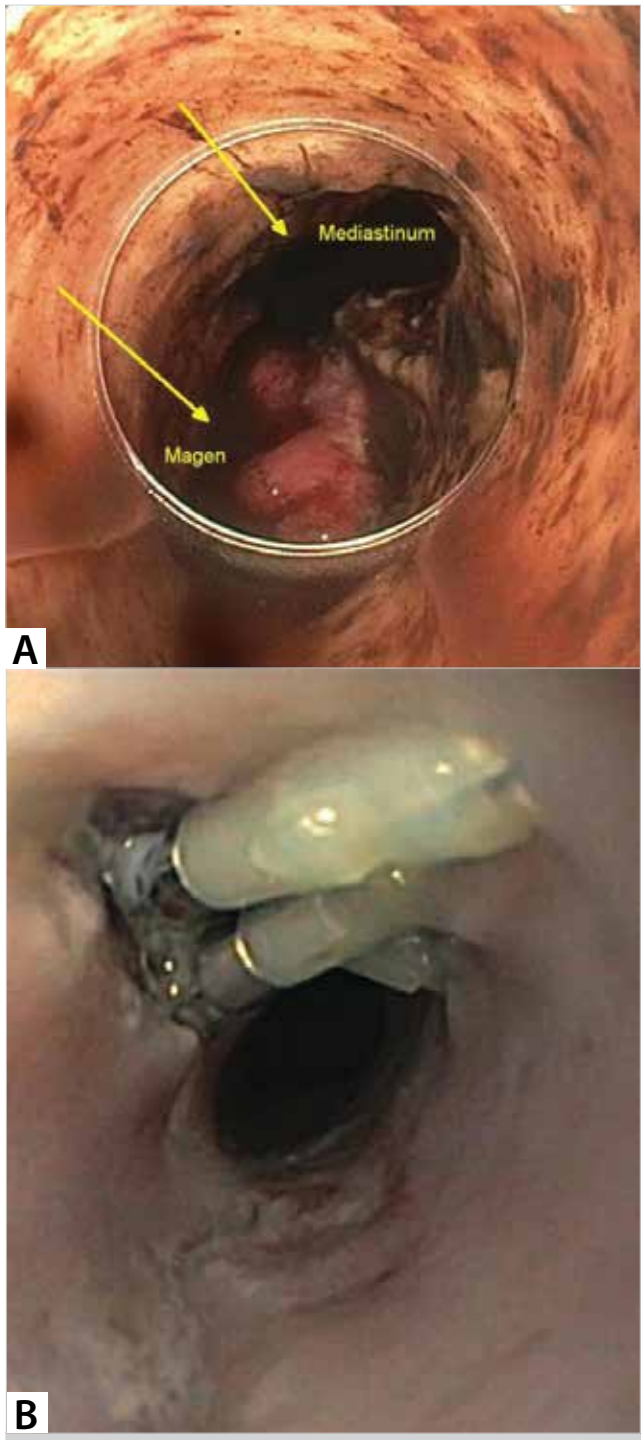

Figure 3. A. Endoscopy with bottom arrow showing the stomach and upper arrow showing the mediastinum. **B.** showing the defect after endoscopic clipping.

To conclude our findings, the most important factor is a timely diagnosis which can be warranted by a CT with oral and intravenous contrast medium followed by an interventional upper endoscopy and or primary surgery depending on the presence of complications, signs of sepsis and clinical status of the patient.

CONCLUSION

Esophageal perforation is an extremely rare but life-threatening condition. The outcome depends on a timely diagnosis and a fast and multidisciplinary management of the patient. A treatment algorithm should be available in every larger centre tackling that rare condition to achieve the best possible outcome for their patients.

Ethics Committee Approval: This study approval was obtained from Oldenburg University Hospital (Decision No: ACH-E.N, Date: 22.04.2021).

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Conflict of Interest: The authors have no conflicts of interest to declare.

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REFERENCES

1. *Vidarsdottir H, Blondal S, Alfredsson H, Geirsson A, Gudbjartsson T. Oesophageal perforations in Iceland: A whole population study on incidence, aetiology and surgical outcome. Thorac Cardiovasc Surg 2010; 58(8): 476-80.*
2. *Troja A, Käse P, El-Sourani N, Miftode S, Raab HR, Antolovic D. Treatment of esophageal perforation: A single-center expertise. Scand J Surg 2015; 104(3): 191-5.*
3. *de Schipper JP, Pull ter Gunne AF, Oostvogel HJ, van Laarhoven CJ. Spontaneous rupture of the oesophagus: Boerhaave's syndrome in 2008. Literature review and treatment algorithm. Dig Surg 2009; 26(1): 1-6.*
4. *Kaman L, Iqbal J, Kundil B, Kochhar R. Management of esophageal perforation in adults. Gastroenterology Res 2010; 3(6): 235-44.*
5. *Boerhaave H. Atrocis, nec descripti prius, morbi historia secundum medicae artis leges conscripta, lugduni batavorum, boutesteniana. Bull Med Libr Assoc 1955; 43(2): 217-40.*
6. *Ryom P, Ravn JB, Penninga L, Schmidt S, Iversen MG, Skov-Olsen P, et al. Aetiology, treatment and mortality after oesophageal perforation in Denmark. Dan Med Bull 2011; 58(5): A4267.*
7. *Schmidt SC, Strauch S, Rösch T, Veltzke-Schlieker W, Jonas S, Pratschke J, et al. Management of esophageal perforations. Surg Endosc 2010; 24(11): 2809-13.*
8. *Chirica M, Champault A, Dray X, Sulpice L, Munoz-Bongrand N, Sarfati E, et al. Esophageal perforations. J Visc Surg 2010; 147(3): e117-28.*
9. *Bhatia P, Fortin D, Inculet RI, Malthaner RA. Current concepts in the management of esophageal perforations: A twenty-seven year Canadian experience. Ann Thorac Surg 2011; 92(1): 209-15.*
10. *Amir AI, Van Dullemen H, Plukker, JT. Selective approach in the treatment of esophageal perforations. Scand J Gastroenterol 2004; 39: 418-22.*
11. *Gupta, NM, Kaman, L. Personal management of 57 consecutive patients with esophageal perforation. Am J Surg 2004; 187: 58-63.*
12. *Vial CM, Whyte RI. Boerhaave's syndrome: Diagnosis and treatment. Surg Clin North Am 2005; 85: 515-24.*

ORİJİNAL ÇALIŞMA-ÖZET
Turk J Surg 2021; 37 (4): 342-346

Özofagus perforasyonu: Teşhis, yönetim ve karar verme - üçüncü basamakta retrospektif kohort bir çalışma

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ÖZET

Giriş ve Amaç: Özofagus perforasyonu, yüksek morbidite ve mortalite ile ilişkili son derece nadir ancak bir o kadar hayati tehlike oluşturan acil bir durumdur. Bu sebeple, zaman yönetimi son derece önemli olmakla birlikte tanısal yöntemler açısından ve bunları takip eden karar verme aşamasında bir algoritmaya sahip olmak önemlidir.

Gereç ve Yöntem: Hastanemizde 2010 ve 2020 yılları arasında özofagus perforasyonu tanısı alan tüm hastalar retrospektif olarak incelendi. Hasta demografik bilgilerine ek olarak tanısal yöntem, tedavi stratejisi, defect boyutu ve lokasyonu ile etiyoloji ve mortalite bulguları kaydedildi.

Bulgular: Özofagus perforasyonu olan toplam 27 hasta belirlendi. Tüm hastalar tedavi algoritmasını başlatan bilgisayarlı tomografi ile tanı alırken 18 hasta konvansiyonel/endoskopik yöntemle, dokuz hasta durum ile alakalı komplikasyonlar sebebiyle primer cerrahi ile tedavi edildi. Toplam mortalite oranı %25,9 olup bu oranın %11,1'i endoskopik grupta %55'i ise cerrahi müdahale grubundaydı.

Sonuç: Özofagus perforasyonu olan olgularda zamanında tanı hayati öneme sahiptir. Dolayısıyla, her hasta oral ve intravenöz kontrast materyali ile acil bilgisayarlı tomografiye (BT) alınmalı ve BT'de durum ile ilişkili komplikasyonlar elendiği takdirde hastalara üst endoskopi uygulanmalıdır.

Anahtar Kelimeler: Özofagus, perforasyon, Boerhaave, endoskopi

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ORIGINAL ARTICLE
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Is there an increasing trend of risk-reducing prophylactic mastectomy procedure in preventing breast cancer among women?

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ABSTRACT

Objective: Prophylactic contralateral/bilateral mastectomy (PCM/PBM), as a risk-reducing mastectomy procedure, has a few evidence-based indications; however, there is an increasing trend in the total number of operations globally. Worldwide famous actress Angelina Jolie was detected to have BRCA-1 mutation and underwent a prophylactic bilateral mastectomy in 2013. The procedure was perceived as 'lifesaving' worldwide, which eventually led to a significant increase in BRCA gene mutation analysis and PCM/PBM. In this study, it was aimed to evaluate our risk-reducing PCM/PBM results.

Material and Methods: Twenty-seven patients underwent risk-reducing PCM/PBM between 2010-2018, but only 22 patients were included into the study. A retrospective analysis was carried out on demographics, family history, preoperative diagnoses, pathological findings, mastectomy details, reconstructive procedures, neoadjuvant chemotherapy, BRCA analysis, educational status, and mastectomy indications.

Results: Surgical indications or major reasons for surgery were as follows: BRCA-1 mutation (n= 5), BRCA-2 mutation (n= 3), malignant-like areas in magnetic resonance imaging (n= 2), lobular carcinoma in situ (n= 3) and intense anxiety (n= 9). Eighteen patients (82%) underwent an additional reconstructive procedure via implantation or autologous tissue and four patients (18%) underwent mastectomy only. PCM/PBM by years was as: 2010 (n= 1), 2011 (n= 0), 2012 (n= 1), 2013 (n= 2), 2014 (n= 1), 2015 (n= 2), 2016 (n= 3), 2017 (n= 4), 2018 (n= 8), which represents the recently increasing trend.

Conclusion: Risk-reducing PCM/PBM was performed in 59.1% of the patients (n= 13) for a significant medical reason, whereas for distress about a relapse or a new disease on the contralateral breast on the remaining 40.9% of the patients (n= 9). Evidence in the literature shows that risk-reducing mastectomy does not affect survival, although it lowers breast cancer incidence. Close surveillance, cancer screening, and chemoprevention methods should have priority.

Keywords: Risk-reducing mastectomy, breast cancer, BRCA1, BRCA2

INTRODUCTION

Breast cancer is the most common cancer in women both in Turkey and the world. One in every eight women has breast cancer in their life, and one in every 30 women dies due to reasons related to breast cancer (1). There has been a significant increase in the number of risk-reducing PCM/PBM (prophylactic contralateral/prophylactic bilateral mastectomy) globally as it doubled in the last ten years (2).

A study from the USA reports that 30-40% of women with breast cancer consider having a PCM as a risk reducing procedure (3). Risk factors for contralateral breast cancer are BRCA-1 or 2 mutation, lobular carcinoma in-situ (LCIS), breast cancer history in the family, absence of hormone receptors, and diagnosis at a young age (4-6). PBM indications are BRCA or some other genetic mutations, LCIS, or prominent cancer history in the family (4).

Although breast-conserving surgery (BCS) is the standard treatment in early-stage breast cancer, mastectomy could be done in the form of nipple-sparing mastectomy (NSM) in eligible patients. PCM is performed as a risk-reducing procedure for these patients or patients with a genetic predisposition. In the modern era, surgical treatment preferences and methods are gradually evolving. From the 1990s to the 2020s, there has not been much change in BCS rates, but it is seen that PCM/PBM rates increase while unilateral mastectomy preferences decrease (5). Women diagnosed with breast cancer mostly prefer to undergo PCM due to the risk of contralateral breast cancer.

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Similarly, women at high risk mostly prefer to undergo PBM even without any cancer diagnosis. PCM/PBM procedure has few evidence-based indications; however, there is an increasing trend in the total number of operations globally (6). Worldwide famous actress Angelina Jolie was detected to have BRCA-1 mutation and underwent PBM in 2013, and the risk-reducing procedure was perceived as 'lifesaving' worldwide, which eventually led to a significant increase in BRCA gene mutation analysis and PCM/PBM in the USA. Some reasons for an increase in the PCM/PBM procedure frequency are the exaggerated anxiety about developing contralateral breast cancer, better breast symmetry with reconstruction procedures, and high utilization rates of preoperative magnetic resonance imaging (MRI), which encourages mastectomy rate (7). This study aimed to analyze and present the results of our PCM/PBM results.

MATERIAL and METHODS

This study was approved by the ethics committee of the Mersin University (number: 2020/179). Of 1057 patients' records that were scanned, 27 patients who underwent risk-reducing PCM/PBM between the years 2010-2018, aged 18-90 years, were identified. Of the 27 patients, 22 with sufficient and accurate medical records were included in the study and analyzed retrospectively. Demographics, family history, preoperative diagnosis, pathology results, mastectomy procedure, reconstructive procedures with implantation or autologous tissue, neoadjuvant chemotherapy (NCT), BRCA analysis rate, educational status, mastectomy indications, and follow-up period were analyzed retrospectively. All patients had mammography (MMG), ultrasonography (USG), and MRI in the preoperative period. The same team performed all surgical operations. Patients with bilateral synchronous/metachronous cancers were excluded.

Analyses were performed by Medicres- 'www.e-picos.com.' Descriptive statistics thereof were represented as frequency (n) and percentage (%). Continuous variables were represented by mean (±SD) or median (minimum-maximum).

RESULTS

Median age of the patients was 46 (31-61) years. Two patients (9%) were diagnosed before the age of 35. Nine patients (41%) had a family history of breast cancer. Two patients had no lactation history, and the median lactation time was 11 (0-22) months. Descriptive properties of the patients are shown in Table 1.

CPM was performed for nine patients (41%) in the same session, it was performed in different sessions for 12 patients (54.5%), and BPM was performed for one patient (4.5%). Prophylactic mastectomy was performed only for the left breast of 13 patients (59.1%) and only for the right breast of eight patients (36.4%); BPM was performed for one patient (4.5%). Bilateral NSM was performed for ten patients (45.5%). Modified radical mastectomy (MRM) for the right breast and NSM for the left breast was performed in seven patients (31.8%), MRM for the left breast, and NSM for the right breast was performed for five patients (22.7%). Bilateral NSM was performed in the same session for two of the four patients. None of them had an implant or autologous reconstruction, right MRM and left NSM were performed in one patient, right MRM and left NSM were performed in one patient.

The mean value of tumor size on the right breast was 2.71 ± 1.78 (0.5-5.5) cm, the mean number of the metastatic lymph node on the right axillary was 2.14 ± 0.69 (1-3). The mean value of tumor size on the left breast was 3.69 ± 2.14 (0.5-7) cm, the mean number of the metastatic lymph node on the left axillary was 5.13 ± 6.94 (1-11). The distribution of molecular breast cancer subtypes is shown in Table 2.

Evaluation of four triple-negative patients by risk factors was as follows: BRCA-1 positive (n= 1), significant family history of breast cancer (n= 2), no other detectable risk factor apart from the unilateral diagnosis (n= 1).

Eighteen patients (82%) underwent a reconstructive procedure, and four patients (18%) did not undergo any additional surgery. Total 10 BRCA-1/2 mutation analyses were performed: one in 2010 (10%), one in 2013 (10%), one (10%) in 2016, two in 2017 (20%), five (50%) in 2018.

Five patients were operated on because they had BRCA-1 gene mutation (n= 5), three patients were operated on as they had BRCA-2 gene mutation (n= 3). Two patients had suspicious findings on MRI scans; BCS were recommended. However, as per the preference of the patients, NSM was performed. Mastectomy specimens were reported as invasive ductal carcinoma (n= 1) and benign (n= 1). Three patients were operated on as they had LCIS diagnosis. According to their expression, the main reason for the remaining nine patients' bilateral mastectomy was the intense anxiety they experienced. Six patients were operated on after receiving neoadjuvant chemotherapy as their locally advanced/advanced aggressive tumor characteristics. Five of these patients had PCM/PBM, and four had anxiety; one had a suspicion in the preoperative MRI scan. Thirteen patients (59.1%) had operations for justifiable medical reasons. Nine patients (49.1%) had PCM/PBM because they were anxious about a relapse. Only two of these nine patients had breast cancer in their family history. Out of nine patients who underwent PCM/PBM, seven had bachelor's degrees (78%), one (11%) had a high school diploma, one (11%) had a primary school diploma.

Pathology reports of the three (13.6%) patients who underwent contralateral mastectomy without a diagnosis indicated malignancy, invasive ductal carcinoma (n= 2) and DCIS (n= 1). Median follow-up time was 33 months (18-116) and none of them

Table 1. Descriptive properties of the cases

Case	Age	Year	Right Breast Diagnosis	Left Breast Diagnosis	Indication For CPM/BPM	Treatment	Family History
Case 1	33	2015	Invasive Lobular Carcinoma	Benign	Anxiety	Right MRM Left NSM	-
Case 2	60	2017	Benign **(Pathology: Invasive Ductal Carcinoma)**	Invasive Ductal Carcinoma	Suspicious MRI	Bilateral NSM	-
Case 3	46	2013	Benign	Mixed Carcinoma	Anxiety	Right NSM Left MRM	-
Case 4	57	2017	Invasive Ductal Carcinoma	Benign	BRCA-1(+)	Bilateral NSM	-
Case 5	36	2013	LCIS	Benign	LCIS	Bilateral NSM	-
Case 6	37	2010	Benign	Benign **(Pathology: DCIS)**	BRCA-1(+)	Bilateral NSM	-
Case 7	56	2018	DCIS	Benign	BRCA-2(+)	Bilateral NSM	+
Case 8	60	2018	Benign	Invasive Ductal Carcinoma	Anxiety	Right NSM Left MRM	-
Case 9	55	2018	Invasive Ductal Carcinoma	Benign	BRCA-1(+)	Bilateral NSM	+
Case 10	37	2018	Invasive Ductal Carcinoma	Benign	BRCA-1(+)	Right MRM Left NSM	-
Case 11	40	2018	Benign	Invasive Ductal Carcinoma	Anxiety	Bilateral NSM	+
Case 12	50	2016	Invasive Ductal Carcinoma	Benign	BRCA-2(+)	Right MRM Left NSM	+
Case 13	44	2016	Invasive Lobular Carcinoma	Benign	Anxiety	Right MRM Left NSM	-
Case 14	61	2014	Invasive Lobular Carcinoma	Benign	Anxiety	Right MRM Left NSM	-
Case 15	55	2018	Benign **(Pathology: Invasive Ductal Carcinoma)**	LCIS	BRCA-2(+)	Bilateral NSM	+
Case 16	35	2017	LCIS	Benign	LCIS	Bilateral NSM	-
Case 17	43	2018	Benign	Invasive Ductal Carcinoma	Anxiety	Right NSM Left MRM	+
Case 18	58	2016	Invasive Lobular Carcinoma	Benign	Anxiety	Right MRM Left NSM	-
Case 19	52	2012	Benign	Invasive Ductal Carcinoma	Suspicious MRI	Right NSM Left MRM	+
Case 20	31	2018	Invasive Ductal Carcinoma	Benign	Anxiety	Right MRM Left NSM	-
Case 21	37	2015	Benign	Invasive Ductal Carcinoma	BRCA-1(+)	Right NSM Left MRM	+
Case 22	40	2017	LCIS	Benign	LCIS	Bilateral NSM	+

had a recurrence. The numbers of PCM/PBM by years were as: 2010 (n= 1), 2011 (n= 0), 2012 (n= 1), 2013 (n= 2), 2014 (n= 1), 2015 (n= 2), 2016 (n= 3), 2017 (n= 4) and in 2018 (n= 8), which reflects the increasing trend in our center.

DISCUSSION

The frequency of risk-reducing PCM/PBM has increased rapidly worldwide in the last two decades. Although there is a risk of developing contralateral breast cancer in patients with breast

Table 2. Distribution of molecular breast cancer subtypes

		Right Luminal Type					
		None	Basal like	Her2+	Luminal-A	Luminal-B	Total
Left Luminal Type	None	1 (4.5%)	3 (13.6%)	1 (4.5%)	7 (31.8%)	1 (4.5%)	13 (59.1%)
	Basal like	1 (4.5%)					1 (4.5%)
	Her2+	1 (4.5%)					1 (4.5%)
	Luminal-A	4 (18.2%)					4 (18.2%)
	Luminal-B	3 (13.6%)					3 (13.6%)
Total		10 (45.5%)	3 (13.6%)	1 (4.5%)	7 (31.8%)	1 (4.5%)	22 (100.0%)

cancer, it is dramatized by both patients and physicians. USA-based studies report that 30-40% of the patients who have breast cancer diagnosis consider having a prophylactic contralateral mastectomy as a risk-reducing procedure, and 15-20% of them undergo prophylactic mastectomy + reconstruction (3). In our study, the rate of having a prophylactic mastectomy in a population of 1057 patients operated on in the last decade was approximately 2%. However, we did not collect data regarding their opinions about prophylactic mastectomy in this review.

A prophylactic mastectomy patient's general profile is anxious, young, with a breast cancer family history, and with suspicious MR findings. It is suggested that surgeons significantly affect the decision-making process of the patients (5). Many surgeries are not in line with medical indications and mainly aim to relieve patients' anxiety and concerns. Many breast study communities published results suggesting various recommendations for prophylactic mastectomy, strictly advised that it should not be carried out without indication (8). Women with breast cancer may often request prophylactic mastectomy due to the concern that new cancer may develop in the breast tissue on the healthy side as well. In our study, 42% of the patients underwent prophylactic mastectomy operation due to anxiety and fear without justifiable medical evidence. In their prospective randomized study, Parker et al. measured the quality of life and patient satisfaction; they included 50 prophylactic contralateral mastectomies out of 288 patients who had a mastectomy. They observed that breast cancer patients were highly anxious about relapse or developing new cancer in the contralateral breast. At the same time, postoperative body appearance perceptions were mostly found worse than preoperative. Every woman would prefer her breasts to match one another. After PCM operation, the patient satisfaction rate is generally lower than after PBM operation (9). We did not collect any data about evaluating the patients' quality of life and body appearance perception after surgery. However, the high rate of patient anxiety and fear in our study (n= 9, 40.9%) is compatible with the studies in the literature. Patients who were a candidate for PCM should be thoroughly evaluated in many respects.

For a woman with breast cancer without any detectable genetic mutation, the risk of developing breast cancer in her contralateral breast is 0.3% to 0.6% per year (10,11). However, high-risk women, such as a family history of breast cancer, personal risk factors, LCIS diagnosis, medically reported genetic mutation (especially BRCA1-2) history, usually prefer PCM/PBM rather than surveillance and screening programs. Many studies have reported that the risk-reducing PCM/PBM procedure could not provide a significant reduction of survival unless there was LCIS or reported deleterious genetic mutation, but it might decrease the incidence of breast cancer (12-15). In the COCHRANE study by Carbine et al., 61 observational studies retrospectively analyzed that PCM reduced tumor recurrence without survival advantage. There is not a randomized study on this subject yet. Each patient should be evaluated individually to reach the best decision (16). In our study, no patients had a recurrence in the follow-up period. Although the number of patients and data was limited to reach an absolute conclusion about recurrence, the absence of recurrence was compatible with many previous studies in the literature. Despite our limited follow-up period, none of our patients lost their lives during this period.

The majority (77%) of the patients who underwent PCM/PBM operation due to anxiety have a bachelor's degree. The rate of prophylactic mastectomy among well-educated women and women with a higher socioeconomic standard was relatively high. We could not achieve statistically significant results due to the limited number of patients, and we consider it clinically significant. Our results were consistent with the results of previous studies (5).

Six patients were treated with neoadjuvant chemotherapy as their locally advanced/advanced and aggressive tumor characteristics. PCM/PBM was performed in four of these six patients due to anxiety; one had BRCA-2 gene mutation, and one had preoperative suspicious MRI findings. Patients receiving neoadjuvant chemotherapy were aware that they were referred to oncology because of their aggressive tumor characteristics and large tumor sizes. Anxiety and fear of these patients were observed to be at higher levels than other patients. These patients had a great tendency to undergo a PCM operation to prevent new tumor oc-

Table 3. Number of prophylactic mastectomy operations

	n	%
2010	1	4.5
2011	0	0
2012	1	4.5
2013	2	9
2014	1	4.5
2015	2	9
2016	3	13.5
2017	4	18
2018	8	36
Total	22	100.0

currence at contralateral breast or tumor recurrence. Only two of the six patients in our study underwent PCM/PBM for a justifiable medical reason. There is no exact data on this subject in the literature. Although the limited number of patients did not allow us to draw any statistically significant results, the high rates of bilateral mastectomy due to anxiety in our locally advanced/advanced cancers may be underlined. We consider that the high PCM/PBM rate in our clinic is solely due to patients' anxiety.

In Fairbairn's study of 100 patients who had undergone PCM, 42% of the patients were operated on due to a justifiable medical indication. Besides, 13% of patients underwent PCM operation due to suspicious MRI findings, and only 8% of patients' postoperative pathology reports were malignant (1). In our study, 59.1% of the patients were operated on for a justifiable medical reason. In 40.1% of the patients, PCM/PBM was performed without a justifiable medical reason due to anxiety about relapse. However, it should be remarked that such patients with diagnosed breast cancer do have a higher risk of developing breast cancer in the contralateral breast than the average population. Also, two of the patients had a family history of breast cancer.

Risk-reducing PCM/PBM was performed on one or two patients annually between 2010-2014, increased every year in line with the global trend until 2018, and was performed on eight patients (36%) in 2018 (Table 3, Figure 1).

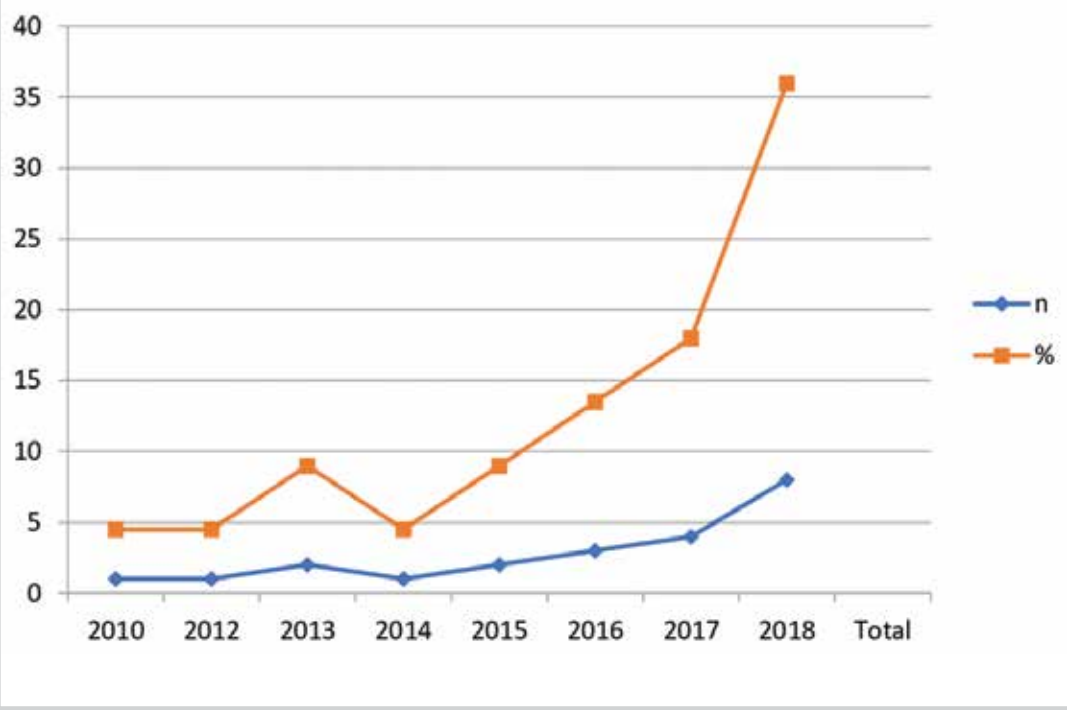

Figure 1. Number of mastectomy operations.

The frequency of BRCA mutation analysis has also increased significantly in the last two decades. There can be underlying reasons thereof. In our opinion, the most critical factor might be that the PCM/PBM lowered the price of the test and the coverage of the BRCA analysis by the Social Security Institution in Turkey. Traditionally, the rate of testing had been lower among women with low income (4). Furthermore, in recent years, the frequency of prophylactic mastectomy has increased. Besides, after the famous movie star Angelina Jolie announced that she had risk-reducing bilateral prophylactic mastectomy + reconstruction due to having BRCA-1 mutation, the frequency of BRCA mutation analysis and PCM/PBM increased all over the world, which was defined as the Angelina Jolie effect (17,18). This procedure, which was launched as a life-saver after the announcement, has become even more popular. It has generally become a preferred method among women who are well educated, with high socioeconomic status and have anxiety with a family history of breast cancer (19).

About 10% of breast cancers are associated with germline genetic mutations such as TP53, BRCA-1, BRCA-2, CDH1, STK11, and PTEN. BRCA-1 and BRCA-2, breast-ovarian syndromes are responsible for approximately one-third of them. The overall lifetime risk of developing breast cancer (up to 80) is approximately 72% in BRCA-1 and approximately 69% in BRCA-2. Breast cancer that develops in BRCA mutation carriers is often bilateral and multicentric. In BRCA-1 carriers, breast cancer develops at an earlier age as opposed to BRCA-2 carriers, especially before the age of 50 and being a triple-negative aggressive type (20). In our study, the BRCA mutation test was run in ten patients and detected as positive in eight patients. Five of the patients had BRCA-1 gene mutation, and three patients had BRCA-2 gene mutation. PBM operation was performed in one (4.5%) patient with BRCA-1 mutation, and PCM operation was performed in seven (31.5%) patients. Two of the patients requested prophylactic mastectomy to relieve their anxiety, even though no deleterious mutation was detected in the BRCA test.

Various strategies are used to reduce or eliminate the risk of developing hereditary breast cancer. Close surveillance and strict follow-up, including prominently MRI (annual or every six months), MMG, USG, and physical examination, should be started from the age of 25 or the earliest breast cancer age in the family. Chemoprevention is proposed as an alternative method. However, there is not enough evidence to prove selective estrogen receptor modulators, and aromatase inhibitors prevent or reduce breast cancer risk in BRCA carriers. Bilateral salpingooferectomy is recommended at the age of 35-40 years after patients complete their planned deliveries (21). In a study conducted by Marta D'Alonzo et al., attentive close surveillance and observation for high-risk patients in breast cancer development have been shown to have high patient satisfaction rates and reduce patients' anxiety about cancer.

On the other hand, prophylactic contralateral/bilateral mastectomy + reconstructive procedure has been suggested to increase patient satisfaction, yet cosmetic results reduce patient satisfaction. Bilateral salpingooferectomy has also been shown to decrease breast and ovarian cancer incidence in BRCA1-2 mutation carriers. One of our patients underwent bilateral salpingooferectomy after delivery.

This procedure also reduces the risk of breast cancer by 50% (19). In our study, BRCA1-2 genetic mutation analysis was applied to ten patients in total, one (10%) in 2010, one (10%) in 2013, one (10%) in 2016, two (20%) in 2017, and five (50%) in 2018. Analyses for other hereditary breast cancer syndromes were not performed. Although the numbers of our patients were limited, the mutation analysis rate has increased over the years. It was considered compatible with the trend in the world in recent years.

LCIS does not usually turn into cancer, but it is a risk factor for invasive breast cancer. Therefore, removing the LCIS lesion is not beneficial for the patient. These patients are recommended chemoprevention, close surveillance, or PBM (22). Patients with a prominent breast cancer family history and widespread anxiety, as in our study, may prefer PBM. In our study, one patient (4.5%) had prophylactic PCM due to both DCIS and BRCA-2 positivity, and three patients (13.5%) had PCM due to LCIS.

Suspicious MRI findings may not be correlated with precancerous or cancerous tissue in the final histopathological examination and urge both physician and patient to unnecessary breast operation (1). Although the number of patients was not sufficient to discuss that issue in our study, invasive ductal carcinoma was diagnosed in one of the patients who was operated on due to suspicious findings on MRI.

Specimens from three patients (13.5%) of all PCM patients were reported as malignant as a result of the final pathology. one of these had BRCA-1 gene mutation, one patient had BRCA-2 gene mutation, and one patient had no other risk factor other than the presence of cancer on the contralateral breast. These results were compatible with the studies in the literature (6).

Twelve of twenty-two patients who underwent PCM/PBM had an implant, six patients had an autologous reconstructive procedure, and the remaining four patients (18%) did not undergo any additional surgery. The implant or reconstructive procedure was performed for eight patients in the same session following the mastectomy operation, and ten of them later on in a separate session. The implant or reconstructive procedure was not applied simultaneously with chemotherapy to regard patient-specific considerations and patient preference; it may delay chemotherapy and might disrupt the cancer treatment. These findings were compatible with the findings in the literature (23). However, in our study, no evaluation was made regarding the patients' postoperative satisfaction status and how

they perceived their body appearance. Previous studies report that up to 17% of patients are not satisfied with their body's final appearance and that they would not prefer such an operation if they could decide now that they can see the results. As a result of PBM, some patients have declared that they had a negative perception of their physiology, sexual health, and appearance of their bodies (24). In a study published by Qin et al. in 2018, it was highlighted, as in many previous studies, that breast implants and reconstructions performed in the same session positively affect sexual health and the perception of body appearance and increased patient satisfaction and quality of life. They also suggested that having an implant or reconstructive operation in the same session with mastectomy does not affect oncological outcomes (25). We believe that these developments have increased the trend towards risk-reducing prophylactic mastectomy, and this trend will escalate. Therefore, we think that all patients should be consulted with the plastic surgery unit before the PCM/PBM procedure. Our study had some limitations including its small sample size and being conducted retrospectively at a single-center.

CONCLUSION

Although PCM/PBM reduces breast cancer incidence, it has no proven reducing effect on survival. The patient's anxiety should be eliminated by providing all kinds of options available for the patient by the physician, and the patient should be able to make decisions in the best setting. To prevent risk-reducing mastectomy without indication, we suggest a thorough and patient-based evaluation regarding patient preference and a multidisciplinary approach that includes general surgeons, medical oncologists, plastic and reconstructive surgeons, radiologists, and psychiatrists.

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REFERENCES

1. *Fairbairn K, Cervantes A, Rayhrer C, Steen S. Trends in contralateral prophylactic mastectomy. Aesthetic Plast Surg 2020; 44(2): 323-9.*
2. *Nealon KP, Sobti N, Gadd M, Specht M, Liao EC. Assessing the additional surgical risk of contralateral prophylactic mastectomy and immediate breast implant reconstruction. Breast Cancer Res Treat 2020; 179(2): 255-65.*
3. *Wong SM, Freedman RA, Sagara Y, Aydogan F, Barry WT, Golshan M. Growing use of contralateral prophylactic mastectomy despite no improvement in long-term survival for invasive breast cancer. Ann Surg 2017 265(3): 581-9.*
4. *Kruper L, Kauffmann RM, Smith DD, Nelson RA. Survival analysis of contralateral prophylactic mastectomy: a question of selection bias. Ann Surg Oncol 2014 21(11): 3448-56.*
5. *Arpino G, Bardou VJ, Clark GM, Elledge RM. Infiltrating lobular carcinoma of the breast: tumor characteristics and clinical outcome. Breast Cancer Res 2004; 6(3): R149-56.*
6. *Yi M, Meric-Bernstam F, Middleton LP, Arun BK, Bedrosian I, Babiera GV. Predictors of contralateral breast cancer in patients with unilateral breast cancer undergoing contralateral prophylactic mastectomy. Cancer 2009 115(5): 962-71.*
7. *Evers C, Fischer C, Dikow N, and Schott S. Familial breast cancer: Genetic counseling over time, including patients' expectations and initiators considering the Angelina Jolie effect PLoS One 2017; 12(5): e0177893.*
8. *Guillem JG, Wood WC, Moley JF, Berchuck A, Karlan BY, Mutch DG. ASCO/SSO review of the current role of risk-reducing surgery in common hereditary cancer syndromes. J Clin Oncol 2006; 24(28): 4642-60.*
9. *Parker PA, Peterson SK, Shen Y, Bedrosian I, Black DM, Thompson AM. Prospective study of psychosocial outcomes of having contralateral prophylactic mastectomy among women with nonhereditary breast cancer. J Clin Oncol 2018; 36(25): 2630-38.*
10. *Chowdhury M, Euhus D, Onega T, Biswas S, Choudhary PK. A model for individualized risk prediction of contralateral breast cancer. Breast Cancer Res Treat 2017; 161(1): 153-60.*
11. *Reiner AS, John EM, Brooks JD, Lynch CF, Bernstein L, Mellemkjær L. Risk of a synchronous contralateral breast cancer in noncarriers of BRCA1 and BRCA2 mutations with a family history of breast cancer: a report from the Women's Environmental Cancer and Radiation Epidemiology Study. J Clin Oncol 2013; 31(4): 433-9.*
12. *D'Alonzo M, Piva E, Pecchio S, Liberale V, Modaffari P, Ponzone R. Satisfaction and impact on quality of life of clinical and instrumental surveillance and prophylactic surgery in BRCA-mutation carriers. Clin Breast Cancer 2018; 18(6): e1361-e1366.*
13. *Rutgers EJT. Is prophylactic mastectomy justified in women without BRCA mutation? The Breast 2019; 48 Suppl 1: 62-4.*
14. *Angelos P, Bedrosian I, Euhus DM, Herrmann VM, Katz SJ, Pusic A. Contralateral prophylactic mastectomy: challenging considerations for the surgeon. Ann Surg Oncol 2015; 22(10): 3208-12.*
15. *Franceschini G, Riccardo Masetti MD. Bilateral risk-reducing mastectomy in BRCA mutation carriers: A difficult decision-making. Breast J 2019; 25(3): 564-65.*
16. *Carbine NE, Lostumbo L, Wallace J, Ko H. Risk-reducing mastectomy for the prevention of primary breast cancer. Cochrane Database Syst Rev 2018; 4(4): CD002748.*
17. *Liede A, Cai M, Crouter TF, Niepel D, Callaghan F, Evans DG. Risk-reducing mastectomy rates in the US: a closer examination of the Angelina Jolie effect. Breast Cancer Res Treat 2018; 171(2): 435-42.*
18. *Kmietowicz Z, Angelina Jolie's mastectomy triggered a sharp rise in gene testing. 2016; 355: i6702.*
19. *Roberts MC, Dusetzina SB. The effect of a celebrity health disclosure on demand for health care: trends in BRCA testing and subsequent health services use. J Community Genet 2017; 8(2): 141-6.*

20. *Dumitrescu RG. Interplay between genetic and epigenetic changes in breast cancer subtypes. Methods Mol Biol 2018; 1856: 19-34.*

21. *National Comprehensive Cancer Network (NCCN). Clinical Practice Guidelines in Oncology: Genetic/Familial High-Risk Assessment: Breast and Ovarian. Available from: https://www.nccn.org/professionals/physician_gls/default.aspx (Accessed date: 2018).*

22. *Miller ME, Muhsen S, Zabor EC, Flynn J, Olcese C, Giri D, et al. Risk of contralateral breast cancer in women with ductal carcinoma in situ associated with synchronous ipsilateral lobular carcinoma in situ. Ann Surg Oncol 2019; 26(13): 4317-25.*

23. *Cabanuz MA, Del Amo MDA, Barles AN, Sanchez ATG. Influence of radiotherapy on immediate breast reconstruction after skin-sparing mastectomy. Before or after: does it matter? Cir Esp 2019; 97(3): 156-61.*

24. *Frost MH, Slezak JM, Tran NV, Williams CI, Johnson JL, Woods JE. Satisfaction after contralateral prophylactic mastectomy: the significance of mastectomy type, reconstructive complications, and body appearance. J Clin Oncol 2005; 23(31): 7849-56.*

25. *Qin Q, Tan Q, Lian B, Mo Q, Huang Z, Wei C. Postoperative outcomes of breast reconstruction after mastectomy: a retrospective study. Medicine (Baltimore) 2018; 97(5): e9766.*

ORİJİNAL ÇALIŞMA-ÖZET
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Kadınlarda meme kanserini önlemede risk azaltıcı profilaktik mastektomi prosedürünün artan bir eğilimi var mıdır?

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ÖZET

Giriş ve Amaç: Risk-azaltıcı kontralateral/bilateral profilaktik mastektomi prosedürü için kanıta dayalı çok az endikasyon vardır. Bu kısıtlı endikasyonlara rağmen tüm dünyada uygulanma sıklığı giderek artmaktadır. 2013 yılında Angelina Jolie'nin BRCA-1 mutasyonu taşıyıcılığı nedeniyle bilateral profilaktik mastektomi operasyonu geçirdiğini açıklamasından sonra tüm dünyada hayat kurtarıcı olarak lanse edilmiş, ABD'de BRCA gen mutasyon analiz sıklığı ve kontralateral/bilateral profilaktik mastektomi uygulanma sıklığı artmıştır. Bu çalışmada kliniğimizdeki kontralateral/bilateral profilaktik mastektomi uygulama sonuçlarını incelemeyi amaçladık.

Gereç ve Yöntem: 2010-2018 yılları arasında kontralateral/bilateral profilaktik mastektomi uygulanan 27 hastadan verilerine ulaşılabilen 22'si çalışmaya dahil edildi. Bu hastaların demografik verileri, aile hikayeleri, preop tanıları, tümör özellikleri, uygulanan prosedür, implant veya rekonstruktif işlem uygulanma durumu, neoadjuvan KT alma durumları, BRCA bakılma oranları, eğitim durumları ve endikasyonları retrospektif olarak incelendi.

Bulgular: Cerrahi endikasyonlar veya cerrahi prosedür uygulanmasının başlıca gerekçeleri şunlardır: BRCA-1 mutasyonu (n= 5), BRCA-2 mutasyonu (n= 3), manyetik rezonans görüntülemede malign benzeri alanlar (n= 2), lobüler karsinoma in situ (n= 3) ve yoğun kaygı (n= 9)'dır. 18 hastaya (%82) implantasyon veya otolog doku yoluyla ek bir rekonstrüktif prosedür uygulandı ve 4 hastaya (%18) sadece mastektomi yapıldı. Yıllara göre PCM/PBM uygulanma sıklığı şöyledir: 2010 (n= 1), 2011 (n= 0), 2012 (n= 1), 2013 (n= 2), 2014 (n= 1), 2015 (n= 2), 2016 (n= 3), 2017 (n= 4), 2018 (n= 8). Bu da son zamanlarda artan eğilimi temsil ediyor.

Sonuç: Hastaların %59,1 (13) tanesi kabul edilebilir tıbbi bir gerekçe ile opere edilmişlerdir. %40,9'u, hastalık nüks etme endişesi ve korkusuyla risk-azaltıcı kontralateral/bilateral profilaktik mastektomi geçirmiştir. Kontralateral/bilateral profilaktik mastektomi meme kanseri insidansını azaltsa da, surviye ek bir katkısının olmadığı birçok çalışmada gösterilmiştir. Yakın takip, tarama ve kemoprevensiyon yöntemleri öncelikli olmalıdır.

Anahtar Kelimeler: Risk-azaltıcı mastektomi, meme kanseri, BRCA1, BRCA2

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ORIGINAL ARTICLE
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Quality of recovery assessment of day case and multiday stay patients undergoing elective laparoscopic cholecystectomy

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ABSTRACT

Objective: Many laparoscopic cholecystectomy operations are performed with at least overnight admission. Current research shows that laparoscopic cholecystectomy is safe and feasible to do as a day case. Patient centred outcomes are less well understood.

Material and Methods: Elective laparoscopic cholecystectomy patients at a single metropolitan hospital in Melbourne, Australia were surveyed 24 hours after surgery using the 15-question Quality of Recovery (QoR-15) survey. A comparison was made between day case surgeries and multi-day surgeries.

Results: One hundred and eight patients were recruited consisting of 34 day case and 74 multi-day patients. Patient groups did not differ in terms of age, sex or postoperative morbidity. The multi-day group had a higher proportion of comorbid patients (p-value = 0.03). There was no significant difference in overall QoR-15 score between the two groups, although there was an observed trend towards a higher score in the day case group (132.0 vs 127.9, p= 0.147). QoR-15 individual question results showed that day cases rated significantly better for sleep quality and for less feelings of anxiety or worry. The differences narrowed when comparing patient groups as they were booked (intention-to-treat). There were no identified sub-groups that had a significantly higher score if admitted multi-day.

Conclusion: Quality of recovery following day case laparoscopic cholecystectomy is just as good, if not better, than multi-day cases. Laparoscopic cholecystectomy as a day case is both safe and economically superior to multi-day management. This gives further weight to current recommendations suggesting that the majority of laparoscopic cholecystectomy operations could be performed as day cases.

Keywords: Laparoscopic cholecystectomy, gallstones, day case, quality of recovery

INTRODUCTION

There is an increasing push for appropriate patients to have laparoscopic cholecystectomy operations performed as day cases. In Australia, the common post-operative management for laparoscopic cholecystectomy still appears to be at least overnight stay with almost all higher volume surgeons having patients with a median stay of at least one day according to Medicare data (1). This has become a major target of healthcare systems such as in the United Kingdom, with the British Association of Day Surgery recommending that approximately 60% of laparoscopic cholecystectomy operations be performed as day cases (2). There are, however, still concerns from surgeons as to the feasibility and acceptability of day case laparoscopic cholecystectomy with post-operative pain perceived as the major issue (2-4).

Day case laparoscopic cholecystectomy has also been shown to have a similar rate of adverse outcomes when compared to multi-day stay patients (5,6). The potential health economic effects could be important with financial benefits shown to be significant (7,8). The choice to keep a patient in overnight is both for a perception of improved patient safety and quality of patient recovery; however, there is little research into the effectiveness of day case surgery in terms of patient satisfaction or quality of recovery. What research has been done, usually through patient satisfaction surveys, suggests that day case surgeries are well received by patients, with

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satisfaction ratings just as high as those for admitted patients (2,9). Quality of Recovery - 15 (QoR-15) has been extensively validated and shown to be a reliable measure in surgical settings of patient's quality of recovery, not just pain scores, in a wide range of surgery including laparoscopy and day case surgery (10-12).

This study aimed to evaluate the quality of recovery of patients undergoing elective laparoscopic cholecystectomy in an unadulterated practice in an Australian metropolitan hospital. A superior or non-inferior outcome could help to prompt surgeons to consider day case laparoscopic cholecystectomy as standard, with improvements in patient outcomes and health economics.

MATERIAL and METHODS

Study Design

The study was performed at a single centre in Melbourne, Australia. All patients that underwent elective laparoscopic cholecystectomy between August 2018 and December 2018 were assessed for inclusion in the study. Exclusion criteria included age <18 years or non-proficient in English language as assessed by requiring an interpreter for consent. Twenty-four hours after surgery, patients were contacted via telephone and verbally consented to take part in the study. Consented patients were administered QoR-15 (Table 1) with scores recorded. In order to keep the answer responses standard, the patients were contacted via telephone regardless of their status as an inpatient or outpatient at the time of the questionnaire. Patient notes were reviewed for demographics, comorbidities and surgical details. 30 days post-operatively, patient notes were interrogated for eventual length of stay and morbidity.

Whilst this study did not record specific techniques during the operation, the standard laparoscopic cholecystectomy approach performed at this institution is a 4 port "American" style cholecystectomy with routine intra-operative cholangiogram. Routine post-operative analgesia included recovery room paracetamol, ibuprofen and fentanyl titrated to effect. Ward and discharge analgesia included paracetamol, ibuprofen and oxycodone as required. Surgeons and anaesthetists were not informed of the conduct of this study so as to not change normal behaviour.

Sample Size and Recruitment

Sample size was calculated assuming a 10% improvement in score with a standard deviation of 15, a probability of a type 1 error of 0.05, and a power of 80%. Based on previous numbers at the study centre, a ratio of 1:3 weighted on overnight stay patients was estimated. The sample size with these parameters was 96 patients, with 24 in the day case group and 72 in the overnight group. Patients were recruited by several investigators and numbers were tallied at the end of each week, with accrual ending when numbers had been reached in both groups.

Table 1. QoR-15 questionnaire

Part A Scored 0-10 where 0=none of the time (feeling terrible) and 10=all of the time (feeling excellent)
Consider how have you been feeling in the last 24 hours? 1. Are you able to breathe easily? 2. Have you been able to enjoy food? 3. Do you feel rested? 4. Have you had a good sleep? 5. Have you been able to look after personal toilet and hygiene unaided? 6. Are you able to communicate with family or friends? 7. Have you gotten enough support from hospital doctors and nurses? 8. Have you been able to return to work or usual home activities? 9. Are you feeling comfortable and in control? 10. Do you have a feeling of general well-being?
Part B Scored 10 to 0, where 10=none of the time (excellent) and 0=all of the time (terrible)
Have you had any of the following in the last 24 hours? 11. Moderate pain? 12. Severe pain? 13. Nausea or vomiting? 14. Feeling worried or anxious? 15. Feeling sad or depressed?

Statistical Analysis

Statistical analysis, using SPSS (IBM, Armonk, USA), included one-way ANOVA to compare differences in scores for individual questions and total score in the QoR-15. Comparisons of categorical data were compared using Chi-Square or Fisher's Exact Test. Student's T test was used to analyse continuous data. Statistical significance was set at a p-value of 0.05 for all analysis. Ethical and governance approval was gained from the Northern Health Office of Research and Governance (ALR 16.2018).

RESULTS

One hundred and eight patients were included in the study, of which 34 were treated as day cases and 74 were admitted as multi-day stay cases. Total QoR-15 scores were compared depending upon length of stay (Figure 1). Cohort numbers for length of stay of more than one day for individual days (other than day 1) were too small to perform analysis on and thus grouped as multi-day stay patients. Demographics and pre-operative data are shown in Table 2. In particular there was a significantly increased number of patients with serious co-morbidities in the multi-day group (14/74 vs 1/34, p= 0.034). No patients lived more than 100 km from the hospital. There were no operations that required conversion to open procedures and no mortality during the study period.

Quality of Recovery

Table 3 demonstrates the mean score for each question of the QoR-15 (Table 1) comparing day case and multi-day cases. There was a slight observed increase in scores in the day case group, however this was not statistically significant (132.0 vs 127.9, p= 0.147). There were two individual question scores that demonstrated statistical significance, both scoring higher in day case: Question 4 (regarding having a good sleep) 7.4 vs 5.9 (p= 0.013); and Question 14 (regarding anxiety and worry) 9.6 vs 9.2 (p- 0.02).

Intention to Treat Analysis

Patients ' feelings of recovery may relate to preconceived ideas regarding length of stay, thus intention to treat analysis (based on whether the patient was booked as a day case or multi-day stay) was also performed (Table 4). The overall score comparing day case booked patients to multi-day was not significant (130.2 vs 128.8, p= 0.631). Question 14 again showed a higher mean score in the day case group (9.8 vs 9.2, p= 0.043).

Factor Subgroups

Subgroups of the patients were analysed for identification of any particular factors that may indicate appropriateness for overnight admission (Table 5). There was no significant difference between scores for patients with co-morbidities, patients undergoing an additional procedure, or whether the operation was performed on an AM or PM list, although interestingly there was a trend towards higher scores in PM list patients that were managed as day cases (134.5 vs 127.7, p= 0.173).

DISCUSSION

The argument over day case laparoscopic cholecystectomy has typically been waged over patient safety versus health economic implications. The safety of day case laparoscopic cholecystectomy has been confirmed in terms of postoperative complications, mortality and readmissions, with studies demonstrating day case patients having similar rates of adverse outcomes when compared to multi-day stay patients (5,6). Studies of

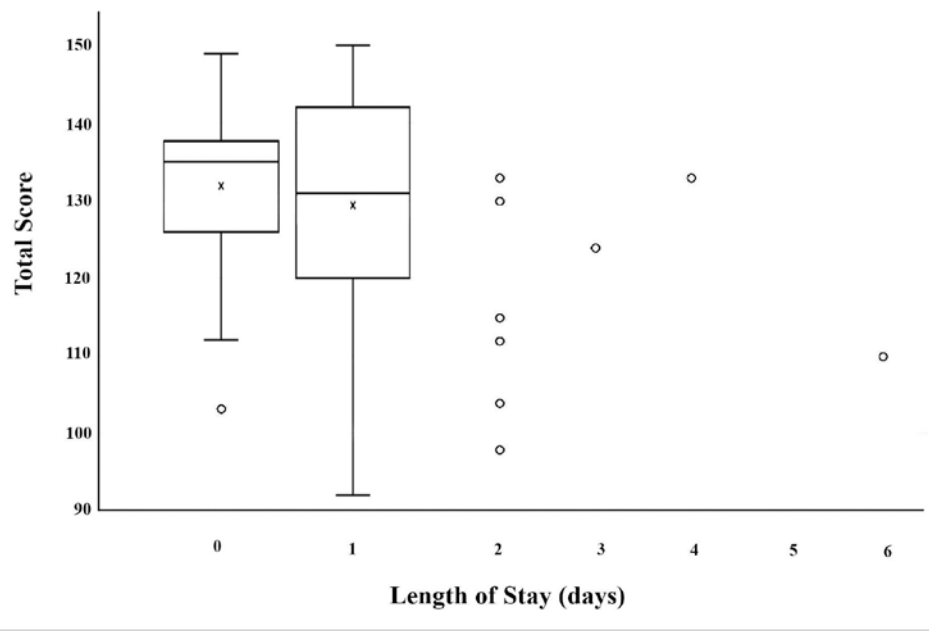

Figure 1. QoR-15 scores per length of stay.

Table 2. Patient demographics

	Day Case (n= 34)	Multi-Day (n= 74)	p
Age	44.0	49.1	0.118
Gender - Female	26	52	0.335
Booked as Day Case	25	5	<0.001*
Significant Comorbidities	1	14	0.020*
BMI >30	2	3	
Ischaemic Heart Disease	0	4	
Cerebrovascular Event	0	2	
Chronic Obstructive Pulmonary Disease	0	3	
Peripheral Vascular Disease	0	2	
Obstructive Sleep Apnoea	0	1	
Other	1	6	
Additional Procedure	3	8	0.524
Umbilical Hernia Repair	2	4	
Gastroscopy	1	0	
Laparoscopic Bile Duct Exploration	0	2	
Significant Adhesiolysis (>45 min)	0	2	
AM list	23	28	0.004*
Surgical Time	73.0	83.9	0.074
Morbidity	2	4	0.617
Clavien-Dindo 1/2	2	1	
Clavien-Dindo 3/4	0	3	

BMI: Body mass index.
* Indicates significance p< 0.05.

Table 3. QoR-15 results comparing day case and multi-day patients, mean score (95% CI)

Question	Day Case (n= 34)	Multi-Day (n= 74)	p
1	9.4 (9.0-9.8)	9.4 (9.1-9.7)	0.934
2	8.4 (7.7-9.0)	8.1 (7.6-8.6)	0.577
3	8.3 (7.6-8.9)	8.1 (7.6-8.6)	0.738
4	7.4 (6.7-8.2)	5.9 (5.2-6.7)	0.013*
5	9.6 (9.3-10.0)	9.2 (8.9-9.6)	0.178
6	9.9 (9.8-10.0)	9.9 (9.8-10.0)	0.95
7	9.6 (9.4-9.9)	9.6 (9.3-9.9)	0.855
8	6.7 (5.8-7.5)	6.4 (5.8-7.5)	0.662
9	8.6 (8.1-9.1)	8.5 (8.1-8.9)	0.699
10	8.4 (7.9-9.0)	8.6 (8.3-9.0)	0.525
11	6.9 (6.1-7.7)	7.0 (6.5-7.5)	0.946
12	9.6 (9.1-10.0)	9.0 (8.6-9.5)	0.151
13	9.5 (9.0-10.0)	9.3 (9.0-9.6)	0.500
14	9.9 (9.6-10.2)	9.2 (8.8-9.5)	0.021*
15	9.7 (6.4-10.0)	9.6 (9.3-9.9)	0.589
Overall Total	132.0 (128.2-135.7)	127.9 (124.5-131.3)	0.147

* Indicates significance p< 0.05.

Table 4. QoR-15 results comparing intention to treat (patients booked as day case or multi-day), mean score (95% CI)

Question	Day Case (n= 30)	Multi-Day (n= 78)	p
1	9.5 (9.1-9.9)	9.4 (9.1-9.6)	0.568
2	8.2 (7.3-9.1)	8.2 (7.7-8.7)	0.979
3	7.8 (6.9-8.6)	8.3 (7.9-8.8)	0.21
4	7.1 (6.2-8.1)	6.1 (5.4-6.8)	0.11
5	9.5 (9.0-9.9)	9.3 (9.0-9.7)	0.669
6	9.9 (9.7-10.1)	9.9 (9.8-10.1)	0.922
7	9.6 (9.3-9.9)	9.6 (9.4-9.9)	0.898
8	6.4 (5.5-7.3)	6.5 (5.9-7.2)	0.856
9	8.6 (8.0-9.2)	8.5 (8.1-8.9)	0.878
10	8.3 (7.6-9.0)	8.7 (8.4-9.0)	0.306
11	6.8 (6.0-7.6)	7.0 (6.5-7.5)	0.642
12	9.5 (9.0-10.0)	9.1 (8.8-9.5)	0.279
13	9.4 (8.9-10.0)	9.3 (9.0-9.7)	0.749
14	9.8 (9.5-10.2)	9.2 (8.8-9.6)	0.043*
15	9.8 (9.5-10.1)	9.6 (9.2-9.9)	0.417
Overall Total	130.2 (125.9 - 134.5)	128.8 (125.6-132.0)	0.631

* Indicates significance p< 0.05.

Table 5. QoR-15 outcomes comparing perceived critical variables

Variable			p
Comorbidity	No (n= 93)	Yes (n= 15)	
QoL-15 score	129.7	126.3	0.381
Comorbidity ± Day Case	Day Case (n= 1)	Multi-Day (n= 14)	
QoL-15 score	135.0	125.7	0.614
Additional Procedure	No (n= 97)	Yes (n= 11)	
QoL-15 score	129.2	129.0	0.962
Additional Procedure ± Day Case	Day Case (n= 3)	Multi-Day (n= 8)	
QoL-15 score	127.7	128.3	0.960
AM or PM list	AM (n= 51)	PM (n= 57)	
QoL-15 score	129.4	129.0	0.881
AM list ± Day Case	Day Case (n= 23)	Multi-Day (n= 28)	
QoL-15 score	130.7	128.3	0.468
PM list ± Day Case	Day Case (n= 11)	Multi-Day (n= 46)	
QoL-15 score	134.5	127.7	0.173

other laparoscopic operations have found similar outcomes, particularly with laparoscopic appendicectomy, laparoscopic hysterectomy and laparoscopic hiatal surgery (9,13-16). This study was not powered to look at safety, but does suggest minimal morbidity in both groups. However, the observed higher rate of significant Clavien-Dindo 3 and 4 complications in the multi-day group was associated with the increased number of patients with serious co-morbidities and may suggest a group where it would be prudent to maintain a multi-day admission with prolonged observation (Table 2).

The counter argument is that if even only a subset of patients is able to be treated as a day case, this still provides benefits for hospital flow. A significant drive towards performing laparoscopic cholecystectomy as a day case is the potential to save on bed stay costs in the hospital setting. Although costs differ between health systems and it is difficult to directly compare

between these, it is apparent that by reducing the number of admitted patients following surgery, the related costs from an overnight stay can be avoided (7,8). In real terms, this may not always mean an empty bed for the night with savings on nursing, cleaning and medication costs, but having the ability to admit another patient and gaining the associated revenue. This cost saving feature has been investigated by various studies that all highlight the significant reduction in costs from performing laparoscopic cholecystectomy operations as day cases and using freed up resources to increase revenue in other areas (6-8,14,17). This study did not evaluate the costs associated with patient admissions, but with at least equivalent results for day case patients, and a large number of patients in the multi-day group not co-morbid, there is the potential for a greater percentage of patients being treated as day procedures leading to further savings.

With the available evidence thus far suggesting that there is a cohort of patients undergoing laparoscopic cholecystectomy that is both safe to discharge on the same day, and provide an economic benefit to the hospital, it is relevant in this context to consider patient satisfaction. Post-operative pain is only one aspect of this, and quality of recovery measurement tools have been developed to encompass the multiple factors that are of importance to a patient recovering from an operation (10,12). QoR-15 questionnaire was used by this study as a well-established tool for this purpose, and demonstrated an observed (but not statistically significant) increase in scores in the day case group. It may not be a surprise that day case patients recorded a significantly better score for quality of sleep with potential interruptions including overnight interruptions for nursing observations or loud/snoring nearby patients. Interestingly, day case patients also recorded a better score for feelings of worry or anxiety, contrary to the thought that having a nurse nearby may moderate these thoughts. These results are echoed in the limited literature published on patient satisfaction with day case laparoscopic cholecystectomy which demonstrates no significant difference in their patient recovery symptom scores (18).

These studies highlight the need for selection of a cohort of patients to whom day case surgery is offered. Common patient factors that could inhibit offering surgery to patients as a day case may include an ASA score of 3 or greater, multiple comorbidities, uncontrolled pain, or supplemental oxygen requirement (19). Most of these factors are known in the lead up to surgery and can therefore be used to direct bookings between day cases or overnight admissions for patients, however ideally pre-operative education of patients regarding day case surgery should be delivered by the surgeon in the outpatient clinic (20,21). The results of this study demonstrate no difference in QoL-15 scores in patients with significant co-morbidities, however details, such as chronic pain, were not recorded and there are likely to be particular features in some individuals that necessitate overnight care. Other studies analysing the safety of day case laparoscopic surgeries also state that stringent selection of patients allows for maximised safety (9,11,22-24). These studies also confirm supports at home as critical for same day discharge after laparoscopic surgery. This study shows that there is no difference in whether the operation is in the morning or afternoon, with an observed but non-significant trend towards improved scores in PM list patients. However, the actual time of operation was not recorded and there may be differences between patients operated on first in the afternoon and patients at the end of the afternoon list, as well as recovery staffing issues.

This study is limited by a relatively small study size, and thus there exists the possibility of a type 2 error. However, the trend is towards a benefit with day case surgery, and further numbers may confirm this approach as significantly better in terms of quality of recovery. A randomised trial will likely be difficult to perform in this setting, with ethical difficulties in keeping suitable day case patients in hospital overnight.

CONCLUSION

Day case laparoscopic cholecystectomy is both a safe and feasible alternative to admission for appropriate patients, and there are significant cost reductions involved with such management. It appears that a combination of traditional management, surgeon's preference and patient's preference is the driving force behind the decision for overnight stay. This study shows that from the patients' perspective, their quality of recovery is just as good, if not better, when managed as a day case rather than a multi-day case. This gives added weight to the development of recommendations that the majority of laparoscopic cholecystectomy operations could be performed as day cases.

Ethics Committee Approval: This study approval was obtained from Northern Health Hospital Human Research Ethics Committee (Decision no: ALR 16.2018, Date: 20.06.2018).

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REFERENCES

1. *Watters D. Clinical Variation: Procedure in profile: Laparoscopic cholecystectomy. Surgical News 2016; 17: 38. Available from: https://umbraco.surgeons.org/media/1415/art-2016-04-01-surgical-news-april-for-web.pdf (Accessed date: 16th of November 20).*

2. *Briggs CD, Irving GB, Mann CD, Cresswell A, Englert L, Peterson M, et al. Introduction of a day-case laparoscopic cholecystectomy service in the UK: a critical analysis of factors influencing same-day discharge and contact with primary care providers. Ann R Coll Surg Engl 2009; 91(7): 583-90.*
3. *Ismail S, Ahmed A, Hoda MQ, Sohaib M, Rehman Zia-Ur. Prospective survey to study factors which could influence same-day discharge after elective laparoscopic cholecystectomy in a tertiary care hospital of a developing country. Updates Surg 2016; 68(4): 387-93.*
4. *Ahn Y, Woods J, Connor S. A systematic review of interventions to facilitate ambulatory laparoscopic cholecystectomy. HPB (Oxford) 2011; 13(10): 677-86.*
5. *Lau H, Brooks DC. Contemporary outcomes of ambulatory laparoscopic cholecystectomy in a major teaching hospital. World J Surg 2002; 26(9): 1117-21.*
6. *Rosen MJ, Malm JA, Tarnoff M, Zuccala K, Ponsky JL. Cost-effectiveness of ambulatory laparoscopic cholecystectomy. Surg Laparosc Endosc Percutan Tech 2001; 11(3): 182-4.*
7. *Jain PK, Hayden JD, Sedman PC, Royston CMS, O'Boyle CJ. A prospective study of ambulatory laparoscopic cholecystectomy: Training economic, and patient benefits. Surg Endosc 2005; 19(8): 1082-5.*
8. *Manzia TM, Quaranta C, Filingeri V, Toti L, Anselmo A, Tariciotti L, et al. Feasibility and cost effectiveness of ambulatory laparoscopic cholecystectomy. A retrospective cohort study. Ann Med Surg (Lond) 2020; 55: 56-61.*
9. *Lassen PD, Moeller-Larsen H, DE Nully Pia. Same-day discharge after laparoscopic hysterectomy. Acta Obstet Gynecol Scand 2012; 91(11): 1339-41.*
10. *Stark PA, Myles PS, Burke JA. Development and psychometric evaluation of a postoperative quality of recovery score: the QoR-15. Anesthesiology 2013; 118(6): 1332-40.*
11. *Trejo-Avila ME, Romero-Loera S, Cardenas-Lailson E, Blas-Franco M, Delano-Alonso R, Valenzuela-Salazar C, et al. Enhanced recovery after surgery protocol allows ambulatory laparoscopic appendectomy in uncomplicated acute appendicitis: A prospective, randomized trial. Surg Endosc 2019; 33(2): 429-36.*
12. *Chazapis M, Walker EMK, Rooms MA, Kamming D, Moonesinghe SR. Measuring quality of recovery-15 after day case surgery. Br J Anaesth 2016; 116(2): 241-8.*
13. *Cross W, Chandru Kowdley G. Laparoscopic appendectomy for acute appendicitis: A safe same-day surgery procedure? Am Surg 2013; 79(8): 802-5.*
14. *Dubois L, Vogt KN, Davies W, Schlachta CM. Impact of an outpatient appendectomy protocol on clinical outcomes and cost: A case-control study. J Am Coll Surg 2010; 211(6): 731-7.*
15. *Frazee RC, Abernathy SW, Davis M, Hendricks JC, Isbell TV, Regner JL, et al. Outpatient laparoscopic appendectomy should be the standard of care for uncomplicated appendicitis. J Trauma Acute Care Surg 2014; 76(1): 79-82.*
16. *Molina JC, Misariu AM, Nicolau I, Spicer J, Mulder D, Ferri LE, et al. Same day discharge for benign laparoscopic hiatal surgery: A feasibility analysis. Surg Endosc 2018; 32(2): 937-44.*
17. *Narain PK, De Maria EJ. Initial results of a prospective trial of outpatient laparoscopic cholecystectomy. Surg Endosc 1997; 11(11): 1091-4.*
18. *Young J, O'Connell B. Recovery following laparoscopic cholecystectomy in either a 23 hour or an 8 hour facility. J Qual Clin Pract 2001; 21(1-2): 2-7.*
19. *Brenner P, Kautz DD. Postoperative care of patients undergoing same-day laparoscopic cholecystectomy. AORN J 2015; 102(1): 16-29.*
20. *Kruzik N. Benefits of preoperative education for adult elective surgery patients. AORN J 2009; 90(3): 381-7.*
21. *de Aguilar-Nascimento JE, Leal FS, Dantas DCS, Anabuki NT, de Souza AMC, E Lima VPS, et al. Preoperative education in cholecystectomy in the context of a multimodal protocol of perioperative care: A randomized, controlled trial. World J Surg 2014; 38(2): 357-62.*
22. *Inaba CS, Koh CY, Sujatha-Bhaskar S, Pejcinovska M, Nguyen NT. How safe is same-day discharge after laparoscopic sleeve gastrectomy? Surg Obes Relat Dis 2018; 14(10): 1448-53.*
23. *Lalezari S, Musielak MC, Broun LA, Curry TW. Laparoscopic sleeve gastrectomy as a viable option for an ambulatory surgical procedure: Our 52-month experience. Surg Obes Relat Dis 2018; 14(6): 748-50.*
24. *Surve A, Cottam D, Zaveri H, Cottam A, Belnap LeGrand, Richards C, et al. Does the future of laparoscopic sleeve gastrectomy lie in the outpatient surgery center? A retrospective study of the safety of 3162 outpatient sleeve gastrectomies. Surg Obes Relat Dis 2018; 14(10): 1442-7.*

ORİJİNAL ÇALIŞMA-ÖZET
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Elektif laparoskopik kolesistektomi uygulanan günübirlik ve uzun yatışlı hastaların iyileşme kalitesi değerlendirmesi

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ÖZET

Giriş ve Amaç: Birçok laparoskopik kolesistektomi operasyonu gecelik yatış ile uygulanmaktadır. Güncel araştırmalar, laparoskopik kolesistektomi operasyonunun günübirlik şekilde yapılmasının güvenilir ve uygulanabilir olduğunu ortaya koymuştur. Hasta odaklı sonuçlar daha az anlaşılmıştır.

Gereç ve Yöntem: Avustralya'nın Melbourne şehrinde tek bir merkezde elektif laparoskopik kolesistektomi geçiren hastalar, operasyon sonrası 24. saatte 15 soruluk Quality of Recovery (QoR-15) (İyileşme Kalitesi) anketi kullanılarak incelendi. Günübirlik kalan ve uzun yatışlı hastalar arasında karşılaştırma yapıldı.

Bulgular: Otuz dördü günübirlik, 74'ü uzun yatışlı hastalar olmak üzere toplam 108 hasta çalışmaya dahil edildi. Yaş, cinsiyet ve postoperatif morbidite açısından hasta grupları arasında bir fark yoktu. Uzun yatışlı hasta grubunda komorbiditesi olan hastalar daha yüksek orandaydı (p-değeri= 0,03). Günübirlik grupta daha yüksek bir skor trendi olsa da toplam QoR-15 skoru açısından iki grup arasında anlamlı bir fark bulunmadı (132.0 vs 127,9, p= 0,147). QoR-15, bireysel sorulara verilen cevaplar günübirlik olguların daha iyi uyku kalitesine sahip olduğunu ve daha düşük endişe ve tedirginlik hissi yaşadığını ortaya koydu. Farklılıklar, hasta gruplarının kayıt edildikleri şekilde (tedavi niyeti) karşılaştırılmaları sonucunda daraldı. Uzun yatışlı olsa anlamlı şekilde daha yüksek skor alacak herhangi bir alt grup yoktu.

Sonuç: Günübirlik laparoskopik kolesistektomi sonrasında iyileşme kalitesinin uzun yatışlı hastalara kıyasla daha iyi olmasa da bir o kadar iyi olduğu bulundu. Günübirlik laparoskopik kolesistektomi hem güvenli hem de uzun yatışa kıyasla daha ekonomiktir. Bu durum, laparoskopik kolesistektomi operasyonlarının çoğunluğunu günübirlik vakalar olacak şekilde uygulanmasını öneren mevcut tavsiyelere destek çıkmaktadır.

Anahtar Kelimeler: Laparoskopik kolesistektomi, safrakesesi taşı, günübirlik hasta, iyileşme kalitesi

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ORIGINAL ARTICLE
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Incidence and mortality results of intestinal obstruction in geriatric and adult patients: 10 years retrospective analysis

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ABSTRACT

Objective: People with ileus is one of the patient groups with the highest admission rates to the emergency departments. In this study, it was aimed to determine the effects of age groups and etiological factors on mortality when evaluated together with gender.

Material and Methods: In our study, patients who were consulted from the Emergency Service to the General Surgery department with a pre-diagnosis of abdominal pain between 2009 and 2020 were retrospectively screened. Patients hospitalized for ileus were analyzed in terms of age (18-65 years and over 65 years), gender, operation, etiology, incidence, and mortality.

Results: Between 2009 and 2020, 534 (3.03%) of 17.601 patients who received emergency consultation from the general surgery clinic were diagnosed with ileus. While 253 (47.4%) of the patients were operated, 317 (59.4%) patients and 101 (18.9%) patients were diagnosed with brid and malignancy, respectively; and 21 (3.9%) patients died in the complete patient group (Table 1). While the incidence of brid was high in non-operated patients, in operated patients, malignancy and other pathologies was found to be higher ($p< 0.001$) (Table 2). While, in patients 65 years and older, mortality was observed in 10.6% of women and 2.6% of men, it was determined that the mortality rate was higher in women ($p= 0.008$) (Figure 4).

Conclusion: The mortality rate in patients hospitalized with the diagnosis of mechanical bowel obstruction was found to be statistically significantly higher in female patients aged 65 and over.

Keywords: Intestinal obstruction, adult, age groups, geriatrics, incidence, mortality

INTRODUCTION

Mechanical intestinal obstruction is a complication that can affect all age groups and has the highest number of emergency service admissions, with a high rate of morbidity and mortality, due to some possible delays in treatment. Mechanical intestinal obstruction is diagnosed annually in more than 300,000 cases admitted to emergency services in the United States, and 15% of the patients consulting for abdominal pain are admitted to the surgical service with the diagnosis of mechanical intestinal obstruction (1). While this patient group creates serious morbidity and mortality, it also causes a high financial burden due to their long hospital stay (2). In cases of ileus with delayed treatment, clinical conditions extending to sepsis are observed, and sepsis is the most important cause of mortality and morbidity, especially in the geriatric age group. (3). Due to the wide spectrum of disease groups that cause mechanical intestinal obstruction and diagnostic difficulties, clear incidence and mortality rates cannot be given. In a 10-year retrospective study, it has been reported that 1.9% of the patients in the geriatric population treated in ICU were due to ileus. (4). In its etiology, there is a wide range of diseases such as abdominal surgery (5), malignant diseases (6), diverticulitis (7), peritonitis (8), mechanical bowel obstruction due to gallstone (9), and inflammatory diseases. Although there are various comorbid factors in its etiology, controversy continues regarding the pathogenesis of mechanical bowel obstruction. In this study, it was aimed to retrospectively analyze the incidence and mortality outcomes of patients treated with the diagnosis of mechanical intestinal obstruction as a result of general sur-

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gery consultation from the emergency department. Thus, it was aimed to determine the effects of age groups and etiological factors on mortality when evaluated together with sex.

MATERIAL and METHODS

Study Population

This study was conducted in accordance with the Declaration of Helsinki from 2009 to 2020 after obtaining approval from the Institutional Ethics Committee (Date of Approval-Protocol No: 23.07.2020-11/15).

This study was conducted as a single-center retrospective descriptive study by scanning the data of the electronic health record system (SARUS) of 17601 patients who were treated for abdominal pain in the Emergency Department of our Level 3 hospital. Five hundred and thirty-four of these patients were hospitalized in the general surgery department for mechanical intestinal obstruction.

Assessments

In our study, patients who were directed to the General Surgery department from the Emergency Department with a pre-diagnosis of abdominal pain between 2009-2020 were retrospectively screened. File records and electronic data of the patients were listed. Mechanical bowel obstruction was considered in patients who presented to the emergency department with complaints of abdominal pain, vomiting, bloating and non-passing gas as signs and symptoms, and whose radiological imaging supported these symptoms. Based on these data, patients who were hospitalized for mechanical intestinal obstruction were determined. For these patients, the ones who underwent operations and the factors related to their etiology were recorded. In terms of etiology, those who underwent bridectomy were classified as malignant and others (diverticulitis, appendicitis, bezoar, gallstone, etc.). Patients hospitalized for mechanical intestinal obstruction were analyzed retrospectively in terms of age (18-65 and over 65 years), sex, medical treatment, operation, etiology, incidence and mortality.

Statistical Analysis

Statistical analysis was made using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY). The normality assumptions were controlled by the Shapiro-Wilk test. Descriptive analyses were presented using mean ± SD (range) or n (%), where appropriate. Categorical data were analyzed by Pearson chi-square. Student's t test was used for the analysis of normally distributed numerical data. ANOVA was used for the comparison of parametric variables between the groups, and Tukey HSD test was used as a post-hoc test for significant cases.

RESULTS

Five hundred and thirty-four (3.03%) of the 17,601 patients who received emergency consultation from the General Surgery Clinic between 2009 and 2020 were diagnosed with ileus; 256 (1.45%) of them were in the geriatric (age ≥65) age group (Figure 1). Among these patients, there were 278 (52.1%) patients between the ages of 18-65, 256 (47.9%) were over 65 years, and there were 219 (41%) females and 315 (59%) males (Table 1). While 253 (47.4%) of the patients were operated on, 317 (59.4%) patients

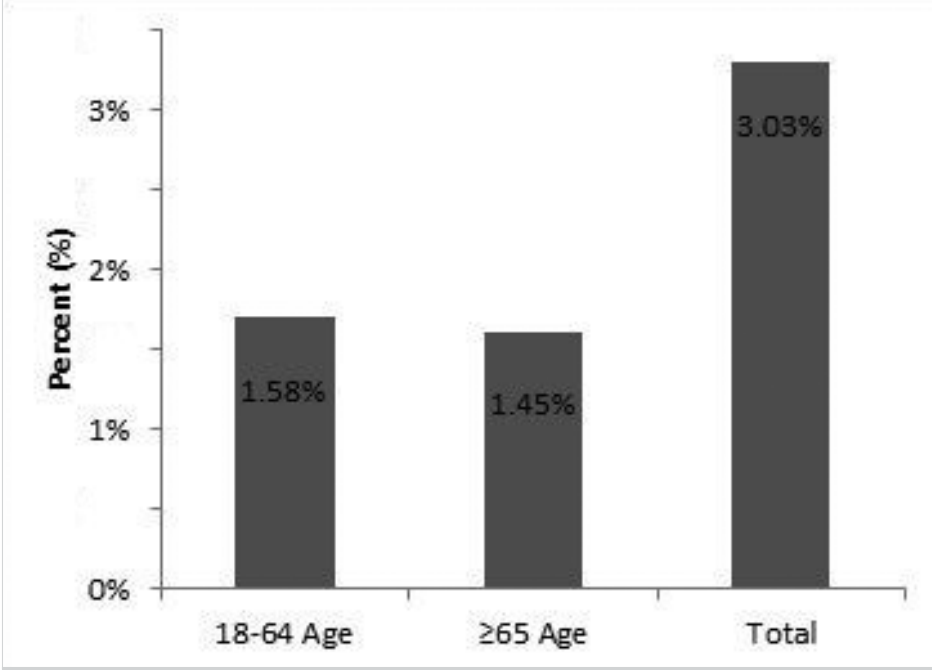

Figure 1. Incidence of ileus in all patients with general consultation to the general surgery clinic.

Table 1. Patients' characteristics	
	n= 534
Age	61.9 ± 17.2 (18-93)
18-65	278 (52.1)
>65	256 (47.9)
Sex	
Female	219 (41)
Male	315 (59)
Mortality	
No	513 (96.1)
Yes	21 (3.9)
Operated	
No	281 (52.6)
Yes	253 (47.4)
Pathology	
Brid	317 (59.4)
Malignity	101 (18.9)
Other	116 (21.7)
Data are presented as mean ± SD (range) or n (%).	

had adhesive ileus, 101 (18.9%) patients had malignancy, and 21 (3.9%) patients died among the whole patient group (Table 1).

Mean age of the operated patients was found to be statistically higher than the non-operated patients (p= 0.043). Although the percentage of patients aged 65 and over was higher in the operated patients, this difference was not statistically significant (p= 0.131). No significant difference was found in terms of sex (p= 0.402) and mortality (p= 0.174) distributions of operated and non-operated patients. The incidence of adhesive ileus was higher in non-operated patients, and malignancy and other pathologies were higher in operated patients (p< 0.001) (Table 2).

While adhesive ileus was in the foreground in the etiology with a rate of 87.9% in the group that received medical treatment without surgery, malignancy was in the foreground with 37.2% in the operated group (Figure 2).

No significant difference was observed in terms of sex and mortality distributions according to the pathology groups of the patients [p= 0.705) (p= 0.387), respectively]. Mean age of the patients in the malignancy group was found to be higher than the adhesive ileus group (p= 0.006). Malignancy and other pathological diagnoses were more common over 65 years of age (p= 0.019) (Table 3).

While the rate of males was higher in the patient group with high surveillance, the rate of females was higher in the population with mortality (Figure 3). The average age of the patients who died was found to be higher than those who did not (p= 0.004). In addition, the percentage of patients with ages 65 and over was statistically higher in those who died than those who did not (p= 0.028). While the rate of female patients was higher in those who died, the rate of male patients was higher in those who did not (p= 0.015) (Table 4).

In patients under 65 years of age, 2.6% of the females and 1.8% of the males had mortality, which was not statistically significant (p= 0.694). While mortality was observed in 10.6% of the females and 2.6% of males in patients 65 years and older, it was determined that mortality rate was higher in females (p= 0.008) (Figure 4).

Table 2. Comparison of patients' characteristics between operated and non-operated patients			
	No (n= 281)	**Yes (n= 253)**	**p**
Age	60.5 ± 17.2 (18-92)	63.5 ± 17 (18-93)	**0.043**
18-65	155 (55.2)	123 (48.6)	0.131
≥65	126 (44.8)	130 (51.4)	
Sex			
Female	120 (42.7)	99 (39.1)	0.402
Male	161 (57.3)	154 (60.9)	
Mortality			
No	273 (97.2)	240 (94.9)	0.174
Yes	8 (2.8)	13 (5.1)	
Pathology			
Brid	247 (87.9)[a]	70 (27.7)b [b]	**<0.001**
Malignity	7 (2.5)[a]	94 (37.2)[b]	
Other	27 (9.6)[a]	89 (35.2)[b]	
Data are presented as mean±SD (range) or n (%). Student's t test, Pearson chi-square test. Different lowercase letters in a row indicate statistically significant difference between groups.			

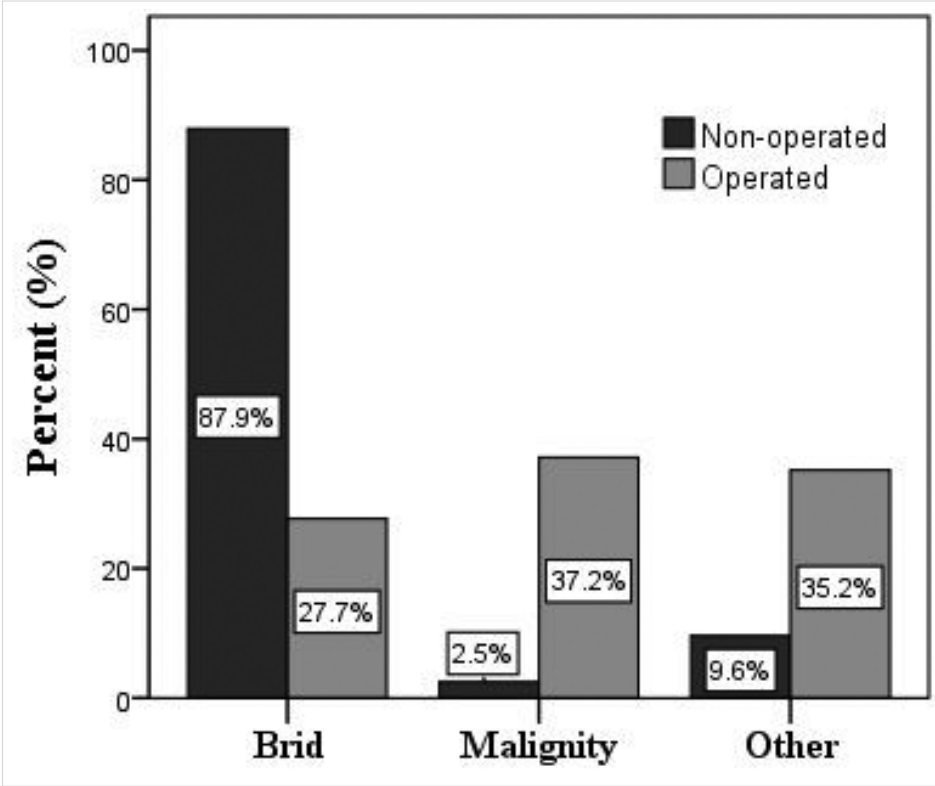

Figure 2. Distribution of pathologies in operated and non-operated patients.

Table 3. Comparison of patients' characteristics according to pathology

	Brid (n= 317)	Malignity (n= 101)	Other (n= 116)	p
Age	60.1 ± 17 (18-92)[a]	66 ± 14.4 (22-93)[b]	63.4 ± 19.3 (18-92)[a,b]	**0.006**
18-65	181 (57.1)[a]	45 (44.6)[b]	52 (44.8)[b]	**0.019**
≥65	136 (42.9)[a]	56 (55.4)[b]	64 (55.2)[b]	
Sex				
Female	134 (42.3)	38 (37.6)	47 (40.5)	0.705
Male	183 (57.7)	63 (62.4)	69 (59.5)	
Mortality				
No	307 (96.8)	97 (96)	109 (94)	0.387
Yes	10 (3.2)	4 (4)	7 (6)	

Data are presented as mean ± SD (range) or n (%). ANOVA, Pearson chi-square test. Different lowercase letters in a row indicate statistically significant difference between groups.

No statistically significant difference was observed in the distribution of pathology types by sex in patients under 65 years of age (p= 0.894). There was no statistically significant difference in the distribution of pathology types according to sex in patients aged 65 and over (p= 0.513) (Figure 5).

DISCUSSION

Considering all cases, the most common cause of mechanical intestinal obstruction is thought to be abdominal surgeries, approximately 75% of which have been conducted previously (10). In our study, this rate was found to be 59.4%. Other common etiological reasons are cancers, hernias and Crohn's disease (11). In our study, malignancy rate was 18.9%, and other etiological reasons were found as 21.7%. As a result of a single center follow-up for 145 years, it has been reported that the average age of incidence of mechanical intestinal obstruction increased from 38.5 to 63.9 (12). In our study, the average age was determined as 61.9 years. While, in a study conducted by Ojo EO et al., the male gender ratio was dominant with 53.5%,

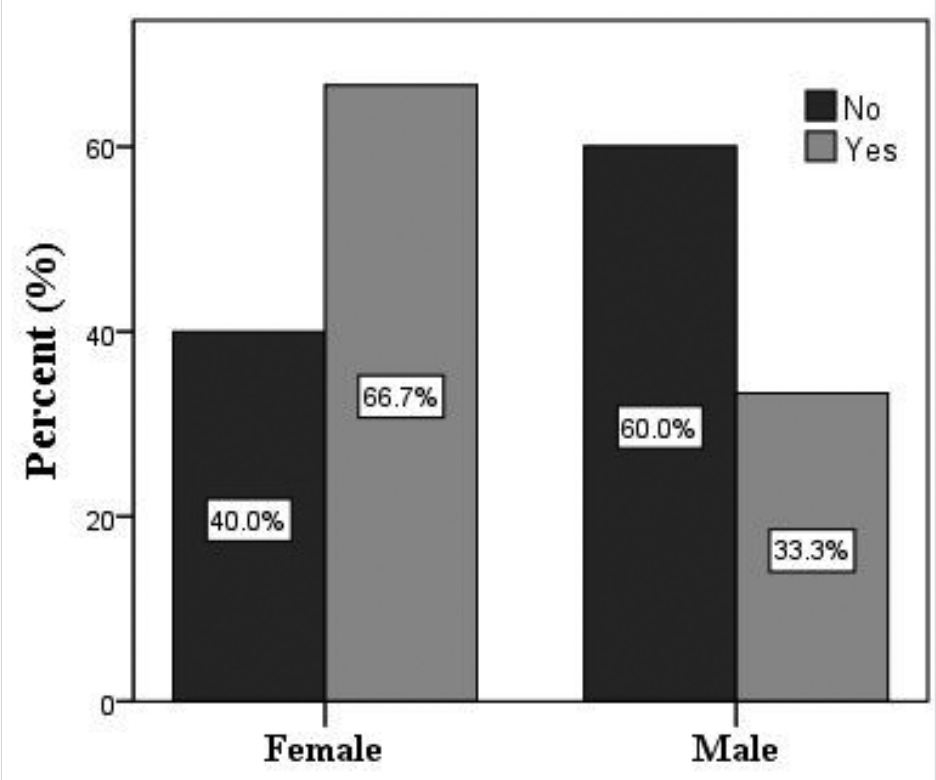

Figure 3. Distribution of sex by mortality.

Table 4. Comparison of patients' characteristics according to mortality

	No (n= 281)	Yes (n= 253)	p
Age	61.5 ± 17.2 (18-93)	72.6 ± 14.1 (42-90)	**0.004**
18-65	272 (53)	6 (28.6)	**0.028**
≥65	241 (47)	15 (71.4)	
Sex			
Female	205 (40)	14 (66.7)	**0.015**
Male	308 (60)	7 (33.3)	

Data are presented as mean ± SD (range) or n (%). Student's t test, Pearson chi-square test.

in the present study, the male gender ratio was found to be 59% (13). The rate of mechanical intestinal obstruction treated due to adhesive ileus with conservative treatment has been reported as 20-73%, and this rate is 46.25% in Turkey (14). When the related literature is reviewed, it is obvious that the etiology of mechanical small intestinal obstruction is predominantly previous surgical operations, but it is quite difficult to define its exact incidence, and there are only a few comprehensive studies on this issue (15-17). While in a study conducted by Parker et al., the rate of adhesive ileus causing mechanical intestinal obstruction is 8.8% in patients undergoing predominantly lower abdominal open surgery, in a study conducted by Lower et al., this rate is 7.1% in patients receiving open gynecological surgery. These studies have examined adhesive ileus rates secondary to regionally different abdominal surgeries. In our study, the rate of patients who were operated on due to adhesive ileus without categorizing previous surgery into subclasses was found to be 27.7%. In the Surgical and Clinical Adhesions Research (SCAR) study groups, the 5-year adhesive ileus-related reoperation rate has been found to be 26% according to all subgroup diagnoses in the SCAR-3 study (18). Considering its subgroups, ileum surgery with 7.7%, abdominal wall surgery with 5.4% and rectum surgery with 5.2% are among the top three causes of adhesive ileus (18). The reported incidence rate of postoperative ileus varies according to various sources and specialties. However, it is generally detected between 10% and 30% of patients with a history of abdominal surgery (19-22). Especially, the complexity in postoperative ileus mechanism and the lack of a common

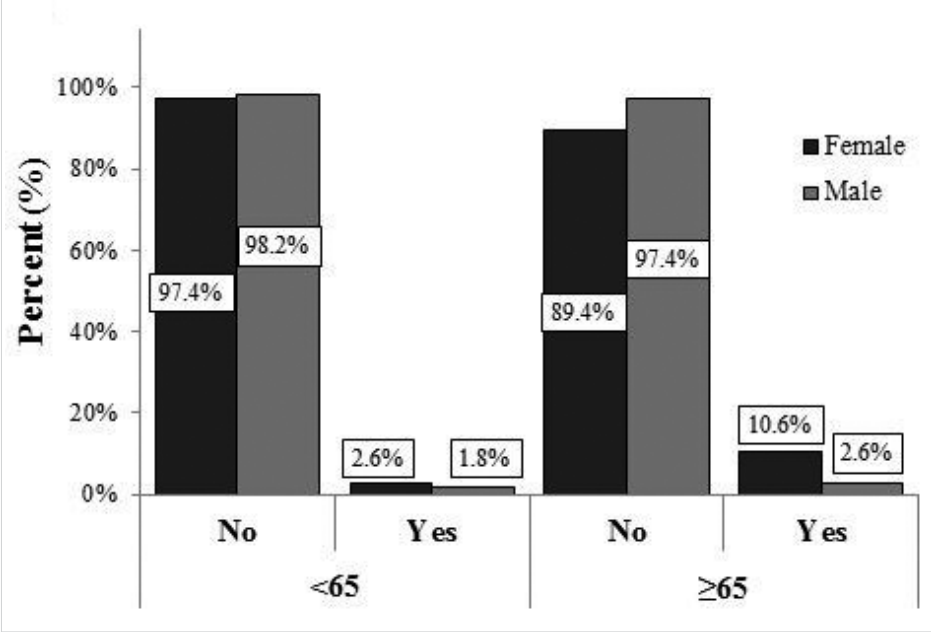

Figure 4. Mortality rates by sex in age groups.

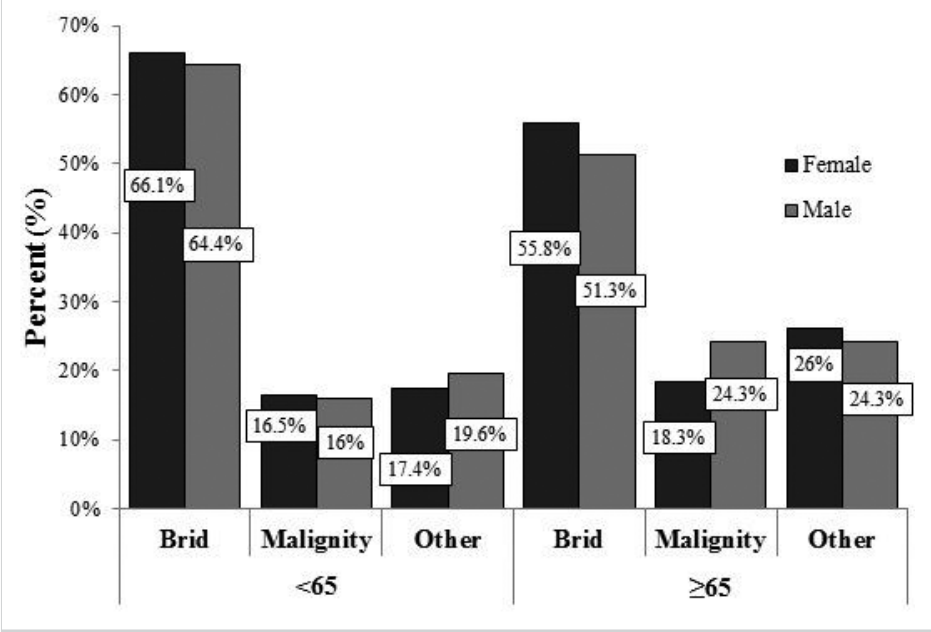

Figure 5. Distribution of pathology by sex in age groups.

determinant criterion in the definition result in confusion between etiological reasons in the literature. For this reason, studies on ileus with preventive measures or supportive treatment containing vitamins and drugs come to the fore in the literature. Among the ones searching for solutions, starting an early diet (23), coffee consumption (24), chewing gum (25), application of lidocaine (26), NSAID (27), intravenous magnesium (28) are among the researches that have recently been encountered. Although supportive treatment methods cause partial improvement in the early period in mechanical intestinal obstruction, there is no data showing that they reduce hospital admissions due to mechanical intestinal obstruction in the long term. Recently, there has been a systematic review of the safety of laparoscopic surgical approach in patients who do not respond to conservative treatment in cases of small intestinal obstruction due to adhesive ileus (29). In another study, only one patient (2.2%) out of 46 who underwent laparoscopic adhesiolysis due to small intestinal obstruction during a 38-month follow-up

period was admitted to the hospital twice (30). To the knowledge of the researchers, in the related literature, the number of studies regarding malignant causes in laparoscopic mechanical intestinal obstruction operations is limited. In laparoscopic adhesiolysis operations, although there are successful studies on small intestinal obstruction due to adhesive ileus, prospective studies involving a wider population and evaluating the prognosis may be needed. Postoperative ileus still stand on our way as an undefined and untreated phenomenon that requires emergency services not only in the postoperative period but also in the long term, leading to a long hospital stay. Although data on the causes, duration and treatment approaches of adhesive ileus are shared in the literature, articles sharing data on mortality rates, age groups, and sex are limited.

CONCLUSION

Although there are difficulties in definition and treatment, postoperative mechanical intestinal obstruction is encountered by surgeons in emergency department consultations with a wide range of diagnoses. Mechanical intestinal obstruction due to adhesive ileus is the most common etiological cause in both age groups. In this study, mortality rate in patients hospitalized with the diagnosis of mechanical bowel obstruction was found to be statistically significantly higher in patients aged 65 and over and in female sex.

Ethics Committee Approval: This study approval was obtained from University of Health Science Antalya Training and Research Hospital (Date: 23.07.2020, Decision no: 11/15).

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Author Contributions: Author Contributions: Concept - M.N.K.; Design - Ö.G.; Supervision -M.N.K.; Materials - M.N.K.; Data Collection and/or Processing - M.N.K.; Analysis and/or Interpretation - Ö.G.; Literature Search - Ö.G.; Writing Manuscript - M.N.K.; Critical Reviews - Ö.G.

Conflict of Interest: The authors have no conflicts of interest to declare.

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REFERENCES

1. *Taylor MR, Lalani N. Adult small bowel obstruction. Acad Emerg Med 2013; 20(6): 528-44.*
2. *Cappell MS, Batke M. Mechanical obstruction of the small bowel and colon. Med Clin North Am 2008; 92(3): 575-97.*
3. *Görgülü Ö, Koşar MN. The effects of comorbidity factors on the prognosis in geriatric sepsis patients in the intensive care unit. Medicine Science 2021; 10(1): 31-5.*
4. *Görgülü Ö, Koşar MN. Diagnosis and mortality outcomes of three different geriatric age groups in the intensive care unit: 10-year retrospective analysis. Turkish Journal of Geriatrics 2020; 23(1): 66-74.*
5. *Chapman SJ. EuroSurg Collaborative. Ileus Management International (IMAGINE): protocol for a multicentre, observational study of ileus after colorectal surgery. Colorectal Dis 2018; 20(1): O17-O25.*
6. *Tsukamoto Y, Oshima H, Katsumori T, Hamaguchi H, Yamamoto S, Toyama E, Iwanaga T. Consideration of surgical treatment for ileus symptoms associated with progressing cancer in our hospital. Gan to Kagaku Ryoho 2019; 46(4): 790-2.*
7. *Lamba HK, Shi Y, Prabhu A. Gallstone ileus associated with impaction at Meckel's diverticulum: Case report and literature review. World J Gastrointest Surg 2016; 8(11): 755-60.*
8. *Kajihara Y. Buried bumper syndrome leading to peritonitis and ileus. Intern Med 2017; 56(19): 2677-78.*
9. *Gürbüz B, Büyüker F, Atak T, Aslan S, Yalman H, Yiğitbaşı R. A rare cause of ileus: Gallstone. JAEMCR 2012; 3: 102-4.*
10. *Menzies D, Ellis H. Intestinal obstruction from adhesions-how big is the problem? Ann R Coll Surg Engl 1990; 72(1): 60-3.*
11. *Miller G, Boman J, Shrier I, Gordon PH. Etiology of small bowel obstruction. Am J Surg 2000; 180(1): 33-6.*
12. *Pędziwiatr M, Budzyński P, Stanek M, Matłok M, Major P, Wierdak M, et al. Mechanical bowel obstruction-changes in aetiology over the past 145 years: A single centre retrospective cohort study. Acta Chir Belg 2015; 115(6): 397-403.*
13. *Ojo EO, Ihezue CH, Sule AZ, Ismaila OB, Dauda AM, Adejumo AA. Aetiology, clinical pattern and outcome of adult intestinal obstruction in Jos, North Central Nigeria. Afr J Med Med Sci 2014; 43(Suppl 1): 29-36.*
14. *Fevang BT, Jensen D, Svanes K, Viste A. Early operation or conservative management of patients with small bowel obstruction? Eur J Surg 2002; 168(8-9): 475-81.*
15. *Ellis H, Moran BJ, Thompson JN, Parker MC, Wilson MS, Menzies D, et al. Adhesion-related hospital readmissions after abdominal and pelvic surgery: A retrospective cohort study. Lancet 1999; 353(9163): 1476-80.*
16. *Parker MC, Ellis H, Moran BJ, Thompson JN, Wilson MS, Menzies D, et al. Postoperative adhesions: Ten-year follow up of 12,584 patients undergoing lower abdominal surgery. Dis Colon Rectum 2001; 44(6): 822-29.*
17. *Lower AM, Hawthorn RJ, Clark D, Boyd JH, Finlayson AR, Knight AD, et al. Surgical and Clinical Research (SCAR) Group. Adhesion-related readmissions following gynaecological laparoscopy or laparotomy in Scotland: An epidemiological study of 24 046 patients. Hum Reprod 2004; 19(8): 1877-85.*
18. *Parker MC, Wilson MS, Menzies D, Sunderland G, Clark DN, Knight AD, et al. Surgical and Clinical Adhesions Research (SCAR) Group. The SCAR-3 study: 5-year adhesionrelated readmission risk following lower abdominal surgical procedures. Colorectal Dis 2005; 7(6): 551-8.*
19. *Chapuis PH, Bokey L, Keshava A, Rickard M, Stewart P, Young CJ, et al. Risk factors for prolonged ileus after resection of colorectal cancer: An observational study of 2400 consecutive patients. Ann Surg 2013; 257(5): 909-15.*
20. *Moghadamyeghaneh Z, Hwang GS, Hanna MH, Phelan M, Carmichael JC, Mills S, et al. Risk factors for prolonged ileus following colon surgery. Surg Endosc 2016; 30(2): 603-9.*
21. *Vather R, Trivedi S, Bissett I. Defining postoperative ileus: results of a systematic review and global survey. J Gastrointest Surg 2013; 17(5): 962-72.*
22. *Kim MJ, Min GE, Yoo KH, Chang Sung-Goo, Jeon SH. Risk factors for postoperativeileus after urologic laparoscopic surgery. J Korean Surg Soc 2011; 80(6): 384-9.*

23. *Boelens PG, Heesakkers FFBM, Luyer MDP, van Barneveld KWY, de Hingh IHJT, Nieuwenhuijzen GA, et al. Reduction of postoperative ileus by early enteral nutrition in patient sundergoing major rectal surgery: prospective, randomized, controlled trial. Ann Surg 2014; 259(4): 649-55.*
24. *Dulskas A, Klimovskij M, Vitkauskiene M, Samalavicius NE. Effect of coffee on the length of postoperative ileus after elective laparoscopic left-sided colectomy: A randomized, prospective single-center study. Dis Colon Rectum 2015; 58(11): 1064-9.*
25. *Su'a BU, Pollock TT, Lemanu DP, MacCormick AD, Connolly AB, Hill AG. Chewing gum and post-operative ileus in adults: A systematic literature review and meta-analysis. Int J Surg 2015; 14: 49-55.*
26. *Kranke P, Jokinen J, Pace NL, Schnabel A, Hollmann MW, Hahnenkamp K, et al. Continuous intravenous perioperative lidocaine infusion for postoperative pain and recovery. Cochrane Database Syst Rev 2015; 7: CD009642.*
27. *Slim K, Joris J, Beloeil H. Colonic anastomoses and non-steroidal anti-inflammatory drugs (NSAID). J Visc Surg 2016; 153(4): 269-75.*
28. *Moharari RS, Motalebi M, Najafi A, Zamani MM, Imani F, Etezadi F, et al. Magnesiumcan decrease postoperative physiological ileus and post-operative pain in major non laparoscopic gastrointestinal surgeries: a randomized controlled trial. Anesthesiol Pain Med 2014; 4: e12750.*
29. *Sajid MS, Khawaja AH, Sains P, Singh KK, Baig MK. A systematic review comparing laparoscopic vs open adhesiolysis in patients with adhesional small bowel obstruction. Am J Surg 2016; 212(1): 138-50.*
30. *Wang Q, Hu ZQ, Wang WJ, Zhang J, Wang Y, Ruan CP: Laparoscopic management of recurrent adhesive small-bowel obstruction: Long-term follow-up. Surg Today 2009; 39(6): 493-9.*

ORİJİNAL ÇALIŞMA-ÖZET
Turk J Surg 2021; 37 (4): 363-370

Geriatrik ve erişkin hastalarda barsak obstrüksiyonu insidansı ve mortalite sonuçları: 10 yıllık retrospektif analiz

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ÖZET

Giriş ve Amaç: İleus hastaları acil servislere en yüksek başvuru oranına sahip hasta gruplarından biridir. Bu çalışmada cinsiyet ile birlikte değerlendirildiğinde yaş gruplarının ve etiyolojik faktörlerin mortaliteye etkisinin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmamızda 2009-2020 yılları arasında Acil Servis'ten Genel Cerrahi Polikliniğine karın ağrısı ön tanısıyla konsülte edilen hastalar retrospektif olarak tarandı. İleus nedeniyle hastaneye yatırılan hastalar yaş (18-65 yaş ve 65 yaş üstü), cinsiyet, ameliyat, etiyoloji, insidans ve mortalite açısından analiz edildi.

Bulgular: 2009-2020 yılları arasında genel cerrahi kliniğinden acil konsültasyon alan 17.601 hastanın 534'üne (%3,03) ileus tanısı konuldu. Hastaların 253'ü (%47,4) ameliyat edilirken sırasıyla 317 (%59,4) hastaya brid ve 101 (%18,9) hastaya malignite tanısı kondu; ve tam hasta grubunda 21 (%3,9) hasta öldü (Tablo 1). Ameliyatsız hastalarda brid görülme sıklığı yüksek iken ameliyatlı hastalarda malignite ve diğer patolojiler daha yüksek bulundu (p< 0,001) (Tablo 2). 65 yaş ve üstü hastalarda ölüm oranı kadınların %10,6'sında, erkeklerin %2,6'sında görülürken, kadınlarda ölüm oranının daha yüksek olduğu belirlendi (p= 0,008) (Şekil 4).

Sonuç: Mekanik barsak tıkanıklığı tanısı ile hastaneye yatırılan hastalarda ölüm oranı 65 yaş ve üzeri kadın hastalarda istatistiksel olarak anlamlı derecede yüksek bulundu.

Anahtar Kelimeler: Barsak tıkanıklığı, erişkin, yaş grupları, geriatri, insidans, mortalite

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ORIGINAL ARTICLE
Turk J Surg 2021; 37 (4): 371-378

Development of a local model for measuring the work of surgeons

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ABSTRACT

Objective: The Relative Value Unit (RVU) is the main method of calculating surgeons' reimbursements and a tool for measuring the work of surgeons. Existing evidence shows that the work Relative Value Unit (wRVU) does not accurately represent surgeon's work. Therefore, the current study attempted to develop a local model to measure surgeons' work.

Material and Methods: This study was conducted in two main phases of determining the metrics and model development using quantitative and qualitative approaches from December 2019 to April 2021. Literature review, focused group discussions, and interviews were used to collect data. Content analysis and Exploratory Data Analysis techniques were applied to analyze data.

Results: The findings demonstrated that patient's conditions (age, severity of disease at referring time, and comorbidities), disease specifications (time, complexity, physical effort, and risk), and provider characteristic (surgeon's willingness, imposed stress, and surgeon's skill) were important by 17, 51, and 32%, respectively, in determining surgeons' work.

Conclusion: Determining a fixed value for each procedure does not accurately estimate the amount of required surgeon's work for any procedure. Many factors, such as the patient's condition, surgeon's characteristics, and disease specification affect surgeons' work in the operation room. Proper measurement of the surgeon's work is an important step towards establishing equity in payment in the health system.

Keywords: Relative value unit, work relative value unit, surgeon's work, measurement

INTRODUCTION

In response to rising health care expenses in the 1980s, Medicare took a new reimbursement approach (1). This new approach was the consequence of studies by Hsiao et al. at Harvard, which was known as Resource-Based Relative Value Scale (RBRVS) (2). This reimbursement method was defined based on the resources spent for each service specified by CPT codes (3). RBRVS consists of three components, the most important of which is work Relative Value Unit (wRVU). The first reason for its importance is because it accounts for 52% of RBRVS and, the second one is that it is a tool that determines the amount of physicians' work for a service, in a way, the reimbursement to the physician (4). According to Hsiao et al., the components of wRVU include the time required to perform a procedure, mental effort and judgment, the physician's physical effort and technical skills, and stress (5). wRVU is now not only used as a reimbursement model but is also known as a criterion to measure a physician's performance and productivity (6). Although RVUs are reviewed by RUC based on receiving suggestions and criticisms from physicians annually, there are still criticisms of RVUs in surgery (7). Previous research showed that the RVU-based payment system did not accurately represent the surgeon's work. According to studies, there is a weak correlation between the surgeon's work and its metrics (8-10). The complexity of the surgeries is not well taken into account, the patient's need in some surgeries to follow-up is not considered in the RVU and, consequently, in the payment to surgeons (11). An imbalance between

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RVU-based system and the amount of work a surgeon performs causes dissatisfaction and burnout in the surgeons' community, which may have irreparable consequences such as behavioral changes in surgeons (10,12). Due to the importance of proper reimbursement to surgeons as one of the most important elements in the health system and its effect on the quality of care, our research aimed at finding a solution for this challenging problem by focusing on two scopes, identifying metrics to measure Iranian surgeons' work and providing a relevant model.

MATERIAL and METHODS

This study was conducted in two main phases of determining the metrics and model development using quantitative and qualitative approaches from December 2019 to April 2021 in Iran.

Literature Review

A comprehensive literature review was conducted to identify metrics that measure surgeons' work in Google Scholar, PubMed, EMBASE, Scopus, Ovid Medline, Web of Science, Cochrane, ProQuest, Scientific Information Database (SID), and Magiran databases. Search keywords were "surgery", "reimbursement mechanism" "surgeons work", "surgery fee", "physician fee", "surgeon workload", "compensation", "relative value units", "RBRVS", "wRVU", and a combination of these keywords, along with searching Persian databases. All searches were conducted without a time limitation. The World Health Organization (WHO) and CMS.Gov websites were also reviewed here. Selected articles were related to RVU and surgeons' work, and duplicate articles were excluded from the study. Finally, metrics related to the surgeon's work were identified after reviewing articles.

Focused Group Discussion and Interview

Since some of the metrics found in the literature review were not available and feasible in Iran, Focus Group Discussion (FGD) and interviews were conducted to identify metrics relevant to the country concept. The purpose of FGD is to increase the quality of data through group dynamics (13). Three FGD meetings were held with surgeons from eight specialties (Urology, Gynecology and obstetrics, Neurological, Ophthalmic, Orthopedic, Cardiothoracic, Otorhinolaryngology, and General surgery).

Each meeting lasted about 120 min, with the attendance of a total of 30 surgeons. The coordinator asked questions during the meetings and tried to involve all participants in the discussions. The surgeons were asked questions about "In your opinion, which metrics should be considered to measure the surgeon's work?" and "In your point of view, what are the missing metrics in calculating current wRVU?" Finally, they were asked to introduce a surgeon as the representative of that specialty to connect the research team to other surgeons in that specialty for the next step of the study.

Semi-structured interviews were conducted with ten surgeons who were not able to attend the FGDs. The interviews continued until saturation, the average interview time was 45 min and were carried out in the surgeon's office. The surgeons were selected purposefully to participate in this study (14). The inclusion criteria were surgeons interested in participating in the study, surgeons who earned by RVU payment method and were familiar with the RVU concept, and those who had an article or some research related to RVU and were experts in their specialty.

Data Analysis

Qualitative Analyses

This study was conducted with an inductive approach in the form of content analysis. Data analysis began concurrently with data collection aiming at using these analyses to help shape the next steps in data collection. Two researchers transcribed and analyzed FGD and interviews on paper. Coding was done in the margin. The main themes were identified, and the relationship between themes was recognized by the research team, followed by merging similar ones. The research team returned a summary of the notes to the participants, and they confirmed the accuracy of the data to increase the study accuracy and rigor (15,16).

Metrics Selection

The identified metrics of the comprehensive review, FGD, and interviews were integrated into a questionnaire consisting of a list of metrics to measure the surgeon's work. The surgeons were asked to select the metrics that were important to measuring the surgeon's work. Questionnaires were provided to surgeons in eight specialties through representatives. Finally, 91 questionnaires were returned from 100 distributed questionnaires.

Model Development

Next, related metrics were placed in a group, and the surgeons were asked to compare the metrics in pairs and score them based on similarities selected from the previous stage with a score of 50% or above. The similarity and dissimilarity between the two metrics were scored from 10 to 1. The groups had to be prioritized and weighted in the final step. A questionnaire was designed to compare the groups in pairs by two criteria of necessity and effectiveness. The questionnaires were given to the surgeons, who were asked to rank the groups based on the two mentioned criteria. Finally, 87 questionnaires were returned from 100 distributed questionnaires.

Delphi Technique

A Delphi questionnaire model was developed for approval after grouping and weighing the metrics. The final metrics were distributed to 100 specialists in the form of surgeons' work mea-

surement model. Experts were asked to score the metrics with a 9-point Likert scale based on three criteria of importance, simplicity and clarity, and feasibility. The median was used to calculate the score of each metric.

Statistical Analysis

For statistical analysis, the similarity of metrics was examined using the Multidimensional Scaling method. The Exploratory Data Analysis technique was applied to categorize the relevant indicators in a group by Stata (version 16). The Multiple Criteria Decision Making (MCDM) approach was used for weighting groups with Super Decision (version 3). The mean and median of the indicators were calculated by Excel (2013).

Ethical Consideration

The study is a part of a Ph.D. dissertation with the ethics code IR.TBZMED.REC.1397.960. Participation in this study was optional, all members participated with informed consent and were notified that their information would remain confidential and anonymous. The participants had the right to withdraw from the study at any time. They were allowed to record audio during FGD and interviews.

RESULTS

Participant Profile

Forty participants attended the FGD and interviews. Age range was between 36 and 68 years, and 80 and 20% of participants were men and women, respectively. Their work experience was between 6 and 35 years. Participants were specialized in Urology (4), Gynecology and obstetrics (3), Neurological (3), Ophthalmic (3), Orthopedic (4), Cardiothoracic (3), Otorhinolaryngology (4), General surgery (4), and healthcare management (2).

Metrics Selection

A comprehensive literature review was done by related keywords. A primary review resulted in a total of 105 articles, 14 of which were eliminated for duplication, and 37 studies were excluded because of lacking related information. Finally, 54 articles were included in the study. Then, 19 metrics were derived through literature review (Table 1), and 21 metrics were obtained from FGD and interviews. Eleven metrics were removed since they were noted in both the literature review and the qualitative data. Finally, 29 metrics were selected and made available in the form of a questionnaire. The surgeons were asked to select the effective ones in the wRVU calculation. The average score was calculated for each metric. According to the research team, selected metrics had a grade of 50% and above (meaning that at least 50% of surgeons selected this metric as a significant item to calculate their work), and metrics with scores below 50% were excluded from the study, ultimately choosing 12 metrics. Selected metrics were patient age, the severity of the disease, operation duration, risk, the complexity of the surgery, imposed stress on a surgeon during surgery, surgeons'

Table 1. Work relative value unit metrics based on literature review

Number	The metric	References
1	Operation Time	(7,9,17-20)
2	Mental effort	(21-23)
3	Physical effort	(20,24,25)
4	Psychological stress	(20,26)
5	Technology	(10,27)
6	Patient characteristic	(8,28-33)
7	Mortality risk	(20,29,4)
8	Physician willingness to provide a service	(35)
9	Complexity	(7,9,19,31,36,37)
10	Severity and Emergency operation	(38-41)
11	Quality of service and out come	(10,37,39,42-47)
12	Number of attending staff at OR	(18,48)
13	Academic rank of surgeon	(8,17,49-51)
14	Skill and surgeon's experience	(8,40,45,46,48)
15	Surgeon's efficiency	(45,52,53)
16	Pre and post operation time	(8,25,36,48,54,55)
17	The leadership and coordination role of surgeon in OR	(43,46)
18	Type of hospital (teaching/community)	(50,56)
19	Demand for a service	(21,24,35,39,47)

Table 2. Work relative value unit metrics and their categorization

Category name	Number of metrics	Metrics	Priority
Patient condition	3	Patient age, Severity of disease, Comorbidities	17%
Disease specification	6	Surgery duration, Risk, Complexity, Physical effort, Pre-operative time, Post-operative time	51%
Surgeon's characteristics	3	Imposed stress, Surgeon willingness, Skill	32%

willingness to operate, skill, physical effort during surgery, comorbidities, pre-operation time, and post-operation time. Complexity gained the highest average score of 93%.

Grouping Metrics

Multi-Dimensional Scaling method was used to classify similar metrics in a group, and the metrics were compared and scored in pairs. Minimum and maximum scores were 1 and 10, respectively. The findings of this step were in the form of a matrix in which the horizontal and vertical axes consisted of 12 metrics. The comparison of the score of each metric in the horizontal axis with itself in the vertical axis was zero. An entry of the matrix showed the geometric mean of the similarity score of the two indicators based on the respondents' opinions. The findings were analyzed by Exploratory Data Analysis. Patients' age, the severity of the disease, and comorbidities were placed in a group as the patient's condition. The metrics of operation duration, risk, complexity, physical effort, and pre-and post-operative times were categorized in a group as the disease specification, and the metrics of imposed stress, surgeon willingness, and skill were categorized as surgeon's characteristics.

Prioritizing the Groups

The AHP method was used to determine the importance and weight of each group of metrics. The three groups containing the indicators were compared to each other in pairs and scored based on two criteria of necessity and effectiveness. The scoring scale ranged from 1 to 9. Both the necessity and effectiveness criteria were considered equal with equal weight (0.5). The obtained data from the questionnaires were entered into Super decision 3 software in the form of a weighted average, which was the result of experts' opinions. After data analysis, the patient's condition, disease specification, and provider characteristics were weighted as 17, 51, and, 32%, respectively. In this study, inconsistency rate was 0.05. A summary of the grouping is given in Table 2.

Delphi

The model was confirmed by the Delphi technique. According to the research team, approved metrics had a median score of 7 or higher. In the present study, minimum and maximum scores for the metrics were 8 and 9, respectively. This model was confirmed by a single step of Delphi. Finally, the expert panel of nine surgeons was held to confirm the model. According to the decision of the experts present in the panel, the length of operation, pre-operation, and post-operation times were merged and named in the form of a single metric as time. A summary of the study process is shown in Figure 1.

DISCUSSION

RVUs were developed to reduce healthcare expenditures and Medicare costs (17). wRVU, which measures surgeon's work for a particular service, has been gradually considered as an important indicator of productivity, performance, and eventually payment for surgeons. In the last decade, more attention has been paid to wRVU and its metrics due to the importance of equity in payment, the proportion of a surgeon's work to earn, and the desire of surgeons to perform certain surgeries, which Hsiao et al. did not expect to be one of the most important challenges to the health system in the coming decades. Proper measurement of the surgeon's work is a prerequisite for a proportionate payment system. After three decades, this study provided a native model for measuring surgeons' work. The findings of our study reveal that measuring surgeons' work solely based on metrics, such as operation duration, risk, physical effort, and mental effort, does not accurately reflect surgeon efforts in the operation room (OR). What happens in the OR is more than that. These results go beyond previous reports, showing that RVUs do not accurately measure the time and effort of procedures across many subspecialties (18,19).

According to the results, several factors influence surgeon's effort in OR, such as the patient's age, disease severity at referral, preoperative consultation time, postoperative care time, operation duration, surgical risk and complexity, the stress imposed on the surgeon during the operation, surgeons' willingness to operate, skills, physical effort, and comorbidities.

As commented by the participating surgeons, severity of the disease at the referring time, patient's conditions such as hypertension or diabetes during the operation, and whether the patient is an elderly man in the last years of his life, a child with a high life expectancy, or a young man in his 25s do not make a difference in the patient treatment by the surgeon in the OR, but the stress transferred to the surgeon in OR is far from the payers' view. Schwartz et al. state that RVU does not distinguish extra work required by an emergent patient (20).

Due to the change in people's lifestyle, comorbidities are more common than 30 years ago (21), which not only make surgery

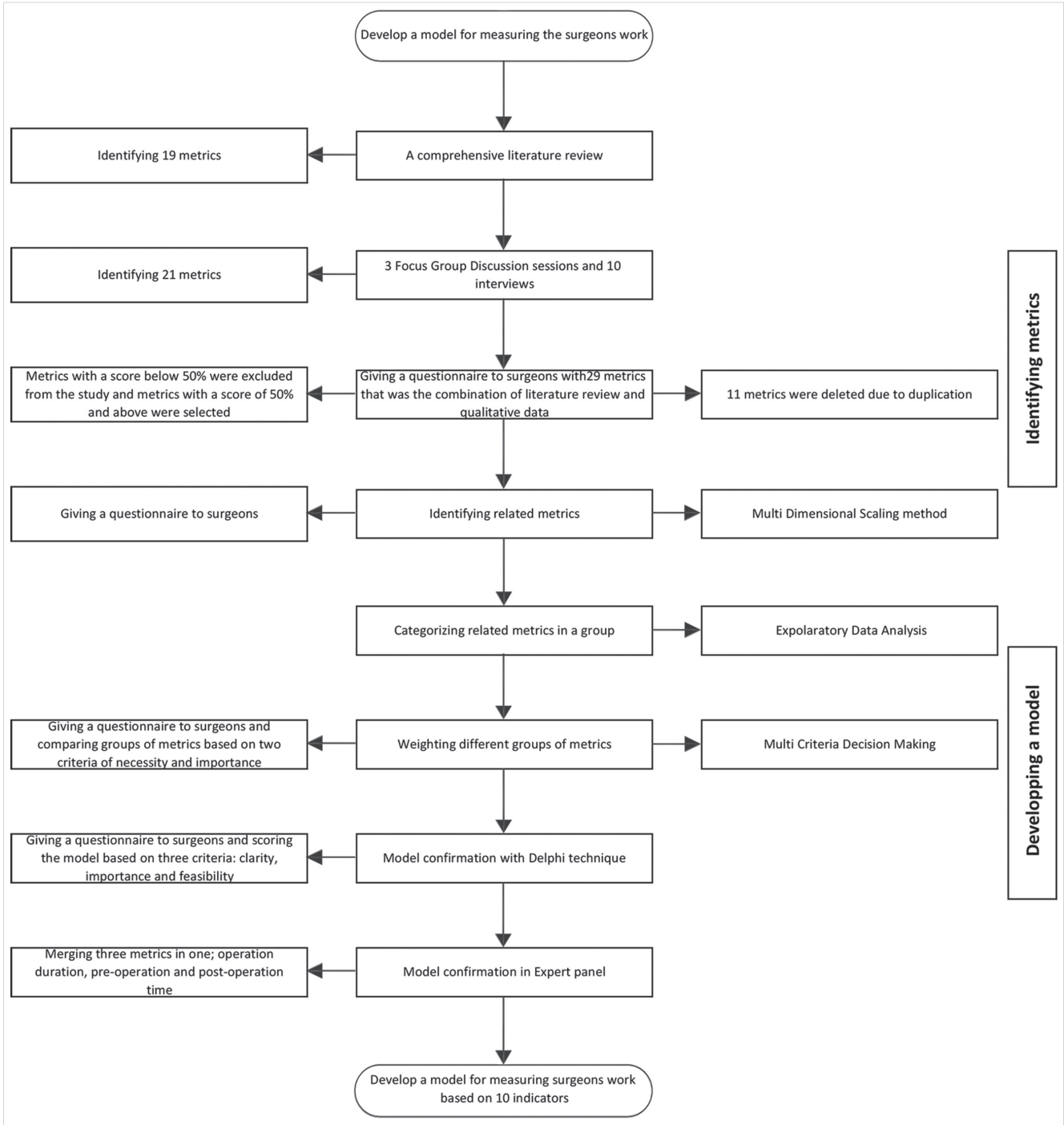

Figure 1. Study process.

more stressful for both the surgeon and the patient but also can lead to postoperative complications. Therefore, these patients need more attention and effort in the OR. Based on this study, patients' conditions have a 17% effect on the amount of physician's work in the OR . As stated above, the age of the patients should be taken into account in determining the relative value (22-24). The findings are directly in line with previous findings, and similar studies have emphasized paying attention to the patient's characteristics in determining the wRVU, which is neglected in the current RVU system (8,25,26).

In order to perform an operation, Hsiao considers time as an important factor in calculating the work of the physician (27). However, calculating the surgeon's work only based on the

length of a surgical operation causes bias. It may be necessary for a patient to consult a surgeon before surgery, or to be followed up with a surgeon for a long time after surgery in some cases (9). In contrast to measuring operation times, this study suggests considering pre- and post-operative care times as well. For each surgery, the term time refers to the time required for pre-operative consultation, the length of the operation, and the postoperative care required. This is consistent with that found in previous studies surgeons who spend time on such affairs as consulting, operative planning, and committee work, for which no payment is made (28,29). A study by Shah et al. has shown poor correlation between RVUs and operative time for a variety of high-volume surgical procedures (8).

From the results, it is clear that besides time, complexity is another metric to measure a surgeon's work. Complicated surgeries take more time and effort and impose more stress on surgeons, therefore, negatively affect their willingness to perform such procedures. In this regard, these findings are consistent with research showing that complexity in operation may need more attention, time, and effort, and, therefore, would be considered in calculating the surgeon's work (30-33).

It is important to highlight the fact that the surgeon's characteristics as the service provider are effective in their work. The present study confirmed the findings about the amount of stress that a physician experiences during surgery, the surgeon's skill during that operation, and the surgeon's willingness to perform that operation affect wRVU by 32%. Therefore, it seems reasonable to measure a surgeon's work considering this finding.

An operation performed by a more skilled surgeon often results in fewer complications for the patient and a shorter surgical duration. Consequently, it affects efficiency and cost of the health system. Previous studies have also noted the weakness of the RVU system in not considering the surgeon's skill (8,34). Also, patients may have difficulty accessing certain specialties if the surgeon is unwilling to perform certain operations (35,36).

Other studies have found that metrics, such as the quality of care, patient satisfaction, and the technology used in the procedure, would be considered to measure the surgeon's work, which are not mentioned in our study. This can be attributed to differences in payment structures, inadequate and unreliable data (physical and electronic) of surgical complications, and medical errors. Because of this potential limitation, it was impossible to measure such metrics (10,37-40).

Nonetheless, we believe that determining a certain value for each procedure does not accurately estimate the amount of required work for a procedure because, in addition to the disease specification, it is also affected by many factors such as the patient's condition, the surgeon's skill, and the provider's tendency. Therefore, we suggest that a range of values with a minimum and a maximum should be considered instead of a fixed wRVU in the RVU schedule for a procedure. The surgeon's skill and willingness, operation complexity, and the patient's condition will determine the value of minimum or maximum. As discussed above, applying this model to determine wRVU causes similar RVU of a procedure to vary in different situations. In addition to ensuring fair payment for surgeons, it would also ensure that patients have access to the required procedures.

CONCLUSION

Due to wRVU's direct effect on payment, measuring the surgeon's work is one of the most challenging issues related on one hand to the surgeon's satisfaction and the health system expenditures on the other. A rational and accurate measurement of the surgeon's work is an important aspect of establishing equity within the health system which is the initial mission of health systems. Performing procedures have now changed considerably, therefore, the need to pay attention and review the metrics of work measurement is felt more than before. In addition to disease specification, the present study emphasizes the need for paying attention to the patient's condition and the surgeon/provider's characteristics for work measurement.

Ethics Committee Approval: This study approval was obtained from Tabriz University of Medicine Sciences (Decision no: IR.TBZMED.REC.1397.960).

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REFERENCES

1. *Baadh A, Peterkin Y, Wegener M, Flug J, Katz D, Hoffmann JC. The relative value unit: history, current use, and controversies. Curr Probl Diagn Radiol 2016; 45(2): 128-32.*
2. *Hsiao WC, Braun P, Dunn D, Becker ER. Resource-based relative values. An overview. JAMA 1988; 260(16): 2347-53.*
3. *Chiu RG, Siddiqui N, Nunna RS, Patel S, Rosinski CL, Chaker AN, et al. Association of neurosurgical work relative value units with objective markers of operative complexity. World Neurosurg 2021; 146: e194-e204.*
4. *Nguyen M, Moffatt-Bruce S. Relative value unit transformation: Our new reality of worth. Int J Acad Med 2016; 2(1): 52-6.*
5. *Hsiao WC, Braun P, Yntema D, Becker ER. Estimating physicians' work for a resource-based relative-value scale. N Engl J Med 1988; 319 (13): 835-41.*
6. *Chon WJ, Pavlakis M, Witkowski P, Chen L, Kadambi P. RVU as a metric for productivity in transplant medicine: a survey of U.S. transplant nephrologists. 2016.*

7. Gan ZS, Wood CM, Hayon S, Deal A, Smith AB, Tan Hung-Jui, et al. Correlation of relative value units with surgical complexity and physician workload in urology. Urology 2020; 139: 71-7.
8. Shah DR, Bold RJ, Yang AD, Khatri VP, Martinez SR, Canter RJ. Relative value units poorly correlate with measures of surgical effort and complexity. J Surg Res 2014; 190(2): 465-70.
9. Samuel LT, Grits D, Acuña AJ, Piuzzi NS, Higuera-Rueda CA, Kamath AF. Work relative value units do not adequately support the burden of infection management in revision knee arthroplasty. J Bone Joint Surg Am 2020; 102(3): 230-6.
10. Rosner MH, Falk RJ. Understanding work: Moving beyond the RVU. Clin J Am Soc Nephrol 2020; 15(7): 1053-5.
11. Orr RD, Sodhi N, Dalton SE, Khlopas A, Sultan AA, Chughtai M, et al. What provides a better value for your time? The use of relative value units to compare posterior segmental instrumentation of vertebral segments. Spine J 2018; 18(10): 1727-32.
12. Tufano J, Conrad DA, Sales A, Maynard C, Noren J, Kezirian E, et al. Effects of compensation method on physician behaviors. Am J Manag Care 2001; 7(4): 363-73.
13. Nyumba TO, Wilson K, Derrick CJ, Mukherjee N. The use of focus group discussion methodology: Insights from two decades of application in conservation. Methods Ecol Evol 2018; 9(1): 20-32.
14. Given LM (ed). The SAGE Encyclopedia of Qualitative Research Methods. Thousand Oaks, California 2008.
15. Elo S, Kääriäinen M, Kanste O, Pölkki T, Utriainen K, Kyngäs H. Qualitative content analysis:a focus on trustworthiness. SAGE Open 2014; 4(1).
16. Johnson JL, Adkins D, Chauvin S. A review of the quality indicators of rigor in qualitative research. Am J Pharm Educ 2020; 84(1): 7120.
17. Laugesen MJ. The resource-based relative value scale and physician reimbursement policy. Chest 2014; 146(5): 1413-9.
18. Little DC, St Peter SD, Calkins CM, Shah SR, Murphy JP, Gatti JM, et al. Relative value units correlate with pediatric surgeons' operating time: when perceived myth becomes reality. J Pediatr Surg 2006; 41(1): 234-8.
19. Jacobs JP, Lahey SJ, Nichols FC, Levett JM, Johnston GG, Freeman RK, et al. How is physician work valued? Ann Thorac Surg 2017; 103(2): 373-80.
20. Schwartz DA, Hui X, Velopulos CG, Schneider EB, Selvarajah S, Lucas D, et al. Does relative value unitYbased compensation shortchange the acute care surgeon? The journal of trauma and acute care surgery. 2014; 76(1): 84-92.
21. Marck CH, Neate SL, Taylor KL, Weiland TJ, Jelinek GA. Prevalence of comorbidities, overweight and obesity in an international sample of people with multiple sclerosis and associations with modifiable lifestyle factors. PLoS One 2016; 11(2): e0148573.
22. Bergersen L, Gauvreau K, McElhinney D, Fenwick S, Kirshner D, Harding J, et al. Capture of complexity of specialty care in pediatric cardiology by work RVU measures. Pediatrics 2013; 131(2): 258-67.
23. Birdsall ML, Trivedi VM. Productivity-based relative value units for radiology procedures. A Delphi approach. J Med Syst 1983; 7(6): 555-65.
24. Issues in the Application of the Resource-Based Relative Value Scale System to Pediatrics: A Subject Review. Pediatrics 1998; 102(4 Pt 1): 996-8.
25. Childers CP, Tang AB, Maggard-Gibbons M. Association of implicit intensity values incorporated into work RVUs with objective measures. Am J Surg 2020; 219(6): 976-82.
26. Wynn BO, Burgette LF, Mulcahy AW, Okeke EN, Brantley I, Iyer N, et al. Development of a model for the validation of work relative value units for the medicare physician fee schedule. Rand Health Q 2015; 5(1): 5.
27. Hsiao WC, Braun P, Becker ER, Dunn DL, Kelly N, Causino N, et al. Results and impacts of the resource-based relative value scale. Medical Care 1992; 30(11 Suppl): NS61-NS79.
28. Peterson J, Sodhi N, Khlopas A, Piuzzi NS, Newman JM, Sultan AA, et al. A Comparison of relative value units in primary versus revision total knee arthroplasty. J Arthroplasty 2018; 33(7S): S39-S42.
29. Sodhi N, Dalton SE, Gold PA, Garbarino LJ, Anis HK, Newman JM, et al. A comparison of relative value units in revision hip versus revision knee arthroplasty. J Orthop 2019; 16(1): 45-8.
30. Satarasinghe P, Shah D, Koltz MT. The Perception and impact of relative value units (RVUs) and quality-of-care compensation in neurosurgery: A literature review. Healthcare (Basel) 2020; 8(4): 526.
31. Hayon S, Deal A, Tan HJ, Namboodri B, Gan Z, Wood C, et al. Is the relative value of surgeon effort equal across surgical specialties? Surgery 2020; 168(3): 365-70.
32. Balasubramanian S, Kipps AK, Smith SN, Tacy TA, Selamet Tierney ES. Pediatric echocardiography by work relative value units: Is study complexity adequately captured? J Am Soc Echocardiogr 2016; 29(11): 1084-91.
33. Yu D, Lowndes B, Thiels C, Bingener J, Abdelrahman A, Lyons R, et al. Quantifying intraoperative workloads across the surgical team roles: Room for better balance? World J Surg 2016; 40(7): 1565-74.
34. Brent RJ, Patel M. Physician rewards for different kinds of service: the RBRVS versus the CPR system. Plast Reconstr Surg 1997; 100(1): 51-7.
35. Nayar SK, Sabharwal S, Aziz KT, Srikumaran U, Giladi AM, LaPorte DM. Medicare compensation rates for hand and shoulder/elbow surgery by operative time: A comparative analysis. Arch Bone Jt Surg 2020; 8(2): 173-83.
36. Oduwole KO, Molony DC, Walls RJ, Bashir SP, Mulhall KJ. Increasing financial burden of revision total knee arthroplasty. Knee Surg Sports Traumatol Arthrosc 2010; 18(7): 945-8.
37. Stecker EC, Schroeder SA. Adding value to relative-value units. N Engl J Med 2013; 369(23): 2176-9.
38. Abouljoud M, Whitehouse S, Langnas A, Brown K. Compensating the transplant professional: Time for a model change. Am J Transplant 2015; 15(3): 601-5.
39. Resnick NM, Radulovich N. The relative value unit in academic geriatrics: incentive or impediment? J Am Geriatr Soc 2014; 62(3): 553-7.
40. Oldani MJ. Assessing the 'relative value' of diabetic patients treated through an incentivized, corporate compliance model. Anthropol Med 2010; 17(2): 215-28.

ORİJİNAL ÇALIŞMA-ÖZET
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Cerrahların iş yükünü ölçmede yerel bir modelin geliştirilmesi

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ÖZET

Giriş ve Amaç: Bağıl Değer Birimi (BDB), cerrahların ödemelerini hesaplamada ve yine cerrahların iş yükünü ölçmede kullanılan ana yöntemdir. Mevcut veriler, iş yükü Bağıl Değer Biriminin (iyBDB) bir cerrahın iş yükünü kesin olarak temsil etmediğini göstermektedir. Bu sebeple, bu çalışmada cerrahların iş yükünü ölçmede kullanılacak yerel bir modelin geliştirilmesi amaçlandı.

Gereç ve Yöntem: Bu çalışma, Aralık 2019 ve Nisan 2021 arasında nitel ve nicel yaklaşımlar kullanılarak metrikleri belirleme ve model gelişimi olarak iki aşamada yürütülmüştür. Literatür taraması, odak grup tartışmaları ve görüşme teknikleri ile veriler toplandı. İçerik analizi ve açınsayıcı veri çözümlemesi verilerin analizinde kullanıldı.

Bulgular: Cerrahların iş yükünü belirlemede hastaların durumu (yaş, başvuru esnasında hastalığın ciddiyeti ve komorbiditeler), hastalığa ilişkin ayrıntılar (zaman, karmaşıklık, fiziksel efor ve risk) ve sağlık uzmanının özellikleri (cerrahın istekliliği, maruz kalınan stres ve cerrahın becerisi) sırasıyla %17, %51 ve %32'lik oranlarla önemli bulundu.

Sonuç: Her bir işlem adına sabit bir değer belirlemek, herhangi bir işlem için cerrah tarafından yüklenilen iş miktarını kesin olarak oranlayamamaktadır. Cerrahın ameliyathanedeki iş yükünü hastanın durumu, cerrahın özellikleri ve hastalığa ilişkin ayrıntılar gibi faktörler etkilemektedir. Sağlık sisteminde maaş ödemelerinde eşitlik sağlamak için cerrahların iş yükünü uygun bir şekilde ölçmek önemli bir adımdır.

Anahtar Kelimeler: Bağıl değer birimi, iş yükü bağıl değer birimi, cerrahların iş yükü, ölçme

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ORIGINAL ARTICLE
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Limited upper midline incision for major hepatectomy in adults: safety and feasibility

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ABSTRACT

Objective: Optimal incision for major hepatectomy remains controversial. In this study, we described our experience with a limited upper midline incision (UMI) for major hepatectomy. The objective was to analyze the feasibility and safety of UMI in major hepatectomy.

Material and Methods: Fifty-seven consecutive patients who underwent major hepatectomies performed via an UMI were compared to a control group of 36 patients who underwent major hepatectomies with a conventional incision (CI).

Results: In 85% of the patients, the indication was malignancy, with a median tumor size of 6 cm. Fifty-three percent of the patients had underlying chronic liver disease, and liver fibrosis was found in 61% of the patients. Nineteen percent of the patients had previous upper abdominal surgery. Twenty-six patients underwent left hepatectomy, 20 patients had right hepatectomy and 11 patients trisegmentectomy. Additional combined surgical procedures were performed in 42% of the patients. Median operative time was 323 minutes, estimated blood loss was 500 ml, and median post-operative hospital stay was seven days. Surgical complications occurred in 22 patients (39%). 5-year overall survival was 67%. When compared with the control group with CI, patients with UMI had no statistical difference on operative time, estimated blood loss, length of hospital stay, complication rate, and overall survival.

Conclusion: Major hepatectomies can be safely performed through UMI. This approach should be considered as a reasonable option in addition to conventional and laparoscopic approaches for major hepatectomies.

Keywords: Upper midline incision, right hepatectomy, left hepatectomy, trisegmentectomy, major hepatectomy

INTRODUCTION

Conventional open surgery for liver resection is frequently performed to resect primary and secondary liver neoplasm, as well for benign indications. This can be accomplished by various type of incisions including bilateral subcostal incision with or without a vertical extension, a J-shaped incision, and a reverse L-shaped incision with or without a left extension (1,2). Liver lesion size and its anatomical location, as well as its proximity to main blood vessels are major determinants when planning for the extent of the liver resection and the incision type. Conducting liver resection through extended incisions enables obtaining optimal resection margins while maintaining the patient's safety. However, if oncological principles and patient safety can be secured, a shorter incisional length would facilitate post-operative recovery. Since 1990, a growing number of minimal invasive hepatectomy methods have been reported with favorable results. According to the Louisville statement of 2008, a panel of international experts has defined three categories of hepatic minimal invasive surgery: pure laparoscopy, hand-assisted laparoscopy and a hybrid technique (3). The benefits of these minimally invasive procedures, such as shorter hospital stay and less pain, have fueled their rapid adoption (3-7). Nevertheless, there are still technical difficulties with minimally invasive liver resections related to hemorrhage control, liver mobilization, avoidance and management of bile duct injuries and the lack of manual sensation. Furthermore, their technical complexity, substantial learning curve, and expense have restricted their use for selected patients (8). Unlike in non-anatomical and minor liver resections, in major liver resections, defined as the resection of three or more contiguous segments and the resection of posterior superior segments (9), the surgeon still needs to

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make a significant incision for specimen extraction even if the entire procedure was possible with minimal invasive orientation. Therefore, the role of minimally invasive approach in major hepatectomy is not clearly defined, especially if the resection can be accomplished directly through the same minimal incision needed for extracting the specimen and spare all of the above-mentioned burdens of the minimal invasive technique. Yet, the safety and feasibility of this alternative surgical option needs to be studied before it can gain widespread use. Upper midline incision (UMI) has been proven to be feasible, safe and effective in living donor major hepatectomy (10,11). However, there is scant published data in the literature about its role in major hepatectomy for patients having malignant and benign indications. The aim of this study was to report our experience with major hepatectomy through UMI for malignant and benign indications and to analyze its feasibility and safety.

MATERIAL and METHODS

We performed a retrospective comparative study on a prospectively collected database of 57 consecutive major liver resections performed via an UMI at a single center between March 2010 and December 2019. In addition, data from a control group of 36 patients, who underwent major hepatectomies with a conventional incision (CI) (defined as bilateral subcostal with midline extension) over the same period, was analyzed in order to compare outcomes with the UMI group. This study was approved by the Institutional Review Board.

We included patients who underwent the following liver resections: right hepatectomy, left hepatectomy, right tri-segmentectomy, and left tri-segmentectomy. The indications were both malignant and benign tumors, regardless of the tumor burden and the involvement of adjacent organs. We excluded patients who underwent resections for the purpose of liver donation.

Surgical indications and plans were determined during a multidisciplinary liver tumor board conference. Pre-operative workup included: laboratory testing, tumor markers, imaging modalities [computed tomography (CT), positron emission CT and magnetic resonance imaging (MRI)] and characterization of the specific tumor (number, location, size and relation to intrahepatic vascular or biliary structures). The patients underwent standard evaluation for major surgery by an anesthesiologist. All patients were informed in detail about the procedure, including the risks and benefits, and written consent was obtained prior to surgery.

Blood loss was estimated using the volume of blood aspirated from the abdominal cavity during the procedure. Operative time was defined as the time elapsed from the skin incision until closure. Postoperative hospital stay was defined as the number of days from the operation until the day of discharge, inclusive. Complications were defined as any unexpected event deviating from a normal recovery course. Severity of complications was graded using the Clavien–Dindo scoring system (12). Tumor burden and resection margins were determined according to the pathological reports from the permanent sections of the extracted specimens. R0 was defined as no cancer cells seen microscopically at the resection margin. After discharge, the patients were followed by our multidisciplinary team as every three months for at least two years and every six months thereafter for a patient with malignancy.

Surgical Technique

The UMI approach for major hepatectomy was performed in the same way as described earlier by our team for living liver donors (10). In brief, after general anesthesia was administered and full muscle relaxation was accomplished, laparotomy was performed using a pre-determined supraumbilical UMI, extending from 1 cm below the tip of the xiphoid process to 3-4 cm above the umbilicus (Figure 1). The xiphoid process was excised for optimal suprahepatic caval exposure. The Thompson retractor system was used with pediatric blades to retract the rib cage. The right or left hepatic lobe (depending on the laterality of planned resection) was mobilized by dividing the falciform and coronary ligaments, as well as retroperitoneal and diaphragmatic attachments. The lobe to be resected (right or left) was then mobilized off the inferior vena cava, and the liver was encircled posteriorly with a firm plastic tube in preparation for the hanging maneuver (13-15). The tube held the liver parenchyma up and provided counter-traction for parenchymal transection via the hanging maneuver. This allowed parenchymal transection to be performed at the abdominal midline level, just underneath the abdominal wall midline incision. Vascular inflow obstruction was applied as needed. The ipsilateral hepatic artery and portal vein were divided; if the right lobe was resected

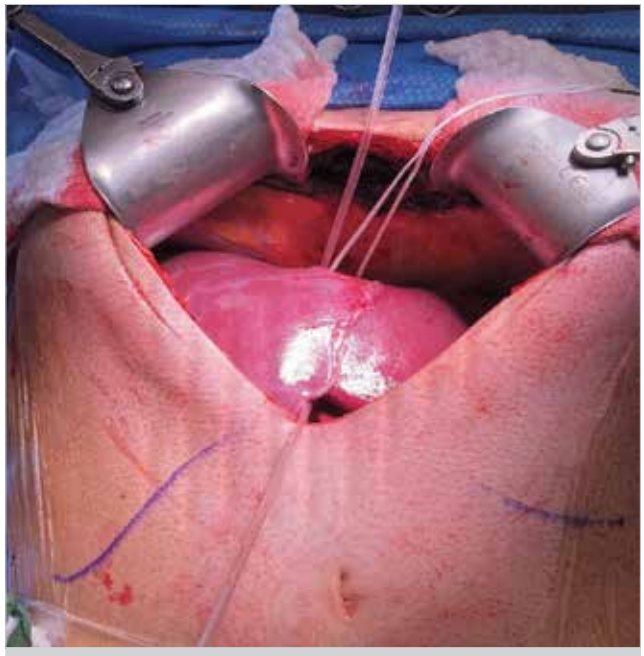

Figure 1. Intraoperative exposure with UMI.

it was rotated clockwise, anteriorly, and to the contralateral side, where-as the rotation of a resected left lobe was counterclockwise. This was followed by transection of the ipsilateral hepatic vein with Endo GIA™ staplers (vascular cartridge, Endo GIA™, Covidien, Norwalk, CT, USA). The parenchymal transection was performed using a Cavitron Ultrasonic Surgical Aspirator (CUSA; Valleylab, Boulder, CO, USA). The specimen was retrieved from the abdominal cavity without difficulty from the UMI. An argon beam coagulator was used for hemostasis. The surgical field was irrigated and checked for bleeding or bile leakage, and residual fluid was removed by suction. An abdominal drain was usually placed over the surgical field. The wounds were then closed in layers. All specimens were sent fresh for pathologic examination to measure surgical margins.

Statistical Analysis

Descriptive statistics were expressed as mean (SD) or median (range). Chi square test or Fisher's test, where appropriate, was used for univariate comparisons. Patient survival curves were calculated according to the Kaplan-Meier method. Differences were considered significant at p= 0.05. All statistical analyses were performed using Stata 11 Statistics/Data Analysis (StataCorp, College Station, TX, USA).

RESULTS

Demographics and Peri-Operative Clinical Data

From March 2010 to December 2019, this UMI was used in fifty-seven patients for major hepatectomy. Patient characteristics are summarized in Table 1. Median age was 59 years, there were

Table 1. Patient demographics

	UMI	CI	p
Number, n	57	36	
Age, years, median, (range)	59 (22-79)	61 (33-85)	0.3
Sex, male, %	47%	72%	0.02
BMI, kg/m^2, median, (range)	25 (15-33)	26 (18-35)	0.1
ASA, n, (%) 2 3 4	 12 (21%) 38 (68%) 6 (11%)	 7 (21%) 23 (70%) 3 (9%)	 1
Diagnosis, n (%) Secondary liver metastasis HCC CCA Adenoma Hemangioma Neuroendocrine metastasis Other	 7 (12%) 22 (39%) 15 (26%) 3 (5%) 2 (3%) 1 (2%) 7 (12%)	 1 (3%) 14 (39%) 10 (28%) 2 (6%) 2 (6%) 1 (3%) 6 (17%)	 0.8
Chronic liver disease, n (%) No Yes Etiology, n (%) HCV HBV NASH PSC Other	 27 (47%) 30 (53%) 16 (28%) 4 (7%) 3 (5%) 6 (11%) 1 (2%)	 20 (56%) 16 (44%) 9 (25%) 3 (8%) 2 (6%) 2 (6%) 0	 0.9
Fibrosis, n (%) Underlying liver fibrosis, yes Stage 1 Stage 2 Stage 3 Stage 4	 35 (61%) 10 (17%) 9 (16%) 6 (10%) 10 (18%)	 14 (39%) 4 (11%) 10 (28%) 5 (14%) 3 (8%)	 0.5
Child-Pugh-Turcotte Score, median (range) Child-Pugh-Turcotte Stage, n (%) A B	5 (5-8) 50 (88%) 7 (12%)	5.5 (5-9) 28 (78%) 8 (22%)	 0.2
Previous upper abdominal surgery, n (%)	11(19%)	7 (19%)	0.99

47% males and 53% females, with a median body mass index (BMI) of 25. In 79% of the patients, the ASA score was above 2, and indication was malignancy in 85%. Fifty-three percent of the patients had known underlying chronic liver disease with hepatitis C virus (HCV) being the major etiology. Liver fibrosis on the pathology specimen was found in 61% of the patients, almost 30% of all patients had at least stage 3-4 fibrosis. The majority of the patients were Child-Pugh-Turcotte Class A and 19% had previous upper abdominal surgery. Liver mobilization, hilar dissection, and parenchymal transection were performed through a limited single upper midline incision. None of the cases required additional subcostal or infra-umbilical extension of the incision for liver resection.

Perioperative characteristics are described in Table 2. Forty-five percent of the patients underwent left hepatectomy, 35% underwent right hepatectomy and 20% of the patients underwent trisegmentectomy (mainly right). Vascular inflow occlusion was applied in 28% of the patients, with a median time of 23 minutes, mostly via Pringle maneuver, with only one patient requiring total vascular isolation (TVI). In addition to major hepatectomy, combined surgery was performed in 42% of the patients through the UMI: 11 patients had caudate lobectomy, one patient had a Whipple procedure, two patients had right adrenalectomy, six patients had additional liver segmentectomy, and one had resection of a retroperitoneal tumor. Three patients had colectomy; one patient had transverse colectomy from the UMI, one patient had left colectomy from a separate infraumbilical midline incision, and one patient had UMI extended inferiorly for an abdominal perineal resection. Median operative time was 323 minutes, estimated blood loss was 500 ml, and 39% of the patients required intraoperative blood transfusion. Median post-operative hospital stay was seven days.

Complications

Surgical complications occurred in 22 patients (39%) as listed in Table 3. Nine complications (16%) were Clavien grade II, 5 complications (9%) Clavien grade III, 3 complications (5%) were grade IV, and 5 complications (9%) were grade V. The most common complication was infections (11%, n= 6). Three patients developed asymptomatic biliary leakage with one patient requiring ERCP and stent placement (IIIa), and the other two required re-operation (IIIb). Two patients (4%) died from liver failure, and three patients (5%) died from severe sepsis and MOF (V). During the follow up period, six patients (10%) developed incisional hernia.

Short- and Long-Term Oncological Outcomes

Median number of lesions in the resected specimens was 1, median size of the biggest lesion was 6 cm. R0 margins were achieved on 89% of the specimens. Mean follow-up period was 30 months (1-104). Overall survival at year 1, year 3, and year 5 was 82%, 77%, and 67% respectively (Table 4, Figure 2).

Table 2. Perioperative characteristics

	UMI	CI	p
Type of liver resection, n (%)			
Right hepatectomy	20 (35%)	15 (42%)	
Left hepatectomy	26 (45%)	6 (17%)	0.01
Right trisegmentectomy	10 (18%)	11 (31%)	
Left trisegmentectomy	1 (2%)	4 (11%)	
Vascular inflow occlusion			
Yes, n (%)	16 (28%)	11 (30%)	0.8
Time, min, median (range)	23 (10-30)	27 (9-50)	0.2
Combined surgery, n (%)	24 (42%)	19 (53%)	0.3
Types:			
Right adrenalectomy	2	0	
Extra liver segmentectomy	6	4	
Resection of retroperitoneal tumor	1	0	
Caudate lobe resection	11	5	
Colectomy	3	0	
Whipple procedure	1	1	
Diaphragmatic resection	0	4	
IVC resection	0	4	
Right nephrectomy	0	1	
Operative time, min, median (range)	323 (220-692)	384 (214-816)	0.06
Estimated blood loss, ml, median (range)	500 (50-4000)	500 (100-2200)	0.7
Intraoperative blood transfusions requirement, yes, n (%)	21 (39%)	21 (58%)	0.04
Post-operative hospital stay, days, median (range)	7 (3-77)	8 (4-42)	0.9

Table 3. Post-operative 30-day complications using clavien classification

	UMI	CI	p
Complications, yes, n (%)	22 (39%)	14 (39%)	0.98
Clavien Classification			
II	9 (16%)	9 (25%)	
IIIa	2 (4%)	1 (3%)	
IIIb	3 (5%)	2 (6%)	0.6
IVa	1 (2%)	1 (3%)	
IVb	2 (4%)	0	
V	5 (9%)	1 (3%)	
Type of complications, n			
Fluid Overload	4	2	
Infectious: fevers, wound, Pneumonia, UTI, C. Diff.	6	5	
Thrombosis: DVT, PE	1	3	
Portal vein thrombosis	1	0	
Hemorrhage	1	0	0.25
Biliary	3	1	
Colonic complications	1	1	
Cardiac	0	1	
Ileus	1	0	
Kidney failure	1	0	
Liver failure	2	0	
Poor nutrition	1	1	
Incisional hernia, yes, n (%)	6 (10%)	5 (14%)	0.6

Table 4. Pathological findings and post-operative outcomes

	UMI	CI	p
Number of liver lesions, median (range)	1 (1-5)	1 (1-5)	0.3
Size biggest liver lesion, cm, median (range)	6 (1.2-19)	8 (1.4-28)	0.9
Margins, R0 (%)	89%	86%	0.7
Follow up, months, mean (range)	30 (1-104)	25 (1-77)	0.4
Overall Survival, %			
1-year	82%	88%	
3-year	77%	63%	0.5
5-year	67%	40%	

Comparison Between Patients with UMI and CI

The entire UMI group consisting of 57 patients was further compared with a separate control group of consecutive patients who underwent major hepatectomies with CI between March 2010 and December 2019 (Tables 1-4).

There were more males in the CI group. There was no statistically significant difference between the groups in terms of age, BMI, ASA score, diagnosis, presence of underlying chronic liver disease, liver fibrosis, Childs-Pugh-Turcotte Class, or history of previous upper abdominal surgery (Table 1). In the UMI group, more patients had right and left hepatectomies, while more trisegmentectomy procedures were performed in the CI group. Both groups had similar rates of combined surgeries, and a similar rate and timing for vascular inflow occlusion. In the UMI group, there was a trend towards less operative time (p= 0.06) without reaching statistical significance, and the same estimated blood loss. Intraoperative blood transfusions were less needed in the UMI group (p= 0.04) (Table 2). The rate of complications was similar in both groups. Patients in the UMI group tended to have more severe complications than patients in the CI group, without reaching statistical significance (p= 0.6) (Table 3). Both groups had similar pathological findings regarding number, size and margins of lesions, with similar survival outcomes (Table 4, Figure 2).

DISCUSSION

Major hepatectomy being safely performed through UMI in the setting of living liver donation has been previously reported by our group and others (10,11). In the current study, we expand-

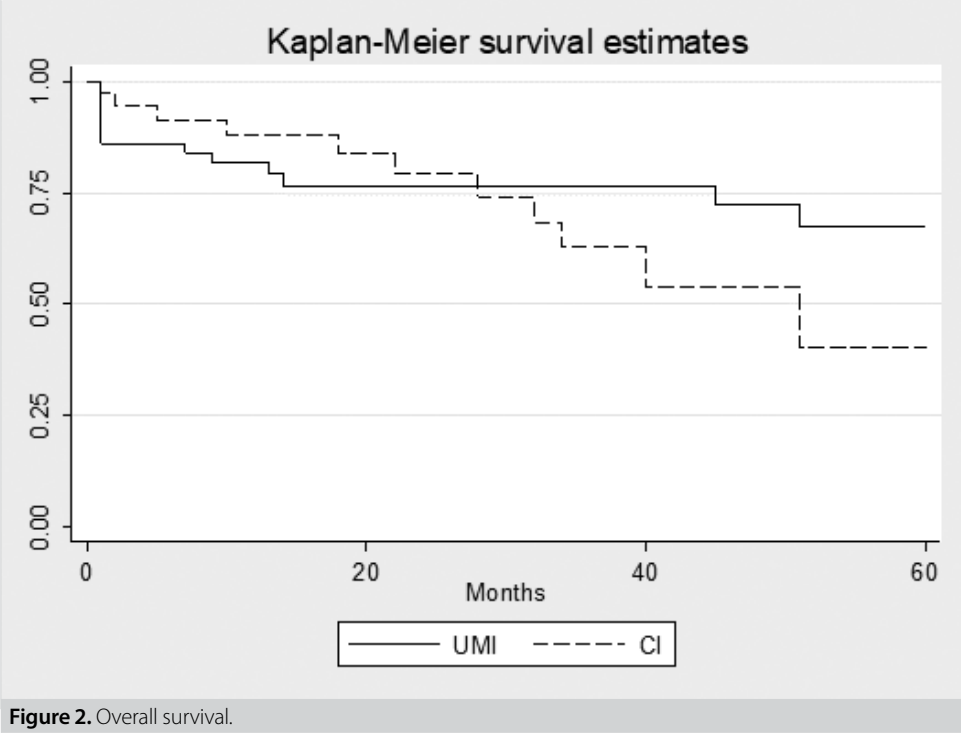

Figure 2. Overall survival.

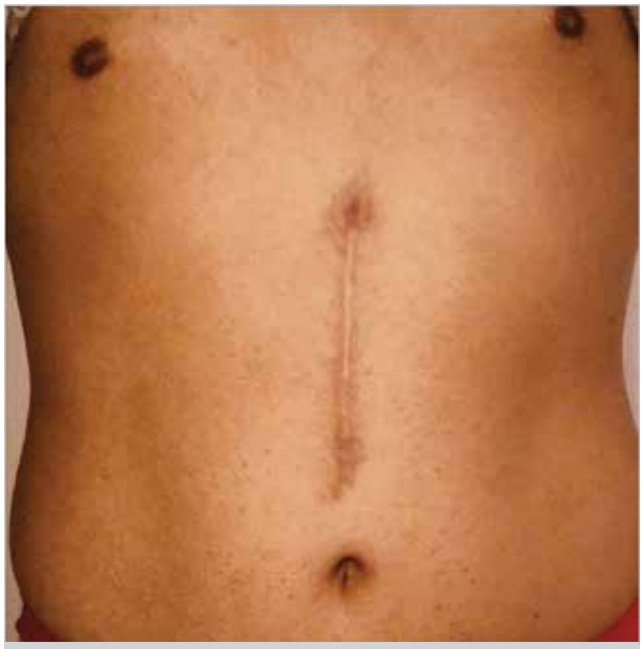

Figure 3. Long-tern cosmetic results with UMI.

ed our experience using an UMI for major hepatectomies in all patients, irrespective of chronic underlying liver disease and the degree of fibrosis, the need of concomitant surgical procedures or receipt of previous upper abdominal surgery. Our results with 57 consecutive patients demonstrate that this approach is both feasible and safe.

In the present study, we compared the patients with UMI to a cohort of patients who had major hepatectomies using CI. Operative time, the need of vascular inflow occlusion, estimated blood loss, and the need for blood transfusions were comparable with data found in the CI patients. Moreover, the length of post-operative hospital stays, complication rate, incisional hernia incidence, resection margins, and survival in the UMI group were similar between the groups.

Unlike CI, UMI above the umbilicus is one of the most common and familiar incisions in abdominal general surgery, representing an optimal way to begin a liver resection. UMI was performed upon the same patient population as for CI, with no limitation on patient selection. In particular situations, such as patients with higher BMI, UMI allows for an extension inferiorly and both lateral sides to maximize surgical exposure if necessary. Its cosmetic results are significantly better compared with the standard subcostal incision with positive impact on quality of life, especially in the population of young patients (Figure 3).

Dagher et al. (16) have reported the combined data of 18 international centers performing laparoscopic major hepatectomies. From 1996 to 2014, a total of 5388 laparoscopic liver resections were identified, 1184 of them were major resections. The conversion rate for all major resections was 10%, mean operative time was 291 min, and mean estimated blood loss was 327 ml.

Laparoscopic major hepatectomy can be a formidable task. Limited visualization of the surgical field can result in unexpected and uncontrolled hemorrhage, especially during the expo-

sure and control of the inferior vena cava and hepatic veins, as well as the parenchymal division. Therefore, a high level of expertise in laparoscopy and good selection of the cases, are required for achieving patient safety and adequate oncological outcome (17).

From a practical aspect, all laparoscopic techniques still ultimately require a large incision for graft extraction, especially when dealing with larger specimens or tumors. When adding the extraction incision length to the sum of the incision's length required for the ports, the comparative benefits of laparoscopic over open surgery using UMI remains a subject for debate and need for future studies.

Kim et al. (18) have reported the use of the UMI technique for liver resections in patients in addition to its use in healthy live donors. They have initially reported results of 308 liver resections through the UMI technique; 160 patients had tumors of 5 cm in size or less, and 148 were living liver donors. Median length of their incision was 16.4 cm. Their statistical analysis in patients' group did not differentiate between major and minor hepatectomy. They have concluded that UMI can be used safely and effectively in conventional open surgery and should therefore be given priority as the first-line technique in patients with tumors measuring 5 cm or less. Our study demonstrated that the UMI can be safely incorporated for patients with larger tumor burden (median tumor size 6 cm).

The major advantage of the UMI technique is that the incision is confined to the supra-umbilical area, and avoids the additional pain and morbidity that is associated with the bilateral or right subcostal incision and rectus muscle division. Moreover, it provides an adequate surgical field exposure around the right kidney, right adrenal gland, hepato-caval junctions of the hepatic veins, and the inferior vena cava, allowing the performance of combined resections including pancreaticoduodenectomy, when indicated. UMI allows doing the liver mobilization, hilar dissection, and parenchymal transection as does conventional open resection. This longitudinal incision runs along the same plane as the transection line needed for major hepatectomies and also along the same plane at which the force needed for the hanging maneuvers is applied, as described by Belghiti et al. (13) and Kim et al. (14,15). When working from an UMI, the hanging maneuver is critical for optimizing exposure and minimizing bleeding, and decreasing the need for vascular inflow occlusion. The rate for vascular interruption in the UMI group (28%) was similar with its use in the CI group (30%), and in line with its rate in the reported literature for major hepatectomies (24%) (19). Completion of a liver resection, without interrupting blood flow reduces its detrimental effects such as hepatic ischemia-reperfusion injury, spontaneous spleen rupture, and portal vein thrombosis (20), especially in patients with underlying liver disease.

The retrospective nature of the present study and the relatively small sample size confer limitations on the level of certainty regarding its results. However, we only chose to include patients who underwent major hepatectomies and used strict exclusion criteria. Additionally, this study was nonrandomized, reflected in the asymmetrical size of the two treatment groups

In conclusion, major hepatectomy using a limited length UMI is shown to be both feasible and safe in our series of 57 consecutive patients. It should not be considered as an opposing alternative to laparoscopic techniques or conventional surgical approach, but rather another component of a diverse strategy for the management of major hepatectomies. The choice of a particular surgical approach should depend upon patient individual risk factors and the expertise of the surgical team.

We, therefore, believe that the UMI technique should be considered in the armamentarium of the liver surgeons when planning for major hepatectomy.

Ethics Committee Approval: Thi study approval was obtained from Institutional Board of the Mount Sinai School of Medicine (Project Information: HS#:20-00917, Date: 31.07.2020).

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Author Contributions: Concept - All of authors; Design - All of authors; Supervision - All of authors; Data Collection and/or Processing - All of authors; Analysis and/or Interpretation - All of authors; Literature Search- All of authors; Writing Manuscript - All of authors; Critical Reviews - All of authors.

Conflict of Interest: The authors have no conflicts of interest to declare.

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REFERENCES

1. *Togo S, Nagano Y, Masumoto C, Takakura H, Matsuo K, Takeda K, et al. Outcome of and risk factors for incisional hernia after partial hepatectomy. J Gastrointest Surg 2008; 12(6): 1115-20.*
2. *Chang SB, Palavecino M, Wray CJ, Kishi Y, Pisters PWT, Vauthey JN. Modified Makuuchi incision for foregut procedures. Arch Surg 2010; 145(3): 281-4.*
3. *Buell JF, Cherqui D, Geller DA, O'Rourke N, Iannitti D, Dagher İ, et al. The international position on laparoscopic liver surgery: The Louisville statement, 2008. Ann Surg 2009; 250(5): 825-30.*
4. *Buell JF, Thomas MT, Rudich S, Marvin M, Nagubandi R, Ravindra KV, et al. Experience with more than 500 minimally invasive hepatic procedures. Ann Surg 2008; 248(3): 475-86.*
5. *Kaneko H, Takagi S, Otsuka Y, Tsuchiya M, Tamura A, Katagiri T, et al. Laparoscopic liver resection of hepatocellular carcinoma. Am J Surg 2005; 189(2): 190-4.*
6. *Sasaki A, Nitta H, Otsuka K, Takahara T, Nishizuka S, Wakabayashi G. Ten-year experience of totally laparoscopic liver resection in a single institution. Br J Surg 2009; 96(3): 274-9.*
7. *Cho JY, Han HS, Yoon YS, Shin SH. Feasibility of laparoscopic liver resection for tumors located in the posterosuperior segments of the liver, with a special reference to overcoming current limitations on tumor location. Surgery 2008; 144(1): 32-8.*

8. *Vibert E, Perniceni T, Levard H, Denet C, Shahri NK, Gayet B. Laparoscopic liver resection. Br J Surg 2006; 93(1): 67-72.*
9. *Wakabayashi G, Cherqui D, Geller DA, Buell JF, Kaneko H, Han HS, et al. Recommendations for laparoscopic liver resection: a report from the second international consensus conference held in Morioka. Ann Surg 2015; 261(4): 619-29.*
10. *Singh MK, Lubezky N, Facciuto M, Contreras-Saldivar A, Wadhera V, Arvelakis A, et al. Upper midline incision for living donor right hepatectomy. Clin Transplant 2016; 30(9): 1010-5.*
11. *Kim SH, Cho SY, Lee KW, Park Sang-Jae, Han Sung-Sik. Upper midline incision for living donor right hepatectomy. Liver Transpl 2009; 15(2): 193-8.*
12. *Dindo D, Demartines N, Clavien Pierre-Alain. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004; 240(2): 205-13.*
13. *Belghiti J, Guevara OA, Noun R, Saldinger PF, Kianmanesh R. Liver hanging maneuver: a safe approach to right hepatectomy without liver mobilization. J Am Coll Surg 2001; 193(1): 109-11.*
14. *Kim SH, Park Sang-Jae, Lee Soon-ae, Lee WJ, Park Joong-Won, Hong EK, et al. Various liver resections using hanging maneuver by three glisson's pedicles and three hepatic veins. Ann Surg 2007; 245(2): 201-5.*
15. *Kim SH, Kim YK. Living donor right hepatectomy using the hanging maneuver by Glisson's approach under the upper midline incision. World J Surg 2012; 36(2): 401-6.*
16. *Dagher I, Gayet B, Tzanis D, Tranchart H, Fuks D, Soubrane O, et al. International experience for laparoscopic major liver resection. J Hepatobiliary Pancreat Sci 2014; 21(10): 732-6.*
17. *Palanisamy S, Sabnis SC, Patel ND, Nalankilli VP, Vijai A, Palanivelu P, et al. Laparoscopic major hepatectomy-technique and outcomes. J Gastrointest Surg 2015; 19: 2215-22.*
18. *Kim SH, Kim YK. Upper midline incision for liver resection. HPB (Oxford) 2013; 15(4): 273-8.*
19. *Al-Saeedi M, Ghamarnejad O, Khajeh E, Shafiei S, Salehpour R, Golriz M, et al. Pringle maneuver in extended liver resection: A propensity score analysis. Sci Rep 2020; 10(1): 8847.*
20. *Hoekstra LT, van Trigt JD, Reiniers MJ, Busch OR, Gouma DJ, van Gulik TM. Vascular occlusion or not during liver resection: the continuing story. Dig Surg 2012; 29(1): 35-42.*

ORİJİNAL ÇALIŞMA-ÖZET
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Yetişkinlerde majör hepatektomi için sınırlı üst orta hat insizyonu: Güvenlik ve fizibilite

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ÖZET

Giriş ve Amaç: Majör hepatektomi için optimal insizyon tartışmalıdır. Bu çalışmada, majör hepatektomi için sınırlı üst orta hat insizyonu (ÜOİ) deneyimimizi açıkladık. Çalışmanın amacı, majör hepatektomide ÖOİ uygulanabilirliği ve güvenilirliğini analiz etmekti.

Gereç ve Yöntem: ÜOİ ile majör hepatektomi yapılan 57 ardışık hasta konvansiyonel insizyon (Kİ) ile majör hepatektomi yapılan 36 hastanın dahil olduğu kontrol grubuyla karşılaştırıldı.

Bulgular: Hastaların %85'inde endikasyon ortanca tümör boyutu 6 cm olacak şekilde malignite idi. Hastaların %53'ünde altta yatan kronik böbrek hastalığı mevcuttu ve karaciğer fibrozu hastaların %61'inde tespit edildi. Hastaların %19'u daha önce üst batın cerrahisi geçirmişti. Yirmi altı hastaya sol hepatektomi, 20 hastaya sağ hepatektomi ve 11 hastaya trisegmentektomi uygulandı. Hastaların %42'sinde ek kombine cerrahi girişimler yapıldı. Ortanca operasyon süresi 323 dakika, tahmini kan kaybı 500 ml ve ortanca postoperatif hastanede yatış süresi yedi gündü. Yirmi iki (%39) hastada cerrahi komplikasyon görüldü. Beş yıllık toplam sağkalım %67 idi. Kİ kontrol grubu ile karşılaştırıldığında, ÖOİ yapılan hastalarda operasyon süresi, tahmini kan kaybı, hastanede yatış süresi, komplikasyon oranı ve toplam sağkalım oranlarında istatiksel bir fark yoktu.

Sonuç: Majör hepatektomiler ÜOİ ile güvenilir bir şekilde uygulanabilir. Bu yaklaşım, majör hepatektomiler için konvansiyonel ve laparoskopik yaklaşımlara ek olarak akıllıca bir seçenek olarak düşünülmelidir.

Anahtar Kelimeler: Üst orta hat insizyonu, sağ hepatektomi, sol hepatektomi, trisegmentektomi, majör hepatektomi

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ORIGINAL ARTICLE
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Risk factors for necrotic cholecystitis during the COVID-19 pandemic: the ChoCO-WSES prospective collaborative study's experience

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ABSTRACT

Objective: During the COVID-19 pandemic, several studies have reported a decrease in in the admission surgical patients and emergency surgical procedures, and an increase in more severe septic surgical diseases, such as necrotic cholecystitis. It was probably due to to a critical delay in time-to-diagnosis and time-to-intervention resulting to limited access to the operating theatres as well as intensive care units. Early laparoscopic cholecystectomy is the standard of care for acute cholecystitis. Moreover early data from COVID-19 pandemic reported an increase in the incidence of necrotic cholecystitis among COVID-19 patients. The ChoCO-W prospective observational collaborative study was conceived to investigate the incidence and management of acute cholecystitis under the COVID-19 pandemic.

Material and Methods: The present research protocol was. conceived and designed as a prospective observational international collaborative study focusing on the management of patients with to the diagnosis of acute cholecystitis under the COVID-19 pandemic. The study obtained the approval of the local Ethics Committee (Nimes, France) and meet and conform to the standards outlined in the Declaration of Helsinki. Eligible patients will be prospectively enrolled in the recruitment period and data entered in an online case report form.

Results: The ChoCO-W study will be the largest prospective study carried out during the first period of the COVID-19 pandemic with the aim to investigate the management of patients with acute cholecystitis, in the lack of studies focusing on COVID-19 positive patients.

Conclusion: The ChoCO-W study is conceived to be the largest prospective study to assess the management of patients presenting with acute cholecystitis during the COVID-19 pandemic and risk factors correlated with necrotic cholecystitis to improve the management of high-risk patients.

Keywords: Cholecystitis, management, COVID-19, SARS-CoV-2, WSES, ChoCO-W

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INTRODUCTION

Acute cholecystitis (AC) is a common surgical disease for admission in the emergency department. Gangrenous cholecystitis (GC) is the most severe complication of AC, affecting around 15% (range 2-30%) of the patients in a emergency setting, which can progress in necrosis and perforation of the gallbladder and pericholecystic abscess, fistula with other organs such in the Mirizzi sindrome or generalised peritonitis (1).

GC is related to increased morbility and mortality rate (mortality rate ranging between 15 and 50%) above all in elderly and high risk patients presenting with diabetes, coronary artery disease, and other chronic co-morbidities compared with non-necrotic AC (2,3).

Under the COVID-19 pandemic, several studies have reported an increased incidence of GC in COVID-19 positive patients and poor outcomes of patients managed non-operatively because of the limited access to operating theatres and intensive care units (4-7).

At present, the pathogenetic relationship of GC with COVID-19 infection is unknown, and the incidence of GC under this ongoing pandemic has not been defined and neither the risk factors correlated with developing this advanced form of acute cholecystitis.

Early laparoscopic cholecystectomy (LC) is the standard of care for AC, in COVID and non COVID patients. Tokyo Guidelines 2013 and its revised version in 2018 proposed a severity classification for AC to guide surgeons in non-operative or operative management of patients (8,9), which is summarised in Table 1.

The World Society of Emergency Surgery (WSES) evidence-based guidelines more clearly recommended early LC in the management of patients with AC, remarking the importance of better distinguishing high-risk patients from patients non-suitable for surgery in considering non-operative management or postponing surgery (10).

To our knowledge, there are not clear criteria in selecting urgent surgical patients presenting acute cholecystitis patients for non operative and operative management apart from haemodynamic stability in decreasing life-threatening complications and mortality rate. During the COVID-19 pandemic, in the lack of practice recommendations, a multi-societary position paper has suggested considering percutaneous drainage of the gallbladder (PC) after the failure of conservative therapy with antibiotics to delay surgical but treatment only in real conditions of the impracticability of a cholecystectomy (11).

With this collaborative study, we aim to prospectively study the effects of COVID-19 pandemic on clinical presentation, diagnosis, severity, and clinical outcome of acute cholecystitis globally to improve the management of high-risk patients that will not benefit from NOM, in non-COVID and in COVID patients.

In conclusion the **"**Risk Factors for necrotic Cholecystitis During the COVID-19 Pandemic" (ChoCO-W) study was conceived and supported by the World Society for Emergency Surgery (WSES) to:

-Assess the incidence of AC during COVID-19 pandemic;

-Investigate risk factors to develop GC under the COVID-19 pandemic;

-Evaluate the management of AC focusing on treatments and outcomes of operative and non-operative strategies in COVID-19 and non-COVID-19 patients to improve outcomes and decrease morbidity and mortality rates.

MATERIAL and METHODS

The ChoCO-W study was designed as a 12 month-period multicenter, observational, prospective cohort study with the purposes to:

1. Evaluate the incidence of AC during the COVID-19 pandemic;
2. Evaluate the risk factors for GC;

Table 1. Tokyo Guidelines 13/18 severity classification of cholecystitis

Grade III (severe) acute cholecystitis
"Grade III" acute cholecystitis is associated with dysfunction of any one of the following organs/systems:
1. Cardiovascular dysfunction: hypotension requiring treatment with dopamine ≥5 μg/kg per min, or any dose of norepinephrine
2. Neurological dysfunction: decreased level of consciousness
3. Respiratory dysfunction: PaO_2/FiO_2 ratio <300
4. Renal dysfunction: oliguria, creatinine >2.0 mg/dl
5. Hepatic dysfunction: PT-INR >1.5
6. Hematological dysfunction: platelet count <100,000/mm^3
Grade II (moderate) acute cholecystitis
"Grade II" acute cholecystitis is associated with any one of the following conditions:
1. Elevated WBC count (>18,000/mm^3)
2. Palpable tender mass in the right upper abdominal quadrant
3. Duration of complaints >72 ha
4. Marked local inflammation (gangrenous cholecystitis, pericholecystic abscess, hepatic abscess, biliary peritonitis, emphysematous cholecystitis)
Grade I (mild) acute cholecystitis
"Grade I" acute cholecystitis does not meet the criteria of "Grade III" or "Grade II" acute cholecystitis. It can also be defined as acute cholecystitis in a healthy patient with no organ dysfunction and mild inflammatory changes in the gallbladder, making cholecystectomy a safe and low-risk operative procedure

3. Assess the correlation between COVID-19 disease and necrotic cholecystitis;
4. Evaluate the management of acute cholecystitis according to the WSES international guidelines (2020) in terms of mortality and morbidity (6).

The draft of the first project was submitted for evaluation to a selected WSES steering committee of international acute care and mini-invasive surgeons for suggestions and comments.

Revisions were made, and the final protocol was approved and entered in the ClinicalTrials.gov register with the ID: NCT04542312.

The ChoCO-W study is an international collaborative study sponsored by the World Society of Emergency Surgery and supported by the Italian Society of Endoscopic Surgery (SICE).

It will be carried out between October 2020 and September 2021 in ChoCO-W participating centers, under the coordination of the unit of Emergency and Metabolic Minimally Invasive Surgery, at the Poissy and Saint Germain en Laye Group of Hospitals (France). Ethical approval was obtained from the Sud Mediterranee Ethics Committee, Nimes, France (2021.03.05 ter _ 21.01.16.09406) (supplemental material 1).

The primary endpoint of the study is:

- To assess the incidence of AC during the COVID-19 pandemic.

Secondary endpoints of the study are:

- To investigate the risk factors for GC in patients admitted with the diagnosis of acute cholecystitis and in the cohort of COVID-19 patients;
- to confirm the hypothesis that COVID-19 infection is a risk factor to present GC;
- to assess mortality rate due to GC during the COVID-19 pandemic;
- to assess the management of acute cholecystitis during the COVID-19 pandemic and the role of non-operative management strategy and operative management.

Study Population

This prospective multicenter observational study will be performed in various medical institutions over a 12-month period (October 2020-October 2021). All adult patients admitted to the surgical departments with a diagnosis of acute cholecystitis (with and without necrotising cholecystitis) will be prospectively enrolled in the study.

Patients with pancreatitis, primary peritonitis from cirrhosis, or ascites will not be included in the study.

Inclusion Criteria

Patients of all ages and sex admitted to the emergency department for acute cholecystitis, aged ≥18 years.

Exclusion Criteria

Patients aged< 18 years.

Patients presenting with biliary pancreatitis, cirrhosis or ascites will not be included in the database.

Data Collection

Every clinical centre, which will be asked to join the ChoCO-W study, will be identified by an ID number assigned by the principal investigator and the coordinator center before starting data collection. Each local ChoCO team research will be composed of one local investigator and two collaborators. An online case report form (supplemental material 2) by Google form platform will be available to collect data in a protected database: the link for accessing the online database will be sent to the local investigator and collaborators for anonymous online data entry. All epidemiological, clinical, surgical and follow up data will be collected in a six-month period. Only the principal investigator of the study will be able to access to the database totally anonymised and secured by a username and password.

Sample Size Calculation

The ChoCO-W study is an explorative one, and data will be used to assess the incidence of GC, to investigate risk factors for GC among patients admitted with the diagnosis of AC during the COVID-19 pandemic and their management in an emergency setting.

The sample size was calculated by considering the incidence of GC reported in the literature which corresponds to a range of 2-30%. Taking into account the mean between the 2 values, and in the lack of data on the incidence of necrotic cholecystitis in COVID patients, that we assumed to be double the incidence of necrotic cholecystitis in the non-COVID population, with an alfa risk estimated error equal to 0.05, the study population will be composed of two cohorts of 111 patients.

Statistical Analysis

The present study aims to evaluate the incidence of GC among patients admitted for acute cholecystitis during COVID-19 pandemic. The statistician investigator will differentiate data by two cohorts of patients: non COVID and COVID patients and sex. The main aim of this study is to assess the management of all patients having severe acute cholecystitis during COVID-19 pandemic. Data will be analyzed in absolute frequency and percentage, in the case of qualitative variables. Quantitative variables were analysed as medians and interquartile range (IQR). Univariate analyses will be performed to study the association between

risk factors and in-hospital mortality using a chi-square test, or a Fisher's exact test if the expected value of a cell was <5. All tests will be two-sided, and p values of 0.05 will be considered statistically significant. To investigate factors associated with death, a logistic regression model will be constructed, including variables with $p< 0.05$ in the univariate analysis.

Ethical Aspects

The present study is an observational one and it will not attempt to change or modify the clinical practice of all participating investigators. All surgeons involved in patient recruitment will be responsible for local ethics committee approval, if required, the anonymous collection and data entry. The study will meet and conform to the standards outlined in the Declaration of Helsinki and Good Epidemiological Practices (14)

All surgeons involved in the patient recruitment will be included in the ChoCO-W research authorship.

Informed Consent

The present observational prospective study, with a retrospective analysis of data, will not attempt to change or modify clinical practices of the participating physicians, consequently, informed consent will not be required. Each eligible patient for this study will be informed about the study and will be asked to authorise the anonymous treatment of personal data, according to standard local clinical practice.

Dissemination of Results and Publication Policy

The primary statistical analysis of the study will be presented at the World Congress of the World Society of Emergency Surgery. The ChoCO-W study embraces corporate authorship and all collaborators that will contribute to this project will form the ChoCO-W collaborative group.

Budget and Financing

The study was conceived, designed and will be carried out without any academic or private fund.

DISCUSSION

AC is one of the most common diseases of admission in the emergency department. The reported mortality of AC is approximately 3%, but the rate increases with age or patients' comorbidities. If appropriate treatment is delayed, life-threatening complications can develop as a consequence of management. GC is the worst manifestation of severe cholecystitis with increased morbidity and mortality rate above all for elderly and high comorbid patients.

The current standard of care in AC is an early LC with the appropriate administration of fluid, electrolyte, and antibiotics. What is unclear is how to recognise the group of patients that will develop GC associated to high operational risk to improve their management.

In the early phase of the ongoing COVID-19 pandemic, surgical activity was reorganised to allow caring about the enormous number of COVID patients needing admission in intensive care units for ventilatory support. Several authors have suggested considering non-operative strategies in the management of urgent surgical diseases in a period of limited access to operating theatres, lack of personal protective equipments and overwhelmed hospitals (12-14).

A multicenter retrospective-prospective cohort study about the management of acute cholecystitis in Madrid (Spain) (15) has shown an increase of non-surgical treatment of AC, and consequently an increase of conservative treatment failure, morbidity and hospital stay length, which may have led to an increased risk of hospital-acquired SARS-CoV-2 infection. Moreover, age, SARS-CoV-2 infection, AC severity and conservative treatment failure have been reported as mortality risk factors.

An Italian monocentric retrospective study (16) have reported data about 37 patients admitted with the diagnosis of AC and the use of PC during COVID-19 pandemic. According to Tokyo Guidelines (2018), patients were successfully treated with antibiotics only, bedside PC and LC, in 29.7%, 21.6% and 48.7% of cases respectively. The overall success rate of percutaneous cholecystostomy was 87.5%. Mean post-procedural hospitalization length was nine days. Median time of drainage removal was 43 days and only 50% of patients thereafter underwent cholecystectomy.

Two other retrospective Turkish studies (17,18) have respectively enrolled 72 and 36 patients and confirmed that PC can be an effective and safe alternative treatment for AC for delaying LC in COVID positive patients and selected negative ones and decreasing in-hospital diffusion of the infectious disease.

The ChoCO-W study could be the largest collaborative prospective study about AC carried out during the COVID-19 pandemic with a provisional number of 2000 patients enrolled with 42 countries involved (Table 2; Figure 1). The strength of the present study is the participation of surgical departments of all over the world and the effort made during the ongoing pandemic.

The limitation of the present study could be the retrospective analysis of data and the short follow up period of patients (period of hospitalisation).

CONCLUSION

AC is a common serious surgical disease. A group of patients will develop GC that is correlated with high morbidity and mortality rate. LC is the standard of care. During the COVID-19 pandemic, surgical activity was re-organised to allow caring for critically ill COVID patients, and non-operative manage-

Table 2. ChoCO-W involved countries

Country	Count
Albania	5
Argentina	1
Austria	2
Belarus	1
Bosnia and Herzegovina	4
Brazil	6
Bulgaria	2
Colombia	1
Croatia	1
Egypt	2
Ethiopia	1
France	4
Georgia	1
Germany	2
Greece	22
India	4
Indonesia	1
Iran	1
Israel	1
Italy	104
Japan	1
Malaysia	8
Mexico	1
Pakistan	2
Paraguay	2
Poland	4
Portugal	1
Romania	3
Russian Federation	3
Serbia	1
Singapore	1
Slovakia	1
Slovenia	1
South Korea	1
Spain	10
Sudan	1
Tunisia	1
Turkey	24
Ukraine	3
United Arab Emirates	5
United Kingdom	11
USA	2

ment strategies were employed for delaying surgery, with high morbidity and increased length of hospital stay. Furthermore, COVID-19 disease seems to be correlated with the risk of presenting with GC.

The ChoCO-W study was conceived to assess the management of AC during the COVID-19 pandemic in COVID-19 and non-COVID-19 patients and to improve the management of patients presenting with GC to decrease morbidity and mortality rates especially in high risk and elderly patients.

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Ethics Committee Approval: This study approval was obtained from Sud Mediterranee Ethics Committee, Nimes, France (03.05.2021 21.01.16.09406)

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - B.D.S.; Design - B.D.S, F.C.; F.M.A.Z.; Supervision - S.D.S., F.C., E.C., B.D.S, L.A., W.L.B., F.A.; Materials - B.D.S.; Data Collection and/or Processing - B.D.S.; Analysis and/or Interpretation - B.D.S., F.M.A.Z.; Literature Search - B.D.S.; Writing Manuscript - B.D.S.; Critical Reviews - All of authors.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

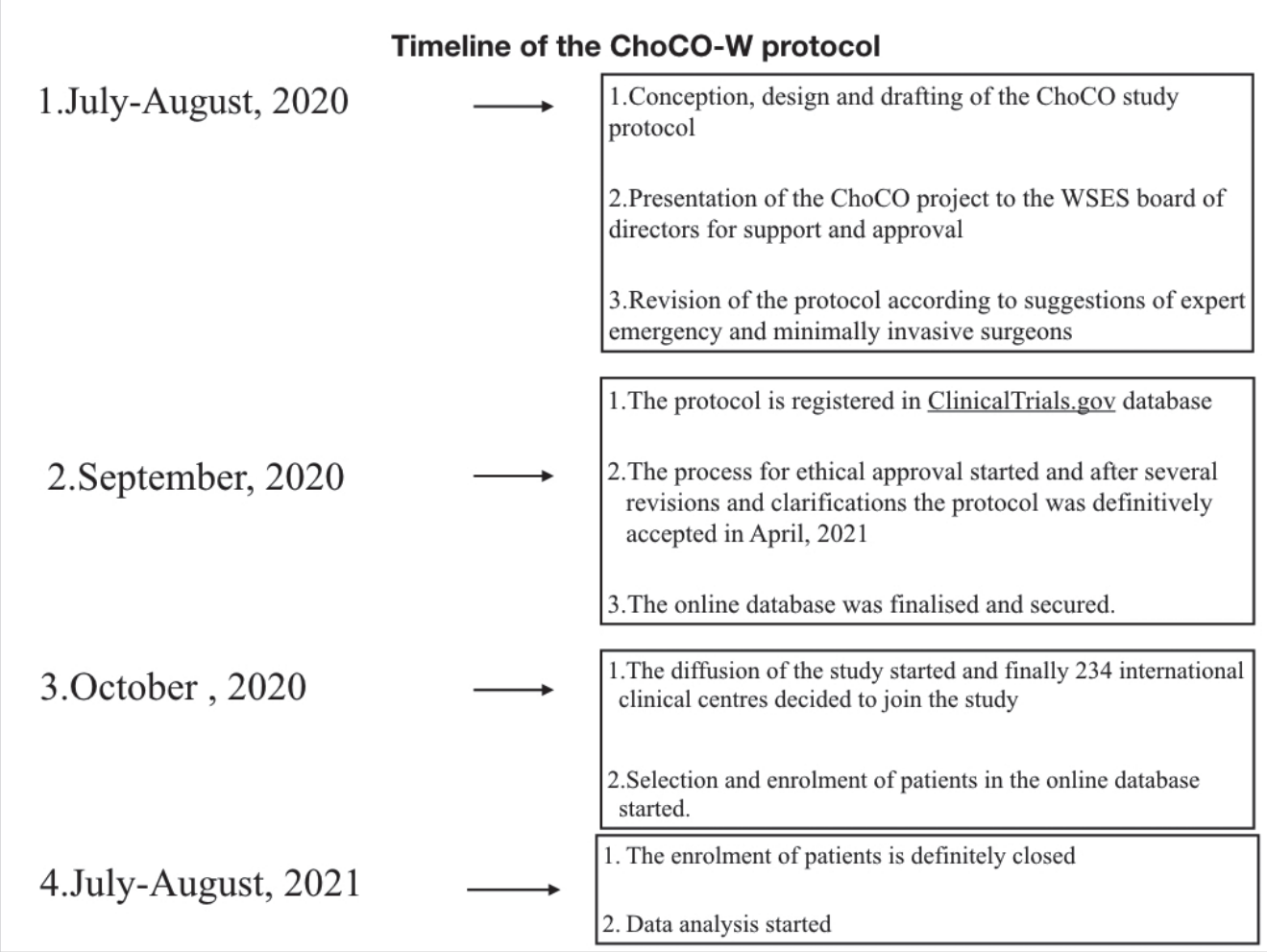

Figure 1. The ChoCO-W protocol timeline.

REFERENCES

1. *Bourikian S, Anand RJ, Aboutanos M, Wolfe LG, Ferrada P. Risk factors for acute gangrenous cholecystitis in emergency general surgery patients. Am J Surg 2015; 210(4): 730-3.*
2. *Önder A, Kapan M, Ülger BV, Oğuz A, Türkoğlu A, Uslukaya Ö. Gangrenous cholecystitis: mortality and risk factors. Int Surg 2015, 100(2): 254-60.*
3. *Gomes CA, Soares C, Di Saverio S, Sartelli M, de Souza Silva PG, Orlandi AS, et al. Gangrenous cholecystitis in male patients: a study of prevalence and predictive risk factors. Ann Hepatobiliary Pancreat Surg 2019; 23(1): 34-40.*
4. *Asti E, Lovece A, Bonavina L. Gangrenous cholecystitis during hospitalization for SARS-CoV2 infection. Updates Surg 2020; 72(3): 917-19.*
5. *Bruni A, Garofalo E, Zuccalà V, Currò G, Torti C, Navarra G, et al. Histopathological findings in a COVID-19 patient affected by ischemic gangrenous cholecystitis. World J Emerg Surg 2020; 15(1): 43.*
6. *Alhassan SM, Iqbal P, Fikrey L, Mohamed Ibrahim MI, Qamar MS, Chaponda M, et al. Post COVID 19 acute acalculous cholecystitis raising the possibility of underlying dysregulated immune response, a case report. Ann Med Surg (Lond) 2020; 60: 434-7.*
7. *Mattone E, Sofia M, Schembari E, Palumbo V, Bonaccorso R, Randazzo V, et al. Acute acalculous cholecystitis on a COVID-19 patient: a case report. Ann Med Surg (Lond) 2020; 58: 73-5.*
8. *Yokoe M, Hata J, Takada T, Strasberg SM, Asbun HJ, Wakabayashi G, et al. Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute cholecystitis (with videos). J Hepatobiliary Pancreat Sci 2018; 25(1): 41-54.*
9. *Okamoto K, Suzuki K, Takada T, Strasberg SM, Asbun HJ, Endo I, et al. Tokyo Guidelines 2018: flowchart for the management of acute cholecystitis. J Hepatobiliary Pancreat Sci 2018; 25(1): 55-72.*
10. *Pisano M, Allievi N, Gurusamy K, Borzellino G, Cimbanassi S, Boerna D, et al. 2020 World Society of Emergency Surgery updated guidelines for the diagnosis and treatment of acute calculus cholecystitis. World J Emerg Surg 2020; 15(1): 61.*
11. *Campanile FC, Podda M, Arezzo A, Botteri E, Sartori A, Guerrieri M, et al. Acute cholecystitis during COVID-19 pandemic: a multisocietary position statement. World J Emerg Surg 2020; 15(1): 38.*
12. *Rickham PP. Human experimentation. Code of ethics of the world medical association. Declaration of Helsinki. Br Med J 1964; 2(5402): 177.*
13. *de Simone B, Chouillard E, Di Saverio S, Pagani L, Sartelli M, Biffl WL, et al. Emergency surgery during the COVID-19 pandemic: what you need to know for practice. Ann R Coll Surg Engl 2020; 102(5): 323-2.*

14. de Simone B, Chouillard E, Sartelli M, Biffl WL, Di Saverio S, Moore EE, et al. The management of surgical patients in the emergency setting during COVID-19 pandemic: the WSES position paper. World J Emerg Surg 2021; 16(1): 14.

15. Martínez Caballero J, González González L, Rodríguez Cuéllar E, Ferrero Herrero E, Pérez Algar C, Vaello Jodra V, et al. Multicentre cohort study of acute cholecystitis management during the COVID-19 pandemic. Eur J Trauma Emerg Surg 2021; 47(3): 683-92.

16. Barabino M, Piccolo G, Trizzino A, Fedele V, Ferrari C, Nicastro V, et al. COVID-19 outbreak and acute cholecystitis in a Hub Hospital in Milan: wider indications for percutaneous cholecystostomy. BMC Surg 2021; 21(1): 180.

17. Çiyiltepe H, Yıldırım G, Fersahoğlu MM, Aydın MT, Özcabı Y, Bulut NE, et al. Clinical approach to patients admitted to the emergency room due to acute cholecystitis during the COVID-19 pandemic and percutaneous cholecystostomy experience. Ulus Travma Acil Cerrahi Derg 2021; 27(1): 34-42.

18. Somuncu E, Kara Y, Kızılkaya MC, Bozdağ E, Yıldız ZB, Özkan C, et al. Percutaneous cholecystostomy instead of laparoscopy to treat acute cholecystitis during the COVID-19 pandemic period: single center experience. Ulus Travma Acil Cerrahi Derg 2021; 27(1): 89-94.

ORİJİNAL ÇALIŞMA-ÖZET
Turk J Surg 2021; 37 (4): 387-393

COVID-19 pandemisi süresince nekrotik kolesistit risk faktörleri: ChoCO-WSES prospektif uluslararası çalışmasının deneyimi

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ÖZET

Giriş ve Amaç: COVID-19 pandemisi süresince bazı çalışmalarda, acil cerrahi hastalarında azalma ve ameliyathane ve yoğun bakım ünitelerine sınırlı erişim sebebiyle tanıya kadar geçen sürenin ve müdahaleye kadar geçen sürenin uzaması nedenli nekrotik kolesistit gibi daha ciddi septik hastalıklarda bir artış bildirilmiştir. Laparoskopik kolesistektomi, akut kolesistitin standart tedavi yöntemidir. Nekrotik kolesistit ile başvuran hastaların yönetimi konusunda kesin öneriler bulunmamaktadır. Bu çalışmanın amacı, yüksek riskli hastaların yönetimlerini iyileştirmek için nekrotik kolesistit insidansını değerlendirmek ve risk faktörlerini araştırmaktır.

Gereç ve Yöntem: Bu araştırma protokolü, akut kolesistit tanılı hastaların yönetimine odaklanan prospektif gözlemsel uluslararası ortak bir çalışma olarak tasarlanmıştır. Çalışma Yerel Etik Kurul (Nimes, Fransa) onayı almış ve Helsinki Bildirgesinde istenilen standartlara uymaktadır. Uygun hastalar, çalışmaya hasta alımı esnasında prospektif olarak dahil edilecek ve veriler çevrimiçi olgu raporu formuna aktarılacaktır.

Bulgular: COVID-19 pandemisi süresince yüksek riskli hastalara odaklanan çalışmaların eksikliği sebebiyle ChoCO-W çalışması, akut kolesistitli hastaların yönetimini inceleyen en geniş prospektif çalışmadır.

Sonuç: ChoCO-W çalışmasının, COVID-19 pandemisi süresince yüksek riskli hastaların yönetimini iyileştimek amacıyla akut kolesistitli hastaların yönetimini ve nekrotik kolesistit ile ilişkili risk faktörlerini değerlendiren en geniş prospektif çalışma olması tasarlanmıştır.

Anahtar Kelimeler: Kolesistit, yönetim, COVID-19, SARS-CoV-2, WSES, ChoCO-W

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ORIGINAL ARTICLE
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The effect of the use of the Gail model on breast cancer diagnosis in BI-RADS 4A cases

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ABSTRACT

Objective: The BI-RADS classification system and the Gail Model are the scoring systems that contribute to the diagnosis of breast cancer. The aim of the study was to determine the contribution of Gail Model to the diagnosis of breast lesions that were radiologically categorized as BI-RADS 4A.

Material and Methods: We retrospectively examined the medical records of 320 patients between January 2011 and December 2020 whose lesions had been categorized as BI-RADS 4A. Radiological parameters of breast lesions and clinical parameters according to the Gail Model were collected. The relationship between malignant BI-RADS 4A lesions and radiological and clinical parameters was evaluated. In addition, the effect of the Gail Model on diagnosis in malignant BI-RADS 4A lesions was evaluated.

Results: Among radiological features, there were significant differences between lesion size, contour, microcalcification content, echogenicity, and presence of ectasia with respect to the pathological diagnosis ($p< 0.05$). No significant difference was found between the lesions' pathological diagnosis and the patients' Gail score ($p> 0.05$). An analysis of the features of the Gail model revealed that there was no significant difference between the age of menarche, age at first live birth, presence of a first-degree relative with breast cancer, and a history of breast biopsy and the pathological diagnosis ($p> 0.05$).

Conclusion: As a conclusion Gail Model does not contribute to the diagnosis of BC, especially in patients with BI-RADS 4A lesions.

Keywords: Breast cancer, breast ultrasonography, breast tumors

INTRODUCTION

Breast cancer (BC) is the most common type of cancer in women and causes the highest number of deaths after lung cancer worldwide; its incidence increases by 0.3% each year (1). Early diagnosis of BC and accurate evaluation of lesions can be achieved in a greater proportion of patients thanks to recent advances in imaging modalities (2). The Breast Imaging Reporting and Data System (BI-RADS®) facilitates communication between radiologists, clinicians, and patients using standardized lesion definitions and reports (3). Although BI-RADS 4A lesions mainly involve some atypical benign and malignant lesions, they possess a malignancy potential as low as 2-10% (4). The accepted opinion is that biopsy should be performed from BI-RADS 4A lesions (5). Clinical and demographic characteristics are also used to determine the BC risk. There are several risk models for assessing breast cancer risk (6-8). Among these, the most widely used one is the Gail model (GM) (7).

In the GM, risk factors are determined by interviewing the patient and a scoring is made according to the presence of these risk factors. These risk factors are; age at menarche, age at first live birth, number of biopsies per age, and number of affected relatives per age at first live birth. As a result of this scoring, the probability of women having breast cancer within five years is calculated. Patients with a probability less than 1.66% are considered low-risk, and patients with a high probability are considered high-risk. The primary purpose of the GM is to select high-risk pa-

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tients for screening and make recommendations for risk-reducing medications, rather than to diagnose BC (7,9).

No study in the literature has specifically evaluated BI-RADS 4A lesions in relation to clinical risk models. We aimed to determine the contribution of GM to the diagnosis of breast lesions that were radiologically categorized as BI-RADS 4A. If the pathologies of BIRADS 4A lesions of women evaluated as low risk in terms of Gail score result in a significant majority of benign lesions, the necessity of performing a biopsy in these patients may be eliminated and the patient can be followed up clinically and radiologically at certain periods.

MATERIAL and METHODS

We retrospectively examined the medical records of 431 patients whose lesions had been categorized as BI-RADS 4A by ultrasonography and/or mammography performed at Başkent University Ankara Hospital between January 2011 and December 2020. The patients' radiological, pathological, and clinical data were obtained using hospital's data system. Patients with missing clinical and demographic information were reached via a telephone call. A total of 111 patients with an age below 18 years, previously diagnosed BC, and missing pathological evaluation and medical records were excluded from the study. We included 320 patients in the study.

Among patients, those under 40 years of age were examined with B-mode breast ultrasonography (USG), and those above 40 years of age were examined with mammography (MMG) and B-mode USG. In the radiological evaluation, the lesions' size, shape, orientation, contours, margins, acoustic shadowing, microcalcification content, echogenicity, structural distortion, and the presence of ductal ectasia were evaluated and recorded.

According to GM, a grouping was done by the age of menarche, age at first live birth, the number of the first-degree relatives diagnosed with BC, and the number of previous breast biopsies to calculate the patients Gail scores (GS). Patients having a risk of greater than 1.7% were grouped as high risk, and the others as low-risk (10).

The patients' pathology reports were retrospectively reviewed from the hospital data system. According to the pathology reports, benign and malignant groups were formed. The malignant group was collected under the headings of invasive carcinoma, intraductal carcinoma, mucinous carcinoma, adenocarcinoma, and other malignant lesions while the benign lesions were collected under the headings of fibrocystic disease and adenosis, fibroadenoma and other adenomas, intraductal papilloma, inflammation, and associated lesions, benign phyllodes tumor, and benign cyst and other benign lesions.

Descriptive statistics of categoric variables were presented as number (n) and percentage (%) and quantitative variables were presented as mean ± S.D. Categoric variables were compared with Pearson's Chi-square test, Likelihood ratio test or Fisher's exact test, depending on the parametric test assumptions. In addition, whether the Gail score can be used to predict the pathology results was assessed using ROC (Receiver Operating Characteristic) curve with AUC (Area Under Curve) and 95% confidence interval. Statistical analyses were performed at a significance level of $p< 0.05$. All statistical analyses were performed with IBM SPSS V22 software.

RESULTS

The study included a total of 320 patients. 9.4% (n= 30) of the patients had malignant lesions, and 90.6% (n= 290) had benign lesions (Table 1). The mean age of the patients was 44.53 ± 14.09 years. The mean age of the patients with benign lesions and those with malignant lesions was 43.87 ± 14.10 one years and 50.90 ± 12.42 years, respectively.

Among radiological features, there were significant differences between lesion size (p= 0.029), contour (p< 0.001), microcalcification content (p= 0.009), echogenicity (p= 0.020), and presence of ectasia (p= 0.002) with respect to the pathological diagnosis. However, no significant difference was found between the lesion shape (p= 0.099), orientation (p= 0.449), margin (p= 0.138), acoustic shadowing (p= 0.101), and presence of distortion (p= 0.179) with respect to the pathological diagnosis (Table 2).

While the size of 75.2% of benign lesions was <2 cm, 56.7% of malignant lesions were smaller than 2 cm. As compared with malignant lesions, a greater percentage of benign lesions had smooth contours (76.2% vs 43.3%). The percentage of having microcalcification was significantly higher in malignant lesions compared with benign lesions (26.7% vs 9.3%). The percentage of malignant lesions that showed complex echogenicity

Table 1. Distribution of BI-RADS 4A lesions by pathological diagnosis

Malignant lesions	**n (%)**
Invasive carcinoma	22 (6.9%)
Intraductal carcinoma	4 (1.3%)
Mucinous carcinoma	0 (0%)
Adenocarcinoma	0 (0%)
Other malignant lesions	4 (1.3%)
Benign lesions	**n (%)**
Fibrocystic disease and adenosis	42 (13.1%)
Fibroadenoma and other adenomas	121 (37.8%)
Intraductal papilloma	41 (12.8%)
Inflammatory and related lesions	21 (6.6%)
Phyllodes tumor, benign	4 (1.3%)
Cyst, benign	14 (4.4%)
Other benign lesions	47 (14.7%)

Table 2. Distribution of the radiological characteristics of the lesions by pathological diagnosis

Radiological parameters	Benign n (%)	Malign n (%)	p
Lesion size			
< 2 cm	218 (75.2)	17 (56.7)	0.029*
≥ 2 cm	72 (24.8)	13 (43.3)	
Shape			
Round, oval	264 (91)	24 (80)	0.099†
Irregular	26 (9)	6 (20)	
Growth orientation			
Parallel	285 (98.3)	29 (96.7)	0.449†
Nonparallel	5 (1.7)	1 (3.3)	
Margin			
Circumscribed	272 (93.8)	26 (86.7)	0.138†
Indistinct	18 (6.2)	4 (13.3)	
Contour			
Smooth, lobulated	221 (76.2)	13 (43.3)	<0.001*
Angular	69 (23.8)	17 (56.7)	
Acoustic shadowing	4 (1.4)	2 (6.7)	0.101†
Microcalcification	27 (9.3)	8 (26.7)	0.009†
Echogenicity			
Anechoic-Hyperechoic	3 (1)	0 (0)	0.020^
İsoechoic-Hypoechoic	221(76.2)	16 (53.3)	
Complex	66 (22.8)	14 (46.7)	
Presence of architectural distortion	1 (0.3)	1 (3.3)	0.179†
Presence of duct ectasia	89 (30.7)	1 (3.3)	0.002*

*: Pearson Chi-Square test, n (%), †: Fisher's Exact test, ^: Likelihood ratio test n (%).

characteristics was higher than that of benign lesions (46.7% vs 22.8%). Ductal ectasia was present in 30.7% of benign lesions and 3.3% of malignant lesions. A greater percentage of malignant lesions had an irregular shape compared with benign lesions (20% vs 9%). In addition, the percentage of malignant lesions with ill-defined margins was greater than that of benign lesions (13.3% vs. 6.2%).

No significant difference was found between the lesions' pathological diagnosis and the patients GS (p= 0.900). The GS showed a low risk in 83.3% and 83.4% of patients with malignant and benign lesions, respectively (Table 3). In addition, our study showed that the GS could not predict cancer in BI-RADS 4A lesions (AUC (95% confidence) = 0.505 (0.396-0.613); p= 0.934)

An analysis of the features of the Gail model revealed that there was no significant difference between the age of menarche (p= 0.130), age at first live birth (p= 0.052), presence of a first-degree relative with breast cancer (p= 0.584), and a history of breast biopsy (p= 0.652) and the pathological diagnosis (Table 3).

DISCUSSION

We showed that the use of GS had no effect on the diagnosis of BCs in the BI-RADS 4A category.

Some parameters used in the radiological evaluation of the breast lesions indicate whether a lesion is benign or malignant. These parameters are lesion shape, orientation, contours, margins, acoustic shadowing, microcalcification content, echogenicity, structural distortion, and the presence of ductal ectasia (11-13). The generally accepted opinion is that biopsy should be performed in this sub-class that possesses a malignancy potential of 2-10% (14). In accordance with the literature, our series showed a malignancy rate of 9.4%.

Niu et al. showed that, irregular lesion margins, ill-defined lesion contours, and microcalcification content on ultrasonography were related to a malignant diagnosis (13). A study reported in 2006 by Levy et al. stressed that the change of the normal pattern of seven parameters was particularly related to a malignant diagnosis. These were lesion shape, orientation, margins, con-

Table 3. Distribution of the Gail scores and parameters by pathological diagnosis

	Benign n (%)	Malign n (%)	p
Gail score			
High risk	239 (82.4)	25 (83.3)	0.900*
Low risk	51 (17.6)	5 (16.7)	
Age at menarche, years			
<12	33 (11.4)	3 (10)	0.130*
12-13	173 (59.6)	13 (43.3)	
>13	84 (29)	14 (46.7)	
Age at first live birth, years			
Nulliparous	79 (27.2)	4 (13.3)	0.052*
<20	22 (7.6)	3 (10)	
20-24	104 (35.9)	13 (43.3)	
25-29	52 (17.9)	10 (33.3)	
≥30	33 (11.4)	0 (0)	
First-degree relatives with breast cancer			
0	231 (79.7)	26 (86.7)	0.584^
1	49 (16.9)	3 (10)	
≥2	10 (3.4)	1 (3.3)	
Number of biopsies			
0	243 (83.8)	26 (86.7)	0.652^
1	43 (14.8)	4 (13.3)	
>1	4 (1.4)	0 (0)	

*: Pearson Chi-Square test; n(%), ^: Likelihood ratio test, n (%).

tours, internal echogenicity, posterior acoustic characteristics, and structural distortion (14). According to our study, significant differences were found only between the lesions' margins, microcalcification content, echogenicity, presence of ductal ectasia regarding the lesions' pathological diagnosis. The presence of more than 3 lobulations indicates the distortion of the normal anatomic structure and an irregular shape. Malignant lesions in our case series more commonly had an irregular shape although this difference wasn't statistical significance. Although benign lesions are generally reported to be oriented parallel to the skin, it has been also shown that a large proportion of malignant lesions have a parallel orientation to the skin (15). Our study found that a large proportion of lesions of both groups were oriented parallel to the skin. When lesion margins are concerned, a clear transition takes place between a benign lesion and the surrounding tissue. However, as a lesion's structure is distorted, its margins may appear ill-defined. Apart from malignancy, extremely dense or extremely fatty breasts may lead to erroneous conclusions about lesion margins (14). Although we didn't detect any significant difference, we showed that a greater proportion of malignant lesions had indistinct margins. Although acoustic shadowing is a sign indicating a lesion's malignant behavior, benign lesions may also develop this feature as they develop fibrosis and calcification over time (16). Our series did not find any significant difference between malignant and benign lesions in terms of acoustic shadowing. Considering structural distortion, it has been observed that a lesion may show shrinkage or thickening due to compression and infiltration of the surrounding tissues (14). In our series, there was only one structural distortion in each group.

The Gail model was developed in 1989 by Gail and colleagues (10). According to this score, the average chance of a 60-year-old patient developing BC within five years is 1.7%, which was determined as the cut-off level between high-risk and low-risk categories (7,9,17). According to our hypothesis, GM, which is a clinical scoring system, can identify patients at high risk for BC, it may contribute to the diagnosis of breast cancer in BIRADS 4A patients by combining this risk scoring with radiological features. The reason why we chose BIRADS 4A lesions in this study is that although the malignancy rate is very low in these lesions, biopsy is required. Gao et al. showed that the GM increased the diagnostic power of the BI-RADS classification for BC (10). In this study, it was stated that BIRADS scoring with GM significantly contributed to the positive predictive value and accuracy in the

diagnosis of breast cancer, especially in BIRADS 4B lesions. In our series, GM did not affect the diagnosis of the BI-RADS 4A lesions. The fact that the malignancy rate of BIRADS 4A lesions is only in the range of 2-10% and patients applied to our center not only for treatment but also for screening, resulted in a relatively small number of patients diagnosed with BC. To our opinion, this discrepancy results from the fact that this study was conducted at cancer centers and the study population had a greater BC risk than the general population. In addition, the fact that GM gave more accurate results in women over the age of 65 and the mean age of women in our study was less than 65 may have affected the results of the study.

The small number of patients with BC may be considered a limitation of our study. The number of patients with BC could be increased and more effective results could be obtained. Furthermore, a radiological evaluation performed by the same team in a prospectively designed study can increase its accuracy rate.

CONCLUSION

In conclusion, although the use of GM is recommended in clinical practice, our results suggest that it does not contribute to the diagnosis of BC, especially in patients with BI-RADS 4A lesions.

Ethics Committee Approval: This study approval was obtained form Başkent University Medicine and Health Sciences Research Committee (Decision No: KA 21/107, Date: 16.03.2021).

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REFERENCES

1. *Siegel RL, Miller KD, Fuchs HE, Jemal A. Cancer statistics, 2021. CA Cancer J Clin 2021; 71(1): 7-33.*
2. *Yu Teng-Fei, He W, Gan Cong-Gui, Zhao Ming-Chang, Zhu Qiang, Zhang W, et al. Deep learning applied to two-dimensional color Doppler flow imaging ultrasound images significantly improves diagnostic performance in the classification of breast masses: A multicenter study. Chin Med J (Engl) 2021; 134(4): 415-24.*
3. *Schönenberger C, Hejduk P, Ciritsis A, Marcon M, Rossi C, Boss A. Classification of mammographic breast microcalcifications using a deep convolutional neural network: A BI-RADS-Based Approach. Invest Radiol 2021; 56(4): 224-31.*
4. *Wang Xin-Yi, Cui Li-Gang, Feng J, Chen W. Artificial intelligence for breast ultrasound: An adjunct tool to reduce excessive lesion biopsy. Eur J Radiol 2021; 138: 109624.*
5. *Davis J, Liang J, Roh A, Kittrell L, Petterson M, Winton L, et al. Use of breast imaging-reporting and data system (BI-RADS) ultrasound classification in pediatric and adolescent patients overestimates likelihood of malignancy. J Pediatr Surg 2021; 56(5): 1000-3.*
6. *Brinton LA, Brown SL, Colton T, Burich MC, Lubin J. Characteristics of a population of women with breast implants compared with women seeking other types of plastic surgery. Plast Reconstr Surg 2000; 105(3): 919-27.*
7. *Gail MH, Brinton LA, Byar DP, Corle DK, Green SB, Schairer C, et al. Projecting individualized probabilities of developing breast cancer for white females who are being examined annually. J Natl Cancer Inst 1989; 81(24): 1879-86.*
8. *Champion VL. Instrument refinement for breast cancer screening behaviors. Nurs Res 1993; 42(3): 139-43.*
9. *Saleh B, Elhawary MA, Mohamed ME, Ali IN, El Zayat MS, Mohamed H. Gail model utilization in predicting breast cancer risk in Egyptian women: A cross-sectional study. Breast Cancer Res Treat 2021; 188(3): 749-58*
10. *Gao Lu-Ying, Gu Y, Tian Jia-Wei, Ran Hai-Tao, Ren Wei-Dong, Chang C, et al. Gail model improves the diagnostic performance of the fifth edition of ultrasound BI-RADS for predicting breast cancer: A Multicenter prospective study. Acad Radiol 2020; S1076-6332(20)30678-4.*
11. *Stines J. BI-RADS: use in the French radiologic community. How to overcome with some difficulties. Eur J Radiol 2007; 61(2): 224-34.*
12. *Raza S, Chikarmane SA, Neilsen SS, Zorn LM, Birdwell RL. BI-RADS 3, 4, and 5 lesions: Value of US in management-follow-up and outcome. Radiology 2008; 248(3): 773-81.*
13. *Niu S, Huang J, Li J, Liu X, Wang D, Zhang R, et al. Application of ultrasound artificial intelligence in the differential diagnosis between benign and malignant breast lesions of BI-RADS 4A. BMC Cancer 2020; 20(1): 959.*
14. *Levy L, Suissa M, Chiche JF, Teman G, Martin B. BIRADS ultrasonography. Eur J Radiol 2007; 61(2): 202-11.*
15. *Stavros AT, Thickman D, Rapp CL, Dennis MA, Parker SH, Sisney GA. Solid breast nodules: use of sonography to distinguish between benign and malignant lesions. Radiology 1995; 196(1): 123-34.*
16. *Baez E, Strathmann K, Vetter M, Madjar H, Hackelöer B-J. Likelihood of malignancy in breast lesions characterised by ultrasound with a combined diagnostic score. Ultrasound Med Biol 2005; 31(2): 179-84.*
17. *Rostami S, Rafei A, Damghanian M, Khakbazan Z, Maleki F, Zendehdel K. Discriminatory accuracy of the gail model for breast cancer risk assessment among iranian women. Iran J Public Health 2020; 49(11): 2205-13.*

ORİJİNAL ÇALIŞMA-ÖZET
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BI-RADS 4A olgularında Gail modeli kullanımının meme kanseri teşhisine etkisi

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ÖZET

Giriş ve Amaç: BI-RADS sınıflama sistemi ve Gail modeli meme kanseri tanısına katkı sağlayan iki skorlama sistemidir. Bu çalışmanın amacı, radyolojik olarak BI-RADS 4A olarak kategorize edilen meme lezyonlarının tanısına Gail modelin katkısını belirlemekti.

Gereç ve Yöntem: Ocak 2011 ve Aralık 2020 arasında lezyonları BI-RADS 4A olarak kategorize edilmiş 320 hastanın tıbbi dosyaları retrospektif olarak incelendi. Meme lezyonlarının radyolojik parametreleri ve Gail modele göre klinik parametreleri toplandı. Malign BI-RADS 4A lezyonları ile radyolojik ve klinik parametreler arasındaki ilişki değerlendirildi. Ayrıca, malign BI-RADS 4A lezyonlarında Gail modelin tanıya etkisi de çalışıldı.

Bulgular: Radyolojik faktörler içerisinde lezyon boyutu, kontür, mikrokalsifikasyon içeriği, ekojenite ve patolojik tanı bakımından ektazi varlığı arasında anlamlı farklılıklar vardı ($p< 0,05$). Lezyonların patolojik tanıları ve hastaların Gail skorları arasında anlamlı bir fark bulunmadı ($p> 0,05$). Gail modelin niteliklerinin analizinde ilk adet yaşı, ilk canlı doğumdaki yaş, meme kanseri olan birinci derece akraba varlığı ile meme biyopsisi ve patolojik tanı arasında anlamlı bir fark bulunmadı ($p> 0,05$).

Sonuç: Sonuç olarak, Gail modeli özellikle BI-RADS 4A lezyonlara sahip hastalarda tanıya katkı sağlamamaktadır.

Anahtar Kelimeler: Meme kanseri, meme ultrasonu, meme tümörleri

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CASE REPORT
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Rhabdomyolysis as a rare complication of bariatric surgery

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ABSTRACT

Rhabdomyolysis after bariatric surgery is a quite rare occurrence with low recognition. Due to the breakdown of striated muscle fibers, creatine kinase and myoglobin are released into systemic circulation with variable effects on renal filtering functions. Herein, it was aimed to present a patient who developed rhabdomyolysis following revision bariatric surgery. This 34-year-old male patient was admitted for bariatric surgery. He had had a gastric band surgery approximately six years ago, with regain of weight starting one year after surgery gradually reaching the previous weight level. Consequently, the gastric band had been removed with open surgery three years ago. The patient had a body mass index of 69 kg/m^2 as well as an incisional hernia due to previous surgery. Although initially laparoscopic sleeve gastrectomy was planned, a switch to open surgery was made due to the presence of diffuse intra-abdominal adhesions and giant incisional hernia precluding laparoscopic intervention. The total duration of surgery was 420 minutes. Postoperative laboratory work-up showed elevated blood creatine kinase (25837 U/L). Upon the failure of fluid replacement and diuretics, hemodialysis was initiated at postoperative day 1. Despite daily sessions of hemodialysis, acidosis did not improve, his general status worsened and the patient died on postoperative day 14. Rhabdomyolysis is a severe and potentially life-threatening complication of bariatric surgery. Its severity may vary from asymptomatic elevations of creatine kinase to death. Postoperative creatine kinase levels should be routinely checked in high-risk patients as a practical and inexpensive laboratory modality for early diagnosis.

Keywords: Sleeve gastrectomy, rhabdomyolysis, complication

INTRODUCTION

In contrast with other well-known complications, rhabdomyolysis (RML) is a rare and under-recognized complication of bariatric surgery (1). The breakdown of striated muscle fibers leads to the release of creatine kinase and myoglobin into systemic circulation with a consequent impact on renal filtering functions. Depending on the severity of the insult, its severity may vary from asymptomatic cases to those with life-threatening hypovolemia, electrolyte disturbances, coagulopathy, and renal failure (2). Since acute renal failure associated with the breakdown of muscle fibers has a mortality of approximately 20% (3), early diagnosis is of utmost clinical importance. Herein, it was aimed to present a patient who developed rhabdomyolysis after bariatric revision surgery.

CASE REPORT

This 34-year-old male patient was admitted for bariatric surgery. He had had a gastric band surgery approximately six years ago, with regain of weight starting one year after surgery gradually reaching the previous weight level. Subsequently, the gastric band had been removed with open surgery three years ago. The patient had a body mass index of 69 kg/m^2 as well as an incisional hernia due to previous surgery. Although initially laparoscopic sleeve gastrectomy was planned, a switch to open surgery was made due to the presence of diffuse intra-abdominal adhesions and giant incisional hernia precluding laparoscopic intervention. The total duration of surgery was 420 minutes. Postoperative laboratory work-up showed elevated blood creatine kinase (25837 U/L). Upon the failure of fluid replacement and diuretics, hemodialysis was initiated on postoperative day 1. Despite daily sessions of hemodialysis, acidosis did not improve, his general status worsened, and the patient died on postoperative day 14.

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DISCUSSION

The first description of rhabdomyolysis (RML) dates back to the bombing of London during the World War II (4). RML may occur after traumatic injury or elective surgical interventions with a variable incidence. For example, while it occurs in %0 to %5 of patients after laparoscopic renal surgery (5), a higher occurrence has been reported following bariatric surgery (6). Risk factors for RML include prolonged surgery, male sex, obesity, and patient position (7). Similarly, duration of surgery longer than four hours or a BMI of >50 kg/m^2 are associated with increased RML risk, just as the case for lithotomy and lateral decubitus positions. Our patient was a 34-year-old male with a history of two previous surgical interventions and a BMI of 69 kg/m^2. Total duration of surgery was 420 minutes. All of these factors placed him in the high-risk category for RML.

A creatine kinase level of greater than 5 times the upper limit of normal or >1000 IU/L is suggestive of RML diagnosis. When creatine kinase levels exceed 5000 IU/L without myocardial or cranial infarction, severe muscle injury is highly likely (8). From a clinical point of view, patients may experience severe pain in the gluteal area, low back, or shoulders, which are usually in direct contact with the surgical table during the operation. Adequate fluid replacement should be initiated as soon as the diagnosis is made at a rate of 200 to 300 ml per hour and for a total daily dose of 10 to 12 L (9). Additional fluid replacement intraoperatively has no effect in the prevention of the development of RML and on the course of acute renal failure. However, early initiation of fluid replacement within six hours and subsequent diuresis may assist in maintaining renal functions and preventing mortality (10).

CONCLUSION

Rhabdomyolysis represents a potentially life-threatening complication of bariatric surgery. It may exhibit a variable severity from asymptomatic clinical course to death. Creatine kinase measurement represents an inexpensive and practical biochemical test that should be routinely checked postoperatively in high-risk patients.

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REFERENCES

1. *Collier B, Goreja MA, Duke 3rd BE. Postoperative rhabdomyolysis with bariatric surgery. Obes Surg 2003; 13(6): 941-3.*
2. *Singh D, Chander V, Chopra K. Rhabdomyolysis. Methods Find Exp Clin Pharmacol 2005; 27(1): 39-48.*
3. *Holt SG, Moore KP. Pathogenesis and treatment of renal dysfunction in rhabdomyolysis. Intensive Care Med 2001; 27(5): 803-11.*
4. *Bywaters EGL, Beall D. Crush injuries with impairment of renal function. BMJ. 1941; 1: 427.*
5. *Glassman DT, Merriam WG, Trabulsi EJ, Byrne D, Gomella L. Rhabdomyolysis after laparoscopic nephrectomy. JSLS 2007; 11(4): 432-7.*
6. *Carvalho DAD, Valezi AC, de Brito EM, de Souza JCL, Masson AC, Matsuo T. Rhabdomyolysis after bariatric surgery. Obes Surg 2006; 16(6): 740-4.*
7. *Biswas S, Gnanasekaran I, Ivatury RR, Simon R, Patel AN. Exaggerated lithotomy position-related rhabdomyolysis. Am Surg 1997; 63: 361–4.*
8. *Ward MM. Factors predictive of acute renal failure in rhabdomyolysis. Arch Intern Med 1988; 148(7): 1553–7.*
9. *Better OS, Abassi ZA. Early fluid resuscitation in patients with rhabdomyolysis. Nat Rev Nephrol 2011; 7(7): 416–22.*
10. *Ron D, Taitelman U, Michaelson M, Bar-Joseph G, Bursztein S, Better OS. Prevention of acute renal failure in traumatic rhabdomyolysis. Arch Intern Med 1984; 144: 277-80.*

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Bariatrik cerrahinin nadir bir komplikasyonu rabdomiyoliz

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ÖZET

Rabdomiyoliz, bariatrik cerrahi sonrası oldukça az görülen ve atlanan bir durumdur. Çizgili kas liflerinin yıkımı nedeniyle, dolaşıma, böbreğin süzme fonksiyonlarına çeşitli etkileri olan kreatin kinaz ve myoglobin salınır. Burada, revizyonel bariatrik cerrahi sonrası rabdomiyoliz gelişen bir hastayı sunmaktayız. Otuz dört yaşında erkek hasta bariatrik cerrahi için başvurdu. Altı yıl önce mide bandı takıldığı ve ameliyattan bir yıl sonra kilo almaya başlayarak zamanla eski kilosuna ulaştığı öğrenildi. İlk ameliyattan üç yıl sonra mide bandının çıkartıldığı öğrenildi. Vücut kitle indeksi 69 kg/m^2 idi ve geçirilmiş cerrahiye bağlı insizyonel hernisi vardı. Başlangıçta laparoskopik cerrahi planlanmakla birlikte, yaygın karın içi yapışıklıklar ve dev laparoskopik girişimi engelleyen dev insizyonel herni nedeniyle açığa geçildi. Toplam ameliyat süresi 420 dakikaydı. Ameliyat sonrası bakılan değerlerden kreatin kinaz düzeyi yüksekti (25837 U/L). Sıvı replasmanı ve diüretiklere cevap alınmaması üzerine ameliyat sonrası 1. gün hemodiyalize başlandı. Günlük hemodiyaliz uygulamalarına rağmen asidozu düzelmedi ve genel durumu daha da kötüleşen hasta ameliyat sonrası 14. gün kaybedildi. Rabdomiyoliz, bariatrik cerrahinin ciddi ve potansiyel olarak yaşamı tehdit eden bir komplikasyonudur. Ciddiyeti, asemptomatik kreatin kinaz yükselmelerinden ölüme kadar değişebilir. Erken tanı için, pratik ve pahalı olmayan bir test olan kan kreatin kinaz düzeylerine rutin olarak bakılmalıdır.

Anahtar Kelimeler: Sleeve gastrektomi, rabdomiyoliz, komplikasyon

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CASE REPORT
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Is appendectomy always adequate treatment?: Clinical manifestations of isolated actinomycosis in appendix

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ABSTRACT

Isolated appendiceal actinomycosis is a rare chronic progressive suppurative infection. Causative agent in humans is gram-positive saprophytic anaerobic bacteria, *Actinomyces Israelii*. Herein, it was aimed to present a case of acute appendicitis that developed in a 54-year-old female due to isolated appendiceal actinomycosis. Diagnosis of appendiceal actinomycosis causing acute appendicitis is generally performed postoperatively histopathologically, and appendectomy alone is not sufficient in treatment. It is an important point that should be considered by clinicians that definitive treatment of the infection is possible by appropriate antibiotic use.

Keywords: Appendicitis, actinomycosis, laparoscopic appendectomy, actinomyces

INTRODUCTION

Acute appendicitis, with its 7.6% incidence in society (8.6% for males and 6.7% for females) is the most commonly seen gastrointestinal surgical pathology necessitating emergency surgery (1). Acute appendicitis develops by the obstruction of the appendiceal lumen. Increased luminal pressure and impaired circulation causes bacterial propagation and increased mucus and induces inflammatory response of the physiopathological process. The most frequent causes of obstruction are lymphoid hyperplasia, fecaloid, foreign materials, tumors and parasites. Appendiceal actinomycosis is one of the rare causes of acute appendicitis.

Real acute actinomyces infection of the appendix can only be differentiated from ileocecal actinomycosis by actinomyces granules that are detected in the appendiceal lumen (2). Real acute actinomyces infection of the appendix is extremely rare (2). Accurate diagnosis in these cases is clinically important since insufficient treatment may result in risks of long-lasting disease, frequently seen local dissemination and metastatic abscess. On the other hand, chronic suppurative appendicitis is the clinical form that develops subsequent to acute clinical picture (2).

Herein, it was aimed to present a case of acute phlegmonous appendicitis caused by localized actinomyces infection alone.

CASE REPORT

A 54-year-old female patient presented to our hospital with a two-day history of complaining of right lower abdominal pain, nausea and vomiting. Her medical history was unremarkable. Physical examination of her abdomen revealed rebound tenderness over the lower-right abdominal quadrant, no mass was palpable. There was a mild fever 37.9°C. Laboratory findings were normal, except for white blood cell count (WBC) 14500/mm^3 and C-reactive protein level of 6.5 mg/L. Abdominal tomography without contrast enhancement revealed an enlarged proximal segment of the appendix (11 mm) and an increased wall thickness. Hyperdense material was detected compatible with appendicolith in the lumen. CT findings were compatible with acute appendicitis (Figure 1). Surgery was planned with the

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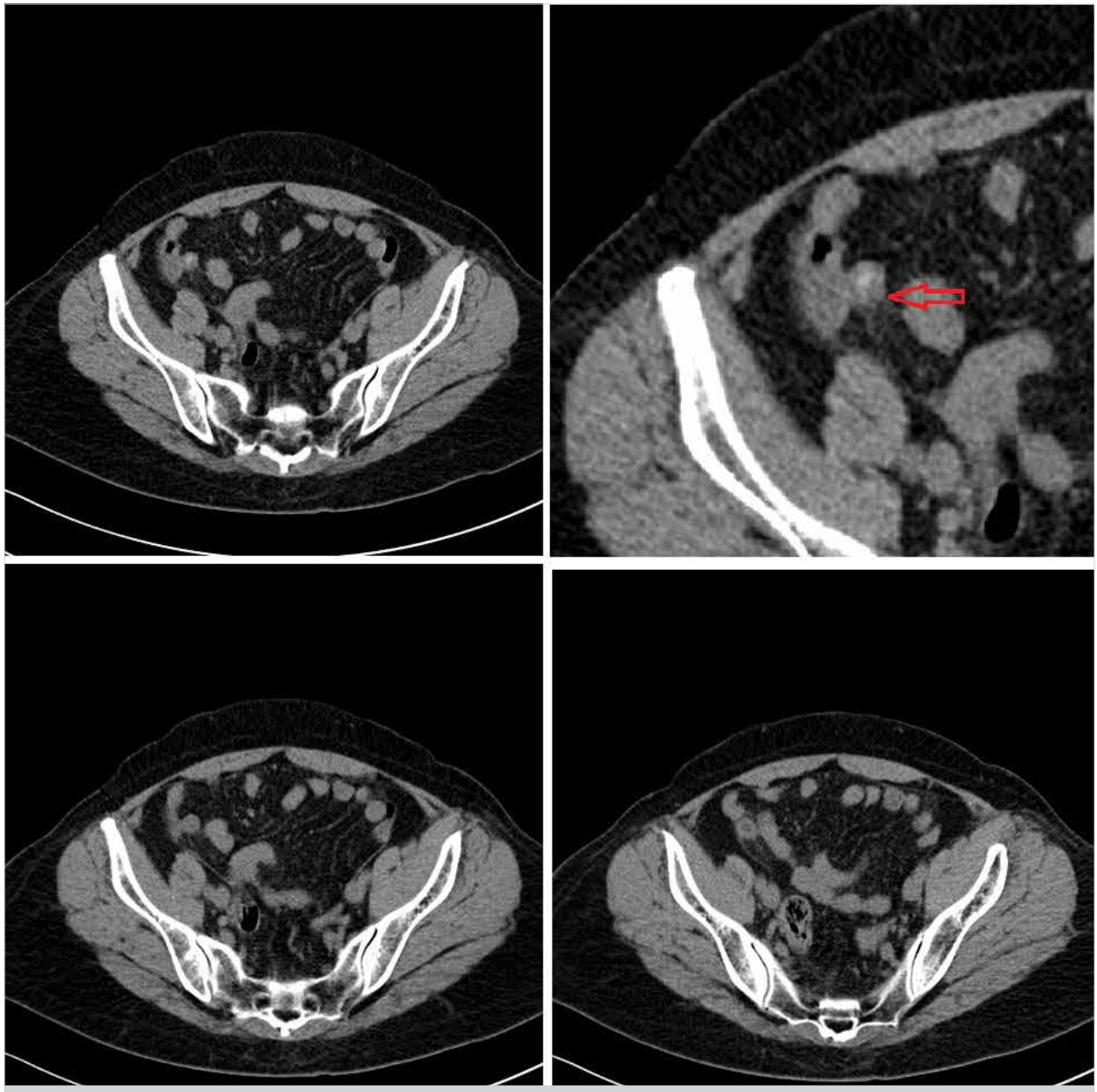

Figure 1. Abdominal CT images: An enlarged proximal segment of appendix (11 mm.), increased wall thickness, hyperdense material compatible with appendicolith in the lumen.

suspect of acute appendicitis. Laparoscopic appendectomy was performed. The vermiform appendix 45 mm×12 mm was found. Although serosal layer of the appendix and mesoappendix were surrounded by fibrotic tissue, exploration of the ileocecal region was normal (Figure 2). The patient recovered well postoperatively and was discharged from hospital on postoperative day 1. The diagnosis of actinomycosis of the appendix was established histologically. Microscopic examination revealed acute phlegmonous appendicitis and actinomyces sulfur granules scattered in the purulent exudate in the appendiceal lumen (H&E x 2). Microscopic x10 magnification revealed typical sulfur granule in lesion (H&E x 10) (Figure 3). Colonies of actinomyces were seen intramurally and intraluminally with Grocott's stain and PAS stain (Figure 4). After definitive diagnosis of appendiceal actinomycosis, the patient was readmitted to the hospital and treated with high doses penicillin G IV for two weeks. Then amoxicillin (oral 2 gm/day for six months) was pre-

Figure 2. Laparoscopic view: Serosal layer of appendix and mesoappendix were surrounded by fibrotic tissue.

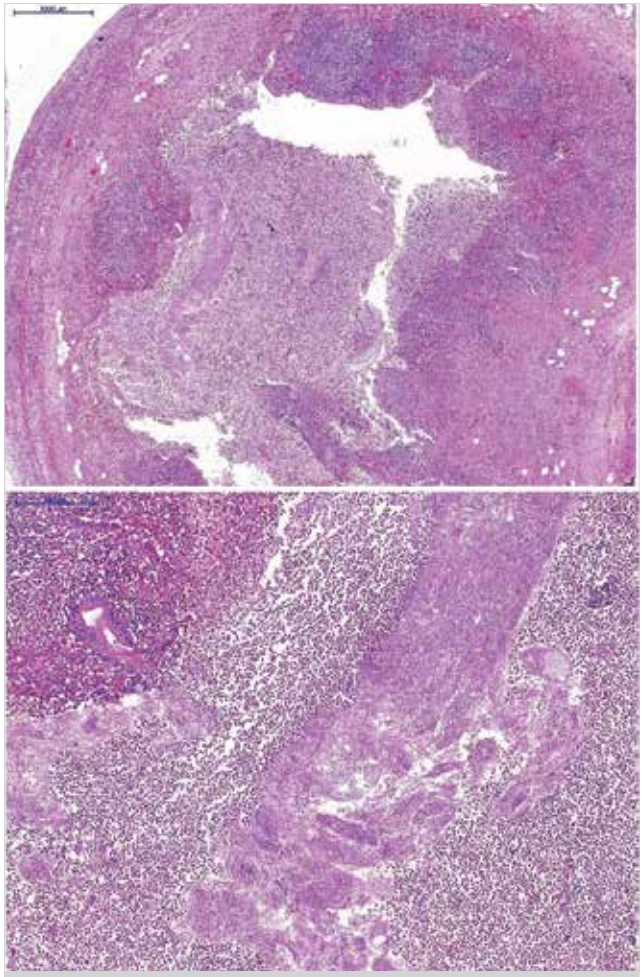

Figure 3. Diagnosis of actinomycosis was established with the presence of sulphur granules microscopically. Acute phlegmonous appendicitis. Actinomyces sulfur granules scattered in the purulent exudate in the appendiceal lumen (H&E x 2). Actinomyces sulfur granules (H&E x 10).

scribed for completing the treatment. Five years have passed and no clinical recurrence is mentioned.

A signed written informed consent was obtained from the patient who participated in this case.

DISCUSSION

Actinomycosis is subacute-chronic bacterial infection affecting soft tissues and internal organs of the body. The most common pathogen that causes actinomycosis in humans is *Actinomyces Israelii* (3,4). This micro-organism can be frequently found in normal human mouth flora, and less commonly in lower gastrointestinal tract and female genital tract as well (4). Although *Actinomyces Israelii* is a non-pathogenic bacterium, mucosal injuries that cause disruption of the mucosal barrier allow the microorganisms to reach deep planes, resulting in actinomycosis infections in the human. The infection leads to formation of granuloma and abscess, followed by consequent healing of sinuses and drained fistulae. Involvement of distant organs is possible via hematogenous metastasis at any stage of the disease (2). The disease may spread via venous route, leading to formation of metastatic abscesses in the liver. Actinomycosis cases among humans are seen in three forms; namely the cervicofacial form, which is the most frequent form observed in 50-70% of cases, and less frequently, the thoracic and abdominopelvic forms observed in 15-20% and 10-20% of cases, respectively (3).

The disease is often seen in populations with low socio-economic level, and in individuals with bad oral hygiene aged between 20-50 years. Actinomycosis infection is more prevalent among men, with a male:female ratio of 3:1, whereas the pelvic form is more frequent among women (3). The cause is often the prolonged use of intrauterine contraceptive devices (IUCD), which causes chronic injury that allows bacteria to penetrate the mucosal barrier and reach deep tissues (5,6). Abdominal form of the disease is typically associated with history of previous abdominal surgery. Pathologies that disrupt the integrity of the gastrointestinal mucosa, such as perforated appendicitis, perforated diverticulitis, endoscopic procedures, trauma, Crohn's disease, and intestinal perforation due to ingestion of bone or fishbone are predisposing factors that play role in the etiology (7).

Other known predisposing systemic factors include immunosuppression, malnutrition, and AIDS. Our case did not have any known local or systemic predisposing factor such as history of previous abdominal surgery.

Abdominopelvic actinomycosis can be clinically manifested with fistula, sinus, inflammatory pseudotumor or abscess, and it can often mimic other diseases clinically. The affected organ is surrounded by dense fibrous tissue, and the disease can mimic malignant diseases due to this mass appearance (3). Isolated actinomycosis of the appendix has non-specific clinical, laborato-

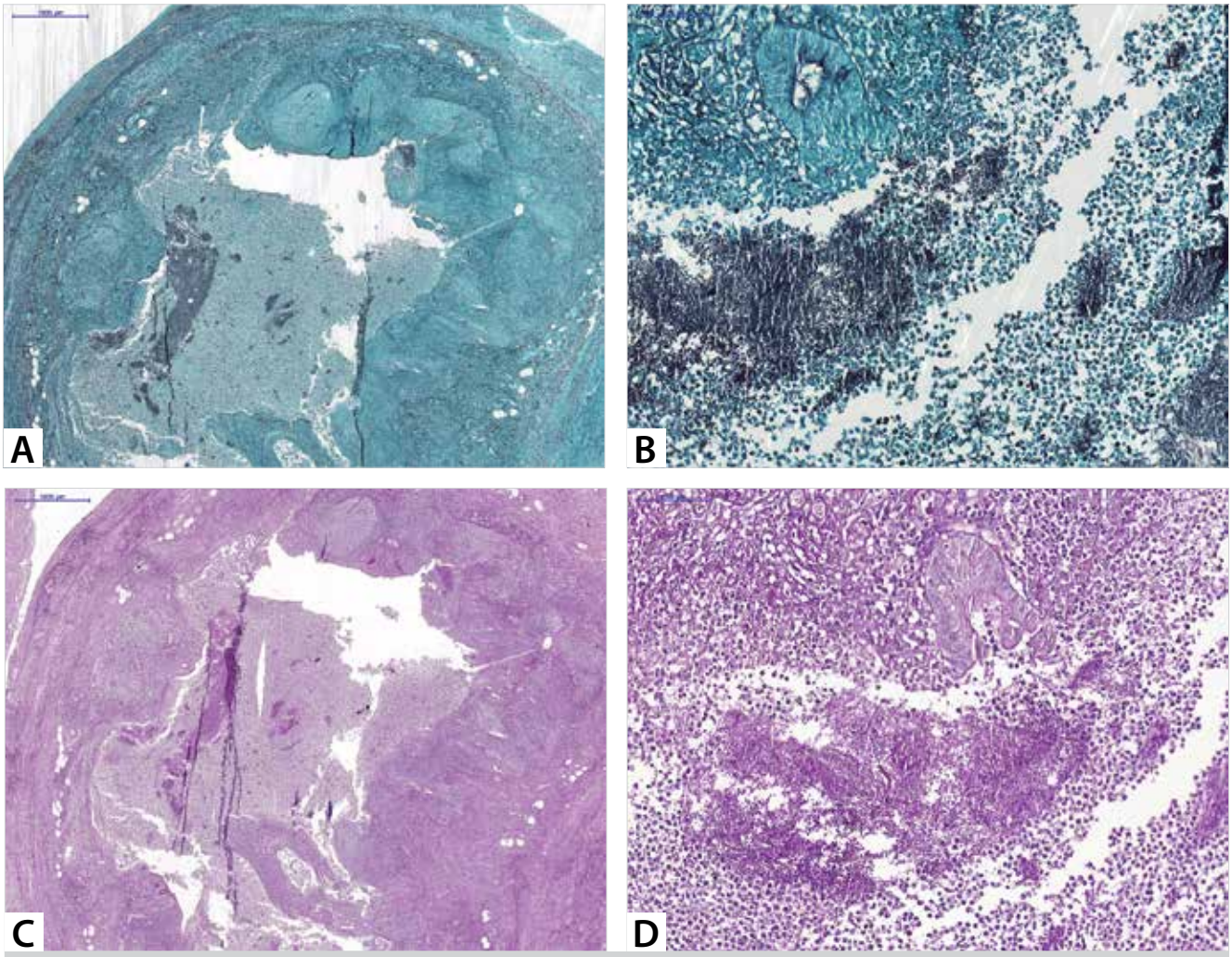

Figure 4. Colonies of actinomyces (stained black with Grocott's stain) were seen intramurally and intraluminally. **A.** Actinomyces sulfur granules positive with Grocott methenamine silver stain (x2). **B.** Grocott methenamine silver stain (x20). **C.** Actinomyces sulfur granules positive with PAS stain (x2). **D.** PAS stain (x20).

ry and radiological findings, and therefore, the disease mimicking acute appendicitis is usually very hard and often impossible to diagnose preoperatively (8). Radiological investigations are often nondiagnostic especially when there is no mass lesion or abscess concurrent with the diagnosis of acute appendicitis as in our case.

According to the literature, the diagnosis of abdominal actinomycosis could be made preoperatively in only 10% of the cases (6,8,9). Upon suspicion of the disease, the diagnosis can be made with microscopical examination of the fine-needle aspiration material. However, the diagnosis is often made with intraoperative or post-operative histopathological examination. Histologically, the microorganism forms actinomycotic granules (sulphur granules) (10). These are made of irregular round bacterial aggregations surrounded by eosinophilic material, and they are typical for the disease. In our case, the diagnosis was possible by observation of the typical sulphur granules detected during histopathological examination.

Studies report over 90% success rate in treatment of abdominal actinomycosis infections when treated with a combination of antibiotics and surgical resection (6). Preferred antibiotic treatment includes high dose crystalline penicillin G (2-4 weeks) and consequent long-term (6-12 months) oral penicillin or semi-synthetic penicillin derivatives (6,7).

CONCLUSION

Appendiceal actinomycosis is a rare pathology that should be considered by clinicians among the causes of acute appendicitis. Accurate diagnosis is the key to treatment success. Control and cure of the infection is only possible with long-term penicillin treatment after appendectomy.

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Conflict of Interest: The authors have no conflicts of interest to declare.

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REFERENCES

1. *Kavic SM. Laparoscopic appendectomy. Wetter PA (ed). Prevention and Management of Laparoendoscopic Surgical Complications. 3th ed. Florida: Society of Laparoendoscopic Surgeons; 2010. pp. 239-48.*
2. *Day DW, Jass JR, Price AB, Shepherd NA, Sloan JM, Talbot NJ, et al, (eds). Morson and Dawson's gastrointestinal pathology. 4th ed. New Jersey: Blackwell Science; 2003.*
3. *Triantopoulou C, Van der Molen A, Van Es A, Giannila M. Abdominopelvic actinomycosis: spectrum of imaging findings and common mimickers. Acta Radiol Short Rep 2014; 3(2): 1-5.*
4. *Karakuş E, Mambet E, Azılı MN, Gülhan B, Tiryaki T, Tezer H. Actinomycosis of the appendix in childhood-an unusual cause of appendicitis. APSP J Case Rep 2014; 5(3): 26.*
5. *Radha P, Condon AF, Yong Kuei TL. Case report of pelvic actinomycosis presenting as a complex pelvic mass. J Preg Child Health 2015; 2(1): 125.*
6. *Castro LL, Cabral MMDA, Andrade RFM, Buzatti KCLR, Silva RG. Actinomycosis mimicking colonic neoplasia. J Coloproctol 2012; 32(3): 312-5.*
7. *Maternini M, Saucy F, Sandmeier D, Vuilleumier H. Simple appendicitis? Can J Surg 2008; 51(3): E54-55.*
8. *Bittencourt JA, Andreis EL, Lima EL, Dorn DE, Muller V. Actinomycosis simulating malignant large bowel obstruction. Braz J Infect Dis 2004; 8(2): 186-9.*
9. *Sumer Y, Yılmaz B, Emre B, Ugur C. Abdominal mass secondary to actinomyces infection: An unusual presentation and its treatment. J Postgrad Med 2004; 50(2): 115-7.*
10. *Paritsky M, Cherepnin L. Abdominal actinomycosis mimicking chronic appendicitis. J Clin Case Rep 2012; 2: 14.*

OLGU SUNUMU-ÖZET
Turk J Surg 2021; 37 (4): 403-407

Apendektomi her zaman yeterli tedavi midir? İzole apendiks aktinomikozunun klinik bulguları

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ÖZET

İzole Apendiks aktinomikozu seyrek rastlanan kronik progresif süpüratif bir enfeksiyondur. İnsanda etken gram-pozitif saprofitik anaerobik bakteri olan *Actinomyces Israelii*'dir. Bu makalede biz 54 yaşında kadın hastada izole apendiks aktinomikozuna bağlı gelişen akut apandisit vakasını sunuyoruz. Akut apandisite neden olan apendiks aktinomikozu tanısı genellikle ameliyat sonrası histopatolojik olarak konulabilmekte ve tedavide yanlız apendektomi yeterli olmamaktadır. Enfeksiyonun kesin tedavisi için uzun süreli, uygun antibiyotik kullanımı klinisyenlerin hatırında tutması gereken bir noktadır.

Anahtar Kelimeler: Apandisit, aktinomikoz, laparoskopik apendektomi, aktinomiçes

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CASE SERIES
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Gastrointestinal tract schwannomas and brief review of literature

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ABSTRACT

Schwannomas originating from Schwann cells arise from the peripheral nerve sheath and are slow-growing, benign tumors that originate mostly from the mesenchyme. It appears equally in both sexes. Schwannomas are often seen in the 3rd and 5th decades of life. Schwannomas can be seen everywhere where peripheral nerves are seen. Gastrointestinal schwannomas constitute 2-6% of all submucosal masses, and the stomach is the most common region (60-70%). Endoscopic Ultrasound (EUS)-guided sampling of gastrointestinal submucosal lesions has made it possible to achieve preoperative differential diagnosis. Patients diagnosed with gastrointestinal schwannomas between January 2005 and December 2017 were included in this study. Three out of six patients were females. Median age was 52.5 (44-76) years. Schwannomas were found in two patients in the gastric region, one patient in the appendiceal region, two patients in the colon and one patient in the perianal region. Primary schwannomas are usually benign. Radical resection with free margin is necessary because of the risk of malignant degeneration; chemo and radiotherapy response is indeterminate, and local recurrence rates are high.

Keywords: Gastrointestinal schwannomas, gastrointestinal submucosal mass, immunohistochemistry

INTRODUCTION

Schwannomas originating from Schwann cells arise from the peripheral nerve sheath and are slow-growing, benign tumors that originate mostly from the mesenchyme.

These tumors could be found wherever peripheral nerves are seen, in the head and neck, spinal cord and extremities according to the order of frequency (1,2).

These tumors are very rare in the gastrointestinal system and in visceral localizations such as mediastinum, retroperitoneum, pelvis, and etc. (3).

Gastrointestinal schwannomas constitute 2-6% of all submucosal masses and the stomach is the most common site (60-70%) (4).

It appears equally in both sexes. Schwannomas are often seen in the 3rd and 5th decades of life (5).

Immunohistochemical examination is necessary for definite diagnosis, and it is difficult to make preoperative diagnosis endoscopically because they are usually covered with smooth mucosa (6).

However, in recent years, endoscopic ultrasound (EUS)-guided sampling of submucosal lesions has made it possible to achieve preoperative differential diagnosis of gastric submucosal tumors (7).

In this study, we aimed to discuss the patients with gastrointestinal schwannomas in light of the current literature.

MATERIAL and METHODS

In this study, patients who underwent operation due to the gastrointestinal mass and were reported as schwannoma in the pathological examination in Istanbul Training and Research Hospital between January 2005 and December 2017 were retrospectively analyzed.

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No diagnosis was obtained in any of the patients in the preoperative period. Preoperative findings were compared with postoperative ones. Surgery, follow-up and recurrence rates of the patients were reviewed in light of the literature.

Local ethics committee approval was obtained from Istanbul Training and Research Hospital for this study. All data were collected from the accessible computer database system of the hospital. Written informed consent was obtained from all patients included in this study. The authors declare that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects".

Statistical Analysis

Statistical analyses were carried out using the Statistical Package for Social Sciences version 15.0 (SPSS for Windows 15.0, Inc, Chicago, IL, USA).

The data were evaluated by descriptive statistical methods (Mean and standard deviation, median).

RESULTS

Three out of six patients were females. Mean age was 52.5 (44-76) years. Schwannoma was found in two patients in the gastric region, one patient in the appendiceal region, two patients in the colon and one patient in the perianal region. Table 1 shows patient demographics and tumor localizations of tumors.

Four out of six patients underwent surgery and two underwent endoscopic polypectomy.

One of the patients with gastric schwannoma was 43 years old and female. Computerized tomography (CT) of the abdomen demonstrated a bulbous mass that infiltrated the stomach corpus, pancreatic corpus and tail and splenic flexure of the colon. Fluid collection was also detected in both pleural spaces and in the pelvic region. Patient's colonoscopy was normal. On endoscopic examination of the upper gastrointestinal tract, ulcer lesions were detected in the posterior wall of the fundus and corpus junction about 2 cm in size. Biopsies from the ulcer site were compatible with gastric ulcer and necrosis and was not diagnostic. In the operation, pancreas and colon-infiltrated mass and ascites were detected in the abdomen originating from the stomach large curvature. The mass was removed from the tissues by applying wedge resection to the stomach wall; and ascite sampling was performed. Pathology of the patient was 6.5×5.5×5.5 cm in size, 2 cm in width on the mucosa and 1.6 cm in depth in the ulcerated area. IHC staining revealed S-100 (+), CD-117 (-), CD-34 (-), SMA (-), and Myosin (-). Ascite material was negative for tumor.

Another patient who was referred to our hospital with dyspeptic complaints was a 43-year-old female. The patient underwent gastroscopy, and a submucosal mass was detected in the middle of the stomach major curvature. Biopsy results of the patient were not diagnostic. The patient underwent surgery with gastrointestinal stromal tumor diagnosis because a submucosal mass was detected in the anterior wall of the stomach corpus about 8 cm in abdominal CT scanning. The mass was resected by wedge resection and sent to frozen, and the resection was expanded, and the procedure was terminated as the surgical margin would be negative. The lesion was an external nodular tumor, 9×7×6.5 cm in size, and IHC staining was as follows; S-100 (+), CD-117 (-), CD-34 (-), Desmin (-), SMA (-) and B catenin (-).

Another patient was a 65-year-old male with schwannoma of the appendix. In the operation, perforated appendicitis and abdominal abscess were detected, and appendectomy was performed. Pathological examination of the specimen revealed 0.7 cm in size with phlegmonous appendicitis, local peritonitis and intramuscular placement at the distal end. IHC staining was as follows; S-100 (+), CD-117 (-), CD-34 (-), SMA (-).

A 44-year-old male patient who had been operated for a perianal fistula had an anterior mass in the distal anal canal localized distant from the fistula region. With fistula surgery, the mass was totally excised. A thick solid mass in 0.6 cm size was found in the border of a 3.5×3×2.5 cm medial hemorrhagic cystic lesion. The findings of IHC staining were as follows; S-100 (+) and SMA (-).

Another patient was a 58-year-old female with colonic schwannoma. Four sessile colon polyps 0.5 cm in diameter were detected in the sigmoid colon on colonoscopy; and polypectomy was performed. Pathologic results showed schwann cell-predominant, infiltrating 0.4 cm nodular formation; and IHC examination revealed S-100 (+), CD-117 (-), CD-34 (-), SMA (-) and Desmin (-).

Table 1. Patient's demographics and tumor localization

Localization	Patient (n)	Age	Gender
Stomach	1	43	F
	1	44	F
Large bowel	1	58	F
	1	72	M
Appendix	1	65	M
Perianal region	1	29	M

F: Female, M: Male.

Another was a 72-year-old male patient with diminutive polyp on the sigmoid colon in the screening colonoscope. Pathologic examination revealed benign mesenchymal tumors of 0.3×0.2×0.1 cm in size composed of stem cells at mucosa; and submucosa and S-100 (+), CD-117 (-), CD-34 (-), SMA and Desmin (-) in IHC examination.

Mean tumor size was 7.25 (6.5-9) cm for the stomach, 0.7 cm for the appendix, 0.6 cm for the distal anal canal, and 0.3 and 0.4 cm for the lesions on the colonic segments.

Follow-up of the patients

Patients were followed up with an annual total body CT scan and upper and lower gastrointestinal endoscopy. Mean follow-up period of the patients was 7.8 (5-12) years, and no recurrence or metastatic lesion was detected.

DISCUSSION

Schwannomas originate from ectoderm and neural sheath. Gastrointestinal tract schwannomas frequently originate from the autonomous nervous system, including Auerbach's plexus and less commonly Meissner's plexus (8,9). Auerbach's plexus originates and grows on the wall and is not pedunculated. Those originating from Meissner's plexus extend the lumen like pedunculated polyps (10). Despite the presence of radiation and hereditary neurofibromatosis in the etiology of peripheral nerve tumors, no such association has been demonstrated in gastrointestinal schwannomas.

Although most mesenchymal tumors of the gastrointestinal tract are GIST, schwannomas constitute 1.4% to 6.3% of mesenchymal tumors and are symptomatic according to the region (7,11).

In order of frequency, stomach (83%), small intestine (12%), colon and rectum (2-6%) are the most common schwannoma localizations in the gastrointestinal tract.Gastric schwannomas constitute approximately 0.2% of all gastric tumors and 4% of benign gastric neoplasms (12,13).

Colon and rectum-involved schwannomas not associated with von-Renklinghausen disease have been reported to be quite rare (2-6%) in the literature (9). Schwannomas are in the retroperitoneal region at a rate of 0.5-5% (14).

The symptoms of lesions change according to their size and location. If located in the stomach, gastric discomfort, hemorrhage or rarely gastric outlet obstruction by luminal or extraluminal effect may cause ileus and associated pain, fever, fatigue.

When localized in the small intestine, the same symptoms may appear with abdominal pain, intussusception, degeneration, ileus; and when localized in the colon and rectum, there may be rectal bleeding or colonic obstruction (15).

Due to submucosal localization, endoscopic biopsies usually result negative (16). In submucosal localization, it causes mucosal erosions and can cause invasion, adhesions and intestinal obstruction of the surrounding tissues by bleeding and exophytic growth (17).

In our series, hemorrhage and anemia were present in a patient with schwannoma of the stomach, and at the same time, it invaded the pancreas and the left colon. The lesion of the first patient caused mucosal compression ulcer and consequently, anemia. As a result, both patients were not diagnosed preoperatively and intraoperatively of the second patient, and schwannoma diagnoses were obtained after immunohistochemical staining.

Lesions showing exophytic growth press on other organs or veins. Those close to the pylorus may block the passage. Schwannomas in the GIS have a peripheral cuff of lymphoid cells (18).

Since schwannomas have a slow growth pattern, vascularity accompanies this and necrosis does not occur. In GIST, rapid growth does not accompany vascularity and intratumoral necrosis can be seen (19,20). Schwannomas with adrenal localization may show septa and cystic changes not seen in other retroperitoneal tumors (21).

Due to the fact that schwannomas have a peripheral lymphoid cuff, this lymphoid tissue shows high FDG uptake in PET. FDG uptake (SUVmax) varies to 3.3 and 7.1 according to metastatic tumor and malignant tumor (22).

Schwannomas are distinguished from other benign lesions by immunohistochemical and microscopic findings. In these tumors, while S-100 protein is strongly positive, c-KIT (CD-117), CD-34, SMA and Desmin are negative. Although S-100 protein is 30-40% positive in neurofibroma, it is 100% positive in schwannoma. In gastrointestinal stromal tumors, c-KIT CD-117 and CD-34 are 70% positive while S-100 protein is negative. Lymphoid cuff, lymphoid infiltration, cellular heterogeneity, nuclear atypia and microtrabecular pattern are seen in schwannoma and absent in GIST (23).

Glial Fibrillary Acidic Protein (GFAP) is used to separate schwannomas from Gastrointestinal Autonomic Nerve Tumors (GANTs). Schwannoma showed GFAP with 63.6%, and GANTs could not be shown. In differential diagnosis, S-100 positive-stained gastrointestinal clear cell sarcoma and metastatic melanoma should also be separated. Somatic NF-2 mutations in soft tissue schwannomas are rare in gastric schwannomas (24).

Gastric schwannomas are usually seen in the 3rd and 5th decades of life. It is often solitary tumors originating from the nerve cells in the fundus and corpus of stomach. Homogeneous appearances of schwannoma in CT scan can help to distinguish them from GISTs. Hong et al. (25) reported a series of 16 cases with a homogeneous pattern in 13 cases and 3 cases with cystic changes in 2008.

Imaging methods such as tomography, MR and endoscopy are

limited in accurate diagnosis. EUS-guided biopsy can help the diagnosis. Takasumi et al. (26) have diagnosed 4 out of 6 cases (66.7%) with EUS-guided biopsy in the preoperative period.

The incidence of colon schwannoma is not fully known. In the series of Voltaggio et al. (27) consisting of 20 cases, the most common localization in the GIS is the stomach followed by the colon.

Schwannomas in GIS are relatively rare compared to GIST that have mesenchymal origins. This ratio is 50-100/1. In smaller scale studies, there are rates reported as 1 schwannoma vs. 8-14 GIST (12,28,29).

Inagawa et al. (30) have examined the colon-rectum localized schwannomas in the Japanese literature and found that the most frequent site is the rectum with 45.7%. In this study, right colon placement, with the exception of appendiceal placement, has been found to be 19.6%.

Our results showed that 4 out of 6 patients (67%) had large intestine and 2 out of 6 patients (33%) had gastric schwannomas. Sigmoid colon and stomach are more common localizations in our series.

Tumor size and mitotic index significance have not been reported in the literature for gastric schwannomas. In this regard, Voltaggio et al. (27) have reported that some gastric schwannomas show more than 10 cm and minor mitotic rates 5/50 (HPFs), none of which exhibit aggressive behavior. Long-term follow-up results of 10/50 (HPFs) schwannoma with high mitotic index are not known. Therefore, patients with Ki-67 proliferative index and high (>5) mitotic index should be followed closely in terms of recurrence and metastases. Primary schwannomas are usually benign. Radical resection with clean borders is necessary because of the risk of malign degeneration, chemo and radiotherapy response is indeterminate, and local recurrence rates are high (30%).

Nowadays, pre-operative submucosal lesions are diagnosed with EUS-guided sampling and IHC staining.

The most important drawback of this study is the retrospective nature, single-center formation and EUS-guided sampling being not used.

CONCLUSION

To conclude, schwannomas are benign tumors arising from the peripheral nerve sheath. Preoperative diagnosis of these tumors is important. If the diagnosis is made preoperatively, surgical margin will be negative for treatment. Radical lymph node dissection is not necessary since it has a benign nature and does not cause lymph node metastasis. Recurrence and malignant transformation may occur if free surgical margin has not been not achieved. Since chemotherapy and radiotherapy are not effective for these tumors, it is very important to remove the tumor with negative surgical margins.

Ethics Committee Approval: The ethical approval for this study was obtained from SBÜ İstanbul Training and Research Hospital Clinical Research Ethics Committee (Decision No: 2512, Date: 08.08.2020).

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REFERENCES

1. *Lauwers GY, Erlandson RA, Casper ES, Brennan MF, Woodruff JM. Gastrointestinal autonomic nerve tumors. A clinicopathological, immunohistochemical, and ultrastructural study of 12 cases. Am J Surg Pathol 1993; 17: 887-97.*
2. *Das Gupta TK, Brasfield RD, Strong EW, Hajdu SI. Benign solitary Schwannomas (neurilemomas). Cancer 1969; 24: 355-66.*
3. *Almo KM, Traverso LW. Pancreatic schwannoma: an uncommon but important entity. J Gastrointest Surg 2001; 5: 359-63.*
4. *Catania G, Puleo C, Cardì F, Catalano F, Iuppa A, Buffone A. Malignant schwannoma of the rectum: a clinical and pathological contribution. Chir Ital 2001; 53: 873-7.*
5. *Moriya T, Kimura W, Hirai I, Takeshita A, Tezuka K, Watanabe T, et al. Pancreatic schwannoma: Case report and an updated 30-year review of the literature yielding 47 cases. World J Gastroenterol 2012; 18: 1538-44.*
6. *Hirota S, Isozaki K, Nishida T, Kitamura Y. Effects of loss-of-function and gain-of-function mutations of c-kit on the gastrointestinal tract. J Gastroenterol 2000; 35 Suppl 12: 75-9.*
7. *Mekky MA, Yamao K, Sawaki A, Mizuno N, Hara K, Nafeh MA, et al. Diagnostic utility of EUS-guided FNA in patients with gastric submucosal tumors. Gastrointest Endosc 2010; 71: 913-9.*
8. *Fotiadis CI, Kouerinis IA, Papandreou I, Zografos GC, Agapitos G. Sigmoid schwannoma: a rare case. World J Gastroenterol 2005; 11: 5079-81.*
9. *Nonose R, Lahan AY, Santos Valenciano J, Martinez CA. Schwannoma of the colon. Case Rep Gastroenterol 2009; 3: 293-9.*
10. *Tsunoda C, Kato H, Sakamoto T, Yamada R, Mitsumaru A, Yokomizo H, et al. A Case of benign schwannoma of the transverse colon with granulation tissue. Case Rep Gastroenterol 2009; 3: 116-20.*
11. *Atmatzidis S, Chatzimavroudis G, Dragoumis D, Tsiaousis P, Patsas A, Atmatzidis K. Gastric schwannoma: a case report and literature review. Hippokratia 2012; 16: 280-2.*
12. *Klimo P Jr, Rao G, Schmidt RH, Schmidt MH. Nerve sheath tumors involving the sacrum. Case report and classification scheme. Neurosurg Focus 2003; 15: E12.*
13. *Chetty R. Reticular and microcystic schwannoma: a distinctive tumor of the gastrointestinal tract. Ann Diagn Pathol 2011; 15: 198-201.*

14. *Kasperlik-Zaluska AA, Roslonowska E, Slowinska-Srzednicka J, Otto M, Cichocki A, Cwikla J, et al. 1,111 patients with adrenal incidentalomas observed at a single endocrinological center: incidence of chromaffin tumors. Ann N Y Acad Sci 2006; 1073: 38-46.*
15. *Miettinen M, Sarlomo-Rikala M, Lasota J. Gastrointestinal stromal tumours. Ann Chir Gynaecol 1998; 87: 278-81.*
16. *Jacobson BC, Hirsch MS, Lee JH, Van Dam J, Shoji B, Farraye FA. Multiple asymptomatic plexiform schwannomas of the sigmoid colon: a case report and review. Gastrointest Endosc 2001; 53: 801-14.*
17. *Hesselfeldt-Nielsen J, Geerdsen JP, Pedersen VM. Bleeding schwannoma of the small intestine: a diagnostic problem. Case report. Acta Chir Scand 1987; 153: 623-5.*
18. *Li S, Ai SZ, Owens C, Kulesza P. Intrapancreatic schwannoma diagnosed by endoscopic ultrasound-guided fine-needle aspiration cytology. Diagn Cytopathol 2009; 37: 132-5.*
19. *Jiang ZX, Zhang SJ, Peng WJ, Yu BH. Rectal gastrointestinal stromal tumors: imaging features with clinical and pathological correlation. World J Gastroenterol 2013; 19: 3108-16.*
20. *Koch MR, Jagannathan JP, Shinagare AB, Krajewski KM, Raut CP, Hornick JL, et al. Imaging features of primary anorectal gastrointestinal stromal tumors with clinical and pathologic correlation. Cancer Imaging 2013; 12: 557-65.*
21. *Zhang YM, Lei PF, Chen MN, Lv XF, Ling YH, Cai PQ, et al. CT findings of adrenal schwannoma. Clin Radiol 2016; 71: 464-70.*
22. *Miyake KK, Nakamoto Y, Kataoka TR, Ueshima C, Higashi T, Terashima T, et al. Clinical, morphologic, and pathologic features associated with ıncreased FDG uptake in schwannoma. AJR Am J Roentgenol 2016; 207: 1288-96.*
23. *Miettinen M, Shekitka KM, Sobin LH. Schwannomas in the colon and rectum: a clinicopathologic and immunohistochemical study of 20 cases. Am J Surg Pathol 2001; 25: 846-55.*
24. *Lasota J, Wasag B, Dansonka-Mieszkowska A, Karcz D, Millward CL, Ryś J, et al. Evaluation of NF2 and NF1 tumor suppressor genes in distinctive gastrointestinal nerve sheath tumors traditionally diagnosed as benign schwannomas: s study of 20 cases. Lab Invest 2003; 83: 1361-71.*
25. *Hong HS, Ha HK, Won HJ, Byun JH, Shin YM, Kim AY, et al. Gastric schwannomas: radiological features with endoscopic and pathological correlation. Clin Radiol 2008; 63: 536-42.*
26. *Sugimoto M, Takagi T, Suzuki R, Konno N, Asama H, Watanabe K, et al. Endoscopic ultrasonography-guided fine needle aspiration can be used to rule out malignancy in autoimmune pancreatitis patients. J Ultrasound Med 2017; 36: 2237-44.*
27. *Voltaggio L, Murray R, Lasota J, Miettinen M. Gastric schwannoma: a clinicopathologic study of 51 cases and critical review of the literature. Hum Pathol 2012; 43: 650-9.*
28. *Daimaru Y, Kido K, Hashimoto H, Enjoji M. Benign schwannoma of the gastrointestinal tract: a clinicopathologic and immunohistochemical study. Hum Pthol 1988; 19: 257-64.*
29. *Melvin WS, Wilkinson MG. Gastric schwannoma. Clinical and pathologic considerations. Am Surg 1993; 59: 293-6.*
30. *Inagawa S, Hori M, Shimazaki J, Matsumoto S, Ishii H, Itabashi M, et al. Solitary schwannoma of the colon: report of two cases. Surg Today 2001; 31: 833-8.*

OLGU SERİSİ-ÖZET
Turk J Surg 2021; 37 (4): 408-412

Gastrointestinal schwannomlar ve literatürün kısaca değerlendirilmesi

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ÖZET

Schwann hücrelerinden kaynaklanan schwannomlar, periferik sinir kılıfından gelişirler ve yavaş büyüyen, çoğunlukla mezenkimden kaynaklanan iyi huylu tümörlerdir. Her iki cinsiyette de eşit olarak görünür. Schwannomalar genellikle 3 ve 5. dekadda görülür. Schwannomalar, periferik sinirlerin görüldüğü her yerde görülebilir. Gastrointestinal schwannomalar tüm submukozal kitlelerin %2-6'sını oluşturur ve mide en sık görülen alandır (%60-70). Gastrointestinal submukozal lezyonların endoskopik ultrasonografi (EUS) kılavuzluğunda biyopsisi ile preoperatif ayırıcı tanı mümkündür. 2005 ve Aralık 2017 arasında gastrointestinal schwannomaları tanısı alan hastalar çalışmaya dahil edildi. Altı hastanın üçü kadındı. Yaş ortalaması 52,5 (44-76) idi. Schwannomalar, iki hastada gastrik lokalizasyonda, bir hastada apandiks, iki hastada kolon ve bir hastada perianal bölgede lokalizeydi. Primer schwannomlar genellikle iyi huyludur. Malign dejenerasyon riski nedeniyle temiz sınırlarla radikal rezeksiyon gereklidir; kemo ve radyoterapi yanıtı belirsizdir ve lokal nüks oranları yüksektir.

Anahtar Kelimeler: Gastrointestinal schwannomlar, gastrointestinal submukozal kitleler, immunhistokimya

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SURGICAL TECHNIQUE
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How we do it: Laparoscopic cholecystectomy in patients with severe obesity

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ABSTRACT

The number of patients with obesity is set to rise, as is the proportion with severe obesity. These patients are a high-risk subgroup who present additional challenges to the surgeon when performing laparoscopic cholecystectomy. It is important that all surgeons who perform this procedure have a safe strategy they can revert to. This article outlines our approach. After obtaining pneumoperitoneum via a supra-umbilical incision, we advise placing a fascial suture before proceeding with the operation. This allows for high-quality closure, reduces the incidence of incisional hernia, and reduces the risk of inadvertent bowel injury. We also advise the repositioning of the patient on the operating table prior to port placement such that an ergonomic set-up can be achieved. In addition to standard ports, we use an additional twelve-millimetre port in the left upper quadrant. A fan retractor can be inserted via this port and used to gently retract the duodenum inferiorly. This provides adequate exposure for Calot's dissection and arguably reduces the risk of injury to a fatty liver. This technique can also be used in non-obese patients in whom Calot's dissection is particularly challenging, for instance in those who undergo delayed cholecystectomy.

Keywords: Laparoscopic cholecystectomy, obese, morbid, severe, bariatric, day case surgery

INTRODUCTION

The first cholecystectomy was performed by Carl Langenbuch in Germany in 1882 (1). It was over a hundred years later, in 1985, when Erich Mühe performed the first laparoscopic cholecystectomy (LC) also in Germany (1). Despite early scepticism surrounding the technique, LC was the gold standard by the mid-1990s. In the UK, it is commonly performed as a day case procedure in low-risk patients, and the rate of conversion to open surgery is less than 4% (2).

Obesity is a growing public health problem, particularly in the Western world. Currently, 28.0% of adults in England are obese (body mass index (BMI) ≥30 kg/m^2) and 3.3% have severe, or class III obesity (BMI ≥40 kg/m^2) (3). These figures are set to rise; it is predicted that 8.0% of adults in England will be severely obese in 2035 (3). Whilst high BMI was once considered a relative contra-indication, recent studies have confirmed that LC can be performed safely in patients with obesity or severe obesity (4). However, patient with severe obesity presents a unique set of technical challenges which all surgeons must be prepared to manage. This article outlines our strategy. Verbal informed consent was obtained from the patient whose images were used. No patient identifiable data/images were included for the purposes of confidentiality. The techniques discussed may also be used in non-obese patients in whom Calot's dissection is particularly challenging.

How We Do It

The approach outlined below can be utilised in patients with severe obesity or patients in whom Calot's dissection is challenging, for instance male patients with central obesity and those with Mirizzi syndrome. The only additional piece of surgical equipment required is a fan retractor. The patient should be positioned supine, in the standard manner. Particular attention should be paid to how the patient is secured since a severely obese patient is at high-risk of sliding off the table when it is rotated; additional shoulder and left-sided support is advised. Since this group of

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patients is also at high-risk of post-operative venous thromboembolism, intra-operative calf compression pumps should be used, and a single dose of low molecular weight heparin should be considered post-operatively. After prepping, drapes should be placed to achieve maximum abdominal exposure. The left sided drapes should be placed as low as is feasible.

Pneumoperitoneum should be obtained in the standard manner using Hassan's technique. It is advisable to make the initial incision superior to the umbilicus so reaching the right upper quadrant does not become a struggle. Once pneumoperitoneum is obtained, we advise placing a fascial suture before continuing with the operation. This allows for good quality closure in a patient who is at high-risk of incisional hernia, and also reduces the risk of the surgeon inadvertently catching the bowel and not being aware of this. We advise re-positioning the patient at this point so that optimum port placement is obtained. "Head up" and "right side up" will help displace the small bowel and omentum such that the gallbladder is easily accessible.

A ten-millimetre port can then be placed below the xiphoid sternum and inserted under direct vision. The tip of the trocar should be directed towards the apex of an open triangle formed by the junction of segment III, segment VIb and the falciform ligament (Aroori's triangle). The tip can then pierce the falciform ligament and be directed towards the gallbladder. An additional five-millimetre port is then placed as laterally as possible in the right upper quadrant, inferior to the lateral right ribs. A final 5 millimetre port is placed between the 10 millimetre ports which have already been placed. This should roughly be in-line with the gallbladder in the midclavicular line. These ports should not be placed directly beneath the inferior surface of the right ribs as this will create an angle which makes accessing the gallbladder more challenging. A gap of at least two finger breadths should be left. In addition to the standard ports mentioned, we advise the use of a fifth port in the severely obese patient (Figure 1). A twelve-millimetre port should be placed in the left upper quadrant and angled towards the gallbladder (Figure 2).

As is standard, the assistant should grab the fundus of the gallbladder with a grasping instrument and gently lift it over the edge of the liver towards the right shoulder. Using the screen as a clock face, the assistant should retract the fundus of the gallbladder towards the eleven o'clock position. This alone usually provides adequate exposure for the lead surgeon to continue with the dissection safely. However, in the severely obese patient it may not be possible to proceed due to limited space and poor views (Figure 2). Some surgeons are tempted to have the assistant push up aggressively on their instrument or to try to push the liver superiorly with an open grasping instrument. We argue that this greatly increases the risk of injury to the liver which is likely to be fatty and friable. We suggest it is safer to insert a fan retractor via the additional port and to gently re-

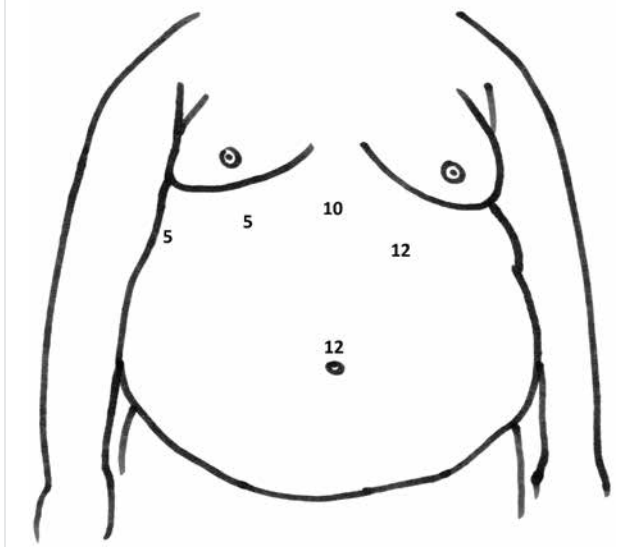

Figure 1. Port placement for laparoscopic cholecystectomy in a male patient with severe obesity. We advise a supra-umbilical initial incision and an additional twelve-millimetre port in the left upper quadrant. The five-millimetre ports should not be placed directly under the rib cage as this result in a more challenging angle and difficulties accessing the gallbladder.

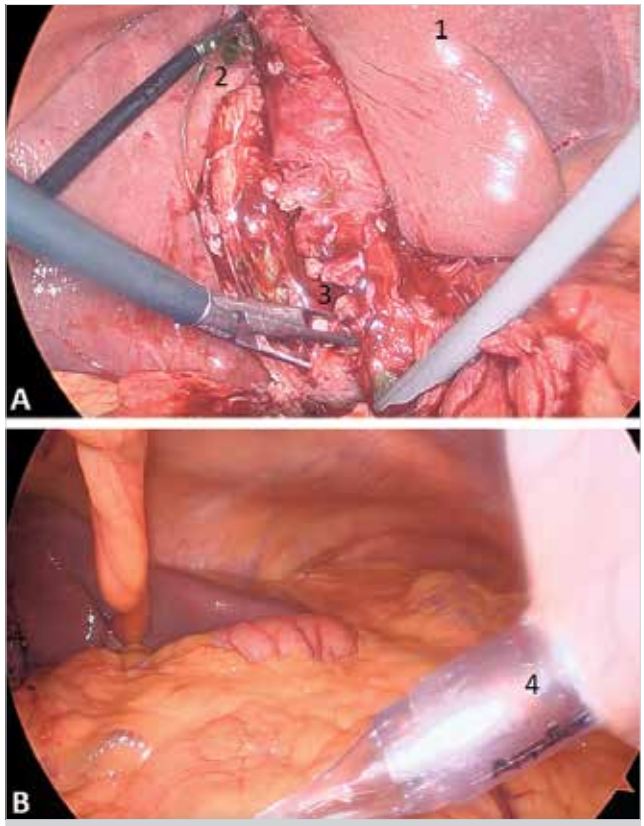

Figure 2. A. The challenging initial dissection in a male patient with severe obesity. 1 = liver, 2 = gallbladder fundus retracted superiorly, 3 = Calot's triangle difficult to appreciate. **B.** The additional port placed in the left upper quadrant. 4 = additional port.

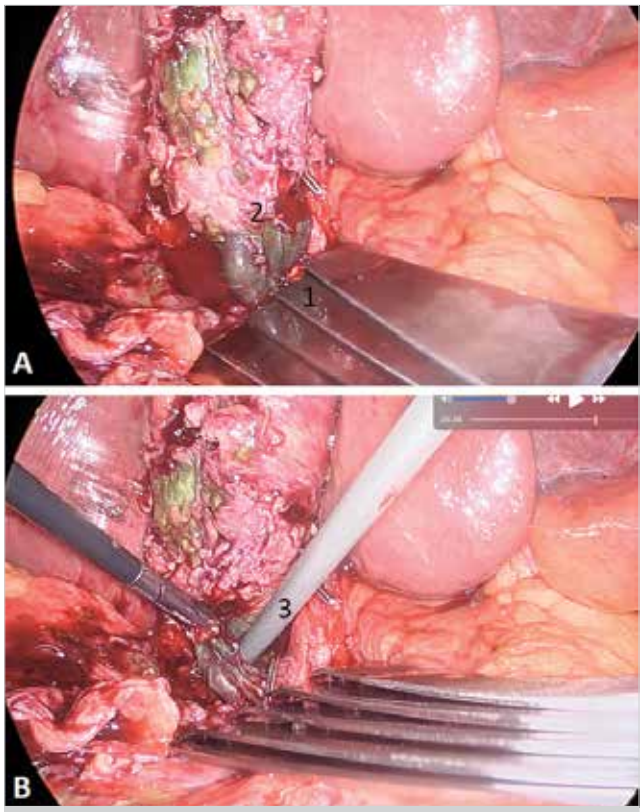

Figure 3. A. Downward retraction on the duodenum using a fan retractor (1) allows a clear view of the structures which need to be dissected (2) so that the critical view can be obtained. Controlled use of a suction device (3) allows safe dissection of Calot's triangle.

tract the duodenum (D1) inferiorly (Figure 3). Since the tip of a fan retractor is blunt, the risk of injury to the duodenum is minimal. This technique can also be used in other cases where the gallbladder cannot be safely retracted upwards towards the right shoulder tip e.g. where Hartmann's pouch is adhered to the hepatoduodenal ligament or where a severely inflamed gallbladder results in difficult dissection.

The operation can then proceed. We advise that dissection is commenced on the back of the gallbladder, at the seven or eight o'clock position, and proceeds towards the fundus. Using the tip of the hook diathermy, the surgeon should attempt to dissect one tissue plane at a time and take advantage of the "Champagne effect"; this is where the gallbladder mesentery is breached, and air enters to allow for easier visualisation of the correct dissection planes. Once a significant amount of the dissection has been completed, we advise that the assistant retracts the gallbladder towards the nine or ten o'clock position. Further dissection then allows for the creation of a "critical window". Progress can then be made underneath the gallbladder; this is often referred to as the "under the bridge" technique. We advise the gallbladder is dissected off the cystic plate as much as possible before attention is turned to the cystic artery and cystic duct.

The surgeon should dissect out Calot's triangle so that the cystic duct and cystic artery can be seen entering/exiting the gallbladder. Ligating clips should be placed on each of these structures, three to the lower end of the duct and two to the artery. As such, two clips remain in situ when the duct is cut, and one remains on the artery. The gallbladder can then be dissected off the gallbladder fossa, placed in a bag, and removed. Haemostasis should be achieved, and the gallbladder fossa should be checked for bleeding prior to closure. We advise closure of the umbilical port under direct vision; this can be achieved by shifting the camera to the additional port.

CONCLUSION

The number of severely obese patients who undergo LC is set to increase. Such a body habitus creates specific challenges which surgeons must be equipped to manage. We advise the use of an additional twelve-millimetre port in the left upper quadrant. This allows for the safe inferior retraction of the duodenum and reduces the risk of liver injury.

Informed Consent: Informed consents were obtained from patients.

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REFERENCES

1. *Reynolds Jr W. The first laparoscopic cholecystectomy. JSLS 2001; 5(1): 89-94.*
2. *Sutcliffe RP, Hollyman M, Hodson J, Bonney G, Vohra RS, Griffiths EA, et al. Preoperative risk factors for conversion from laparoscopic to open cholecystectomy: a validated risk score derived from a prospective U.K. database of 8820 patients. HPB (Oxford) 2016; 18(11): 922-8.*
3. *Keaver L, Xu B, Jaccard A, Webber L. Morbid obesity in the UK: A modelling projection study to 2035. Scand J Public Health 2020; 48(4): 422-7.*
4. *Tiong L, Oh J. Safety and efficacy of a laparoscopic cholecystectomy in the morbid and super obese patients. HPB (Oxford) 2015; 17(7): 600-4.*

CERRAHİ TEKNİK-ÖZET
Turk J Surg 2021; 37 (4): 413-416

Biz nasıl yapıyoruz: ağır obezitesi olan hastalarda laparoskopik kolesistektomi

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ÖZET

Obezitesi olan hasta sayısı artmaya devam ederken aynı artış trendi ağır obeziteli hastalarda da görülmektedir. Bu yüksek riskli hasta alt grubu, laparoskopik kolesistektomi esnasında cerraha ek zorluklar yüklemektedir. Bu işlemi gerçekleştiren her cerrahın dönebileceği güvenilir bir stratejiye sahip olması önemlidir. Bu makale, bizim yaklaşımımızı ortaya koymaktadır. Supra-umbilikal insizyon ile pnömopertoneum ulaşıldığında operasyona devam etmeden önce fasiyal sütür konulmasını tavsiye etmekteyiz. Bu işlem, yüksek kaliteli kapama sağlarken insizyonel herni oluşumunu ve kasıtsız olarak sebep olunan bağırsak hasarını da azaltmaktadır. Ayrıca, port yerleştirilmesinden önce daha ergonomik bir ortam yaratabilmek adına hastanın ameliyat masasında tekrar pozisyonlanmasını da önermekteyiz. Standart portlara ilaveten sol üst kadranda 12 mm'lik ek bir port daha kullanmaktayız. Bu port ile fan retraktör içeri sokulabilir ve duodenum inferiyör olarak hafifçe çekilebilir. Bu, Calot's diseksiyonu açısından uygun açıklığı sağlamakta ve muhtemelen yağlı bir karaciğere hasar riskini azaltmaktadır. Bu teknik, Calot's diseksiyonu özellikle zorlayıcı olan obez olmayan hasta gruplarında ve örneğin gecikmiş kolesistektomi gibi durumlarda kullanılabilir.

Anahtar Kelimeler: Laparoskopik kolesistektomi, obez, morbid, ciddi, bariyatrik, günübirlik ameliyat

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LETTERS TO THE EDITOR (ONLINE)

Letter to: Serial estimation of serum C-reactive protein and procalcitonin for early detection of anastomotic leak after elective intestinal surgeries: A prospective cohort study

Firdaus Hayati, Syed Sharizman Syed Abdul Rahim, Andee Dzulkarnaen Zakaria

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Letter to: Risk factors for conversion to open surgery in laparoscopic cholecystectomy: A single center experience

Surenthiran Theva Darshini, Marianne Jia Jiah Wong, Syed Sharizman Syed Abdul Rahim, Firdaus Hayati
DOI: 10.47717/turkjsurg.2021.5392

Letter to: Endometriosis of the rectosigmoid colon mimicking gastrointestinal stromal tumor

Dg Marshitah Pg Baharuddin, Firdaus Hayati, Nornazirah Azizan, Andee Dzulkarmaen Zakaria
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LETTER TO THE EDITOR
Turk J Surg 2021; 37 (4): 417

Letter to: Serial estimation of serum C-reactive protein and procalcitonin for early detection of anastomotic leak after elective intestinal surgeries: A prospective cohort study

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Dear Editor,

We read with great interest the original article by Aaron et al, which was recently published in this esteemed journal (1). The authors have concluded that C-reactive protein (CRP) on the third postoperative day can predict anastomotic leak, and any patient with raised CRP needs careful evaluation to rule out anastomotic leak before deciding on early discharge. We believe that there are few issues that need to be addressed in this article.

Firstly, we think that the title is slightly misleading as it stated that the sample collection was performed among elective intestinal surgeries. According to our understanding, intestinal surgery involves the operations of the small intestine and colon, however, the majority of the samples were taken from gastric and pancreaticobiliary cases (2). It is ideal to use gastro-intestinal rather than intestinal surgeries per se.

Secondly, we were quite perplexed at the data provided. It shows that the rate of anastomotic leak is 26.19%, which is quite high as compared to the literature (3). We believe that further detailed information needs to be displayed in the tabulated demography. Certain characteristics such as (a) benign or malignant diagnosis, (b) handsewn or stapler anastomosis, (c) operators either consultant, specialist or medical officers, (d) co-morbidities, and (e) nutritional status, are among the crucial information that can affect the findings. These factors may contribute to the rate of anastomotic leak postoperatively. In addition, the cause of death for mortality cases was not mentioned in the manuscript as well.

Finally, in Table 1, we were thinking about whether there was any cell with an expected value of less than 5 from the variable of age group and mortality, which we may suggest using another test like Fisher's exact test rather than the Chi-square test.

REFERENCES

1. *Aaron DJ, Anandh A, Sreenath GS, Sureshkumar S, Skaikh OH, Balasubramaniyan V, et al. Serial estimation of serum C-reactive protein and procalcitonin for early detection of anastomotic leak after elective intestinal surgeries: a prospective cohort study. Turk J Surg 2021; 37(1): 22-7.*
2. *Girard E, Messager M, Sauvanet A, Benoist S, Piessen G, Mabrut JY, et al. Anastomotic leakage after gastrointestinal surgery: Diagnosis and management. J Visc Surg 2014; 151(6): 441-50.*
3. *Hayati F, Azman ZAM, Nasuruddin DN, Mazlan L, Zakaria AD, Sagap İ. Serum procalcitonin predicts anastomotic leaks in colorectal surgery. Asian Pac J Cancer Prev 2017; 18(7): 1821-5.*

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LETTER TO THE EDITOR
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Letter to: Risk factors for conversion to open surgery in laparoscopic cholecystectomy: A single center experience

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Dear Editor,

We read with great interest the original article by Sapmaz et al. which was recently published in this esteemed journal (1). This article highlights demographic characteristics for laparoscopic cholecystectomy surgeries and identifies the rate of conversion to open surgery as well as the risk factors behind its conversion. The article has great values, even the research scope is not too updated in this current era. Even so, we would like to suggest a few amendments which could make it more beneficial.

Firstly, we were hoping that Table 1 would be more extensive depicting the demographic characteristics and risk factors which are closely related to the possibility of conversion. We were hoping to see the analyses of certain trivial factors such as thickened gallbladder wall, diabetes mellitus, previous upper abdominal surgery, body mass index and surgeons' experience rather than just mere age and sex in Table 1 or just slightly touched it in Table 2 (2). Furthermore, Table 1 can be further improved by stating what statistical test was used for which variable with the appropriate t-value and chi square value as well as cross tabulations. Those variables that were not significant could also be included in the table as it is still relevant findings. One of the main significant findings was acute cholecystitis and risk of conversion to open surgery; however this was not tabulated and explained with appropriate statistical tests.

Secondly, the authors stated that they had recorded the data of patients' preoperative diagnosis, leucocytosis and CRP elevation, but that information was not portrayed in the results table. We feel it would be beneficial to include the aforementioned biochemical markers so that readers can grab the overview of the average severity. In addition, we believe that the proportion of two sexes in the study subjects is too skewed, with males only constituting 7.9%, so the difference in the rate of conversion to open surgery in the two sexes might not be inaccurate.

Thirdly, the authors did not mention whether there are any exclusion criteria prior to patient recruitment. Patients with such characteristics namely jaundice, pregnancy, cirrhosis of the liver, suspected or proven malignancy are possible to be excluded prior to the recruitment as they might be affecting the research progress (3).

Fourthly, we noticed a discrepancy in the duration of the study stated between the abstract and in the material and methods. List of references is slightly outdated; if possible the authors could include some latest references.

Lastly, we are suggesting that the authors can continue with multivariate analysis as there were significant findings from the initial analysis. By doing so, the analysis would be adjusted for confounders.

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REFERENCES

1. *Sapmaz A, Karaca AS. Risk factors for conversion to open surgery in laparoscopic cholecystectomy: A single center experience. Turk J Surg 2020; 37(1): 28-32.*
2. *Yang TF, Guo L, Wang Q. Evaluation of preoperative risk factor for converting laparoscopic to open cholecystectomy: A meta-analysis. Hepatogastroenterology 2014; 61(132): 958-65.*
3. *Ros A, Carlsson P, Rahmqvist M, Bäckman K, Nilsson E. Non-randomised patients in a cholecystectomy trial: Characteristics, procedures, and outcomes. BMC Surg 2006; 6: 17.*

LETTER TO THE EDITOR
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Letter to: Endometriosis of the rectosigmoid colon mimicking gastrointestinal stromal tumor

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Dear Editor,

We would like to congratulate the authors for publishing such an informative and interesting article (1). We totally agree with the authors to proceed with various modalities and evaluation in this patient who presented with pelvic pain and abdominal bloatedness as it is not easy to diagnose rectosigmoid endometriosis solely by history and physical examination (2,3). However, we believe that there are few issues that can be highlighted in the article to further enhance the visibility of the article value. We value if further detailed gynaecology history could be included namely cyclical pain, dysmenorrhoea, dyschezia and also her fertility status. Physical examination such as tenderness at the pouch of Douglas and thickening of the uterosacral ligament might also give a clue to the preoperative diagnosis of endometriosis as in this patient. In addition, we believe that the readers are keen to know the findings of the transvaginal ultrasound prior to surgical intervention as it has high sensitivity and specificity (4).

The authors stated that the frozen section was performed prior to anterior resection. We were wondering what type of tissue was submitted for the section as intraoperative findings were not described. As we are concerned, gastrointestinal stromal tumor arises from the submucosal tissue, hence we wonder whether the authors performed laparoscopic cytology of the submucosal mass or biopsy of the peritoneal tissues. Commonly, the assessment involved in gastrointestinal pathology of the submucosal lesion is via endoscopic biopsy (5).

In malignant cases, usually, a clinical assessment that shows perforation, bleeding and obstruction warrant a colonic resection or diversion (6). We were wondering about the decision for surgical resection in this case as the reasons were not described in detail. Furthermore, since it is a benign diagnosis following the frozen section, we believe that any lesion above 5-8 cm from the anal verge as in this case, is better to be managed with conservative management such as hormonal suppression rather than surgical resection to decrease the risk of short- and long-term complications (7).

Lastly, since this is a collaborative effort between general surgery, radiology, obstetrics and gynaecology as well as anatomic pathology until eventual diagnosis, we believe that the involvement of the latter 2 disciplines is crucial as part of the authorship in making this article valuable. In addition, the authors could acknowledge those aforementioned disciplines in the acknowledgement section if they were not involved much in manuscript preparation. We hope that this practice can be improved in the future.

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REFERENCES

1. *Kafadar MT, Çaviş T, Sürgit Ö, Köktener A. Endometriosis of the rectosigmoid colon mimicking gastrointestinal stromal tumor. Turk J Surg 2020; 36(4): 409-12.*
2. *Yantiss RK, Clement PB, Young RH. Endometriosis of the intestinal tract: a study of 44 cases of a disease that may cause diverse challenges in clinical and pathologic evaluation. Am J Surg Pathol 2001; 25: 445-54.*
3. *Remorgida V, Ferrero S, Fulcheri E, Ragni N, Martin DC. Bowel endometriosis: Preesentation, diagnosis and treatment. Obstet Gynecol Surv 2007; 62(7): 461-70.*
4. *Guerriero S, Ajossa S, Orozco R, Perniciano M, Jurado M, Melis GB, et al. Accuracy of transvaginal ultrasound for diagnosis of deep endometriosis in the rectosigmoid: A systematic review and meta-analysis. Ultrasound Obstet Gynecol 2016; 47(3): 281-9.*
5. *Zainudin S, Rajanthran SK, Azizan N, Hayati F, Ginawoi J, Suhaimi KA, et al. An oncological curiosity of a male patient with a huge leiomyoma of the terminal ileum. Oxf Med Case Reports 2020; 2020(10): omaa086.*
6. *Yang XF, Pan K. Diagnosis and management of acute complications in patients with colon cancer: Bleeding, obstruction, and perforation. Chin J Cancer Res 2014; 26(3): 331-40.*
7. *Nezhat C, Li A, Falik R, Copeland D, Razavi G, Shakib A, et al. Bowel endometriosis and management. Am J Obstet Gynecol 2018; 218(6): 549-62.*