Closing Perforations and Postperforation Management in Endoscopy

Esophagus and Stomach

Stavros N. Stavropoulos, MD*, Rani Modayil, MD, David Friedel, MD

KEYWORDS

• Perforation • Endoscopic closure • Through-the-scope clip • Over-the-scope clip • Stent

KEY POINTS

- Endoscopic closure of perforations can be successfully achieved using a variety of devices.
- Even with endoscopic closure of perforations, the patient needs continued close monitoring with multidisciplinary input.
- Endoscopic closure of perforations effectively creates a leakproof seal, permits healing of perforation, prevents peritonitis, and limits peritoneal and mediastinal adhesions.

INTRODUCTION

Gastrointestinal luminal perforation may result from passage of the endoscope itself, diagnostic/therapeutic maneuvers (biopsy, dilation, ablation, polypectomy, endoscopic mucosal resection [EMR]/endoscopic submucosal dissection [ESD]), barotrauma (rare), or increasingly purposeful perforation, as in natural orifice transluminal endoscopic surgery (NOTES), including peroral endoscopic myotomy (POEM). Herein the authors emphasize endoscopic nonoperative management and their own and prior clinical experience in the literature, although animal studies are discussed regarding the rapidly evolving field of gastric perforation closure.

EPIDEMIOLOGY

A large retrospective analysis from the Mayo Clinic noted a perforation rate of 1 in 3000 upper endoscopy procedures, with a 38% higher rate with therapeutic

Disclosures: Dr S.N. Stavropoulos is a consultant for Boston Scientific. Drs R. Modayil and D. Friedel have no relevant disclosures.
Department of Gastroenterology, Hepatology and Nutrition, Winthrop University Hospital, 222 Station Plaza North, Suite 429, Mineola, NY 11501, USA
* Corresponding author.
E-mail address: sstavropoulos@winthrop.org

Gastrointest Endoscopy Clin N Am 25 (2015) 29–45
http://dx.doi.org/10.1016/j.giec.2014.09.008 giendo.theclinics.com
1052-5157/15/$ – see front matter

intervention.[1] Most of these perforations were esophageal (51%) and duodenal (32%), with only 3% gastric. The overall mortality was 17%, and 31% of deaths were related to esophageal perforations. Nearly half of these patients were treated nonoperatively; however, one-fifth of the patients failed nonoperative treatment within 3.7 days and required surgical intervention.[1] Meta-analysis of 75 studies of esophageal perforation yielded a pooled mortality of 17% and a mean hospital stay of 33 days.[2] The distal esophagus is the most common site in one review.[3] Gastric ESD is used for submucosal lesion resection and noninvasive neoplasia; one group noted a 5% perforation for the latter indication.[4]

GENERAL PRINCIPLES OF MANAGEMENT

There are several essential initial steps the endoscopist should consider after an actual or suspected upper gastrointestinal perforation. Most importantly, the endoscopist should remain calm because proper management may obviate surgical intervention. Prompt recognition of the perforation and patient positioning minimizes spillage outside the gastrointestinal tract and improves clinical outcomes.[5] Insufflation should be switched to carbon dioxide if room air is used initially. Endoscopic assessment is paramount, with attention to size, edge characteristics, and bleeding.[6] There are a variety of potential closure methods. Parenteral antibiotics and proton-pump inhibitors should be administered immediately and attention given to cardiopulmonary issues. Endotracheal intubation is advisable, although it should not delay closure attempt in an otherwise stable patient. Surgery (general/thoracic) should be notified and the patient triaged for intensive care unit monitoring.

Judicious use of radiologic examinations may be helpful after perforation, including after attempted closure. A lateral neck film may detect air after cervical esophageal perforation. Posterior and lateral chest and abdominal radiographs are ordered for more distal esophageal and gastric perforations. Contrast studies (eg, contrast esophagography to assess for esophageal perforation) using water-soluble agents (eg, gastrografin) are valuable for diagnosing perforation, although occasionally perforations are missed because of technical considerations. Contrast may also be injected during endoscopy to assess perforation and degree of closure after intervention. Computed tomography (CT) is useful when traditional contrast studies are negative, and directs interventions such as drainage of collections. CT can demonstrate mediastinal and subcutaneous emphysema, pleural effusion, and pneumothorax. Patients with conservative treatment of perforations require vigilant clinical and radiographic follow-up.

The mere presence of extraluminal air does not mandate surgery, nor is the amount proportionate to perforation size.[7] On the other hand, air can dissect through tissue planes, and a compartment syndrome caused by air pressure is an emergency. Therefore, appropriate needles such as Veress needles or small-caliber angiocaths should be available to decompress tension pneumothorax and pneumoperitoneum. Needle insertion into the abdomen must be away from areas of potential organ injury (eg, away from surgical scars), and time must be allowed for adequate decompression. Failure to close an esophageal perforation usually mandates surgery. The stomach, on the other hand, is more “forgiving,” and small gastric perforations may be amenable to conservative management. Gastric perforations usually benefit from nasogastric tube insertion for decompression and diversion of luminal contents. In some cases, nonoperative management may be considered in conjunction with interventional radiologic drainage.[7] Patients treated conservatively should keep fasting (nothing by mouth) with intravenous fluids and analgesia. Parenteral nutrition is considered, but