MICROLARYNGOSCOPIC REPAIR OF IATROGENIC PHARYNGEAL POUCH PERFORATIONS: TREATMENT OF CHOICE?

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Abstract: Background. Endoscopic stapled diverticulostomy (ESD) has become the preferred technique for managing pharyngeal pouches. Iatrogenic perforation, created during stapling, is a rare but serious complication with significant morbidity and mortality. The conventional management in these instances is to convert it to an external procedure and excise the pouch. Methods. Iatrogenic perforations were noticed after stapling in 3 cases in our series of 73 patients who underwent ESD. They were repaired using microlaryngoscopic techniques. Results. All patients had an unremarkable postoperative course. Conclusions. Selected cases with iatrogenic perforations can be repaired primarily and observed with excellent outcome, obviating the need for an external pouch excision. © 2006 Wiley Periodicals, Inc. Head Neck 29:189–192, 2007

CASE REPORTS

Pharyngeal pouches are uncommon conditions that can cause significant morbidity if left untreated. The treatment of pouches has been revolutionized after the introduction of the endoscopic staple diverticulostomy (ESD). This has been shown to be safe and reliable in treating symptoms with a high degree of success. Complications are uncommon. The most serious is perforation of the fundus of the pouch at the time of stapling. If unrecognized, this can lead to mediastinitis, which is associated with high morbidity and mortality rates. The conventional management of a perforation detected at the time of stapling is to convert to an external procedure and excise the pouch. Repair of the tear using microlaryngoscopic technique has been described once in the literature. We report here a further 3 cases that have been successfully managed with no additional complications.

Patient 1. An 84-year-old woman presented with difficulty in swallowing solids, a foreign body sensation in the throat, and globus phenomenon. Contrast swallow identified a medium-sized pharyngeal pouch (van Overbeek system). She underwent stapling of the pouch party wall under telescopic guidance with a staple gun. When the stapling gun was removed, a 2-cm defect was seen at the base of the pouch. This was repaired with
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All pouches were stapled with the Technique.

**Patient 2.** A 71-year-old woman underwent stapling of a large pouch, with difficult access owing to prominent upper teeth. One staple cartridge was fired with satisfactory stapling of the bar, but the tip of the staplegun had perforated the pouch posteriorly. The perforation needed 2 stitches of 5-0 braided Polyglactin 910 (Vicryl, Ethicon, Piscataway, NJ) for repair. She was fed by nasogastric tube feeds for 5 days and a repeat contrast swallow confirmed no evidence of mediastinal leakage. She was discharged home on the sixth postoperative day and was reviewed 1 month postoperatively when she was swallowing well.

**Patient 3.** A 76-year-old woman at presentation had dysphagia of 4 years’ duration, associated with weight loss. She also complained of gurgling noises on swallowing. Contrast swallow showed a large pharyngeal pouch with small amount of aspiration noted between swallows. Endoscopic stapling of the pouch was performed using 2 cartridges. The tip of the staplegun on the second run punctured the pouch leaving a small defect. This was sutured under the microscope with 5-0 braided Polyglactin 910 (Vicryl, Ethicon, Piscataway, NJ) and needed 4 stitches. The integrity of closure was confirmed using a telescope.

She was allowed fluids on the same day and soft diet on the first postoperative day. She developed a chest infection secondary to aspiration, but there was no clinical evidence of mediastinitis. She was discharged home on the fifth postoperative day. She was reviewed at 6 weeks postoperatively and her swallowing was much improved.

**Technique.** All pouches were stapled with the Endopath ETS endoscopic linear cutter TSB35 (Ethicon Endo-Surgery) using 3.5-mm cartridges. A Hopkins rod telescope was used to confirm the positioning of the staplegun and examine the results. Suturing of the perforations was carried out under the operating microscope using microlaryngeal instruments. Two pairs of Storz microlaryngeal crocodile forceps were used, 1 as a needle holder and 1 as tissue forceps. Knots can be tied by hand outside the scope, after suture placement, and advanced down into position using the same forceps, but there is room to tie them down the scope using 1 of the microlaryngeal forceps. Purpose-designed microlaryngeal needle holders would make suture placement easier but were not available to us at the time. Sutures were cut using standard microlaryngeal scissors.

**DISCUSSION**

A recent systematic review identified an incidence of 0% to 17% of complications following minimally invasive pouch surgery, as opposed to a 29% to 38% complication rate with external procedures. In a retrospective review of 159 consecutive stapling procedures, Chang et al reported the most common complications to be chipped teeth (7.3%), followed by postoperative fever (4.0%). Pouch perforation is a rare complication of ESD. In a review of iatrogenic pharyngeal pouch perforations caused by ESD, Mirza et al reported an incidence of pouch perforation to be 3.5% in 430 procedures. There have been subsequent reports, even in experienced centers.

In our 3 cases of perforation, there was no problem with the stapling or the incision made by the staplegun between the lines of staples. The gun is designed such that the incision does not extend to the end of the staples so as to maintain a watertight seal on either side. After using the staplegun and inspecting the result, we have on occasions extended the incision a little using microlaryngeal scissors, although we have no evidence that this improves the outcome. The perforations in our patients occurred as a result of the metal tip of the staple cartridge puncturing the thin wall of the fundus of the pouch, which would seem more likely in elderly subjects. After experiencing these complications, we analyzed the stapling process, looking for ways to avoid further perforations. This led us to 3 conclusions. First, and most obvious, is the need to avoid perforating the pouch on initial insertion of the staplegun. This could only occur in small or medium-sized pouches or, if more than 1 stapling is carried out, in larger ones. Second, closure of the staplegun draws the anterior wall of the pouch toward the esophagus; if the distal end of the diverticuloscope has been opened so widely as to put the pouch under some tension, this drawing forward of the anterior pouch wall by the metal “anvil” of the staplegun may lead to perforation by the anvil tip. There needs to be some slack in the pouch to allow for the closure of the pouch.
They describe 26 patients in whom the bar of the zon, who have the largest published series of leaks in the experience of Richtsmeier and Monz, ETS-Flex45 has been cited to be the cause of 2 standard cartridge that comes with the Endopath have been taken and find it quite safe to use. The and as long as the precautions mentioned earlier have been taken and find it quite safe to use. The standard cartridge that comes with the Endopath ETS-Flex45 has been cited to be the cause of 2 leaks in the experience of Richtsmeier and Monz, who have the largest published series of ESD. On the basis of experimental evidence, they concluded that the leak occurred at the apex of the incision because of the conformation of the 3.5-mm cartridge, which has only 2 rows of staples.

In the literature, the most common management option used after identifying an iatrogenic perforation was immediate conversion to an external approach and diverticulectomy. Perforations identified postoperatively tend to have a worse prognosis.

Endoscopic placement of sutures is not a difficult technique for the otolaryngologist. In the setting of the pharyngeal pouch, Scher and Richtsmeier advocate placing 2-0 retraction sutures on either side of the cricopharyngeal bar prior to stapling. These authors have also been the first to describe endoscopic sutures to close an iatrogenic perforation in a subsequent paper. They used an endoscopic needle holder and 3-0 chromic sutures to close the perforation. There have been other sporadic reports of closure of mucosal tears noticed at the time of stapling. Gross et al sutured 2 of 3 “mucosal interruptions” through the endoscope; both patients were discharged home within 72 hours. They do not qualify if these complications were perforations. However, Adams et al describe repairing 2 of 3 iatrogenic perforations, occurring in 21 ESDs, in the apex of the pouch by “minimally invasive techniques.” Neither of these patients had postoperative complications.

The strongest indicator that endoscopic suturing is a safe option comes from Sommer et al. They describe 26 patients in whom the bar of the hypopharyngeal pouch was completely divided until the mediastinal space was opened; the mucosa was subsequently closed and sealed with fibrin glue. Five patients had postoperative pyrexia, but there was no mediastinitis or mortality.

There is also indirect evidence that a small perforation at the site of the cricopharyngeal bar is best closed endoscopically rather than being observed. Mattinger and Hormann report a series of 52 patients who underwent endoscopic division of the cricopharyngeal bar. Their technique involved division of the cricopharyngeus with a carbon dioxide laser or scissors until “the mediastinal fat could be seen through a thin layer of esophageal adventitia.” All patients received intravenous antibiotics. Most of the patients in this series had postoperative fever and leukocytosis with a complication rate of 13.5%, but there was no mortality in the cohort, with only 2 patients showing clinical signs of mediastinitis. The mean hospital stay in this study was 7.2 days, with all patients receiving intravenous antibiotics.

The middle layer of the deep cervical fascia invests the visceral structures, called the buccopharyngeal fascia posteriorly. Cadaver studies have shown that the buccopharyngeal fascia is intact after endoscopic cricopharyngeal myotomy. It is very likely that the buccopharyngeal fascia plays an important role in impeding spread of infection in the presence of a mucosal tear, as shown by the good outcome even when the mucosa is not repaired, or even when large tears are managed conservatively as in the case of staple failure. These studies challenge the conventional view that iatrogenic perforations have to be converted to an external procedure to avoid the risk of mediastinitis.

Between 1997 and 2004, a total of 73 pharyngeal diverticula have been stapled in our department. As seen in the case of our third patient, the perforation did not in any way alter the postoperative management once it had been repaired. She resumed oral feeds on the first postoperative day as per our usual protocol.

From this limited series and the review presented, we believe that endoscopic repair of iatrogenic perforations should be performed rather than conversion to an external approach for diverticulectomy. The reason for variable delays in commencing oral feeds is part of the initial learning curve, and we believe that, if a watertight closure can be obtained, oral fluids can be commenced on the same day. This technique is safe, avoids the higher complication rate of an external

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procedure, is repeatable, and should be the technique of choice if the perforation can be visualized in its entirety.

REFERENCES