CLINICAL STUDY

Significance of Stent Abutment in Gastroduodenal Stent Placement for Gastric Outlet Obstructions

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ABSTRACT

Purpose: To evaluate the frequency, severity, and clinical significance of stent abutment (SA) after gastroduodenal stent placement in patients with gastric outlet obstruction caused by unresectable gastric cancer.

Materials and Methods: A retrospective study was conducted in a single tertiary referral university hospital to identify the incidence and clinical significance of SA in 318 patients who underwent self-expandable metallic stent placement. SA was defined as abutment of the distal end of the stent to the duodenal wall and/or superior duodenal flexure. The outcomes included technical and clinical success, complications, repeat intervention, stent patency, and survival.

Results: A total of 318 patients, 107 with SA (33.6%) and 211 without, were included. SA occurred partially (n = 64; 59.8%) and completely (n = 43; 40.2%). The technical and clinical outcomes and survival were similar in the groups with and without SA. Food impaction and resultant repeat intervention rates were higher in the SA group than in the non-SA group ($P < .001$ and $P < .001$, respectively), and were associated with complete SA ($P = .007$). Stent patency rate was lower in the SA group than in the non-SA group ($P = .003$).

Conclusions: SA was associated with increased food impaction, resulting in a greater incidence of stent malfunction and shorter stent patency compared with a lack of SA. The concept of SA may be useful for the improvement of stent patency and avoidance of food impaction.

ABBREVIATIONS

CI = confidence interval, GOO = gastric outlet obstruction, SA = stent abutment

Placement of a self-expandable metallic stent is a well-established minimally invasive alternative to surgery for the palliative treatment of malignant gastric outlet obstructions (GOOs) (1–8). A common cause of malignant GOO is gastric cancer (32%–75%) affecting the area around the pylorus and/or extension of the duodenal bulb (6–8). Placement of the stent in the proper position is very important for successful palliation, especially for Borrmann type 4 gastric cancer, which is characterized by diffuse infiltration that occupies a large and deep area of the stomach (9). In addition, neurologic disorders can lead to delayed gastric emptying and weakened peristaltic activity in the stomach (10,11), such that food materials only pass through the stent by gravity (12).

When a gastroduodenal stent is placed in a patient with GOO, a stent that is 40–50 mm longer than the stricture is usually used so that the middle part of the stent fully covers the stricture (3,7,8). The stent is placed so that approximately the distal 20 mm protrudes into the duodenal bulb, and its end may abut the duodenal wall and/or superior duodenal flexure immediately after stent placement or a few days later because of gradual shortening of the stent. To the best of our knowledge, most previous studies have just

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focused on technical and clinical outcomes of stent placement for the palliation of malignant GOO and overlooked the issue of stent abutment (SA) (1–8,12). Therefore, the purpose of the present study was to evaluate the frequency, severity, and clinical significance of SA after gastroduodenal stent placement in 318 patients with malignant GOO caused by unresectable gastric cancer.

MATERIALS AND METHODS

Study Population

The present retrospective cohort study was approved by the institutional review board, and requirement for written informed consent was waived. The medical records of patients who underwent gastroduodenal stent placement for the palliative treatment of malignant GOOs between December 1998 and December 2015 were reviewed. The inclusion criteria were (*i*) documented unresectable and primary gastric cancer and (*ii*) obstruction of the area around the pylorus and/or extension to the duodenal bulb, resulting in nausea, vomiting, and dysphagia. The exclusion criteria were (*i*) classification as a mildly symptomatic patient in whom an adult endoscope could be passed through the malignant GOO, (*ii*) clinical evidence of perforation or peritonitis, and (*iii*) evidence of multiple small-bowel obstructions.

A total of 318 patients with GOO caused by unresectable gastric cancer were eligible for this study. SA occurred partially (n = 59; 18.5%) or completely (n = 48; 15.1%; Fig 1) in 107 of 318 patients (33.6%) within 1–3 days (mean, 2 d) after stent placement. In the remaining 211 patients (66.4%), the distal end of the stent was located in the second portion of the duodenum (n = 84; 26.4%) or the duodenal bulb without abutment (n = 127; 39.9%). Comparisons of the characteristics between the SA and non-SA groups are summarized in Table 1. There were no significant differences between the SA and non-SA groups with respect to the covariates (all $P > .005$).

Stent Placement and Follow-up

A partially covered dual stent (S&G Biotech, Seongnam, Korea; Fig 2) was used that consisted of an outer partially covered stent and inner bare nitinol stent. The inner stent was 18 mm in diameter, with both ends of the stent flared to 28 mm. The outer stent had three parts: a proximal bare nitinol stent (28 mm in diameter), nylon mesh (18 mm in diameter), and distal bare nitinol stent (28 mm in diameter). The stent introducer set consisted of a Teflon sheath with an outer diameter of 3.8 mm (11.4 F) and length of 120 cm, a pusher coil catheter, and a guiding "olive" tip.

Endoscopic and barium studies were performed 2–10 days before stent placement to evaluate the site, severity, and length of the stricture. A nasogastric tube was placed ≥ 24 hours before the procedure for gastric emptying. Stent placement techniques have been described elsewhere (3,7,13). Briefly, the stricture was negotiated with a stiff-angled, 260-cm, 0.035-inch exchange guide wire (Radifocus M; Terumo, Tokyo, Japan) under fluoroscopic guidance and then delineated with the introduction of a radiopaque contrast agent. The wire was exchanged with a super-stiff 260-cm guide wire (Boston Scientific, Marlborough, Massachusetts). A stent delivery system for the outer partially covered stent was then advanced over the guide wire through the stricture under fluoroscopic guidance. The 3.8-mm sheath, guiding olive tip, and pusher catheter were removed, and the super-stiff guide wire was left in place. The inner stent was coaxially placed into the outer stent to expand the nylon mesh portion of the outer stent.

After stent placement, patients routinely underwent barium studies 1–3 days and 1 month after stent placement

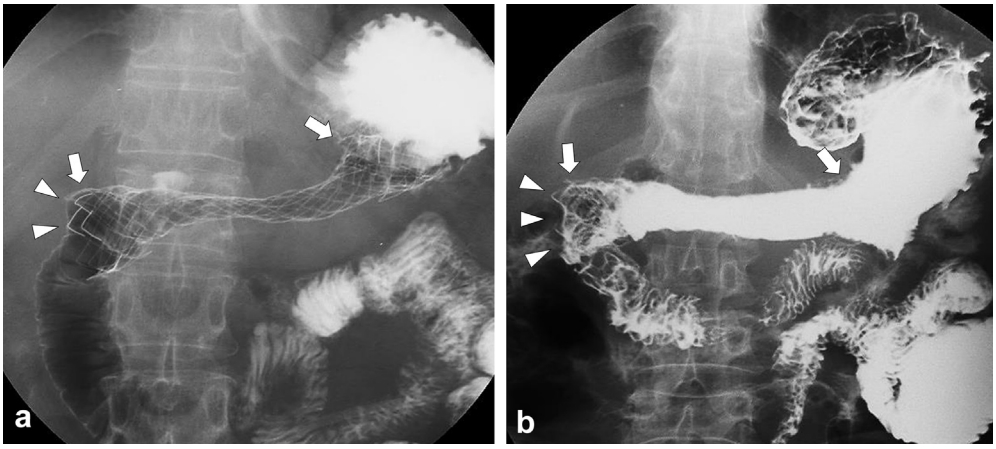

Figure 1. Radiographs after stent placement in patients with GOO as a result of unresectable gastric cancer. **(a)** Radiograph obtained 1 day after stent placement (arrows) shows partial abutment of the distal end of the stent into the superior duodenal flexure (arrowheads). **(b)** Radiograph obtained 3 days after stent placement (arrows) shows complete abutment of the distal end of the stent into the superior duodenal flexure and duodenal wall (arrowheads) and contrast medium passing through a distal bare portion of the stent.