



‘Stent in a Stent’—An Alternative Technique for Removing Partially Covered Stents Following Sleeve Gastrectomy Complications

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Abstract Endoscopic stenting is a relatively new technique for the treatment of post sleeve gastrectomy complications. Partially covered stents are used in this method to minimise the risk of migration but they are associated with difficulties with removal. Patients requiring emergency stenting following sleeve gastrectomy underwent insertion of a partially covered metallic stent. One month later, if the stent was not easily removable, a fully covered overlapping stent was inserted and the patient was readmitted 2 weeks later for removal of both stents. Four patients required stenting following sleeve gastrectomy leaks, and one patient required stenting for a stricture. In these cases, a ‘stent in a stent’ technique was used for removal. This technique allows the safe removal of partially covered stents inserted following sleeve gastrectomy complications.

Keywords Sleeve gastrectomy · Endoscopy · Complications · Leak · Stricture · Stent

Introduction

Laparoscopic sleeve gastrectomy has been shown to be a safe and efficacious treatment for morbid obesity; however,

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these procedures are associated with a small but appreciable incidence of complications such as leaks and stricturing [1]. A number of studies have described treatment options for such complications, but there is currently no consensus as to the optimum management. In the literature, endoscopic techniques have been described—in particular stenting as a treatment modality for both leaks [2–4] and stricturing [5]. Although fully covered metallic stents have been shown to be beneficial in controlling leaks and can easily be retrieved, these stents are prone to migration [6, 7]. As a consequence of this, some authors have advocated the role of partially covered stents [8]. Whilst these stents are not prone to migration, they do present some difficulties in terms of stent removal [9]. We describe our experience of using a ‘stent within a stent’ technique to aid removal of partially covered stents following stenting post sleeve gastrectomy complications.

Methods

St George’s Hospital is a large supra-regional centre performing bariatric surgery and acting as a quaternary centre for emergency referrals from local bariatric units. Between 2009 and April 2012, we performed 370 number of laparoscopic sleeve gastrectomies. Of these, a total of five patients required emergency stenting (four of whom had leaks and one who had a stricture causing acute obstruction).

In all cases, a partially covered stent (Wallflex partially covered esophageal stent, Boston Scientific, Boston, MA) was inserted and the stent was deployed under fluoroscopic guidance. The stents came in a 23-mm diameter with a length

of 12.5 cm. One month following stent insertion, on radiological confirmation of the resolution of the pathology, patients were readmitted for attempted stent retrieval. If, however, stent removal was deemed to be too technically demanding and potentially hazardous, a fully covered stent (Wallflex fully covered esophageal stent, Boston Scientific, Boston, MA) was inserted over the partially covered stent with the aim of increasing stent mobility. Two weeks following second stent insertion, the patients were re-scheduled for endoscopic stent removal.

Results

Of our series of five complicated sleeve gastrectomies (age range 37–53 years), one patient who had sleeve gastrectomy after previous gastric band surgery had persistent intractable vomiting secondary to a stricture located at the previous band site and underwent stenting on the 14th post-operative day. The remaining four patients (three of whom had primary sleeve gastrectomy and one had revision surgery following a previous gastric band) represented with clinical and radiological evidence of leak. Of the four leak patients, all were discharged 2 days following surgery but represented a mean period of 14 days (range 7–25 days) following surgery with abdominal pain and underwent a CT scan to confirm the diagnosis of a leak. In all cases, the leak was in the proximal part of the sleeve.

All patients were initially managed with intravenous antibiotics and fluid resuscitation. In three cases, initial endoscopy was performed within 48 h of diagnosis of leak and a partially covered stent inserted as described above. The other patient underwent laparoscopic washout for peritonitis together with attempted primary repair and drain insertion. This repair was unsuccessful with persistent high drain output and endoscopy, and stent insertion was therefore performed 18 days following readmission.

Following stenting, the patients stayed in hospital for a mean period of 29 days (range 12–45). After confirmation via gastrograffin swallow that the leaks had been sealed, patients were commenced on fluid intake on day 1 and oral intake on day 2. They were started on protein pump inhibitors (PPIs) and simple analgesia where appropriate for symptom control. All patients were managed for mild retrosternal pain and reflux, which eventually resolved. Long hospitalisation of patients was due in part that we are a supra-regional centre covering a large population area. These patients require dietetic and specialist physiotherapy, which is not available locally. In addition, one patient developed neurological symptoms unrelated to their stent procedure, which required extensive investigation.

In all cases, a gastrograffin swallow was performed 1 month following surgery to confirmed resolution of the pathology. A

repeat endoscopy was then undertaken in all four cases with the aim of removing the stent. However, in all five cases, this was not achievable due to significant stent ingrowth. Stent removal was deemed potentially hazardous, and so a decision was made to insert a second fully covered stent.

In all five cases, a second stent insertion was successfully inserted with an overnight stay. Similarly, in all five cases, removal of both stents was successful 2 weeks later with no morbidity, no bleeding and an overnight stay.

Discussion

Endoscopic stenting has been shown to be a useful therapeutic tool following sleeve gastrectomy complications. Although relatively non-invasive, stent insertion is associated with a number of problems including perforation and migration. The technique has derived from the use of stents in oesophageal malignancy, where the issue of migration is at a minimum. In oesophageal malignancy, strictures commonly arise at the site of growth, creating a fixation point for the stent to be secured and thus preventing migration. Stent migration has been shown to be a particular problem with fully covered stents [10]. Migration has been described even in the context of efforts to secure the upper and lower ends of the stent using suture and clips [6]. This is a particular concern in sleeve gastrectomy leaks where the high intra-luminal pressure of a gastric sleeve [11] means that there is considerable propulsive force that may lead to stent migration. In an attempt to address this problem, a number of groups have utilised partially covered stents [8, 12, 13]. The major advantage of partially covered stents is ingrowth of mucosa between the stent wires and the wall of the gastrointestinal tract, enabling anchorage of the stent. However, this in turn leads to difficulties on removal once it is fixed, due to fibrotic vascular granulation tissue ingrowth [14]. Wei et al. [12] demonstrated that partially covered stent removal following bariatric surgery was associated with a high incidence of mucosal injury and two of the eight cases in their series required either further endoscopic sessions or laparoscopic-assisted enterotomy to remove the stents [12].

In an attempt to avoid mucosal injury following the removal of partially covered stents, a number of techniques have been described including argon plasma coagulation, but these have been found to be time-consuming, technically demanding and associated with significant complications [15, 16]. In an attempt to avoid these issues, we utilised a ‘stent in stent technique’ to increase the mobility of the partially covered stent. The rationale behind this approach is that the radial force from the second stent on vascularised granulation tissue attached to the first stent causes pressure ischaemia and necrosis on these tissues, making it easier for the first stent to be retrieved. Langer et al. [17] described the technique of placing

a plastic stent inside a partially covered metal stent to aid removal in a patient with a benign oesophageal stricture. Hirdes et al. [13] have described this technique in three patients with gastric bypass leaks who had plastic and metal stents inserted over a partially covered metal stents. This is, however, to our knowledge the only study that has utilised this approach to aid removal of stents in sleeve gastrectomy patients and the first to routinely use fully covered metal stents as opposed to plastic stent for this purpose. Our rationale for using a fully covered metal as opposed to a plastic stent is that the soft silicone in the plastic stents is likely to result in lower radial pressures on the partially covered stents as compared with metal stents [18]. Given the densely fibrotic granulation tissue produced in the high pressure sleeve gastrectomy tube, we felt it was appropriate to use a metal stent in order to maximise the ischaemic necrosis of the ingrowing granulation tissue [18].

In summary, we have demonstrated an effective and safe technique for retrieving partially covered self-expandable metal stents post sleeve gastrectomy. We do, however, accept that this technique requires an additional endoscopy and stent insertion, adding extra costs. It also remains unclear how long the second stent should be left in situ until removal of both stents is attempted. Nonetheless, we would advocate that a stent within a stent is a technically feasible and safe technique for removing partially covered stents, which have become partially or totally embedded in the gastric wall following sleeve gastrectomy stenting.

Conflict of interest All contributing authors declare that they have no conflicts of interest.

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