Widespread use of screening colonoscopy has led to the identification and endoscopic resection of colonic polyps. Even very large and flat polyps can now be successfully removed endoscopically by using EMR and endoscopic submucosal dissection techniques. Although very successful, these techniques can potentially cause serious, even life-threatening complications.

The article by Swan et al in the current issue of Gastrointestinal Endoscopy deals with the most serious complication of EMR: perforation of the colonic wall. The authors analyzed endoscopic treatment of 445 patients with large (>20 mm in diameter) laterally spreading tumors and sessile colonic polyps. This analysis led to identification of a new endoscopic marker of colonic perforation—the target sign.

The authors used normal saline solution mixed with indigo carmine for submucosal injection and gave the following description of the target sign: “The resected [muscularis propria] appears on the transected surface of the specimen as a white to gray central circular disk, ‘the target,’ surrounded by a web of blue-stained submucosal connective tissue (after submucosal injection), which is then encircled by the white cauterized mucosa.” Although the authors emphasized the role of both colored solution for submucosal injection and the depth of resection in generating the target sign, it seems that resection (full or partial) of the muscularis propria layer of the colonic wall (ie, depth of resection) is far more important than the solution used to create a submucosal cushion: I have seen the target sign in cases of inadvertent resection of the muscularis propria even when normal saline solution without any colored additives was used for submucosal injection during colonic EMR (Fig. 1).

How important is this newly described target sign for a practicing gastroenterologist? The target sign has very important clinical value. Colonic perforations have been reported in 2% to 10% of patients undergoing colonic EMR and endoscopic submucosal dissection. Most frequently, the perforation is suspected in patients reporting abdominal pain after polypectomy and usually is confirmed by peritoneal signs on physical examination and the presence of free air on an abdominal radiograph or CT scan. However, these are relatively late subjective and objective findings caused by irritation of the parietal and visceral peritoneum by the colonic content and air leaking through the perforation into the peritoneal cavity. In patients with full-thickness inadvertent resection of the colonic wall, clinical manifestations can develop faster (depending on the size of the perforation), but in patients with a partial-thickness resection of the colonic wall, the diagnosis of perforation could be delayed by several hours (Figs. 2 and 3). As a result of the diagnostic delay, most patients with colonic perforation after polypectomy require surgery, not only to close the colonic defect, but also to wash and clean the contaminated intestinal content and infection from the peritoneal cavity.

The target sign, as described by Swan et al, can potentially give us a new weapon: if we are able to diagnose a...
partial- or full-thickness defect in the colonic wall right after EMR, then we can immediately close the perforation, preventing leakage of the intestinal content into the peritoneal cavity. Several previously published experimental animal studies have already demonstrated good results of endoscopic closure of colonic perforations by using endoclips and endoscopic suturing devices.\(^8,9\) The current study again confirmed the adequacy of endoscopic closure of colonic perforation: the closure with clips was so tight that none of the patients (including 3 patients with full-thickness perforations) had subdiaphragmatic intraperitoneal air on postprocedure abdominal radiographs or CT scans.\(^2\)

In addition, Swan et al demonstrated that use of the target sign can potentially cause a paradigm shift in management of colonic perforations: immediate endoscopic closure of a colonic defect with administration of broad-spectrum antibiotics right after endoscopic detection of the target sign during polypectomy eliminated surgery in all patients (100%) and obviated the need for inpatient observation in 70% of patients with partial- and even full-thickness colonic perforations.\(^2\)

Multiple questions about the clinical value of the target sign still need their answers: How sensitive and how specific is the target sign? Is it only valid for the colon, or is it a universal sign applicable to resection of any portion of the GI tract? If the target sign is positive, what is the maximal size of the defect that we can close endoscopically without the need for surgery? How many hours after the procedure should the patient be on bowel rest and when can the patient be discharged home?

It is probably too early to recommend changing our current approach to colonic perforations based on a relatively small (only 10 patients with the target sign), non-randomized study performed in a single, highly specialized tertiary center. However, the main recommendation of this study about meticulous inspection of the EMR site and the resected specimen during and after the procedure with particular attention to the presence of the target sign should already be implemented by every gastroenterologist removing large colonic lesions, and it can potentially significantly improve our management of colonic perforations after EMR.

**DISCLOSURE**

The author disclosed no financial relationships relevant to this publication.

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**REFERENCES**


Registration of Human Clinical Trials

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