

[ CASE REPORT ]

## Fracture of a Self-expandable Metallic Stent Inserted for Malignant Gastric Outlet Obstruction

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### Abstract:

Duodenal stenting has gradually been established as the first-line treatment for malignant gastric outlet obstruction (GOO). We encountered a case of duodenal stent fracture in a 76-year-old woman with gastric cancer and GOO. She underwent self-expandable metallic stent (SEMS) placement. The SEMS was found to be fractured 4 weeks after its placement. We removed the broken part of the stent and placed a second SEMS. SEMS fracture is a rare and - to the best of our knowledge - unreported complication; hence, clinicians and their patients should be aware of this possibility.

**Key words:** malignant gastric outlet obstruction, self-expandable metallic stent, stent fracture

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### Introduction

Malignant gastric outlet obstruction (GOO) is a common complication in patients with advanced gastric, duodenal, or pancreatobiliary cancer. Malignant GOO drastically decreases the patient's quality of life due to persistent nausea and vomiting and causes nutrient deficiency, leading to cachexia.

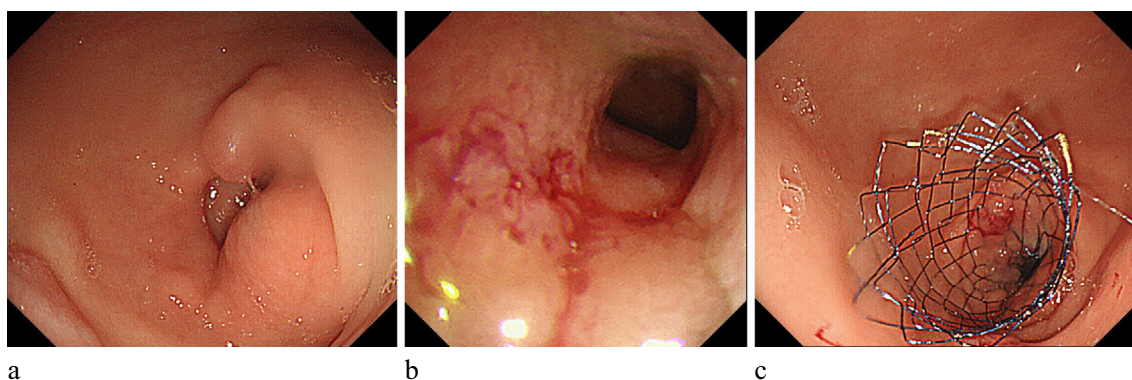
The utility of self-expandable metallic stent (SEMS) placement for treating malignant GOO is widely recognized, and is becoming common as a therapeutic alternative to surgical bypass in cases of malignant GOO, particularly in patients with a short life expectancy (1, 2). However, complications associated with SEMS placement for malignant GOO have been reported in approximately 19.4-26.2% of cases (3, 4). The main complications include stent obstruction and migration, bleeding, and perforation. SEMS fracture, however, is a rare and - to the best of our knowledge - unreported complication.

We herein report a case of duodenal stent fracture in a patient with malignant GOO due to gastric cancer.

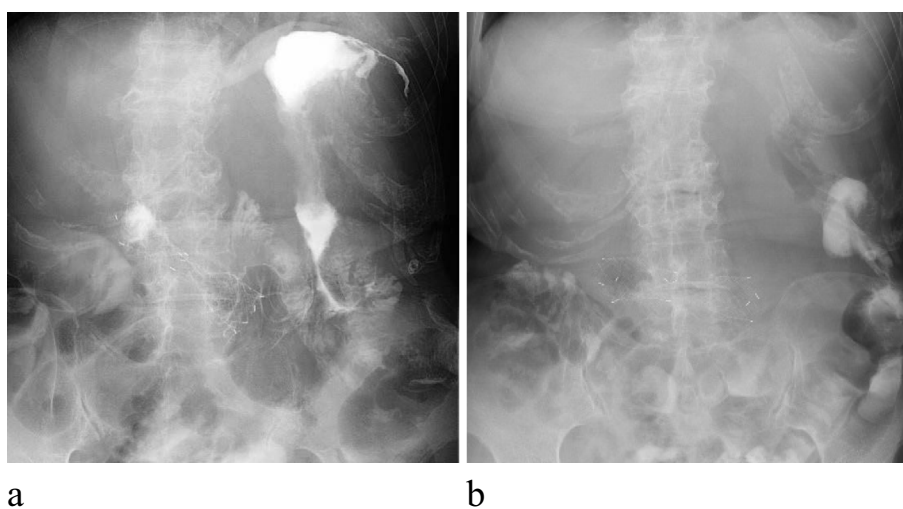
### Case Report

A 76-year-old woman was diagnosed with gastric cancer (cT3N2M1 c stage IV) with para-aortic lymph node metastasis. S-1 plus oxaliplatin chemotherapy was initially performed, and ramucirumab plus paclitaxel was selected as the second-line therapy. However, the tumor progressed and nausea and vomiting due to GOO were observed (Fig. 1a, b). Thus, the GOO was treated by SEMS placement (HANAROSTENT<sup>®</sup> Naturfit<sup>™</sup> Duo; diameter, 22 mm; length, 8 cm; Boston Scientific, Tokyo, Japan) (Fig. 1c). The SEMS was placed appropriately and no problems with stent deployment were observed at 24 hours after stent placement (Fig. 2). The symptoms of obstruction disappeared immediately after stent placement, and the patient was able to ingest a regular diet. She was soon discharged from our hospital.

At two weeks after stent placement, she was readmitted for thoracic compression fracture. Oral food intake was not a problem at the beginning of admission; however, she gradually developed nausea. At two weeks after readmission (i.e., 4 weeks after stent placement), abdominal X-ray revealed stent fracture (Fig. 3). Endoscopy revealed a broken stent that had migrated back to the stomach, and restenosis



**Figure 1.** Endoscopic images. (a) A distant view of the site of pyloric stenosis. (b) A close-up view of pyloric stenosis; (c) insertion of the uncovered self-expandable metallic stent (SEMS) at the gastric antropyloric region.



**Figure 2.** Radiographs. (a) The SEMS was placed appropriately. (b) Twenty-four hours after stent placement.



**Figure 3.** Radiograph showing the fractured self-expandable metallic stent.

(Fig. 4a, b). We removed the broken part of the stent using a collection net through an esophageal overtube and placed a second SEMS (WallFlex™ Duodenal Soft Stent; diameter, 22 mm; length, 9 cm; Boston Scientific) coaxially with the

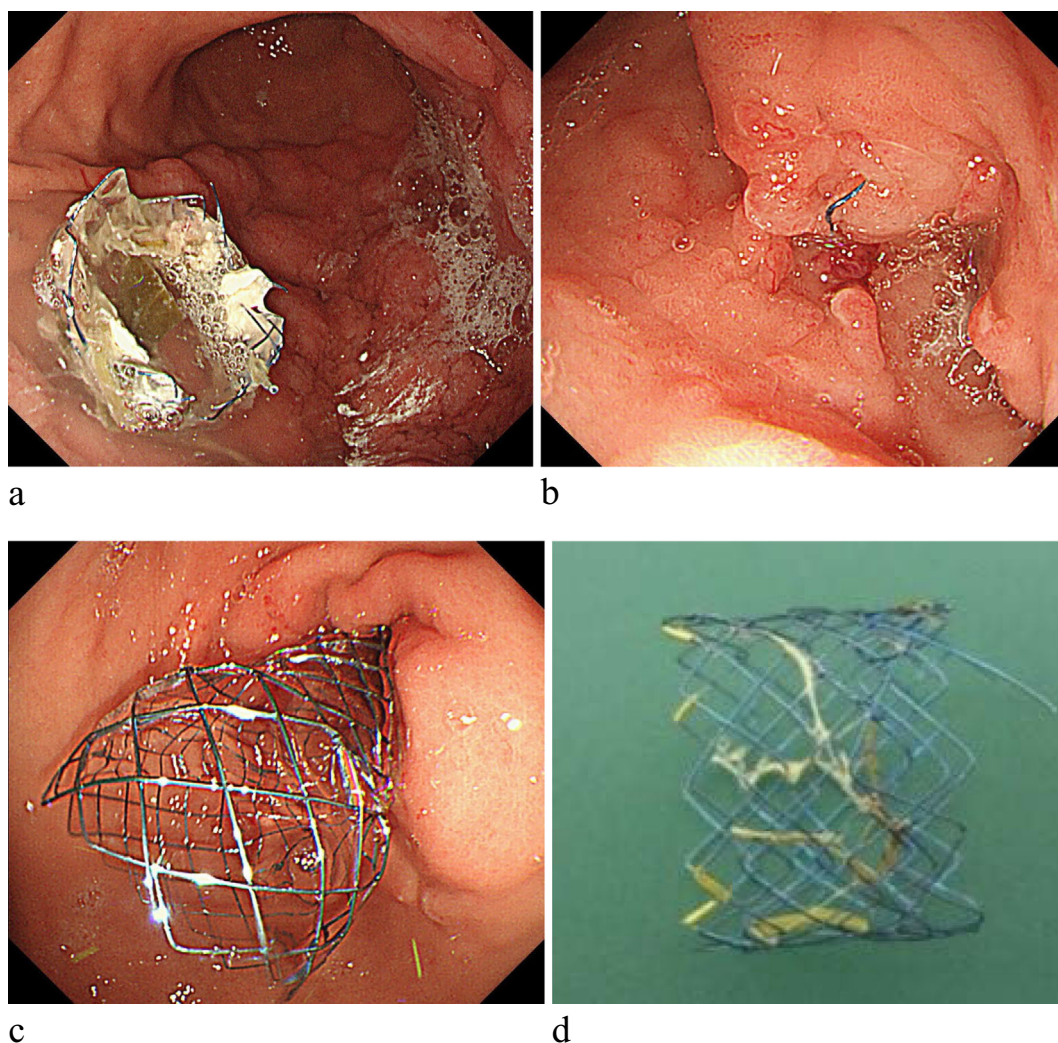
first one; the wire mesh of the removed stent was found to be broken (Fig. 4c, d, 5). She was then able to eat solid food and was discharged from our hospital. Although she died of disease progression 3 months after this procedure, she was able to eat orally until death.

## Discussion

GOO may frequently develop in patients with gastric, duodenal, or pancreatobiliary cancer. Stent placement may be the preferred treatment option because it is less invasive than standard surgical procedures and the patient's treatment response is rapid (1, 2). Complications of SEMS placement for malignant GOO, such as tumor ingrowth, tumor overgrowth, food impaction, stent migration, stent occlusion, and perforation have been reported (3, 4); however, stent fracture is rare. In the literature, the incidence of stent fracture is reported to be 0-4.8% (1, 3, 5-8), but detailed case reports are very rare (9, 10).

Fractures of stents used in the tracheobronchial system have been reported. In most of these cases, stent fractures





**Figure 4.** Endoscopic images of the placement of the second self-expandable metallic stent (SEMS). (a) Strands of the proximal segment were observed in the stomach body; (b) restenosis caused by stent failure. (c) The second SEMS was successfully placed (d) The broken part of the stent was collected.



**Figure 5.** A radiograph showing the second self-expandable metallic stent (SEMS) inserted through the distal segment of the previous SEMS.

occurred spontaneously, and it was hypothesized that these fractures resulted from repeated and prolonged shearing

forces exerted by coughing or forced respiratory movements (11).

Maetani et al. (9) reported a case of duodenal stent fracture and hypothesized that the pressure induced by endoscopy, metal fatigue, acid and the removal of the stent coating material by repeated endoscopic retrograde cholangiopancreatography procedures are conducive to stent fracture. In this case, the patient had taken a proton pump inhibitor orally before the procedure and its administration had been continued. We contacted the manufacturer and confirmed the manufacturing history of the stent, but no deviation from the specified manufacturing procedure or product specifications was recorded. Stent fractures might result from repeated and prolonged shearing forces caused by gastrointestinal motility.

When an SEMS is deployed at a bending site, such as the gastric outlet (prepyloric to duodenum), a low axial force SEMS is preferred. The HANAROSTENT<sup>®</sup> Naturfit<sup>™</sup> Duo is an uncovered SEMS composed of nitinol and has an interwoven hook and cross structure. The specific feature of

this stent is its low axial force (with moderate radial force). In contrast, the WallFlex™ Duodenal Soft Stent is woven only by a cross wire and has high axial force and moderate radial force. We selected the WallFlex as the second stent due to its robustness. To reduce the risk of fracture in future stent placement, in cases of short stenosis near the pylorus, it may be useful to select a stent with stronger axial force or to select a shorter stent to avoid the effects of gastrointestinal motility.

**The authors state that they have no Conflict of Interest (COI).**

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