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The management of esophageal strictures by using self-expanding metallic stents

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Abstract

Esophageal stents are an important tool for palliative treatment of inoperable or recurrent esophageal cancer; and broncho-esophageal fistula; to bypass refractory benign stenosis. Our work aims are to study the indication of self-expanding metallic stents for esophageal strictures, as well as the challenges, and complications of their placement. Between May 2016 and November 2019, 10 esophageal stents placement procedures were performed on 9 patients. The placement of the esophageal stent was performed by using a guidewire. Radioscopic control has been systematically carried out, and all patients were monitored 24 hours after the procedure. Nine patients were included in this study, 77.7% (n=7) were male and 22.3% (n=2), were female, the average age was 54 years (18-67 years). All stents have been successfully placed. The average follow-

up for the procedures was 24 weeks. 33.33% (n=3) of the patients had a stent migration treated by the placement of another stent in 11.1% (n=1). No stent occlusion and no complications were noted. The food recovery was again possible in all cases. The evolution was marked by the death in 33.3% (n=3), fistula closure in 22.2% (n= 2) and persistent of stricture in 11.1% (n=1). Esophageal stents remain an important tool for the management of malignant esophageal diseases and refractory benign esophageal stricture. The simplicity and the functional success of the majority of cases, make them highly recommended as palliative treatment, as the success rate in our study was 66.7% (n=7).

Introduction

Esophageal stents are an important tool for the palliative treatment of inoperable esophageal malignancies because half of these patients are unresectable at the time of diagnosis [1], broncho-esophageal fistula, or for dilation of a refractory esophageal stricture [2,3]. Our work aims are to study the main indication of self-expanding metallic stents for esophageal strictures, as well as the challenges and complications of their placement.

Methods

A retrospective study included 9 patients with malignant or benign stenosis and esophageal fistula, who underwent placement of esophageal stents, during the period from May 2016 to November 2019. All of the procedures were performed with the patients under sedation using propofol. Before insertion, the proximal and distal margin of the stricture was marked by cutaneous markers. Savary dilation over a guidewire under fluoroscopic guidance was then performed to facilitate the introduction of the stent applicator. Subsequently, the applicator with the uploaded stent was advanced over the guidewire and positioned with the proximal radiopaque marker approximately 2 cm proximal to the site of cutaneous markers. The stent was released under fluoroscopic control by withdrawing. Endoscopy was performed immediately after stent release to confirm the correct positioning and stent expansion across the stricture. All patients were monitored 24 hours after the procedure. The stents used were: NESA Hanaro stent® and Ultraflex. Fully covered stents were used in 70% (n=7) of the cases and partially covered or not covered stents in 30% (n=3) of the cases. Upper endoscopy and chest computed tomography scan were used for the assessment of location and length of stenosis on admission and during follow-up. Technical success and complications were collected and analyzed in Excel.

Results

Nine patients were retrospectively included in this study presented for dysphagia or swallowing problems, 77.7% (n=7) of the patients were male and 22.3% (n=2), were female, and the average age was 54 years (18-67 years). Were included patients with stenosis of the upper third of the esophagus (between 16 and 25 cm of the dental arches), with an average length of 22.5 mm 44.4% (n=4) of the patients had a benign broncho-esophageal fistula, 33.3% (n=3) had a malignant esophageal stricture, 11.1% (n=1) of the patients had a malignant broncho-esophageal fistula, and 11.2% (n=1) had a refractory caustic stenosis. 30% (n=3) of the patients have required endoscopic dilation by balloon dilator for bypassing esophageal stricture. The average follow-up of the procedures was 24 weeks. All stents have been successfully placed. 33.33% (n=3) of the patients had a stent migration treated by the placement of another stent in 11.1% (n=1) of cases. No stent occlusion and no complications such as chest pain or hemorrhage were noted. The tolerance was considered “acceptable to excellent” by the patient and the food recovery was again possible. The evolution was marked by the death of 33.3% (n=3) of the patients between 1-4 weeks of follow up, fistula closure in 22.2% (n= 2) of the cases after 8 weeks of follow up and persistent of stricture in 11.1% (n=1) after removing stents (Figure 1, Figure 2, Figure 3 and Table 1).

Discussion

History of esophageal stents and their various types: the concept of using a hollow tube to palliate malignant strictures dates back to over 100 years. In the mid-1990s, several rigid plastic stents were commercially available. These stents were associated with significant complications due to their lack of flexibility. These drawbacks were addressed with the introduction of SEMS in the late-1990s [4]. A large number of SEMSs are available on the market: covered, partially covered, and uncovered [5,6]. Stent placement usually requires both endoscopic and fluoroscopic guidance, but it can be done safely with either modality. Most stents are placed distally and across the gastroesophageal junction [7].

Management of malignant esophageal diseases: esophageal cancer is the eighth most common cancer worldwide with an estimated 456 000 new cases and 400.000 deaths in 2012 [8]. More than 50% of the patients have metastatic disease at the time of diagnosis and dysphagia is the most common symptom. European Society of Gastroenterology (ESGE) preconizes the placement of partially or fully covered self-expanding metal stents (SEMSs) for palliation of malignant dysphagia with esophageal bypass. A study showed a food recovery and improved quality of life for these patients [8]. In our study, the esophageal stent permitted a food recovery in all cases (n=3) despite the death of 22.2% (n=2) of patients between 1-4 weeks of follow up. Malignant bronchoesophageal fistula develops in 5% to 15% of patients with esophageal cancer and less than 1% of patients with lung carcinoma [9,10]. ESGE recommended SEMSs placement as the preferred treatment for sealing malignant bronchoesophageal fistula with the possibility of double stenting (esophagus and airways) when fistula occlusion is not achieved by esophageal or airway prosthesis alone [8]. Multiple studies using SEMSs for sealing off esophageal airway fistulas have reported improvement in symptoms and sealing of the fistula in 75 % to 100% of the patients [9-13]. In the largest prospective series, Shin *et al*. successfully placed SEMSs in 61 patients with malignant esophageal airway fistulas, sealing off the fistula in 49 patients (80%), while 10 patients (16%) required concomitant airway stents [9]. In our series, one patient (111%) had a malignant bronchoesophageal fistula and esophageal stent permitted food recovery until 2 weeks (death).

Management of benign bronchoesophageal fistula: benign bronchoesophageal fistula is due to prolonged endotracheal intubation, radiation therapy, surgical or endoscopic interventions, it´s suspected in patients with request coughing, recurrent purulent bronchitis or pneumonia, and unexplained malnutrition [14]. The treatment is curative with surgery, however, not all patients are suitable for surgical intervention, especially for large fistula. The esophageal stent is employed after surgery failure or as a bridge or palliative treatment for large fistula (>5mm). In our study, we noticed fistula closure in 50% (n= 2) of the cases after 8 weeks of follow-up. A. Debourdeau *et al*. demonstrate in their series of 22 patients with non-malignant bronchoesophageal fistulas endoscopic successful closure of fistula in 45% (n=10) after 6 months [15].

Management of refractory benign stenosis: benign esophageal strictures arise from a diversity of causes: gastroesophageal reflux, esophageal resection, radiation therapy, ablative therapy or the ingestion of a corrosive substance [16]. Most studies have used expandable stents for the treatment of refractory or recurrent esophageal strictures as defined by Koch-man: generally, when more than 3 to 5 dilations have been performed without clinical and endoscopic response or when it was impossible to achieve a 14 mm lumen over 3 dilation sessions [17]. Most experts agree that stent placement should be considered when other treatment options (dilation with or without intralesional triamcinolone acetonide injections and/or incisional therapy) have failed, though a clear definition of clinical failure has not been uniformly adopted. Repici *et al*. conclude in their study that after a mean follow-up of 43.9 months,

only 22 patients (31.4%) out of 70 patients had achieved clinical stricture resolution [9]. We report in our study 1 case (11.2%) of refractory benign esophageal stenosis which underwent 6 dilations with triamcinolone acetate injections without endoscopic response, SEMS was placed with an early migration.

Complication: the use of SEMSs is not free from drawbacks or even life-threatening complications, such as the risk of migration [18]. In our study, it was the most common complication with a rate of 33.3% (n=3), in addition to restenosis caused by malignant or granulomatous ingrowths, and difficulties or failure in stent removal [19]. Besides, the esophageal stent is often easier accepted by patients [8]. In our study, the acceptance of SEMSs was judged acceptable to excellent by all patients.

Conclusion

Esophageal stents remain an important tool for the management of malignant esophageal diseases and refractory benign esophageal stricture especially after the development of multiple SEMSs. The minimally invasive approach of esophageal stenting has improved the quality of life of many patients. In our study, the success of the procedure was 66.7%. In the future, innovations such as biodegradable stents may improve stent patency, mitigate stent-related complications and decrease the need for re-interventions.

What is known about this topic

- *esophageal stents are an important tool for the palliative treatment of inoperable esophageal cancer;*
- *The indications of SEMSs in benign diseases.*

What this study adds

- *The indications of SEMSs;*
- *Improving the quality of life of patients with SEMS.*

Competing interests

The authors declare no competing interests.

Authors' contributions

All the authors have read and agreed to the final manuscript.

Table and figures

Table 1: patients' characteristics and the result of endoscopic treatment

Figure 1: endoscopic picture showing esophageal stent placement

Figure 2: fluoroscopic pictures of the placement of an esophageal stent

Figure 3: CT scan showing esophageal stent migration in stomach

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Table 1: patient's characteristics and the result of endoscopic treatment

Patients (n=9)	**Pathology**	**Esophageal stents**	**Complication**	**Fellow-up**	**Evolution**
1	Malignant stricture	SEMS with dilation	None	2 weeks	Death
2	Malignant stricture	SEMS	None	1 week	
3	Malignant stricture	SEMS with dilation	Migration	4 weeks	Death
4	Malignant fistula	SEMS	None	2 weeks	Death
5	Benign fistula	SEMS	Migration and placement of another stent	8weeks	Closure of fistula
6	Benign fistula	SEMS	None	8weeks	Closure of fistula
7	Benign fistula	SEMS	None	8weeks	Persistent of fistula
8	Benign fistula	SEMS	None	8 weeks	Persistent of fistula
9	Benign stenosis	SEMS with dilation	Migration	8weeks	Endoscopic dilation

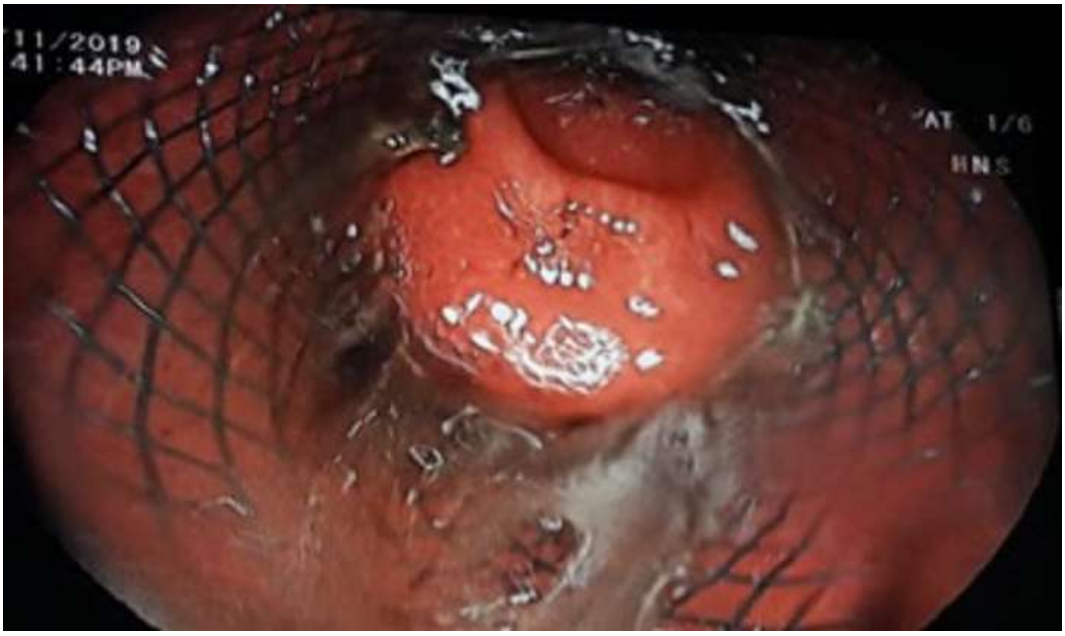

Figure 1: endoscopic picture showing esophageal stent placement

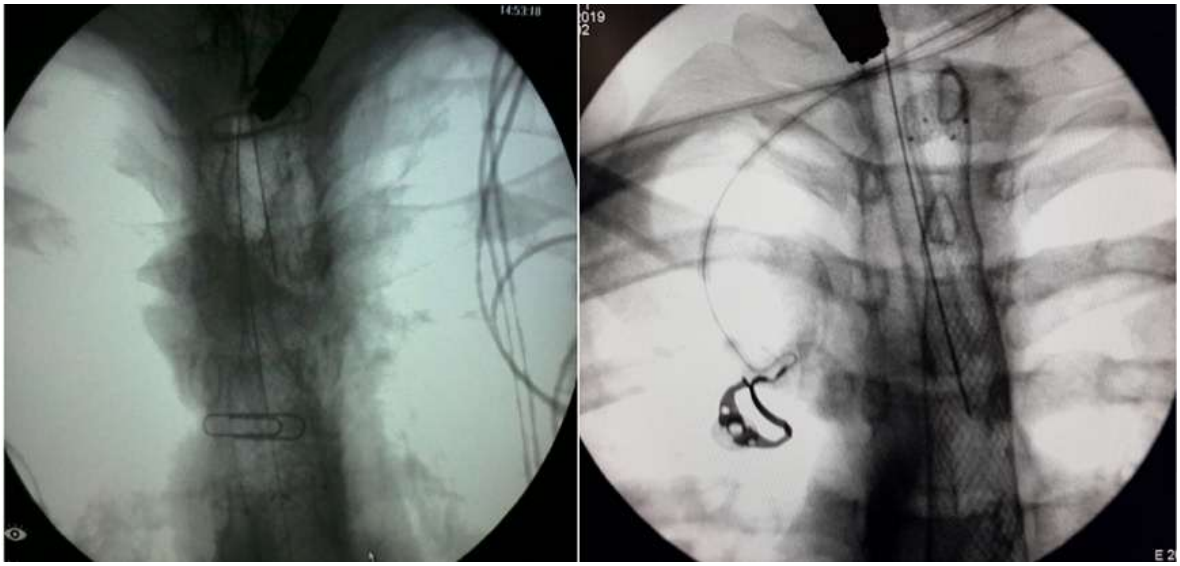

Figure 2: fluoroscopic pictures of the placement of an esophageal stent

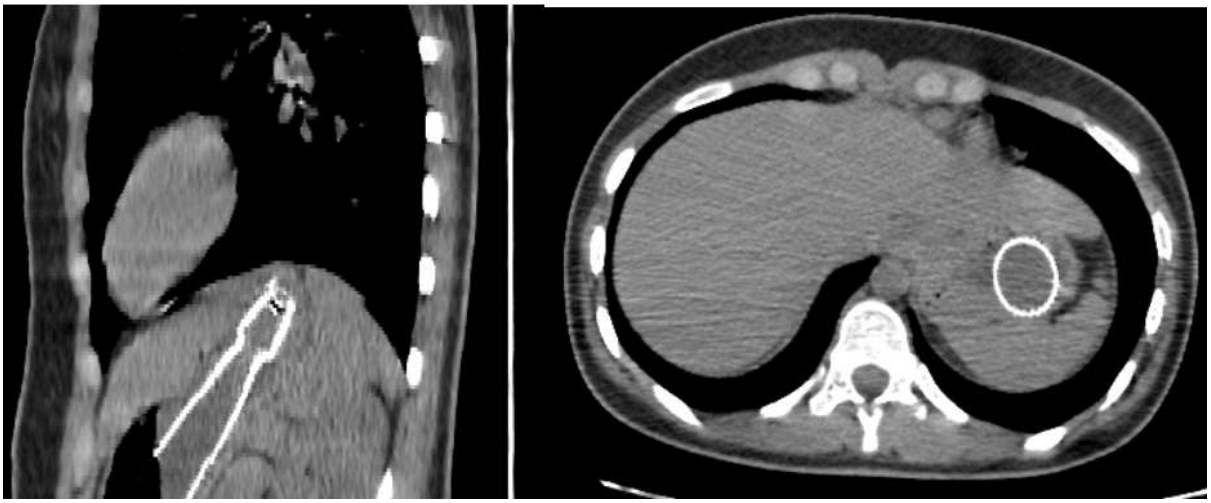

Figure 3: CT scan showing esophageal stent migration in stomach