



Endoscopic closure of a postoperative rectal anastomotic leakage with hemoclips: A case report

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ABSTRACT

INTRODUCTION AND IMPORTANCE: Hemoclips have been used to protect leakage after endoscopic resection of large colorectal polyps or early-staged rectal cancer, or for perforation of the sigmoid colon during colonoscopy. However, endoscopic clips were seldom used to manage anastomotic leakage after low anterior resection of rectal cancer.

CASE PRESENTATION: A patient with postoperative anastomotic leakage after low anterior resection for rectal cancer was successfully treated by endoscopic hemoclips under colonoscopic vision after failure of conservative treatment. Postoperative course was uncomplicated and the patient was discharged from the hospital seven days later.

CLINICAL DISCUSSION AND CONCLUSION: Endoscopic hemoclips should be considered as an alternative option for the treatment of an anastomotic leakage in cases where conservative treatment has failed. As they are safe and effective for closure, however good bowel preparation and strict inclusion criteria are required.

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1. Introduction and importance

Anastomotic leakage is a major postoperative complication after total mesorectal excision (TME) for low rectal cancer. It has been associated with significant morbidity, increased length of hospital stay, increased risk of an end-colostomy, and mortality. Hemoclips have been used to protect leakage after EMR or ESD for larger colorectal polyps [1], or for perforation of the sigmoid colon during colonoscopy [2]. However, endoscopic clips were seldom used to manage anastomotic leakage after TME [3]. In this case report, we share the experience of treating rectal anastomotic leakage successfully by applying endoscopic hemoclips. This case report has been reported according to the SCARE checklist in 2020 [4].

2. Case presentation

A 46 year old woman was admitted to the hospital because of rectal cancer. The inferior edge of the tumor was 7 cm from the anal verge. Due to the clinical stage being T2N0M0, no neo-adjuvant treatment was applied. TME was performed by open approach without diverting ileostomy. The end-to-end anastomosis was 5 cm from the anal verge, performed via the double stapling technique, using a 29 mm transanal circular stapler. Manual interrupted sutures were added to the seromuscular layer of the anastomosis. During intra-operative testing no leakage was identified. A double-channel drainage tube was left in the presacral space and the pelvic peritoneum was closed. Three days postoperatively the patient passed stools, but had high fever (39 degrees Celsius) and yellow sticky discharge from the drainage tube. Their white blood cell count was increased to $9.7 \times 10^9/L$, with a neutrophilic granulocyte percentage of 84.7 %. Heart rate was raised (90 bpm) and blood pressure was normal. Abdominal pain or tenderness was absent. In accordance with protocol, cefuroxime and metronidazole were given intravenously for 24 h post-TME. The temperature was 37.4 degrees Celsius, and the white blood cell count was $5.7 \times 10^9/L$. The patient was clinically stable for the next four days, but did not fully recover and an anastomotic leakage was suspected. Therefore, a CT-scan of the abdomen was performed 12 days postoperatively, which did not show an anastomotic leakage or abscess (Fig. 1). Due

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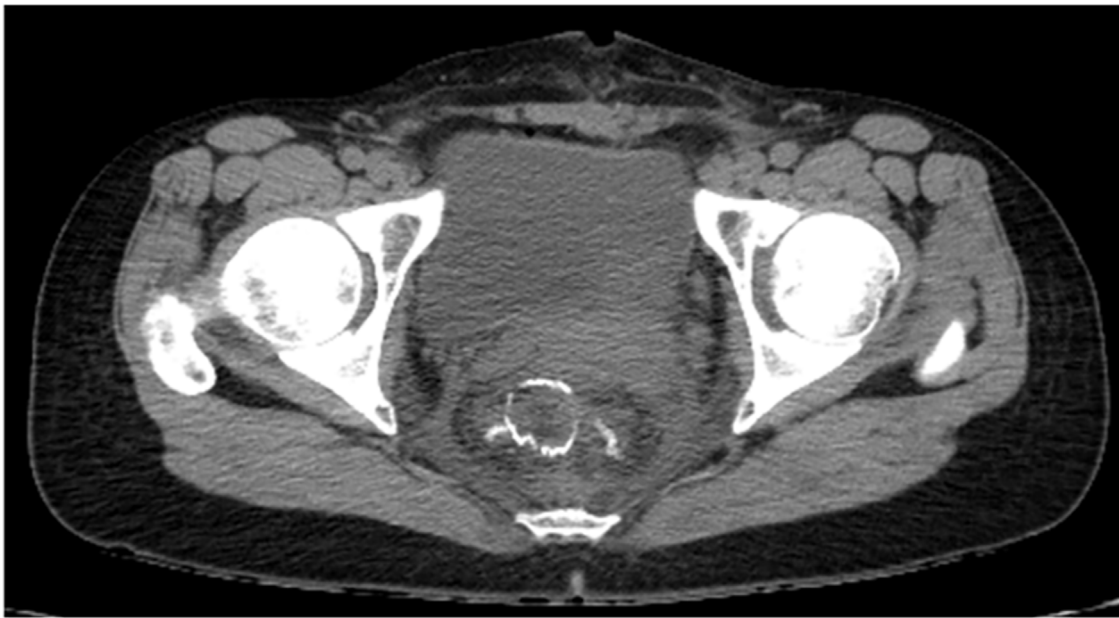


Fig. 1. CT-scan of the abdomen 12 days after the operation.

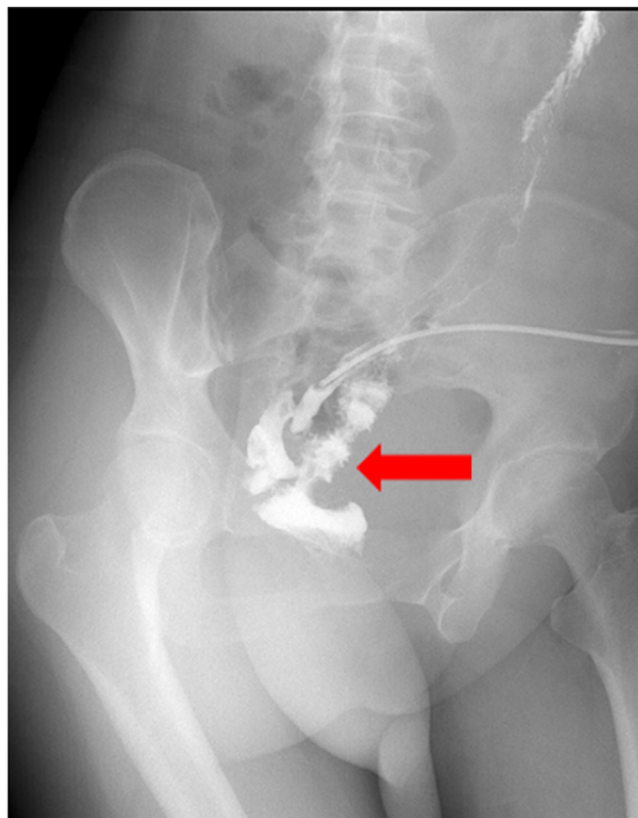


Fig. 2. Abdominal plain film with transanal iodine contrast showed that the iodine leaked into the pelvis indicating the existence of a leakage at the anastomosis.

to the patient not showing any improvement in the days afterwards, two days later, an abdominal plain film was performed by injecting iodine transanally as contrast. A fistula tract could be identified on the abdominal plain film from the anastomotic site to the presacral space (Fig. 2). At this stage the patient was not septic with both temperature and white blood cell count being normal, conservative measures were taken. After flushing the pelvic drainage tube combined with fasting and parenteral nutrition, the

patient gradually recovered. However, the pelvic drainage is still muddy.

Thirty-five days postoperatively, colonoscopy was performed to close the anastomotic leakage with hemoclips in the digestive endoscopy center of Changhai hospital (major digestive endoscopy center; by Dr. Wei Zhang, senior expert in colonoscopy and colorectal surgeon). The whole procedure was accomplished without anaesthesia. The patient was in left lateral position. During colonoscopy,

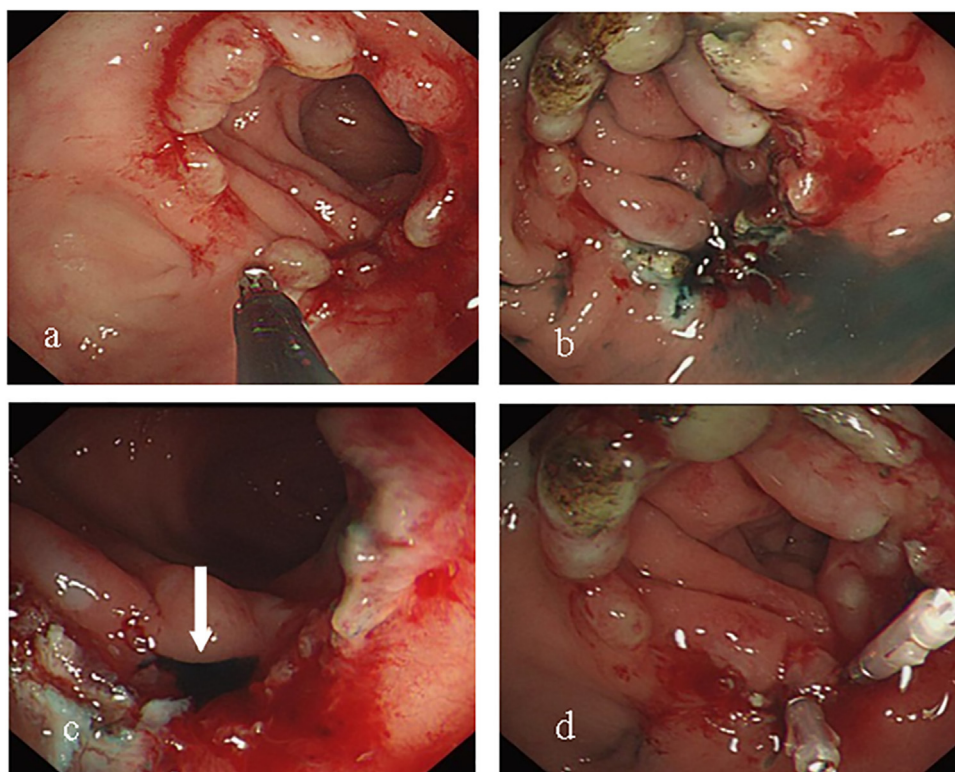


Fig. 3. a Hyperplastic granulation tissue and staple residue around the anastomosis. Endoscopic submucosal dissection was utilized to remove this tissue. b Methylene blue was injected into the presacral space through the presacral drainage tube. Methylene blue was found to leak into the lumen through the anastomosis. c After washing with saline and suction of inflamed and necrotic tissue around the leakage, a dehiscence with a size of 0.2 * 0.2 cm could be clearly identified (white arrow). d Two hemoclips were applied to close the leakage. Methylene blue was injected into the presacral space through the presacral drainage tube again to examine whether the leakage was sealed tightly; no methylene blue leaked into the lumen.

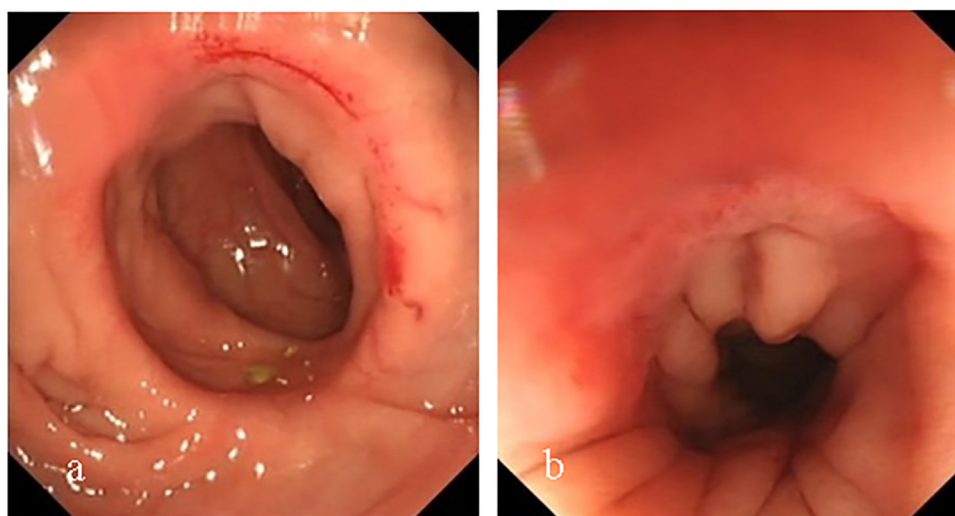


Fig. 4. The anastomosis was completely healed during follow-up.

hyperplastic granulation tissue and staple residue was detected at the level of the anastomosis (Fig. 3a). The anastomosis was flushed with metronidazole. Cautery was used to remove the granulation tissue and staple residues (Fig. 3b). Methylene blue was injected into the presacral space, and was found to leak into the lumen thus identifying a anastomotic leakage (Fig. 3b). After washing out and suction of the remaining inflammation and necrotic tissue around the leak, a dehiscence with a size of 0.2 cm*0.2 cm (Clavien-Dindo Grade 3a) could be clearly seen with fresh tissue around it (Fig. 3c, white arrow). Three endoscopic rotatable

hemoclips (HX-610-135S, Olympus Medical Systems Cooperation, Tokyo, Japan) were utilized, with two successfully closing the leakage. To examine the effect of this procedure, methylene blue was injected again, and no leakage was observed through the anastomosis (Fig. 3d). The drainage tube was removed seven days after the closure with hemoclips and the patient was subsequently discharged. One year postoperatively a colonoscopy during follow up was performed at the previous site of leakage, and showed the anastomotic ring to be completely healed (Fig. 4).

3. Clinical discussion

Gastrointestinal leakage can occur from many reasons, varying from endoscopic ultrasound [5], colonoscopy [6], balloon dilation of anastomotic stricture [7], EMR [8], and postoperative leakage [9].

In the case of rectal anastomotic leakage, the initial treatment can be conservative or surgical, depending on the condition of the patient. However, with the development of new endoscopic techniques, the use of surgery as a preferred primary treatment option is decreasing in the case of anastomotic leakage. Endoclips were initially introduced for luminal endoscopic hemostasis [10], but can also be used for the closure of limited perforations of the colon or rectum. However, it is still rarely used in the case of small leakages in rectal anastomosis after low anterior resection. Barsic et al. [11] reported closure of an anastomotic leakage of the rectum in a single patient, however in this case an over-the-scope clip (OTSC, 12/6 T; Ovesco, Tubingen, Germany) was utilized. Kadir et al. [12] reported successful closure of an extraperitoneal rectal perforation with endoscopic hemoclips which occurred during transurethral urologic surgery. Erol et al. [13] also reported closure of a rectal perforation after diagnostic colonoscopy with an over-the-scope clip. Mehmet et al. [3] reported one case of anastomotic leakage after anterior resection for rectal cancer which was successfully repaired with hemoclips under endoscopic vision and this was actually the first case report on closing a rectal anastomotic leakage with hemoclips. These cases report on perforations because of different reasons and it is of vital importance to pay attention to the cause of perforation. For example, a perforation caused by a rectal anastomotic leak, colonoscopic examination and trauma have varying physical conditions. Chronic inflammatory tissue and necrosis usually exist in rectal anastomotic leakage, but will rarely be present when a perforation is caused by colonoscopy or trauma. In addition, since hemoclips are currently widely used in clinical practice, for example when closing superficial defects after EMR [14], there is already a lot of experience and also easily available. In comparison, the over-the-scope clip requires special equipment and experience [15]. In cases where hemoclips can be used in the treatment of anastomotic leakage of the rectum, this reduce costs as well as avoid an additional operation for the patient. However, data on endoscopic management of anastomotic leakage with hemoclips is still lacking.

The hemoclips succeeded in closing the rectal anastomotic leakage in the current case, however, we required the following selection criteria where used for identifying suitable patients: 1) the diameter of the leakage should be smaller than the width of the clip's nail; 2) the tissue around the leak must be smooth and suitable for drawing the edges together; 3) the visual field should be good; 4) the peritonitis is localized or mild; 5) bowel preparation should be adequate; 6) pelvic drainage was good. In addition, this technique requires an experienced team to identify and close the leakage safely and effectively. Closure with hemoclips could have been performed earlier in this case thus shortening the hospital stay.

4. Conclusion

To conclude, in this case the hemoclip device was an effective and safe device for endoscopic closure of the anastomotic leakage after low anterior resection for rectal cancer, however, strict criteria should be applied when identifying suitable patients.

Declaration of Competing Interest

None.

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Ethical approval

This study is exempt from ethical approval because we give the patient inform consent and this is not a design of a clinical trial. We have given the patient inform consent and tell the patient about the risks and the benefits of the new techniques also the reason why he needs that. Based on the patient's full understanding and agreement, the inform consent was signed with a sentence of agreement with the medical information to be used in scientific research and publications.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request. The privacy of patient is protected in this article

Author contribution

Wei Zhang* and Ge Sun* contribute equally.
Wei Zhang and Ge Sun: Conceptualization, Methodology, Writing- Reviewing and Editing.
Hang Zhang. Data collection, Investigation.
Edgar Furnee, Qizhi Liu and Haifeng Gong: Reviewing, Editing.
Peichun Sun and Wei Zhang: Supervision, Reviewing.

Registration of research studies

Not Applicable.

Guarantor

Wei Zhang.

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References

- [1] S.V. Kantsevoy, M. Bitner, G. Hajiyeva, P.M. Mirovski, M.E. Cox, T. Swope, Endoscopic management of colonic perforations: clips versus suturing closure (with videos), *Gastrointest. Endosc.* (2016), <http://dx.doi.org/10.1016/j.gie.2015.08.074>.
- [2] W. Albuquerque, E. Moreira, V. Arantes, P. Bittencourt, F. Queiroz, Endoscopic repair of a large colonoscopic perforation with clips, *Surg. Endosc. Interv. Tech.* (2008), <http://dx.doi.org/10.1007/s00464-008-9782-6>.
- [3] M. Ibis, Y. Beyazit, I.K. Onal, M. Kurt, E. Parlak, Successful endoscopic closure of anastomotic leakage following anterior resection of the rectum by endoclip application, *Am. J. Gastroenterol.* (2010), <http://dx.doi.org/10.1038/ajg.2009.761>.
- [4] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* (2020), <http://dx.doi.org/10.1016/j.ijsu.2020.10.034>.
- [5] D.G. Seibert, Use of an endoscopic clipping device to repair a duodenal perforation, *Endoscopy* (2003), <http://dx.doi.org/10.1055/s-2003-37004>.
- [6] F. Mana, K. De Vogelaere, D. Urban, Iatrogenic perforation of the colon during diagnostic colonoscopy: endoscopic treatment with clips, *Gastrointest. Endosc.* (2001), <http://dx.doi.org/10.1067/mge.2001.114959>.

- [7] L. Cipolletta, M.A. Bianco, G. Rotondano, R. Marmo, R. Piscopo, C. Meucci, Endoscopic clipping of perforation following pneumatic dilation of esophagojejunal anastomotic strictures, *Endoscopy* (2000), <http://dx.doi.org/10.1055/s-2000-7032>.
- [8] H.S. Kim, D.K. Lee, Y.S. Jeong, K.H. Kim, S.K. Baik, S.O. Kwon, M.Y. Cho, Successful endoscopic management of a perforated gastric dysplastic lesion after endoscopic mucosal resection, *Gastrointest. Endosc.* (2000), [http://dx.doi.org/10.1016/S0016-5107\(00\)70305-1](http://dx.doi.org/10.1016/S0016-5107(00)70305-1).
- [9] S. Mizobuchi, K. Kuge, H. Maeda, Y. Matsumoto, M. Yamamoto, S. Sasaguri, Endoscopic clip application for closure of an esophagomediastinal-tracheal fistula after surgery for esophageal cancer, *Gastrointest. Endosc.* (2003), [http://dx.doi.org/10.1016/S0016-5107\(03\)70054-6](http://dx.doi.org/10.1016/S0016-5107(03)70054-6).
- [10] T. Hachisu, S. ichi Miyazaki, K. ichi Hamaguchi, Endoscopic clip-marking of lesions using the newly developed HX-3L clip, *Surg. Endosc.* (1989), <http://dx.doi.org/10.1007/BF00591360>.
- [11] N. Barsic, J. Rivory, O. Monneuse, J.C. Saurin, T. Ponchon, M. Pioche, Successful closure of a refractory rectal anastomotic fistula using endoscopic submucosal dissection combined with an over-the-scope clip, *Endoscopy* (2018), <http://dx.doi.org/10.1055/s-0044-100612>.
- [12] K. Aksoz, G. Yoruk, Z. Buyrac, B. Unsal, M. Haciyanli, A. Bocutoglu, Z. Kozacioglu, Transanal endoscopic repair of rectal perforation with hemoclips, *J. Laparoendosc. Adv. Surg. Tech. - Part A* (2005), <http://dx.doi.org/10.1089/lap.2005.15.170>.
- [13] E. Barbur, G. Sisman, Endoscopic closure of a perforated rectum with an over-the-scope clip following diagnostic colonoscopy, *Endoscopy* (2020), <http://dx.doi.org/10.1055/a-11198-4288>.
- [14] G.S. Raju, L. Gajula, Endoclips for GI endoscopy, *Gastrointest. Endosc.* (2004), [http://dx.doi.org/10.1016/S0016-5107\(03\)02110-2](http://dx.doi.org/10.1016/S0016-5107(03)02110-2).
- [15] H. Kobara, H. Mori, N. Nishiyama, S. Fujihara, K. Okano, Y. Suzuki, T. Masaki, Over-the-scope clip system: a review of 1517 cases over 9 years, *J. Gastroenterol. Hepatol.* (2019), <http://dx.doi.org/10.1111/jgh.14402>.

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