CASE REPORT

An instant rare complication: a fractured metallic pyloric stent

Mahvesh Rana Javaid,¹ Aasim Mohammad Yusuf²¹Barts & The London School of Medicine and Dentistry, London, UK²Department of Internal Medicine, Shaikat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan**Correspondence to**

Mahvesh Rana Javaid, mahvesh.r.javaid@gmail.com

SUMMARY

Metallic pyloric stenting (also termed as metallic enteral stenting) performed endoscopically, stands as first-line treatment for malignant gastric outlet obstruction. With reported evidence, these self-expandable metallic stents (SEMS) re-enable oral food intake, preventing patients having to face invasive techniques such as surgical gastroenterostomy. We report a patient having received a covered pyloric SEMS insertion following a tumour growth causing stenosis in the gastric antropylic region. After 3 weeks, the patient presented with a fracture of the pyloric SEMS, a rare complication, resulting in a second pyloric SEMS insertion.

BACKGROUND

Patients with advanced gastric, duodenal or pancreaticobiliary cancer can have the potential to develop malignant gastric outlet obstruction (GOO).^{1 2} In such cancers, malignant GOO can occur due to a carcinoma (1) compressing externally; (2) growing within the gastric antropylic region or (3) invading from the pancreatic head.^{2 3} Park *et al*¹ reports that malignant GOO is less likely to occur by invasion of adjacent malignancies (eg, bile duct cancer or gallbladder cancer) and in metastatic cancers. Malignant GOO can prevent oral food intake, causing nutrient deficiency leading to cachexia. Associated symptoms include nausea, vomiting, dysphagia, abdominal pain and indigestion. Patients who present with excessive episodes of vomiting have potential to develop dehydration, electrolyte imbalance, aspiration pneumonia, acidic erosions of the oesophagus and teeth and Mallory-Weiss tears. These patients cannot be treated using enteral feeding through percutaneous jejunostomy.³

Insertion of a pyloric self-expandable metallic stent (SEMS) significantly improves patients' quality of life by overcoming most of the symptoms of obstruction and thereby re-enabling oral food intake. In addition, they are also reported to be safe, cost-effective and easy to use.²⁻⁵ Pyloric SEMS insertion also prevents patients having to face invasive techniques, such as surgical gastroenterostomy, which hold increased risk of morbidity and mortality, and longer recovery times in regaining normal gut function.^{2 6}

On the other hand, pyloric SEMS have also been reported to have many complications. The main complications include obstruction (11%), bleeding (1%), migration (4%) and perforation (6%).¹ Pyloric SEMS fracture is a new unreported complication. This case report highlights the occurrence of

pyloric SEMS fractures, for which no clear cause could be identified.

CASE PRESENTATION

A 41-year-old man with a 5-month history of epigastric discomfort presented with gastric fullness, bloating and excessive vomiting for both solids and liquids. Medical history shows that the patient is positive for hepatitis C and that he has been treated for tuberculosis 7 years earlier. Imaging showed circumferential thickening of the pyloric antrum due to a T3 lesion with perigastric fat arborisation and a few perigastric lymph nodes. At an outside hospital, ultrasound-guided biopsy provided the diagnosis of a poorly differentiated adenocarcinoma with signet ring cell features. The patient then underwent Oesophago-Gastro-Duodenoscopy (OGD; figure 1)

Figure 1 (A and B) Endoscopic images showing a tumour in the gastric antropylic region causing pyloric stenosis.

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Figure 2 Endoscopic image showing the first inserted covered self-expandable metallic stent at the gastric antropyloric region.

and pyloric SEMS insertion (figure 2). Following recovery, the patient was discharged and scheduled for staging laparoscopy, PET CT and, later, chemotherapy. Staging laparoscopy showed a non-mobile bulky tumour involving the stomach body and antrum, with significant perigastric and gastrohepatic ligament lymph nodes.

After 3 weeks, the patient presented with a 6-day history of multiple episodes of excessive coffee-ground-coloured vomiting, along with constipation and oliguria. On physical examination, findings included a tender palpable mass in the epigastrium, along with positive bowel sounds and the presence of a succussion splash. An abdominal x-ray revealed that the stent was now in two parts, lying separate from one another (figure 3). Another OGD was performed for a second pyloric SEMS insertion.

Figure 3 Plain abdominal x-ray revealing a pyloric self-expandable metallic stent fracture.

INVESTIGATIONS

On investigation, haemoglobin level was 16.1 g/dl, while serum electrolyte levels were as follows: sodium 138 mmol/l, potassium 2.61 mmol/l, chloride 85 mmol/l, bicarbonate 35.5 mmol/l, urea nitrogen 19.77 mg/dl and creatine 0.84 mg/dl.

An abdominal x-ray revealed a broken pyloric SEMS (figure 3). The proximal stent segment was observed freely in the stomach body and the distal stent segment was still found intact in the first part of the duodenum. The pyloric SEMS fracture was further confirmed with OGD (figure 4).

DIFFERENTIAL DIAGNOSIS

Recurrent episodes of vomiting, following a pyloric SEMS insertion, can also be due to other complications. First, there is a possibility of stent obstruction caused by food impaction or by tumour overgrowth. Second, there could be a stent migration, which can also be diagnosed by imaging. In addition, patients with pyloric SEMS insertion who then start chemotherapy may show side effects, such as chemotherapy-induced nausea and vomiting.

TREATMENT

The patient was admitted to hospital from the emergency room for the initial treatment of his vomiting. This included being kept nil by mouth, the insertion of a nasogastric tube and

Figure 4 (A and B) Endoscopic images from the second oesophago-gastro-duodenoscopy that revealed a covered pyloric SEMS fracture. (A) The free visible strands of the proximal segment are observed in the stomach body. (B) The distal segment is observed in the first part of the duodenum.

Figure 5 Endoscopic image from the second oesophago-gastro-duodenoscopy showing the second covered pyloric self-expandable metallic stent (SEMS) inserted, which was placed through the distal segment of the previous SEMS.

administration of omeprazole intravenously. The patient's electrolytes were corrected. The patient was scheduled for OGD to confirm the putative diagnoses and to consider further treatment options.

A second pyloric SEMS was placed through the previous SEMS, specifically through the distal stent segment (figure 5). The initial stent was not removed during the second SEMS insertion. It was felt that the free segment of the first stent was unlikely to cause symptoms, and it was therefore left in the stomach. In addition, attempts at removal were likely to be fraught with danger of perforation of the oesophagus, or of aspiration of gastric content during withdrawal, also could lead to obstruction by distal migration of the stent. A report by Altiparmak *et al*⁷ describes attempts at removing fractured stents from other places using endoscopic retrieval methods. These include using grasping forceps, balloon dilation catheters and polypectomy snare. However, they were found to be unsuccessful and their patients required surgery, such as gastrotomy.⁷ On the other hand, a recent report has described the success in removing oesophageal SEMS using laser fragmentation.⁸

OUTCOME AND FOLLOW-UP

The second pyloric SEMS treated the symptoms of obstruction that were caused by the stent fracture. A follow-up abdominal x-ray (figure 6) showed the new stent through the distal segment of the previous SEMS, extending from the pyloric antrum to the first part of the duodenum. Also, the proximal stent segment was observed freely within the stomach body. The patient was kept overnight under observation and had another uneventful recovery. The patient was discharged the next day and was scheduled for a follow-up appointment, with continued chemotherapy.

DISCUSSION

Fracture of a covered pyloric stent has not previously been reported. Meanwhile, the cause of such a fracture is yet to be found.

Figure 6 A plain abdominal x-ray showing the second pyloric self-expandable metallic stent (SEMS) inserted (red arrow) through the distal segment of the previous SEMS (blue arrow), and the free proximal fractured SEMS segment in the stomach body (yellow arrow).

The covered pyloric SEMS (Hanarostent, M.I.Tech, Seoul, Korea) used for both procedures, were the same-sized nitinol (nickel and titanium alloy) tubular prosthesis with silicone membrane. Specifically, they had a diameter of 20 mm and a length of 130 mm, and were uncovered and flared at both ends. This particular type of SEMS has a geometric-shape property providing expansible force, which immediately springs open into its dilated shape upon release from its delivery system.³

Patel *et al*³ and Maetani *et al*⁹ describe some of the causes of fractures of covered and uncovered stents during endoscopic stenting. These include tumour ingrowth (uncovered stents), tumour overgrowth (covered stents), mucosal hyperplasia (covered stents) and food impaction (both types of stents).^{3 9} There are reports in the literature of recent tracheobronchial,^{10–22} oesophageal,^{4 23–38} gastroduodenal,^{1 9 24–32} biliary^{33–38} and colonic^{39–41} stent fractures. In the case of a bronchial stent fracture, Lee *et al*²¹ and Rousseau *et al*²² postulate that this may have resulted from the repeated and prolonged shearing forces placed on the stents by coughing or forced respiratory movements. With colonic stents, in particular, Odurny¹² suggests that anatomic factors unique to anastomotic colonic strictures produce constant compression, and that prolonged insertion may lead to a higher rate of fracture. Yoshida *et al*³⁶ have suggested that mechanical, thermal or electro-mechanical efforts at clearing stents blocked by a tumour may damage the metallic or plastic covering components of the stent, and predispose to fracture. A particular report by Ell *et al*⁴² describes the fracture of a stent after electrocoagulation, which was used to remove obstructing tumour tissue, in a case of inoperable cholangiocarcinoma.

Since our patient received none of these forms of treatment, since the stent was not apparently manipulated or distorted during staging laparoscopy, and since the stent had only been in place for a short while with no food impaction observed, we cannot be certain of what the true cause of the stent fracture was. We wonder whether this was related to a manufacturing defect, or to metal fatigue, but the exact cause will remain something of a mystery.

Learning points

- If patients who have been treated with pyloric self-expandable metallic stents (SEMS) present with symptoms of recurrent vomiting and constipation, they require immediate medical attention.
- There are many complications with excessive vomiting. Therefore, these patients need to be dealt initially and easily with nil by mouth and/or by an insertion of a nasogastric tube, even before establishing the diagnosis.
- Such patients will require urgent diagnosis via imaging, such as an abdominal x-ray or even with a contrast study such as gastrograffin swallow, to ensure the patency of the inserted pyloric SEMS.
- Pyloric SEMS fracture is a rare and an unreported complication. Therefore, this requires awareness among physicians and their patients being treated with pyloric SEMS insertion.

Competing interests None.

Patient consent Obtained.

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REFERENCES

- 1 Park KB, Do YS, Kang WK, *et al.* Malignant obstruction of gastric outlet and duodenum: palliation with flexible covered metallic stents. *Radiology* 2001;219:679–83.
- 2 Adler DG, Baron TH. Endoscopic palliation of malignant gastric outlet obstruction using self-expanding metal stents: experience in 36 patients. *Am J Gastroenterol* 2002;97:72–8.
- 3 Patel S, Patwardhan R, Levey J. Endoscopic stenting: an overview of potential complications. *Pract Gastroenterol* 2003;27:44–54.
- 4 Reddy VM, Sutton CD, Miller AS. Terminal ileum perforation as a consequence of a migrated and fractured oesophageal stent. *Case Rep Gastroenterol* 2009;3:61–6.
- 5 Graber I, Dumas R, Filoche B, *et al.* The efficacy and safety of duodenal stenting: a prospective multicenter study. *Endoscopy* 2007;39:784–7.
- 6 Nagy A, Brossek D, Hemming A, *et al.* Laparoscopic gastroenterostomy for duodenal obstruction. *Am J Surg* 1995;169:539–42.
- 7 Altiparmak E, Saritas U, Disibeyaz S, *et al.* Gastrocolic fistula due to a broken esophageal self-expandable metallic stent. *Endoscopy* 2000;32:S72.
- 8 Coomber RS, Patel PH, Dhir A, *et al.* Endoscopic laser fragmentation and removal of a nonremovable metal esophageal stent for persistent dysphagia: a technical note. *Surg Endosc* 2012;26:1791–3.
- 9 Maetani I, Ukita T, Tada T, *et al.* Metallic stents for gastric outlet obstruction: reintervention rate is lower with uncovered versus covered stents, despite similar outcomes. *Gastrointest Endosc* 2009;69:806–12.
- 10 Ost DE, Shah AM, Lei X, *et al.* Respiratory infections increase the risk of granulation tissue formation following airway stenting in patients with malignant airway obstruction. *Chest* 2012;141:1473–81.
- 11 Schulte KL, Müller-Hülsbeck S, Cao P, *et al.* MISAGO 1: first-in-man clinical trial with Misago nitinol stent. *EuroIntervention* 2010;5:687–91.
- 12 Fernandez-Bussy S, Akindipe O, Kulkarni V, *et al.* Clinical experience with a new removable tracheobronchial stent in the management of airway complications after lung transplantation. *J Heart Lung Transplant* 2009;28:683–8.
- 13 Dialani V, Ernst A, Sun M, *et al.* MDCT detection of airway stent complications: comparison with bronchoscopy. *AJR Am J Roentgenol* 2008;191:1576–80.
- 14 Chung FT, Lin SM, Chen HC, *et al.* Factors leading to tracheobronchial self-expandable metallic stent fracture. *J Thorac Cardiovasc Surg* 2008;136:1328–35.
- 15 Chan AL, Juarez MM, Allen RP, *et al.* Do airway metallic stents for benign lesions confer too costly a benefit? *BMC Pulm Med* 2008;8:1–8.
- 16 Bodhey NK, Gupta AK, Neelakandhan KS, *et al.* Fluoroscopic-guided balloon dilatation and stenting in tracheal stenosis with metallic self-expandable stents and long-term follow-up results. *Australas Radiol* 2007;51:351–7.
- 17 Asopa S, Moorjani N, Saad RA, *et al.* Rare and fatal complication of Gianturco tracheobronchial stent. *Ann Thorac Surg* 2007;84:1758–60.
- 18 Noppen M, Stratakos G, D'Haese J, *et al.* Removal of covered self-expandable metallic airway stents in benign disorders: indications, technique, and outcomes. *Chest* 2005;127:482–7.
- 19 Zakaluzny SA, Lane JD, Mair EA. Complications of tracheobronchial airway stents. *Otolaryngol Head Neck Surg* 2003;128:478–88.
- 20 Ferretti GR, Kocier M, Calaque O, *et al.* Follow-up after stent insertion in the tracheobronchial tree: role of helical computed tomography in comparison with fiberoptic bronchoscopy. *Eur Radiol* 2003;13:1172–8.
- 21 Lee KW, Im JG, Han JK, *et al.* Tuberculous stenosis of the left main bronchus: results of treatment with balloons and metallic stents. *J Vasc Interv Radiol* 1999;10:352–8.
- 22 Rousseau H, Dahan M, Lauque D, *et al.* Self-expandable prostheses in the tracheobronchial tree. *Radiology* 1993;188:199–203.
- 23 Wadsworth CA, East JE, Hoare JM. Early covered-stent fracture after placement for a benign esophageal stricture. *Gastrointest Endosc* 2010;72:1260–1.
- 24 Wiedmann M, Heller F, Zeitz M, *et al.* Fracture of a covered self-expanding antireflux stent in two patients with distal esophageal carcinoma. *Endoscopy* 2009;41(Suppl 2):E129–30.
- 25 Rana SS, Bhasin DK, Sidhu GS, *et al.* Esophageal nitinol stent dysfunction because of fracture and collapse. *Endoscopy* 2009;41(Suppl 2):E170–1.
- 26 Chhetri SK, Selinger CP, Greer S. Fracture of an esophageal stent: a rare but significant complication. *Endoscopy* 2008;40(Suppl 2):E199.
- 27 Doğan UB, Eğilmez E. Broken stent in oesophageal malignancy: a rare complication. *Acta Gastroenterol Belg* 2005;68:264–6.
- 28 Stern N, Smart H. Repeated enteral stent fracture in patient with benign duodenal stricture. *Gastrointest Endosc* 2010;72:655–7.
- 29 Goenka AH, Garg PK, Sharma R, *et al.* Spontaneous fracture of an uncovered enteral stent with proximal migration of fractured segment into cervical esophagus: first report. *Endoscopy* 2009;41(Suppl 2):E204–5.
- 30 Phillips MS, Gosain S, Bonatti H, *et al.* Enteral stents for malignancy: a report of 46 consecutive cases over 10 years, with critical review of complications. *J Gastrointest Surg* 2008;12:2045–50.
- 31 Bessoud B, de Baere T, Denys A, *et al.* Malignant gastroduodenal obstruction: palliation with self-expanding metallic stents. *J Vasc Interv Radiol* 2005;16(2 Pt 1):247–53.
- 32 Catalan O, De Bellis M, Sandomenico F, *et al.* Complications of biliary and gastrointestinal stents: MDCT of the cancer patient. *AJR Am J Roentgenol* 2012;199:W187–96.
- 33 Kawakubo K, Isayama H, Tsujino T, *et al.* Endoscopic removal of a spontaneously fractured biliary uncovered self-expandable metal stent. *Dig Endosc* 2012;24:182–4.
- 34 Rasmussen IC, Dahlstrand U, Sandblom G, *et al.* Fractures of self-expanding metallic stents in periampullary malignant biliary obstruction. *Acta Radiol* 2009;50:730–7.
- 35 Yoshida H, Mamada Y, Taniai N, *et al.* Fracture of an expandable metallic stent placed for biliary obstruction due to common bile duct carcinoma. *J Nippon Med Sch* 2006;73:164–8.
- 36 Yoshida H, Tajiri T, Mamada Y, *et al.* Fracture of a biliary expandable metallic stent. *Gastrointest Endosc* 2004;60:655–8.
- 37 Sriram PV, Ramakrishnan A, Rao GV, *et al.* Spontaneous fracture of a biliary self-expanding metal stent. *Endoscopy* 2004;36:1035–6.
- 38 Baraza W, Lee F, Brown S, *et al.* Combination endo-radiological colorectal stenting: a prospective 5-year clinical evaluation. *Colorectal Dis* 2008;10:901–6.
- 39 Forshaw MJ, Sankararajah D, Stewart M, *et al.* Self-expanding metallic stents in the treatment of benign colorectal disease: indications and outcomes. *Colorectal Dis* 2006;8:102–11.
- 40 Suzuki N, Saunders BP, Thomas-Gibson S, *et al.* Complications of colonic stenting: a case of stent migration and fracture. *Endoscopy* 2003;35:1085.
- 41 Suzuki N, Saunders BP, Thomas-Gibson S, *et al.* Colorectal stenting for malignant and benign disease: outcomes in colorectal stenting. *Dis Colon Rectum* 2004;47:1201–7.
- 42 Ell C, Fleig WE, Hochberger J. Broken biliary metal stent after repeated electrocoagulation for tumor ingrowth. *Gastrointest Endosc* 1992;38:197–9.

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