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Endoscopic stenting for gastroduodenal outlet obstruction of a malignant origin, real life experience in a single center

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ABSTRACT

Aim: to evaluate the safety and effectiveness of self-expandable metal stent placement for malignant gastric outlet obstruction (GOO).

Methods: a retrospective, analytic cohort study at a single, tertiary-care center.

Results: thirty-six patients that underwent stent placement for GOO of malignant origin were identified during the study period. Technical success was achieved in 36 (100%) patients and clinical success was achieved in 31 patients (86.1%). Before the procedure, 17 (54.8%) patients had a gastric outlet obstruction score (GOOSS) of 0, which is a complete inability of oral intake. Twenty-three patients were alive 30 days after the procedure, two (8.6%) patients had a GOOSS of 1, ten (43.3%) had a GOOSS of 2 and eleven (47.9%) had a GOOSS of 3. Abdominal pain was present in all 31 patients before the procedure and only seven (22.6%) patients continued with abdominal pain 24 hours after the procedure. During follow-up, ten (30.3%) patients developed complications related to the stents and none of them was fatal. Additional therapy due to partial occlusion of the stent was necessary in three patients. The stents functional duration had a median of 72 days (IQR 25-75 15-105 days) and was closely related to overall survival.

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Conclusion: palliative stenting for gastroduodenal obstruction is a safe, feasible and effective therapy to treat patients with malignant gastric outlet obstruction.

Keywords: Endoscopic stent. Gastric outlet obstruction.

INTRODUCTION

Gastroduodenal outlet obstruction (GOO) is the clinical and pathophysiological consequence of any process that produces a mechanical impediment to gastric emptying. Patients usually present with a combination of nausea, vomiting and weight loss due to impaired oral intake, which results in a reduced quality of life. There has been a shift in the most frequent causes of GOO in the last 50 years (1). Benign disease was responsible for the majority of cases of GOO in adults until the late 1970s, mostly as a complication of peptic ulcer disease. The incidence of benign causes have declined substantially since the introduction of H2 blockers and proton bomb inhibitors and *Helicobacter pylori* eradication (2). Thus, malignancy is now the most common cause of GOO (3). Advanced upper gastrointestinal tract (UGI) cancer commonly presents in older patients and life expectancy is limited. Up to 20% of patients with UGI tumors will develop GOO as a complication of their disease (4). A minimally invasive method is preferred in patients with a fragile status and advanced disease. Endoscopic stents have been widely used for the treatment of many benign and malignant conditions of the gastrointestinal tract, which could previously solely be treated by surgical therapy.

The purpose of this study was to evaluate the safety and effectiveness of uncovered self-expandable metal stent placement (USEMS) for GOO of a malignant origin.

METHODS

A retrospective, analytic cohort study was performed at a single, tertiary-care center. An endoscopic database of all patients treated with uncovered self-expandable stents from September 2013 to May 2018 was reviewed. Inclusion criteria were patients undergoing stent placement for gastroduodenal outlet obstruction and not candidates for surgical treatment for locally advanced tumors, tumor relapse in surgical anastomosis or GOO due to metastasis from tumors of any origin.

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Data was collected from the medical records, including demographics, type of carcinoma, staging and Eastern Cooperative Oncology Group (ECOG) scale for quality of life, biliary involvement, previous biliary stent placement and previous treatment. Data from the procedure report sheet was collected, including technical success of the stent placement, stenosis location, immediate complications and outcome. Technical success was defined as a successful stent placement and deployment during the endoscopic procedure. Clinical success was defined as the relief of symptoms and the possibility of oral intake after stent placement.

The symptoms of GOO syndrome were reviewed, such as the presence of abdominal pain and complications. Oral intake evolution before stent placement and 24 hours, seven days and 30 days after the procedure were analyzed. The outlet obstruction scoring scale (GOOSS) was used to asses oral intake as follows: 0 = no oral intake; 1 = liquids only; 2 = soft solids; and 3 = hard solids or full diet.

Late complications and outcomes such as functional duration of the stent and survival of patients were recorded. All information was obtained from electronic medical records and patients were followed up until June 2018 or death.

Endoscopic procedure

An upper endoscopy was performed under conscious sedation, with a normal endoscope (GIF-H180; Olympus, Tokyo, Japan) to evaluate the obstruction of the lumen by the tumor. Two different techniques were used (Fig. 1). Fluoroscopy was not used if the stenosis allowed the passage of the endoscope. An endoscopic retrograde cholangiopancreatography (ERCP) guidewire (Acrobat® 2; Cook Medical, Bloomington, Indiana, USA) was positioned distal to the stenosis by direct observation. Fluoroscopy was used to guide the ERCP guidewire distal to the stricture if the stenosis did not allow for endoscope progression. After guidewire insertion, water-soluble contrast was injected under fluoroscopic control to evaluate the duodenal anatomy and then a therapeutic upper endoscope (GIF-XTQ160; Olympus, Tokyo, Japan) was used. The stenosis was reached with the guidewire through the working channel. Two types of USEMS were used due to the availability in our center. The Hanaro® M.I. Tech stent, 22 mm-23 mm-11 cm was used from September 2013 to February 2016. From March 2016 to May 2018, the Evolution® Cook

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Medical, 22 mm-27 mm-9 cm was used. The stent catheter was advanced over the guidewire and was released under direct visual examination and fluoroscopic control.

Statistical analysis

The differences in the parameters after stenting were compared with baseline (pre-interventional) values using the Wilcoxon signed-ranks test. p values were derived from two-tailed tests and differences were considered to be significant if $p < 0.05$. Survival duration was evaluated using the Kaplan-Meier analysis. All statistical analysis was performed using SPSS v.22.0 (IBM Corp., Armonk, NY, USA).

RESULTS

The review of the endoscopy database identified 36 patients that underwent stent placement for GOO of a malignant origin during the study period. The patient characteristics are shown in table 1.

Technical success was achieved in 36 (100%) patients and three patients had immediate complications, i.e. less than one hour after stent placement. One patient developed emesis of gastrointestinal content and bronchoaspiration after the procedure, one developed hematemesis and hypovolemic shock and another had a clinical perforation and went into cardiac arrest. All cases ended in a fatal outcome in the subsequent 48 hours. Clinical success was achieved in 31 patients (86.1%). Two patients could not restart oral intake, a tomography study showed that the stent was partially collapsed by the tumor in the distal end in one patient and one patient had a total occlusion of the stent ten days after the procedure.

Clinical success was achieved in 31 patients (86.1%), who started clear liquid intake the same night after the procedure. Oral intake was evaluated before and after the procedure in all surviving patients. Before the procedure, 17 (54.8%) patients had a GOOSS of 0, 13 patients had a GOOSS of 1 (39.3%) and only one (5.9%) patient had a GOOSS of 2. Twenty-three patients were alive 30 days after the procedure, two (8.6%) patients had a GOOSS of 1, ten (43.3%) had a GOOSS of 2 and eleven (47.9%) had a GOOSS of 3. Abdominal pain was present in all 31 patients before the procedure and only seven (22.6%) patients still had abdominal pain 24 hours after the procedure.

During follow-up, ten (30.3%) patients developed complications related to the stents and none were fatal. However, most patients were considered to be unsuitable for anymore treatment due to disease progression. Stent obstruction due to disease progression developed in five patients and two patients were deemed as non-candidates for treatment due to their fragile status. Additional therapy was offered to three patients due to partial occlusion of the stent, one was successfully treated with another USEMS, one patient had a gastrojejunostomy and another had a radiological stent placement.

Other complications due to USEMS included hemorrhagic complications, one patient developed cholangitis complicated with a hepatic abscess and one patient had a distal stent migration that was treated successfully with a second USEMS. The stents functional duration was a median of 72 days (IQR 25-75 15-105 days) and was closely related to overall survival.

DISCUSSION

USEMS are designed for palliation and prompt relief of malignant GOO. Endoscopic treatment has many advantages over surgery in patients with advanced disease. It is associated with lower morbidity and mortality, shorter hospitalization and earlier symptom relief (5). A recent study demonstrated that USEMS are as effective as surgery in patients with GOO due to pancreatic cancer, regardless of survival. Furthermore, they may be more beneficial in those that will receive chemotherapy (6).

Most of the data on USEMS is based on patients with pancreatic cancer. A recent study found a similar efficacy and survival in patients with GOO of any origin (7). In our series, there was a clear benefit with the short post-procedure time before introducing oral intake (24 hours for liquids), which was clinically successful in 86.1% of patients. Improvement of the GOOSS scale after SEMS placement has been observed in many studies (8) and the results of our study were similar to those reported in the literature. GOOSS improvement was sustained overtime in our series and all patients that were still alive after 30 days had an acceptable oral intake.

The basis of the correlation between abdominal pain and GOO is unknown. Abdominal pain is multifactorial in this group of patients, it may be a secondary effect of chemotherapy or radiotherapy, due to local invasion of the tumor or other local complications of the disease

(9,10). It is known that gastric distension and gastroparesis are associated with abdominal pain and the prevalence is as high as 89% in gastroparesis according to some studies (11). In our study, a subset of patients had an improvement in abdominal pain after the stent procedure and the benefit was sustained over time. A prospective study of abdominal as a primary outcome after stent procedure would be needed to prove our findings.

The use of USEMS has long-term complications such as ulceration and bleeding due to the stent wires (12). In our series, two patients developed upper gastrointestinal bleeding, although no endoscopic studies were performed due to the poor functional status of the patients. Other complications have been previously reported, including perforation and migration of the stent. In our series, there was a case of stent migration that was successfully treated with another stent. Stent occlusion by tumor ingrowth is an expected complication of the disease rather than a complication of the procedure and has been reported in up to 20-25% of cases (13,14). It was the most common late complication in our series. Fifteen per cent of patients developed stent obstruction due to tumor growth, one case was successfully treated with another stent and two other cases required surgical or radiological intervention. The functional duration of the stent in our study was closely related to the life expectancy and no patient had a long-term fatal complication due to the stents. The re-intervention rate was also comparable to data produced by larger centers (8).

CONCLUSIONS

Palliative stenting for gastroduodenal obstruction of a malignant origin is a safe, feasible and effective therapy to treat patients with malignant gastroduodenal outlet obstruction. The technical success is high and the rate of complications is low when the procedure is performed by an expert endoscopist.

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Table 1. Patient's characteristics

Age, median (IQR 25-75)	68 (53-83)
Male gender, n (%)	20 (55.6)
Tumor type - Gastric, n (%) - Pancreatic, n (%) - Cholangiocarcinoma, n (%) - Metastasis, n (%)	 11 (30.6) 14 (38.9) 3 (8.3) 8 (22.2)
Tumor stage Stage III, n (%) Stage IV, n (%)	 6 (16.7) 30 (83.3)
ECOG ECOG 1, n (%) ECOG 2, n (%) ECOG 3, n (%) ECOG 4, n (%)	 10 (27.8) 15 (41.7) 10 (27.8) 1 (2.8)
Chemotherapy before procedure, n (%)	20 (55.6)
Metastatic disease, n (%)	22 (61.1)
Obstructive jaundice, n (%) Previous biliary stent, n (%)	9 (25) 8 (22.2)
Ascitis, n (%)	5 (16.7)

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Site of obstruction	
Pyloroduodenal, n (%)	13 (36.1)
Second duodenal portion, n (%)	10 (27.8)
Complete loop, n (%)	4 (11.1)
Anastomosis, n (%)	3 (8.3)

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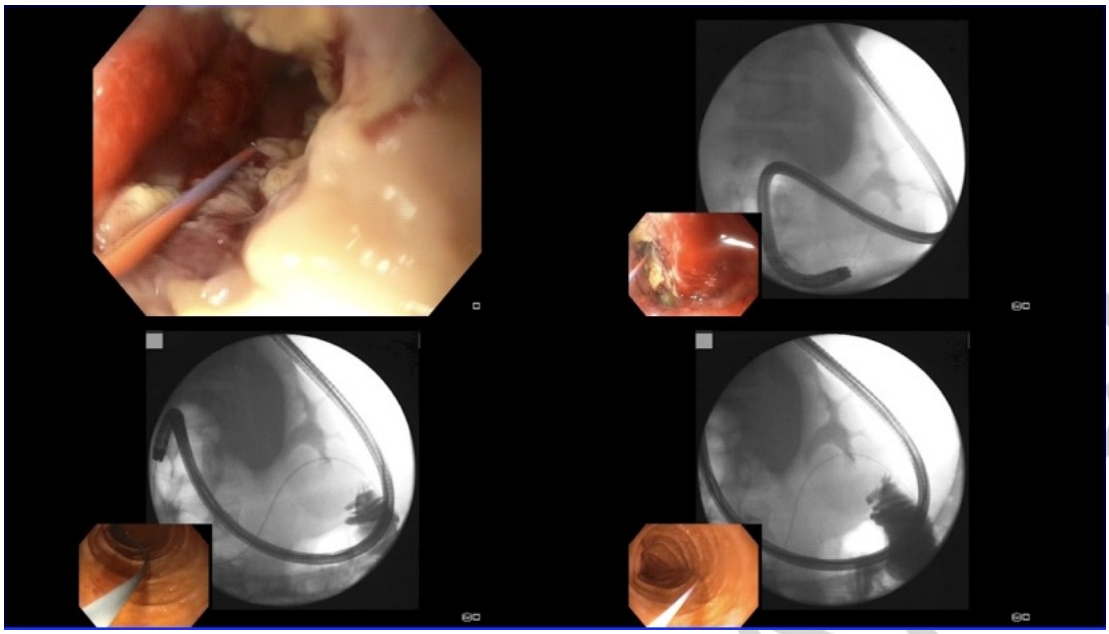

Fig. 1. The upper images show one case in which the endoscope could not transverse the stricture and the stent had to be deployed with the aid of fluoroscopy. The bottom images show another case in which the endoscope could pass the stricture and the guidewire can be seen beyond the tumor.

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