Endoscopic repair of rectal perforation due to colonoscopy with a clamp method

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ABSTRACT
Colon perforation during colonoscopy is a rare complication and usually requires surgical intervention. Traditionally, primary repair, by laparoscopy, laparotomy, resection, and anastomosis would be performed for such perforations. More recently developed minimally invasive endoscopic instruments have also been used in the repair of such perforations; this is becoming increasingly common. An endoscopic over-the-scope clip (OTSC) clamp was used in a 59-year-old male patient who suffered a rectum perforation in connection with a diagnostic colonoscopy. He was referred to our clinic. A colonoscopy was performed in our clinic to assess the rectal perforation caused by a diagnostic colonoscopy 2 h after the initial colonoscopy, with the concurrent therapeutic purpose of repairing the perforation using an endoscopic clamping method. Oral feeding was started 24 h after the procedure. After 3 days, the patient was discharged. An endoscopic clamping method in appropriate cases can be a safe and appropriate alternative therapy in the management of colonoscopic perforations.

Keywords: Colonoscopy, clamp, perforation

INTRODUCTION
Colonoscopy is a commonly used method in the diagnosis and treatment of lower gastrointestinal system diseases. The most common complications in colonoscopy are bleeding and perforation. Less often, pneumothorax, pneumomediastinum, colonic volvulus, hernia incarceration, retroperitoneal abscess, and mesenteric tears may occur. The risk of perforation during a diagnostic colonoscopy is 0.2-0.5% (1), while the risk of perforation in a therapeutic colonoscopy is around 2% (2). In terms of anatomical location, iatrogenic perforation occurs most commonly in the sigmoid colon. Extraperitoneal injuries are rare. Colonic perforation during colonoscopy can occur due to several mechanisms. These include the application of heat energy during polypectomy, direct mechanical trauma from the endoscope tip, more lateral pressure applied during the spinning of the endoscope, and pneumatic injury can occur through over insufflation (3). While injuries due to mechanical trauma are usually noticed during endoscopic procedures, perforations due to pneumatic injury and excessive energy may be overlooked. The most common physical examination findings in perforation cases are persistent abdominal pain and distension (3). If perforation is detected late, peritonitis may develop. Indeed, delay in treatment may lead to septic shock and even death.

The most advantageous aspect of colonic perforation after colonoscopy is that it may be noticed immediately and this situation may allow more frequent use of minimally invasive procedures. Today, endoscopic perforations are commonly repaired by laparoscopy or laparotomy. Endoscopic repair of perforations due to colonoscopy is increasingly being discussed in the literature (4). Here, we present a case in which the patient suffered a rectal perforation during colonoscopy and was treated with an endoscopically placed over-the-scope clip (OTSC) clamp.

CASE PRESENTATION
A 59-year-old male patient, who had undergone a colonoscopy at another centre because of abdominal pain and constipation, had suffered a perforation during retroflexion to examine the rectum and was admitted to our emergency clinic 2 h after the perforation. He was hospitalised with the diagnosis of a rectal perforation. The patient's general condition was good: conscious, cooperative, and oriented. BP was 120/70 mmHg, pulse: 70/min, temperature: 37°C, and BMI: 35. There was tenderness in the abdomen on physical examination and there was no defence or rebound. Other systemic examinations were normal. On a digital rectal examination, sensitivity in the rectum and haematochezia were present. White blood cells and CRP were normal. A plain X-ray showed no free air. Intravenous fluid therapy, ceftriaxone, ornidazole, and famotidine were begun simultaneously. The patient was scheduled for a colonoscopy. Informed consent was obtained from the patient included in the study.

The patient was transferred to the interventional procedure room. The patient underwent sedo analgesia with 20 mg pethidine and 2 mg midazolam and treatment began. A 1.5 cm rectal perforation was seen in
the proximal rectum (Figure 1). With aspiration, air was evacu-
ated in the lumen. After the perforated edges shrank and while
maintaining the wound edges with an endoscopic grasper, one
deroscopic OTSC clamp was used (Figure 2). The process was
ended after the perforation was closed totally using the clamp.
An oral diet (regimen 1) was begun 24 h after the procedure.
After 3 days in hospital, the patient was discharged.

DISCUSSION
Colonoscopy remains the gold standard for the diagnosis and
treatment of diseases of the colonic mucosa. Diagnostic and in-
terventional endoscopic procedures are increasingly common,
together with development of new endoscopic techniques. To-
day, many colon lesions, including some tumours, are treated
with endoscopic surgery. With the increasingly widespread
use of colonoscopy, the incidence of complications has also
increased. The most serious complications of colonoscopy are
bleeding and perforation. Perforation risk is especially increased
due to lack of experience in interventional procedures. Howev-
er, perforations may still occur even with experienced endosco-
pists and the use of advanced endoscopes.

The ‘traditional’ treatment of perforation due to colonoscopy is
a laparotomy, although treatments are performed increasingly
with laparoscopic methods. Although primary repair is usually
preferred, sometimes resection and anastomosis or a stoma
is among the treatment options. To decide on which one to
use, the size of the perforation, the detection time of the per-
foration, and intraperitoneal contamination rate are vital. Per-
foration due to a colonoscopy is usually detected during the
colonoscopy and bowel preparation has usually already been
performed prior to the perforation in these cases. Early de-
tection of colonic perforation and the content to be cleared
before the procedure in recent years has brought endoscopic
repair of the perforation to the agenda. Recently, several case
reports or small case series have been reported on treatment
methods for perforation due to colonoscopy.

Colonoscopic procedures must be performed carefully and by
experienced endoscopists; otherwise, colonoscopic perfora-
tions can result in malpractice allegations and lawsuits. Early
detection of the perforation and early treatment reduce the
risk of patient morbidity and mortality. Lohsiriwat divided
colonoscopic perforation treatment into three categories:
conservative management, endoscopic repair, and operative
repair (5). A conservative approach may be applicable in se-
lected cases of colonoscopic perforations. Especially, lower
rectum injuries can be monitored non-operatively with good
follow-up and close monitoring of clinical laboratory values
and using radiological imaging.

Today, minimally invasive surgical treatment of colonoscopic
perforations is preferred. Minimally invasive methods are in-
creasingly being used for the management of colonic perfora-
tion, with corresponding reductions in the use of conventional
laparotomy techniques. With the prominence of laparoscopic
treatment, some algorithms related to laparoscopic repairs
have been reported (6). Zhang et al. indicated a mean opera-
tion time of 2.3±0.6 h for a perforation repair using a laparo-
scopic suture (7), whereas in our case, the endoscopic clamping
process took 15 min and resulted in no perioperative bleeding.
They stated that oral intake was started 3.9±2.0 days later,
whereas we began an oral diet (regimen 1) within the first 24 h.
Their hospitalisation was 6.8±4.2 days, whereas our patient was
discharged at 3 days. The major disadvantage associated with
laparoscopy is the learning curve and in small centres, it may be
difficult, especially in emergency cases, because of equipment
issues. A laparotomy is still used in the management of perfora-
tion in large-scale perforations in delayed cases, in small cen-
tres where laparoscopy is contraindicated, or in the absence of
adequate surgical experience and equipment.

The development of endoscopic instruments similar to laparo-
scopic instruments in modern surgery has made endoscopic
therapy possible in the same session. Colonoscopy preparation
had been performed in our case and the perforation was identi-
fied during a colonoscopy. Perforation of the rectum was below
the perineal reflex and findings of peritonitis were not noted.
Radiological and laboratory findings were normal. Our clinic
had experience using endoscopic clips in colonic perforations.
However, in this case, a perforation of ~1.5 cm was present. We
decided to use an endoscopic OTSC clamp in this patient. The
endoscopic clip method is used especially in small perforations.
A greater number of clips may be necessary with increasing di-
ameter of the perforation. This increases the time and cost of
the process and also reduces the technical success rate.
Trecca et al. (8) in a review stated that an endoscopic clip was used in 55-96% of colonic perforations during therapeutic colonoscopy and that the success rate was 69-93%. However, they reported that perforations greater than 10 mm and perforations occurring during a diagnostic endoscopy created contraindications to endoscopic closure. Thus, in large perforations, endoscopic clamping methods may be more appropriate. Clips and clamping applications associated with iatrogenic perforation are being increasingly reported. A metallic clip was used for haemostasis in gastrointestinal bleeding previously. Kim et al. (9) reported 27 colon perforations in 115,285 diagnostic colonoscopies over 12 years. In total, 16 patients underwent endoscopic clipping; of them, three patients underwent surgeries. None suffered major morbidity or mortality. Repair of a perforation with an endoscopic clamp method may be applicable at any location in the colon. It can be applied in therapeutic endoscopy applications relatively easily by experienced endoscopists.

It may be difficult to repair all colonoscopic perforations endoscopically. Endoscopic surgical repair should be reserved for centres where the experience and adequate infrastructure are available and, if necessary, surgical treatment should be administered without delay. We anticipate that in the future, endoscopic clips and clamping methods, which are minimally invasive, will become widespread at many centres.

Sagawa et al. (10) reported no perforation in their series of diagnostic colonoscopies and reported colon perforation in 8 (0.3%) patients undergoing therapeutic colonoscopies. The most common perforation was reported during endoscopic submucosal dissection (3.8%). CRP also had a lower value in those endoscopic clippings. They stated that the average CRP level in those with clips was 2.9±1.6 mg/dL, and 9.7±6.2 mg/dL in those without clips.

In the management of perforation due to colonoscopy in selected patient groups (bowel preparation prior to colonoscopy, perforation localisation, perforation diameter, peritoneal contamination degree, the general condition of the patient and endoscopist experience), if it is not appropriate for the patient to be treated conservatively, an endoscopic clamp method should be considered before surgery. Treatment of patients with non-operative methods, in addition to reducing mortality and morbidity, provides advantages such as shorter hospital stays, reduced infection risk, quicker return of quality of life, and reduced overall costs. There is not yet enough data to assess the implementation of endoscopic clamps in urgent cases or cases of delayed perforation. We believe that in such cases, if the endoscopy unit has adequate equipment and the endoscopists sufficient experience, this endoscopic method can be attempted before surgical treatment. However, the patient’s general condition should be taken into consideration and delay should be avoided in cases requiring surgery. If success cannot be achieved with endoscopic methods (primarily laparoscopic procedures), surgical treatment should be used.

CONCLUSIONS

Iatrogenic colon perforations are being encountered more frequently due to the increasing number of diagnostic and therapeutic colonoscopies. The ideal approach is the detection of such a complication by endoscopists aware of all treatment methods and using minimally invasive methods where possible to treat the patient. We conclude that use of non-operative treatments, such as endoscopic clamping, will increase in the future.

Informed Consent: Written informed consent was obtained from patient who participated in this study.

Peer-review: Externally peer-reviewed.


Conflict of Interest: No conflict of interest was declared by the authors.

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

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