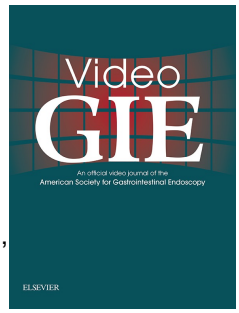

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Intraoperative enteroscopy using a disposable single-use sterile endoscope

Running head: single-use endoscope for intraoperative enteroscopy

Guanyi Liu, M.D.[1], Pei Chen, M.D.[2], Shuai Zuo, M.D.[3], Yingchao Wu, M.D.[3], Wanyin Hou, M.D.[2], YunLong Cai, M.D.[1], Long Rong, M.D.[1]

1 Endoscopy Center, Peking University First Hospital, Beijing, China

2 Department of Nephrology, Peking University First Hospital, Beijing, China

3 Department of Gastrointestinal Surgery, Peking University First Hospital, Beijing, China

Corresponding author: Long Rong, M.D.

Endoscopy Center, Peking University First Hospital, Beijing, China, Fax:+86-83572437, ronglong8@vip.sina.com

Text number: 598

Intraoperative enteroscopy using a disposable single-use sterile endoscope

Guanyi Liu[1], Pei Chen[2], Shuai Zuo[3], Yingchao Wu[3], Wanyin Hou[2], YunLong Cai[1], Long Rong[1]

1 Endoscopy Center, Peking University First Hospital, Beijing, China

2 Department of Nephrology, Peking University First Hospital, Beijing, China

3 Department of Gastrointestinal Surgery, Peking University First Hospital, Beijing, China

Corresponding author: Long Rong, MD

Endoscopy Center, Peking University First Hospital, Beijing, China, Fax:+86-86572437, ronglong8@vip.sina.com

Intraoperative enterscopy is frequently performed based on the requirements of the requesting surgical team. The endoscope used during surgery is normally disinfected with an iodophor before being placed on the platform. However, the effects of disinfection remain unclear. Recently, we successfully performed intraoperative enteroscopy with a disposable single-use sterile endoscope.

A 69-year-old man was admitted to the nephrology ward with edema and a 1-month history of elevated serum creatinine levels. Laboratory tests revealed a serum creatinine level of 1136 (44-133) μmol/L. He was diagnosed with rapidly progressive glomerulonephritis, and a renal biopsy confirmed crescentic glomerulonephritis type III. The patient underwent methylprednisolone pulse therapy (500mg for 3 days) and therapeutic plasma exchange on eight occasions. Following treatment, his renal function significantly improved, with serum creatinine fluctuating between 160 and 210 μmol/L. However, 6 days after methylprednisolone pulse therapy, the patient developed hematochezia, and his hemoglobin levels dropped to a minimum of 40g/L. He was fasted and resuscitated with liquid and blood components, including a total of 17 units red

blood cells. Bedside gastroscopy revealed insignificant chronic gastritis, and colonoscopy revealed blood clots in the terminal ileum, indicating small intestinal bleeding. Celiac arteriography revealed no positive findings. Capsule endoscopy, while potentially helpful in identifying the general intestinal segment affected by the bleeding, was not pursued due to its limitations in pinpointing the exact site of hemorrhage and its inability to provide hemostasis. Additionally, our hospital did not have access to the necessary equipment for balloon enteroscopy hemostasis.

After multi-disciplinary treatment and thoroughly communication with the patient and his family, the patient decided to undergo an exploratory laparotomy. Intraoperative enteroscopy was performed using a disposable single-use sterile colonoscopy (XZING-W200B; Huizhou Xianzan Technology Co., Ltd, Huizhou, China) through an incision 70cm downward from the ligament of Treitz where a visible small vessel was found at the serosal surface (video 1). First, we advanced the scope in a retrograde manner to the upper side of the small intestine until there was no blood in the lumen. With the help of surgeons manually pushing the bowel over the scope, the entire small intestine could be observed through the endoscope, revealing a visible vessel with an overlying fibrin clot (figure 1). Although no active bleeding was observed, we believed this was the cause of the bleeding episode; thus, two clips were passed through the operative channel and fixed to the vessel site to prevent rebleeding (figure 2). After the operation, the bleeding stopped for 4 days but then reappeared. Intraoperative enteroscopy was

repeated, and enterectomy of the suspicious intestinal segment with the visible vessel was performed. Pathological examination revealed intestinal mucosal inflammation and erosion, with dilated small arterioles and veins in the submucosa. We supposed that these changes might be attributed to the vasculitic nature of his primary renal disease, which was exacerbated by the use of steroids. The patient gradually improved and was finally discharged from our hospital.

Because of the coronavirus disease 2019 (COVID-19) outbreak, healthcare providers have become increasingly aware of the risk of infection due to sterilization process(1). Disposable single-use endoscopes are extremely suitable for scenarios that require high-level disinfection or involve high-risk patients, such as intraoperative endoscopy or endoscopy for immunocompromised and multidrug-resistant bacterial-infected patients(2). The cost of such an endoscope is approximately $1500. The endoscope is disposed as medical waste, eliminating the risk of infection from reuse. In this case, we confirmed that the technical feasibility, operability, and image quality of the disposable single-use endoscope were satisfactory for most endoscopists. Overall, the disposable single-use endoscope opens up a new horizon for endoscopists in intraoperative endoscopy examinations and other scenarios.

Reference:

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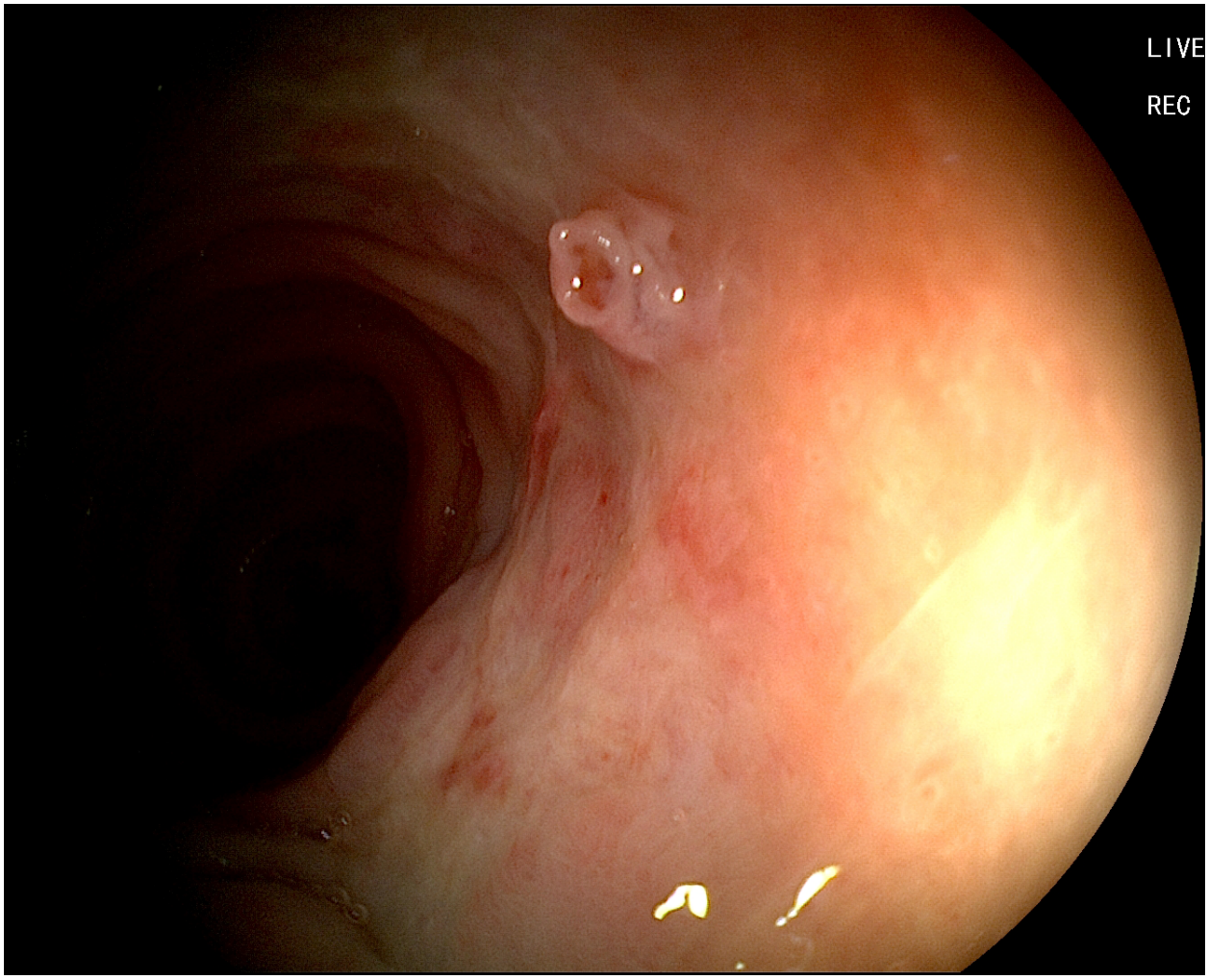
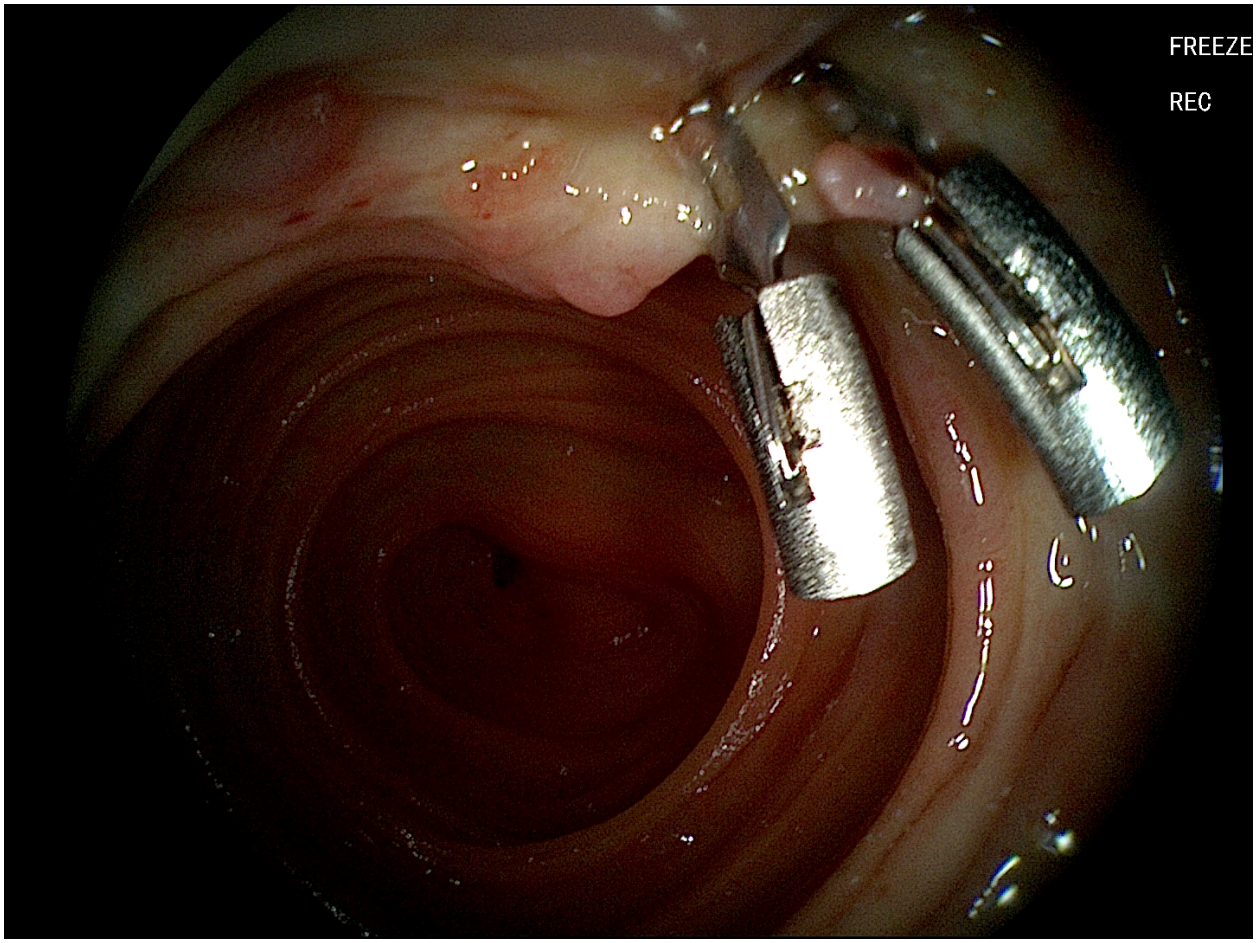
2020;48(3):309-15.

Video text:

Intraoperative enteroscopy was performed using a disposable single-use sterile colonoscopy and portable endoscopy mainframe with an imaging processor. The working length of the endoscope was 1300mm, and the outer diameter was 14mm, with a 3-mm instrument channel. The endoscope was inserted into the intestine through an incision 70cm downward from the ligament of Treitz, where a visible vessel was found at the serosal surface. First, we advanced the endoscope in a retrograde manner to the upper side until there was no obvious blood in the lumen. We then carefully observed while pulling the endoscope backward to identify the suspicious bleeding foci. With the help of the surgeons manually pushing the bowel over the scope, we proceeded downward to the terminal ileum. The surgeon's pressure on the distal part of the view revealed the position of the ileocecal valve. The small intestine was carefully examined endoscopically while we pulled the endoscope backward. A visible vessel with an overlying fibrin clot was observed; however, no active bleeding was observed. The vessel was confirmed to be located at the mesenteric side, where it was inconvenient for surgeons to place local sutures. This was believed to be the cause of the bleeding episode; thus, two clips were passed through the operative channel and fixed to the vessel site to prevent rebleeding. After carefully adjusting the endoscope, we successfully released the first clip, and the release of the second clip is also shown in the video. After the operation, the bleeding stopped for 4 days but then

reappeared. Enterectomy of the suspicious intestinal segment with the visible vessel was performed. The patient gradually improved and was finally discharged from our hospital.


LIVE
REC


FREEZE
REC

Video legend: The process of intraoperative enteroscopy using a disposable single-use sterile endoscope

Figure legend:

Figure 1 A visible vessel with an overlying fibrin clot was observed during enteroscopy.

Figure 2 Two clips were passed through the operative channel and fixed to the vessel site to prevent rebleeding.

COVID-19　corona virus disease 2019

Running head: single-use endoscope for intraoperative enteroscopy