Treatment of esophageal perforations and anastomotic leaks: the endoscopist is stepping into the arena

Over the last 15 years, self-expanding stents have increasingly been used for the palliation of malignant dysphagia and the sealing of malignant esophagorespiratory fistulas. For most of this period, the available stent types were made of metal. Preloaded stents are delivered over introduction catheters with a diameter of only 5 to 10 mm, requiring little or no dilation before placement. The available metal stents differ in design and in diameter, after full expansion and range, between 16 and 24 mm. They are all partially or fully covered with a membrane to avoid tumor ingrowth through the metal mesh, which occurs in 20% to 30% of patients with uncovered stents. No differences have been demonstrated in efficacy or complication rates between the various types of metal stents.

Recently, a new woven plastic stent made of polyester mesh embedded in silicone, the Polyflex stent (Rüsch AG, Kernen, Germany), was introduced. The Polyflex stent has been shown to be safe and effective in treating malignant esophageal strictures. Although no randomized study has yet been performed, both efficacy and complications are probably similar to those of metal stents, with one exception: migration into the stomach appears more frequent with this stent design. The diameter after placement of different-sized Polyflex stents varies between 16 and 21 mm. The Polyflex stent has the advantage that its purchase cost is approximately 50% lower than that of metal stents. A drawback is that the stent needs to be loaded into the delivery device before stent placement, which may take 3 to 4 minutes. In addition, the diameter of the delivery device is larger than that of the most commonly used metal stents, i.e., 12 to 14 mm; however, if a stricture is not too tight, this usually is not a problem.

A new indication for self-expanding stent placement is the treatment of nonmalignant perforations of the esophagus. These perforations constitute severe injuries, with a high morbidity and mortality if left untreated. Iatrogenic perforations of the esophagus after instrumentation or surgery, i.e., leaking anastomoses, form the most common cause, but it also may occur spontaneously during vomiting (Boerhaave’s syndrome). Successful management depends on early, preferably instant, diagnosis and prompt treatment. The classical surgical treatment options include repair, esophagectomy, or cervical exclusion. Primary closure and mediastinal drainage within 24 hours of the injury have been shown to improve survival. However, after a delayed diagnosis, surgery involves a high morbidity and mortality, particularly in patients with mediastinal and pleural contamination. These patients may be better off with a conservative treatment, because the mortality from surgical interventions equals that of a conservative approach. This is where the endoscopist is now stepping into the arena and, by means of endoscopic techniques, is sealing off these traumatic nonmalignant perforations.

In 2003, we reported a series of 11 patients who presented with either traumatic perforations of the esophagus (n = 8) or anastomotic leaks after esophageal surgery (n = 3). In all patients, a large diameter Flamingo Wallstent (Boston Scientific, Natick, Mass) (proximal diameter 30 mm) or a Ultraflex stent (Boston Scientific) (proximal diameter 28 mm) was placed a median of 60 hours (range 24 hours to 28 days) after the initial clinical symptoms of perforation. The stents completely sealed off the perforation in 9/11 patients, whereas two patients still needed esophageal resection because of incomplete sealing (n = 1) or incomplete drainage of the mediastinum (n = 1). In 7 patients, the stents were retrieved endoscopically. In the case of Ultraflex stents, this was done by collapsing the stent by its purse string suture. In the case of Flamingo Wallstents, careful traction with a biopsy forceps on all 4 quadrants of the tubular mesh of the metal stent was applied. In 5 patients, the stent could be retrieved intact after remaining in place for 6 to 7 weeks. In the other two patients, the stents could only be removed in a piecemeal fashion, because the proximal and distal uncovered parts of the stent had become deeply embedded in the wall of the esophagus. These stents had been in place for 11.5 and 14 weeks, respectively. One of the latter patients developed an esophagorespiratory fistula 2 weeks after stent removal.
It was found that a metallic strand from the stent, left behind during piecemeal retrieval, had created a fistula in the wall of the esophagus. It was removed endoscopically, and the patient recovered.

The Polyflex stent has two characteristics that may make it more advantageous than metal stents for treating nonmalignant esophageal perforations. The Polyflex stent is completely covered by a soft silicone layer, which may result in less proliferation of inflammatory tissue, which is seen with partially covered metal stents at their uncovered ends. Another feature of the Polyflex stent is that it narrows under pressure, this is in contrast to, for example, Ultraflex stents, and can thus be removed more easily. Last year, Hünerbein et al. described 19 patients with anastomotic leaks after esophagectomy treated between 1998 and 2003. The first 10 patients were treated by reexploration (n = 7) or conservative means (n = 3), whereas the last 9 patients received a large-diameter Polyflex stent (proximal diameter 25 mm) a median of 8 days (range 2-11 days) after resection. In the stent group, leak occlusion was established in 8 (89%) patients. The mean time to stent removal was 4 weeks. In comparison with the other treatment groups, stent patients had earlier oral intake (11 vs. 25 days) and a shorter hospital stay (35 vs. 57 days). Gelbmann et al. used Polyflex stents of different sizes for anastomotic leaks after esophageal resection (n = 5) or perforation (n = 4). In 7/9 (78%) patients, the leaks were completely sealed. Stent migration occurred in 3 (33%) patients, but the stents could all be repositioned. In 6 patients, the stents were removed without difficulty after a mean of 19 weeks. Two patients died from sepsis and one from the underlying malignancy.

In this issue of Gastrointestinal Endoscopy, Schubert et al. report the placement of Polyflex stents in 12 patients with clinically and radiologically evident esophageal anastomotic leaks, 3 to 12 days after resection of an epiphrenic diverticulum (n = 1), esophagectomy for esophageal cancer (n = 9), and gastrectomy for gastric cancer (n = 2). The extent of the esophageal wall dehiscence ranged from 20% to 70% of the anastomotic circumference. The investigators are to be congratulated on their detailed descriptions of the clinical course and outcomes in these patients. In contrast to the other reported series, their initial treatment consisted of endoscopic lavage and debridement at 2-day intervals before stent placement. This was continued until the anastomotic fistulas were sufficiently cleaned, incipient granulation tissue was seen, and putrid drain efflux had ceased (median duration 5 days; range 4-18 days). When these criteria were fulfilled, a large diameter Polyflex stent (proximal diameter 25 mm) was placed to seal off the leakage a median of 15 days (range 10-45 days) after surgery. Simultaneously the perianastomotic mediastinum was drained by chest drains. All 12 patients were successfully treated by endoscopic stent placement without the need for re-operation. A complete closure of the leakage was achieved in 11 of 12 patients after stent removal (median time to stent retrieval: 4 weeks, range 2-8 weeks). In one patient, a persistent leak after stent removal was sealed endoscopically by 3 clips. Distal stent migration was seen in two patients.

What can we learn from this series? Firstly, Schubert et al. established criteria for esophageal stents to be successful in anastomotic perforations. In patients with small leaks (less than 30% of the circumference), they recommend endoscopic fibrin glue injection or clipping, although no results were reported. There, however, are case reports showing that this approach is effective. When a dehiscence is 30% to 70% of the circumference, stent placement was found to be successful. However, a dehiscence of more than 70% of the anastomotic circumference was thought to be unsuitable for stent placement and re-operation is required. I largely agree with these recommendations, however, in our experience, the patients who are most likely to profit from stent placement are those with an esophageal-wall dehiscence of 25% to 50% of the circumference. If a dehiscence is smaller than 25%, endoscopic clipping or fibrin glue usually is sufficient, whereas patients with a dehiscence larger than 50% of the circumference often need a surgical procedure.

Secondly, the investigators added traditional surgical principles to their treatment algorithm. Before stent placement, endoscopic cleansing of the fistula and perianastomotic mediastinum was performed on a regular basis. Only when the drains stopped producing purulent efflux and granulation tissue in the fistulous tract was observed, was a stent placed. I am not sure whether endoscopic cleaning is indeed needed and whether adequate drainage of the mediastinum and pleural cavity, in combination with immediate stent placement, is perhaps also sufficient. In our experience, which now includes more than 30 patients with nonmalignant perforation, adequate drainage and stent placement was successful in more than 90% of patients. The only way to be sure would be to perform a randomized study, however, this requires a multicenter effort because of the relatively low number of cases even in specialized centers.

Thirdly, a large diameter Polyflex stent was used to seal the anastomotic leak and to minimize the risk of persisting contamination of the perianastomotic mediastinum. It may well be that larger diameter stents are less likely to migrate in an esophagus without a stricture to fix the stent in place. Nevertheless, in both the studies of Schubert et al. and of Gelbmann et al., stent migration was observed. A practical solution could be to fix the stent with an endoclip to prevent the stent from migrating, as was suggested by Gelbmann et al. For this purpose, a small hole was cut through the silicone lining and the polyester mesh of the Polyflex stent before stent insertion. After positioning the stent, an endoclip was placed through the hole.

Fourthly, an interesting issue is the time of retrieval of the stent. In our study, metal stents were removed after a median of 7 weeks, which was considerably longer.
compared with the median time of only 4 weeks in the study by Schubert et al., in which only one patient had a persisting small leak after 4 weeks, which was successfully managed by the placement of endoclips. In the reported studies that used Polyflex stents for this indication, no difficulties were reported in stent retrieval. In fact, Gelbmann et al. reported retrieval of Polyflex stents in 6 patients after a mean period of 19 weeks! In contrast, in our study that used metal stents, two stents had to be removed in piecemeal fashion after a period of 11.5 and 14 weeks, respectively, because the uncovered stent parts were too firmly embedded in the esophageal mucosa. A retained metallic strand resulted in a new fistula in one of these patients. Therefore, it seems preferable to use stents that are completely covered and easily removed. It remains to be established what type of stent material, i.e., metal, polyester, or anything else, is most suitable for these benign indications. The pros and cons of the presently used stent types for sealing nonmalignant esophageal perforations are summarized in Table 1.

Finally, is there anything new on the horizon? Covered biodegradable stents, with or without different drugs attached, are already being used by our interventional radiology, cardiology, and urology colleagues. Moreover, an alternative could be the use of biodegradable formulations that can be used to cover fistulous tracts, cavities, etc. These formulations have been shown not to cause abnormal growth behavior, morphologic changes, or inhibition of metabolic activity. In addition, they may stimulate connective tissue and vascular ingrowth. It is to be expected that, in time, such biodegradable stents or formulations also will become available to interventional endoscopy.

It can be concluded that endoscopists can successfully treat traumatic nonmalignant esophageal perforations smaller than 50% to 70% of the circumference. The study by Schubert et al. demonstrates that endoscopists again are setting foot into the surgical arena, not as cleaners, but as gladiators, with a role which is equivalent to that of the other participants.

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REFERENCES