Palliative management of malignant gastric outlet obstruction with endoscopically inserted self-expanding metal stents


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ABSTRACT

Aim and background: the insertion of self-expanding metal stents to palliate malignant gastric outlet obstruction is a minimally invasive procedure that is being increasingly used. We discuss experience with this technique in a level-II hospital in the Spanish National Health System.

Patients and methods: a retrospective five-year study (2003-2007) was conducted in 23 patients who underwent 27 procedures aimed at resolving malignant gastric outlet obstruction (mean, 0.45 procedures per month) using endoscopically inserted uncovered stents (Wallstent® and Wallflex®).

Results: insertion was technically feasible in all 27 (100%) attempts, with satisfactory clinical results in 25 cases (92.5%). Endoscopy alone was used 10 times (37%), and both endoscopy and fluoroscopy on 17 (63%) occasions. After stent insertion, one patient was intervened for treatment, and a patient with an unsuccessful prosthesis received a palliative surgical bypass. Four stents became obstructed by tumoral ingrowth, and patency was reestablished by inserting a new stent. Obstructive jaundice caused by stents covering the papilla of Vater occurred in three cases. There were no other complications or mortality due to the procedure. Mean survival was 104 days (range 28-400, SD ± 94).

Conclusions: in our experience endoscopic insertion of self-expanding metal stents appears to be a safe and efficient palliative method for malignant gastric outlet obstruction, and can be performed successfully in a center with our characteristics.

Key words: Enteral stent. Gastrojejunostomy. Malignant gastric outlet obstruction. Palliative treatment. Pancreatic cancer.

RESUMEN

Antecedentes y objetivo: la inserción de prótesis metálicas autoexpandibles para paliar la obstrucción tumoral del vaciamiento gástrico es un procedimiento mínimamente invasivo, que cada vez se utiliza con más frecuencia. Presentamos la experiencia de esta técnica en un hospital de nivel II del Sistema Nacional de Salud.

Pacientes y métodos: estudio retrospectivo de un periodo de cinco años (2003-2007), en los que se trató de resolver la obstrucción tumoral del vaciamiento gástrico en 27 ocasiones a 23 pacientes (media de 0.45 procedimientos por mes), mediante la inserción endoscópica de prótesis no recubiertas (Wallstent® y Wallflex®).

Resultados: la inserción fue técnicamente posible en el 100% de los 27 intentos. Se obtuvo un buen resultado clínico en 25 ocasiones (92.5%). Se utilizó sólo endoscopia 10 (37%) veces y en las otras 17 (63%) también fluoroscopia. Tras la inserción de la prótesis se intervino a un paciente con intención curativa y a otro, en el que la prótesis no funcionó, para realizar una derivación paliativa. Cuatro prótesis se obstruyeron por crecimiento tumoral, recausalizándose mediante la inserción de nuevas prótesis. En tres ocasiones se produjo ictericia obstructiva en prótesis que cubrían la papila de Vater. No hubo otras complicaciones. Tampoco mortalidad derivada del procedimiento. La media de supervivencia fue de 104 días (rango 28-400, DE ± 94).

Conclusions: en nuestra experiencia, la inserción endoscópica de prótesis metálicas autoexpandibles parece un método seguro y eficaz en el tratamiento paliativo de la obstrucción tumoral del vaciamiento gástrico y puede llevarse a cabo con éxito en un centro de nuestras características.

INDRODUCTION

Obstruction is a pathological phenomenon common to all tubular organs of the body. Pathophysiological consequences vary in relation to the anatomical location of the obstruction. Technological advances allow the use of different materials to build self-expanding metal prostheses or stents (SEMS). SEMS are meshed cylindrical tubes of various lengths and widths that can be inserted folded. This property allows their passage beyond severe strictures, usually without the need for previous dilation. Once inside the obstructed area, SEMS are opened by a release mechanism that provides sufficient diameter to re-canalize the stenosed area. SEMS can be modified according to anatomic locations, and are used to achieve patency in the obstruction of tubular structures such as the coronary arteries, trachea, and most of the digestive tract and bile duct (1).

SEMS are being used to palliate malignant gastric outlet obstruction (MGOO) since the nineteen-nineties (2-8). Due to technological improvement, stent models can now be specifically designed to re-canalize tumoral obstructions of the gastric outlet (antrum, pylorus, and duodenum). The term enteral SEMS includes prostheses for the treatment of MGOO and malignant colorectal obstructions (MCRO). Usually, the design in both cases is similar, although the prosthesis has an end wider than the rest of the stent, which is located orally in relation to the obstruction to help prevent SEMS migration. Since stents for MGOO are inserted by upper endoscopic techniques, and colorectal ones via the anus, this wider portion is already located in the folded prosthesis in a different end.

SEMS for MGOO as opposed to stents for MCRO (9) are usually inserted with a palliative purpose (10). The concept of using SEMS as a bridge to surgery is not yet clearly established for the stents for MGOO. Unlike acute colonic obstruction, which needs urgent treatment, obstruction of the gastric outlet can be managed with nil per os (NPO), with sometimes aspiration by a nasogastric tube if surgery is not delayed too much. This study describes the palliative management of MGOO using SEMS insertion in our center.

PATIENTS AND METHODS

Patients with MGOO and treated by SEMS insertion were analysed retrospectively over a five-year period (2003-2007). MGOO was diagnosed by gastroscopy in patients having typical clinical symptoms (vomiting and food intolerance). Radiological barium contrast studies were also performed occasionally. According to the Surgery and Oncology departments, when a surgical procedure was not possible, MGOO was palliated by the insertion of SEMS. The gastric cavity was cleaned of retained food as much as possible to facilitate the endoscopic procedure and to avoid aspiration. The patient was on NPO and occasionally had a nasogastric tube.

The most critical step for SEMS insertion is the passage of a guidewire through the tumoral stricture to place it beyond the tumor, in healthy tissue. The undeployed stent is then glided over this guidewire and may then be opened inside the tumor thus solving the obstruction. To ensure that the guidewire was properly positioned, two techniques were used:

1. **Fluoroscopy** was used if a fluoroscopic device was available (Fig. 1). The endoscope with a therapeutic working channel (usually a colonoscope, because a therapeutic gastroscope was not available) was located in the proximal part of the tumor. A guidewire of 0.035 inches (0.875 mm) in diameter fitted with anatraumatic hydrophilic tip was passed through the working channel to make it through the whole stenosed segment. This passage was confirmed by fluoroscopy. A biliary catheter used for endoscopic retrograde cholangiopancreatography (ERCP) was introduced over the guidewire and the obstruction was delineated by contrast injection. The catheter was then withdrawn and the prosthesis was always inserted over the guidewire. Once the SEMS was inside the stricture, it was gradually opened up to place it correctly with proximal and distal ends located in healthy areas. The proximal end of the stent was always located in the prepyloric distal antrum, which is called the transpyloric position (Fig. 2), except when the obstruction was in the more distal duodenum (Fig. 3). Both types of stents were inserted, stainless steel Wallstent® and nitinol Wallflex® (both from Boston Scientific). They had lengths of 6 or 9 cm, and minimal diameters of 22-25 mm once fully open.

2. The second technique was the use of an ultrathin endoscope (UTE) able to go beyond strictures. The difficulty that many gastroenterologists face is having appropriate fluoroscopy devices to help in performing endoscopic procedures safely, which has led to develop only endoscopic methods that can provide the reassurance fluoroscopy brings. Several models of very small caliber endoscopes are available that can go beyond many strictures in the digestive tract. According to our previously described technique (11), once the tumor is traversed by a 6 mm diameter endoscope (Pentax® EG-1870 K) a guidewire is left in place through the UTE working channel. Subsequently the UTE is removed, leaving the guidewire in place beyond the stenosis. This guidewire is then inserted in a retrograde manner in the therapeutic endoscope working channel, and a SEMS is placed over it.

The SEMS that were employed (Wallstent® and Wallflex®) have no cover over the mesh, and this allows the tumor to penetrate the metal cells, thus decreasing migration. However, a tumor can grow into the stent and obstruct it over time.

After SEMS insertion, patients were usually kept in hospital for 24 hours, and their tolerance to liquids was tried the next day. Clinical improvement in patients was assessed, and possible complications were evaluated. Patients received instructions to start a normal diet gradually.
The resolution of gastric outlet obstruction syndrome after stent insertion without significant complications such as need for surgery was considered a clinical success.

RESULTS

Twenty-seven enteral SEMS insertions were attempted in 23 patients during a study period of 60 months (0.45 procedures per month). There were 15 men (65%) and 8 (35%) women with a mean age of 75 years (range 46-19, SD ± 12). Patient characteristics are depicted in table I. Tumor obstruction was due to primary gastric adenocarcinomas in 16 (69.5%) patients. The rest of cancers corresponded to three duodenal neoplasms, two pancreatic neoplasms, and two common bile duct cholangiocarcinomas that had extended into the duodenum. Obstructions were antropyloric (14 patients or 61%), duodenal (6 or 23%), and pyloroduodenal (3 or 13%) (Fig. 4).

Endoscopy alone was used in 10 (37%) procedures according to the UTE method. Endoscopy with fluoroscopic monitoring was used in the other 17 (53%). SEMS were inserted successfully in the obstructed zone in all 27 (100%) attempts. In general, conscious sedation with midazolam was employed but occasionally dolantine and sometimes buscapine were added to relax gastroduodenal motility.

Two overlapped SEMS were needed in three patients to completely open the stricture in its entire length. No significant complications (hemorrhage or perforation) were observed during the first few days after the procedure, and patients did not need any special analgesia. Complete clinical improvement of the MGOO syndrome was achieved on 25 (92.5%) occasions. However, in one patient improvement was partial and in another a palliative gastrojejunostomy had to be performed due to total lack of improvement.

SEMS were inserted as a definitive palliative treatment in all patients. Nevertheless, a patient with a duodenal tumor was re-evaluated after stent insertion in another hospital and underwent surgery several months later. Meanwhile he was able to have a normal diet. Mean survival was of 104 days (range 28-400, SD ± 94) excluding surgically intervened patients. In three patients the stent...
was re-obstructed by tumor ingrowth, and they were treated with repeat SEMS insertion. A third stent was needed for a 91-year-old patient (Table I) who survived for 400 days (Fig. 5).

Three patients with stents covering the papilla of Vater area showed jaundice several weeks after the insertion. No therapeutic procedure was performed because of their advanced condition and according to the wishes of patients and their families.

DISCUSSION

Patients with MGOO show a significant decline in their quality of life. Initially, the symptoms of MGOO syndrome, such as nausea, vomiting, dehydration and weight loss, can be mistakenly attributed to advanced neoplastic disease and to various oncology treatments (chemotherapy, opiates, etc.). Due to stomach distension the diagnosis of MGOO is sometimes delayed. Traditionally the only choices for MGOO patients were surgical palliative techniques. Derivative surgery, usually a gastrojejunostomy, does not offer satisfactory results, and has high morbidity and mortality rates (12). Moreover, these patients usually have a very poor clinical condition that is contraindicative for a surgical procedure.

The therapeutic management of MGOO has progressively changed since the 1990s, when SEMS were beginning to be used to palliate neoplastic gastric outlet obstruction. A review on the use of stents to palliate MGOO that included 606 patients showed that stents were inserted correctly in 97% of cases while clinical improvement with the possibility of oral intake was achieved in 89% of cases (13).

Nowadays, insertion of SEMS is the palliative treatment of choice for MGOO. When compared to surgery, stents are at least as efficient as gastrojejunostomy, although the cost of the procedure is lower. Patients have to stay in hos-
In Spain, a multicenter study performed at 13 centers showed that the annual mean number of stent insertions for MGOO treatment was 0.45 stents per month (18). Our center’s stent insertion rate is similar. It is important to keep in mind that our hospital is a level-II site in the National Health System (and may be considered a community hospital), whereas some hospitals that participated in the study are tertiary referral centers. If surgical and oncology teams understand the advantages of this minimally invasive procedure to solve gastric outlet obstruction by means of stents, the use of this technique is likely to proliferate even further.

Endoscopic SEMS insertion, at either the gastroduodenal, colonic (9) or esophageal (19) level, in the context of the difficulties that every interventional technique implies, seems to us a simpler procedure than ERCP (20). SEMS insertion has a shorter learning curve. However, to obtain acceptable success rates (successful rate insertions around 100%) special dedication is needed. Taking into consideration that, in our institution, the mean rate of gastroduodenal stent insertions is slightly less than one hospital for a shorter period and after the endoscopic procedure they can start oral diets earlier after SEMS insertion than after surgery (10,14-17).

In four cases stents became obstructed and new ones were inserted to solve the obstruction, for a total number of procedures of 27.

In Table I, we present a list of all patients with tumoral obstruction of the gastric outlet palliated by the endoscopic insertion of self-expanding metal stents.

### Table 1. Characteristics of patients with tumoral obstruction of the gastric outlet palliated by the endoscopic insertion of self-expanding metal stents

<table>
<thead>
<tr>
<th>Patient</th>
<th>Gender/Age (1)</th>
<th>Location of the stricture (2)</th>
<th>Type of tumor</th>
<th>Stent type/length (cm)</th>
<th>Clinical success</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M/78</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallstent® 6 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>M/55</td>
<td>Pyloroduodenal</td>
<td>Duodenal</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>M/67</td>
<td>Duodenum</td>
<td>Cholangio</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>M/87</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>F/91</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>M/77</td>
<td>Duodenum</td>
<td>Pancreas</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>F/85</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallstent® 6 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>M/77</td>
<td>Duodenum</td>
<td>Duodenal</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>F/84</td>
<td>Pyloroduodenal</td>
<td>Gastric</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
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<tr>
<td>10</td>
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<td>Gastric</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
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<tr>
<td>11</td>
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<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>12</td>
<td>M/79</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>M/78</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallstent® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>14</td>
<td>M/91</td>
<td>Duodenum</td>
<td>Duodenal</td>
<td>Wallstent® 6 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>15</td>
<td>F/87</td>
<td>Pyloroduodenal</td>
<td>Gastric</td>
<td>Wallflex® 6 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>16</td>
<td>F/62</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallflex® 6 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>17</td>
<td>M/80</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallflex® 9 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>18</td>
<td>M/86</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallflex® 6 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>19</td>
<td>M/78</td>
<td>Duodenum</td>
<td>Pancreas</td>
<td>2 Wallstent® 9 cm</td>
<td>Partial</td>
</tr>
<tr>
<td>20</td>
<td>M/72</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>2 Wallflex® 9 cm</td>
<td>No</td>
</tr>
<tr>
<td>21</td>
<td>M/62</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>2 Wallflex® 6 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>22</td>
<td>M/78</td>
<td>Antropyloric</td>
<td>Gastric</td>
<td>Wallflex® 6 cm</td>
<td>Yes</td>
</tr>
<tr>
<td>23</td>
<td>F/53</td>
<td>Duodenum</td>
<td>Cholangio</td>
<td>Wallflex® 6 cm</td>
<td>Yes</td>
</tr>
</tbody>
</table>

In four cases stents became obstructed and new ones were inserted to solve the obstruction, for a total number of procedures of 27.

(1) M = male, F = female.

(2) Gastric and duodenal tumors were carcinomas originating in these organs. Cholangio (cholangiocarcinomas) corresponded to duodenal extension of tumors originated in the common bile duct.

![Fig. 5. When a stent becomes obstructed the easier way to re-canalize is by inserting another stent within the initial one. This image corresponds to the patient in figure 2, who lived more than a year after the insertion of the first stent. It then became obstructed and was re-canalized.](image-url)
every two months, the performance of this technique should be limited to few physicians. In addition, the experience with instruments used for ERCP such as catheters and guidewires is very useful for a successful insertion of digestive stents (21). Also, in contrast to acute colonic obstruction, a stent is never urgently needed for MGOO.

In our opinion, the endoscopic insertion of stents should always be performed with fluoroscopic monitoring. Nonetheless, gastroenterologists experience frequent difficulties in using adequate radiological devices. Until this problem is eventually solved, UTEs may be an alternative method (11). Also, it would be very useful that every center had a gastroscope with therapeutic channel for insertion techniques and many other endoscopic procedures (such as higher aspiration capacity in gastrointestinal hemorrhage).

Serious complications of stent insertion are few, but if a gastroduodenal perforation occurs during insertion, an urgent procedure will probably be needed under difficult conditions. Recently, the closure of a perforation due to a gastroduodenal SEMS by means of another covered SEMS has been reported (22). The obstruction of stents by tumor growth into mesh cells can be easily solved endoscopically by the insertion of new stents (Fig. 5). Occasionally, covered stents, which prevent or delay such obstruction, can be used, but their tendency to migrate is higher (23). In our study we used uncovered –bare– Wallstents® and Wallflex® stents, and no migration was recorded.

Three of our patients developed obstructive jaundice several weeks after the insertion. Bile flow obstruction through the papilla due to epithelial covering of the pros thesis some time after its placement cannot be discarded as a cause. Insertion of a biliary transapillary stent through the duodenal prosthesis is usually very difficult and frequently needs the use of transhepatic techniques (interventional radiology) or, nowadays, transhepatic ultrasonographically-guided biliary drainage from the upper body of the stomach. Our patients’ conditions were clinically unstable and, therefore, other bile drainage interventions were not considered.

In conclusion, gastroduodenal SEMS insertion to treat MGOO was possible in 100% of cases. Complete clinical improvement was achieved with 92.5% of insertions, and only two patients showed no relief. One patient required surgical gastrojejunostomy while another patient had a complete liquid diet and prokinetics administered. No immediate complications occurred after the procedures.

Radiologists can also place gastroduodenal SEMS (24). Although no comparative study between efficacies after endoscopic or radiological insertions has been conducted, according to radiological studies published the effectiveness seems to be similar. The endoscopic insertion of gastroduodenal stents may be easier due to the stability that an endoscope provides in passing guidewires, catheters, and prostheses themselves. Also, if no endoscopes with therapeutic channels in which stents may fit are available, endoscopes with a diagnostic caliber can be useful to advance stents to the obstruction (25). This is also useful for placing esophageal stents that cannot be introduced in any endoscope working channels.

In view of the good results achieved by this and previous studies, the insertion of self-expanding metal stents may generally be considered the treatment of choice for malignant gastric outlet obstruction. This technique can be performed successfully in a center such as ours.

**REFERENCES**


