Transluminal washout and debridement of extraluminal contamination as an adjunct to endoscopic defect repair

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Background and Aims: GI tract perforations and anastomotic dehiscence are increasingly being repaired endoscopically; however, well-known and long-held surgical principles must still be honored. One important principle is that significant extraluminal contamination must be washed out, debrided, and drained in conjunction with repair of the defect if the wound is to effectively heal and resolve. Here we describe the use of endoscopic washout and debridement of extraluminal contamination at the time of luminal defect closure in a 7-patient series at our institution, with video demonstration of 2 patients in the series.

Methods: We reviewed a series of 7 patients at our institution and provide a video demonstration of the described technique in 2 patients. A 50-year-old man with decompensated liver cirrhosis presented with a large distal esophageal disruption secondary to a severe Minnesota tube injury. Extensive thoracic and mediastinal contamination of solid and liquid debris was removed and washed out endoscopically, followed by esophageal defect repair. Closure of the defect with overlapping, fully covered, esophageal stents sutured in place was successful after attempts at repairing the primary disruption with suturing alone failed. A 49-year-old man with multiple endocrine neoplasia type 1 and multiple prior surgeries presented with an acute abdomen and sepsis secondary to a fully perforated duodenal ulcer. Extensive endoscopic washout and lavage of the purulent liquid and semiliquid debris covering the liver, stomach, and adjacent structures was performed, followed by closure of the perforation by endoscopic suturing. A percutaneous pigtailed drainage catheter was placed in the extraluminal cavity to facilitate postoperative drainage, followed by placement of a PEG with jejunal extension for enteric exclusion and nutrition.

Results: The results for all 7 patients were reviewed. The overall rate of technical success, defined as effective repair of the luminal defect and drainage of extraluminal contamination, was 100%. The overall rate of clinical success, defined as clinical recovery and return to the patient’s previous state of health, was 86% because 1 patient died because of severe concomitant disease. The length of time from the described procedure to hospital discharge ranged from 8 to 52 days (mean, 27 days).

Conclusion: Endoscopic washout and debridement can effectively and immediately address extraluminal contamination at the time of endoscopic luminal defect repair in appropriately selected patients. Therefore, it may represent a valuable option to address this clinical situation when a more conventional surgical approach is problematic. A more structured study should be considered for the development and validation of this approach. (VideoGIE 2019;4:91-4.)
CASE REPORTS

Patient 1

A 50-year-old man with decompensated liver cirrhosis incurred a large distal esophageal tear complicated by extraluminal contamination, apparently secondary to Minnesota tube misplacement during treatment of a variceal bleed. Because the patient was a very poor surgical candidate, an endoscopic approach to this esophageal perforation was used. The initial endoscopic evaluation revealed an enormous distal esophageal disruption with heavy contamination of the thoracic cavity with food and fluid (Fig. 1).

Closure of the defect by stent placement after extensive endoscopic debridement and washout was successful but was then complicated by stent migration and 2 subsequent failed endosuturing attempts. Defect closure was finally achieved with fully covered, overlapping esophageal stents secured in place with 3 sutures. During 3 of the endoscopic repairs, all solid debris in the thoracic cavity was removed with suction, a Roth net, or a snare, followed by high-volume lavage.

There was complete resolution of the damaged areas at 3 months, and ultimately the patient returned to a regular diet and full activities of daily living. At follow-up, he was considered too well for liver transplantation after recovery and cessation of alcohol use.

Patient 2

A 49-year-old man with multiple endocrine neoplasia type 1 and multiple previous abdominal surgeries was transferred to our institution with signs and symptoms of an acute abdomen with secondary abdominal sepsis stemming from a fully perforated duodenal ulcer. CT showed high-grade extravasation of oral contrast material from the second part of the duodenum, with free air consistent with a duodenal perforation (Fig. 2). Endoscopic options for the management of the acute duodenal perforation were sought in light of the hostile aspect of the abdomen.
Upper endoscopy showed a 6-mm opening on the posteromedial aspect of the second part of the duodenum, which was partially epithelialized as a result of chronic ulceration (Fig. 3). The epithelialized edges of the disruption were debrided with cold forceps, and the defect was widened to 11 mm to allow access to the contaminated abdominal cavity with a standard 9-mm upper adult upper-endoscope.

Extensive endoscopic washout and lavage of the purulent liquid and semiliquid debris covering the liver, stomach, and adjacent structures was performed. The 11-mm defect was then closed by endoscopic suturing, and a percutaneous pigtailed drainage catheter was placed into the contaminated area to facilitate further drainage, followed by placement of a PEG with jejunal extension. A small-bowel contrast study 3 weeks after endoscopic repair showed no extravasation of contrast material from the duodenum (Fig. 4). The percutaneous drainage catheter and the feeding tube were removed as the patient was able to tolerate a regular diet.

Now compliant with an intensified acid-suppressive regimen, the patient recovered well and returned to work 3 weeks after discharge.

CONCLUSION

Endoscopic washout and debridement can immediately address extraluminal contamination at the time of luminal defect repair in appropriately selected patients and thus may serve as an important adjunct to traditional percutaneous and surgical treatment of luminal perforations. A brief overview of the 7 patients treated with the described techniques of transluminal debridement and washout with immediate luminal defect repair at our institution is summarized in Table 1. This provides a key surgical principle.

| Patient D | Patient E | Patient F | Patient G |
|-----------|-----------|-----------|-----------|
| 49-year-old man | 78-year-old woman | 71-year-old woman | 55-year-old man |
| Duodenal ulcer from Zollinger-Ellison syndrome | Iatrogenic (E-J anastomotic dehiscence) | Iatrogenic (G-J anastomotic leak) | Iatrogenic (E-G anastomotic leak) |
| 6- to 8-mm posterolateral D2 perforation | 50% disruption of E-J anastomosis | 3-cm gastric disruption along lesser curvature | 2-cm disruption at the E-G anastomosis |
| Abdominal | Mediastinum | Abdominal | Mediastinum |
| Purulent and liquid debris | Purulent and liquid debris | Yes (purulence and “overt infectious material”) | Liquid and solid debris |
| Washout and debridement with endoscopic suturing | Washout with esophageal FCSEMS | Washout and endoscopic suturing | Washout, debridement, endoscopic suturing, and FCSEMS sutured in place |
| 8 days | 14 days | 12 days | 50 days |

Figure 3. Upper endoscopic view showing a 6-mm opening on the posteromedial aspect of the second part of the duodenum.

Figure 4. Small-bowel contrast study 3 weeks after endoscopic repair showing no extravasation from the duodenum. The tip of the percutaneous drain is present in the right upper quadrant as indicated by the red arrow. Several loops of opacified jejunum are indicated by the yellow arrow.
of addressing extraluminal contamination in an efficient and minimally invasive manner in appropriately selected patients.

This series and the demonstrated technique are not proposed to routinely replace the standard surgical or interventional radiologic approaches. Our experience suggests that a more structured study be considered for the development and validation of this approach.

**DISCLOSURE**

*Dr Moyer, Dr Maranki, and Dr Mathew are consultants for Boston Scientific. All other authors disclosed no financial relationships relevant to this publication.*

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