

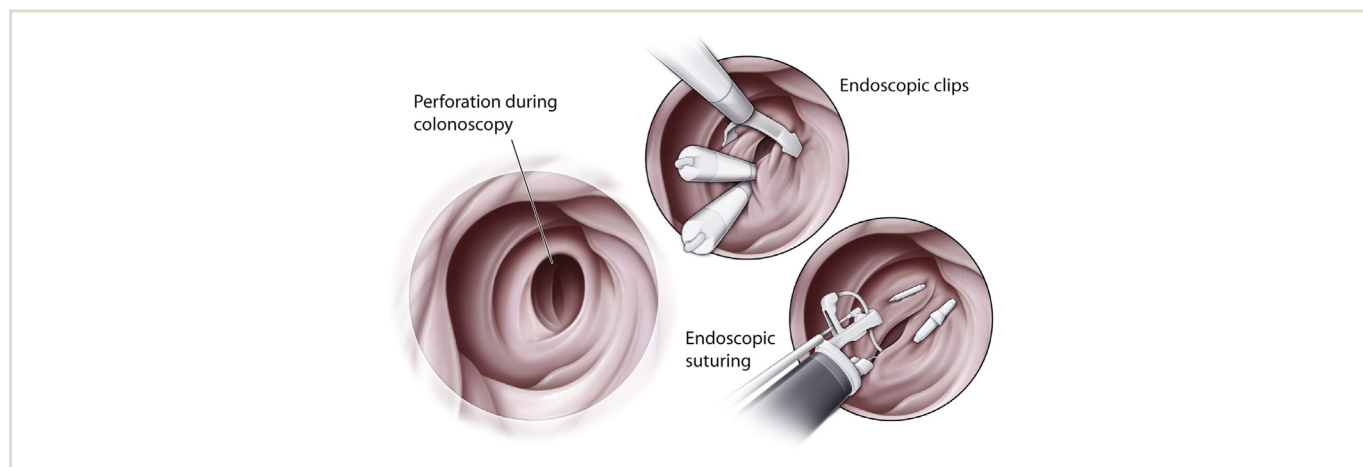
Endoscopic management of colonic perforations: clips versus suturing closure (with videos)



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GRAPHICAL ABSTRACT



Background and Aims: Perforation during colonoscopy remains the most worrisome adverse event and usually requires urgent surgical rescue. The aim of this study was to evaluate the feasibility and effectiveness of endoscopic closure of full-thickness colonic perforations.

Methods: We performed a retrospective analysis of all consecutive patients with endoscopically closed colonic perforations over the past 6 years (2009-2014). Colonic perforations were closed by using endoscopic clips or an endoscopic suturing device. Most patients were admitted for treatment with intravenous antibiotics and kept on bowel rest. If their clinical condition deteriorated, urgent surgery was performed. If patients remained stable, oral feeding was resumed, and patients were discharged with subsequent clinical and endoscopic follow-up.

Results: Twenty-one patients had iatrogenic colonic perforations closed with an endoscopic suturing device or endoscopic clips during the study period. Primary closure of a colonic perforation was performed with endoscopic clips in 5 patients and sutured with an endoscopic suturing device in 16 patients. All 5 patients after clip closure had worsening of abdominal pain and required laparoscopy (4 patients) or rescue colonoscopy with endoscopic suturing closure (1 patient). Two patients had abdominal pain after endoscopic suturing closure, but diagnostic laparoscopy confirmed complete and adequate endoscopic closure of the perforations. The other 15 patients did not require any rescue surgery or laparoscopy after endoscopic suturing. The main limitation of our study is its retrospective, single-center design and relatively small number of patients.



This video can be viewed directly from the GIE website or by using the QR code and your mobile device. Download a free QR code scanner by searching “QR Scanner” in your mobile device’s app store.



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Conclusion: Endoscopic suturing closure of colonic perforations is technically feasible, eliminates the need for rescue surgery, and appears more effective than closure with hemostatic endoscopic clips. (Gastrointest Endosc 2016;84:487-93.)

(footnotes appear on last page of article)

Perforation of the colonic wall remains the most worrisome adverse event of endoscopic intervention, and usually requires immediate open or laparoscopic surgical repair or colon resection.^{1,2}

Colonoscopy has become the standard modality for early detection and prevention of colorectal cancer.³ In the United States, more than 14.2 million screening colonoscopies are performed annually.⁴ Considering the reported perforation rate of 0.1% (1:1000) during screening colonoscopy, at least 14,200 colonic perforations are estimated to occur in the United States every year.^{1,2,5,6} Therapeutic interventions, such as removal of colonic polyps or resection of early colon cancer, have an even higher perforation rate compared with screening colonoscopy. The latest published meta-analysis reported a perforation rate of 1.4% during 973 colonic EMRs and a 5.7% rate of perforation during 1326 colonic endoscopic submucosal dissections (ESDs).⁷

Previous studies have demonstrated successful endoscopic closure of colonic perforations with both endoscopic clips and suturing devices on live animal models.⁸⁻¹⁰ However, in our review of available medical literature, we were unable to find any large study devoted to endoscopic closure of colonic perforations in humans other than several reports involving a small number of patients.¹¹⁻¹³ We performed a retrospective analysis of colonic perforations treated endoscopically at our institution over the past 6 years to evaluate the feasibility and effectiveness of endoscopic closure of full-thickness perforations encountered during colonoscopy.

METHODS

We obtained permission from the institutional review board of Mercy Medical Center to perform a retrospective analysis of medical records of consecutive adult patients who had endoscopic closure of documented colonic perforations over the past 6 years (2009-2014).

All patients had undergone screening or therapeutic colonoscopy. Demographic and clinical data including patient age, sex, indications for colonoscopy, pathological diagnosis, lesion size and location, adverse events, and follow-up results were collected for all patients. All data were entered into an Excel database and analyzed. Our primary study outcome was to determine the need for rescue

laparoscopic or open surgery after endoscopic repair of a colonic perforation.

All endoscopic repairs of colonic perforations were performed by the same endoscopist (S.V.K.) with the patient under intravenous sedation or general anesthesia. All procedures were performed with carbon dioxide insufflation.

When the perforation was diagnosed during colonoscopy, we continued the same mode of anesthesia, the patient was given intravenous antibiotics, and an attempt to repair the perforation was made with either endoscopic clips (Resolution; Boston Scientific Inc, Natick, Mass) or an endoscopic suturing device (Overstitch; Apollo Endosurgery Inc, Austin, Tex). Endoscopic clips were applied through the biopsy channel of the colonoscope used for the primary procedure (PCF-H180AL or CF-H180AL; Olympus, Tokyo, Japan).

To perform endoscopic suturing closure of a colonic perforation, the colonoscope was removed, and a double-channel endoscope (GiF 2T-180; Olympus) preloaded with an Overstitch endoscopic suturing device was inserted. The colonic wall defect was completely closed by full-thickness sutures creating a continuous suture line or by separated stitches, as described previously.¹⁴⁻¹⁶

To release pneumoperitoneum, a sterile angiocatheter (BD Insyte Autoguard Infusion Therapy System; Boston Dickinson Inc, Sandy, Utah) or Veress needle (Endopath Ethicon Endo-Surgery, LLC, Guaynabo, Puerto Rico) connected to a syringe with a sterile normal saline solution was placed in the peritoneal cavity through the abdominal wall (Video 1, available online at www.giejournal.org). After completion of the suturing closure to confirm airtight closure, an air-leak test was performed (Video 2, available online at www.giejournal.org), and then the angiocatheter (or Veress needle) was removed.

After colonoscopy, initial blood work (complete blood cell count, coagulation, and metabolic profile) was performed, and an abdominal radiograph in the flat and upright position (to determine the presence of intraperitoneal air) was taken. Most patients were admitted for observation and kept on bowel rest with intravenous fluids and antibiotics. If the clinical condition deteriorated (increased intensity of abdominal pain or clinical signs of peritonitis), urgent laparoscopy was performed by the collaborating surgeon. If the patient remained stable for 24 hours, oral feeding was resumed, and the patient was discharged home. Subsequent clinical follow-up included a phone conversation within 7 to

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