

Original Article

Palliation of malignant esophageal obstruction and fistulas with covered self expandable metallic stents: assessment of a simple fluoroscopic method

Kai Zhang¹, Shufang Wei², Jiahong Wu¹, Caixia Li¹, Xiangxing Ma¹, Qingliang Wang¹

¹Department of Radiology, Qilu Hospital of Shandong University, Jinan, Shandong, China; ²Zongheer Ward, Qilu Hospital of Shandong University, Jinan, Shandong, China

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Abstract: Purpose: To introduce a convenient, quick and effective way to place self-expandable metal stents (SEMSs) to relieve dysphagia and fistula caused by esophageal carcinoma. Materials and methods: A consecutive series of 36 patients (25 men, 11 women), aged 38-82 years (median, 52.7 years) underwent stent placement using a 7F long sheath of 55 cm and fully covered SEMS under local anesthesia with fluoroscopic control. Results: Stent placement was successful in all patients. Swallowing improved from mean dysphagia score 3.44 ± 0.50 to score 0.69 ± 0.71 ($P = 0.000$). There were no clinically significant complications during and after the deployment of stents. Migration was noted in 4 patients. Restenting was needed in 3 patients. Removal was needed in 2 patients. Mean survival following stenting was 134.14 d. Conclusions: SEMSs provide rapid, safe and effective relief of dysphagia and fistula. Using the 7F long sheath of 55 cm could make the procedure easy, quick and safe.

Keywords: Esophageal obstruction, dysphagia, fistula, self-expandable metallic stent

Introduction

Malignant esophageal obstruction and fistula are caused by a primary esophageal neoplasm in most patients [1, 2]. Unfortunately, despite recent advances in the curative treatment of esophageal carcinoma, including combination chemotherapy and radiotherapy, many patients present with the disease at an incurable stage, requiring palliative treatment to relieve dysphagia and cough, which are often their main symptoms [3, 4].

SEMSs were developed with the advantage of having a smaller, more flexible delivery system and increased ease of deployment [5]. Currently, covered stents are the most commonly used SEMSs in patients with esophageal cancer because they restrict tumor in growth through the metal mesh [6]. Covered SEMSs also have been used successfully in the management of patients with anastomotic leaks or fistulas [7].

Usually there are two main kinds of techniques to deploy the SEMSs, endoscopically and fluo-

roscopically. For the unique practitioner, the way to insert a SEMS is various [8-14]. Each method has its advantages and drawbacks. The most meaningful intervention we think is to provide an adequate esophageal lumen as quickly, conveniently and effectively as possible with low morbidity and mortality.

In this paper we report our experience with the use of covered SEMSs to introduce an efficient and safe way to place SEMSs to relieve dysphagia and fistula caused by esophageal carcinoma.

Patients and methods

Patients

Thirty-six patients (25 males and 11 females, aged 38 to 82 years, mean age 52.7 ± 8.5 years) with esophageal carcinoma were referred for deployment of covered SEMSs from December 2013 to November 2014. Among the patients, we found strictures were secondary to squamous carcinoma (26 cases), adenocarcinoma (10 cases) and anastomotic recurrence

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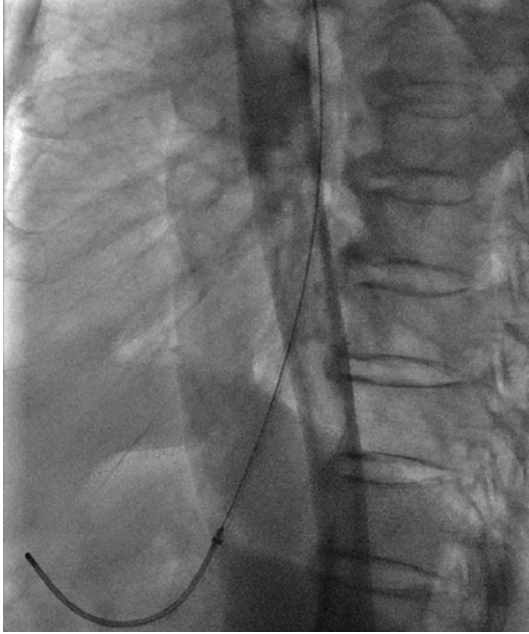


Figure 1. J shape guide wire and 7F long sheath with the dilator were inserted into the stomach first, then the guide wire and dilator were withdrawn. The superstiff exchange guidewire were inserted into the stomach along the 7F long sheath.



Figure 2. To inject contrast media via the sidearm of the 7F long sheath as the sheath was withdrew gradually to confirm the position and length of the lesion.

of tumor (6 cases). Each patient was diagnosed at the third or fourth stage of their disease by barium study, CT, MRI, endoscopy and pathology. The degree of dysphagia was graded as the following: 0 = no dysphagia, 1 = being able to swallow most solid foods, 2 = being able to swallow semisolid foods, 3 = being able to swallow liquids only, 4 = complete obstruction. Among the patients, 19 were at grade 3 and 17 were at grade 4. The strictures had a mean length of 75 ± 8 mm (range, 40-120 mm), 5 patients had tracheoesophageal fistulae, and one patient had mediastinoesophageal fistula. Three tumors were localized in the proximal, 15 in the middle, 4 in the distal third of esophagus, 9 invaded both middle and lower thirds and 5 in the gastroesophageal junction.

Materials

All the procedures were carried out using PHILIPS FD20 or GE3100 angiographic digital system. 36 covered SEMSs (Derman Science Technology Co, Ltd, Jinan, China), with a length between 80 mm to 160 mm (average 110 ± 10 mm), a diameter between 16 mm to 20 mm were used. A dental pad, 7F long sheath of 55 cm (Cook Incorporated, USA), a J shape guide

wire of 0.038 inch diameter and 150 cm length, an superstiff exchange wire of 180 cm or 260 cm length and a stent delivery system were used.

Methods

Local anesthesia (200 mg lidocaine) was applied to the mouth and throat and 10 mg anisodamine was injected intramuscularly before the procedure. With patients in supine position or lateral recumbent position on the operating table, J shape guide wire and 7F long sheath with the dilator were inserted into the stomach first, then the guide wire and dilator were withdrawn. The superstiff exchange guidewire were inserted into the stomach along the 7F long sheath. Then we injected contrast media via the sidearm of the 7F long sheath as the sheath was withdrew gradually to confirm the position and length of the lesion (**Figures 1-4**). The stents chosen were at least 4 cm longer than the length of the stricture. Under fluoroscopic guidance the stent delivery system was passed through the stricture site and deployed at the exact position. The shape and position of the stent were observed immediately with water-soluble contrast material esophagography.

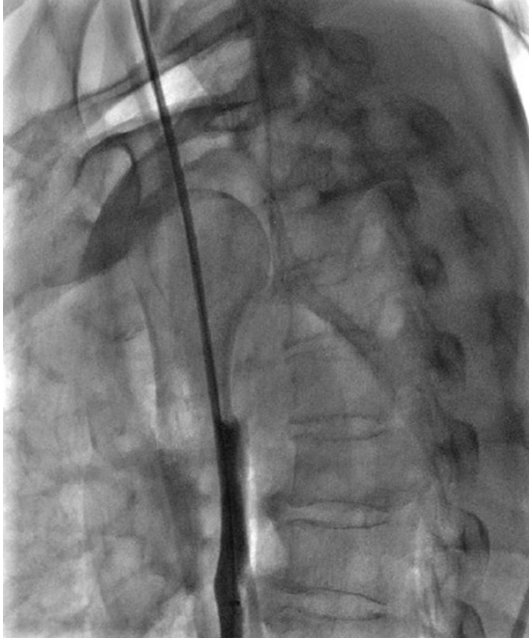


Figure 3. Lower margin of the lesion has been shown clearly.

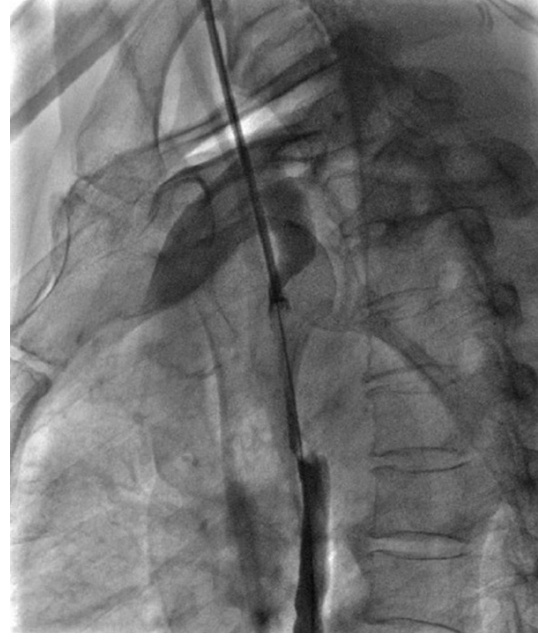


Figure 4. Upper margin and whole the length of the lesion has been shown clearly.

Follow-up

Fasting during the first 24 h was necessary and gentamicin sulfate was given by oral administration to prevent infection. Liquid food was first given in the following day, and then semi-solid food and solid food were given. The time to begin normal food in those patients who had a covered stent inserted depended on the position and degree of stent expanding. Further esophagography should be done in a week if the stent was not fully expanded during the procedure. Survivors should be followed up for at least 24 mo.

Results

A total of 37 covered SEMSs were placed in 36 patients suffered from esophageal cancer, including 30 malignant dysphagia, 5 tracheo-esophageal fistulae, and one mediastinoesophageal fistula. In one case, when the stent was opened in an inappropriate position, the stent was removed by pulling the attached string and a new stent was reinserted. Other covered SEMSs were deployed successfully for the first time. Balloon dilatation was not performed in any of the patients. Almost all patients improved in terms of oral intake and repeated coughing

associated with eating and drinking. After the procedure, 88.9% of the patients (32/36) did not report any dysphagia during follow-up. Before stent placement, mean dysphagia score was 3.44 ± 0.50 ; after stent placement, mean dysphagia score was 0.69 ± 0.71 ($P = 0.000$) (**Figure 5**). There were no clinically significant complications during the deployment of stents. Intermittent, non-massive hemorrhage due to the erosion caused by the distal end of the stent in the proximal stomach occurred in one patient who had received stent implantation in the cardio-esophageal junction. With respect to complications associated with stents, migration was noted in 4 patients (11.1%). Migration was noted after 65 d on average (after 119 d in the first patient, after 69 d in the second patient, after 45 d in the third patient and after 27 d in the fourth patient). Migrations occurred following chemotherapy in 3 of the patients because of severe vomiting. Mean survival following stenting was 134.14 d. Restenting was needed in 3 patients because of migration. Removal was needed in 2 patients, one for migration and the other because of intolerable discomfort. No patient had esophageal perforation or procedure-related death. **Table 1** illustrates the localizations of the stents and the patients' demographic data.

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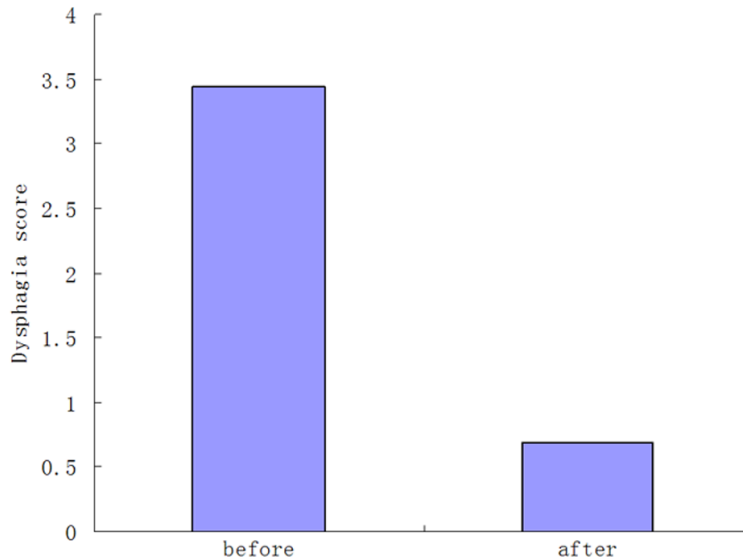


Figure 5. Comparison of oral alimentation status before and after placement of SEMSs.

Table 1. Patient demographics

	N (%)
Total No. of patients	36
Mean age (yr, range)	52.7 ± 8.5 (38-82)
Male/female	25/11 (69.4/30.6)
Present illness	
Esophagus carcinoma	31 (86.1)
Squamous cell carcinoma	26 (72.2)
Adenocarcinoma	5 (13.9)
Cardiac carcinoma	5 (13.9)
Location of obstruction	
Proximal	3 (8.3)
Middle	15 (41.7)
Distal	4 (11.1)
Middle and distal	9 (25)
Gastroesophageal junction	5 (13.9)
Restenting	3 (8.3)
Removal	2 (5.6)

Discussion

Obstruction of the esophagus leads to progressive dysphagia, malnutrition, and aspiration pneumonia. Dysphagia is usually the most distressing symptom in patients with inoperable malignancies of the esophagus. Fistula is another devastating and life-threatening complication of esophageal carcinomas, according to most etiologies [15], such as direct tumor

invasion and subsequent perforation or after radiation, laser therapy, chemotherapy or pre-existing stents, or a combination of these [15, 16]. So dysphagia and fistula are both severe symptoms necessitating immediate palliation [1, 17, 18].

Nowadays, deployment of SEMS is the first choice to solve these problems. In summary there are two main kinds of method to deploy SEMS, endoscopically or fluoroscopically, while each practitioner has his unique skill [19]. Compared to the majority of self-expanding metal stent users, our method of stent placement differs in the following way. The key

point is that we favour the use of 7F long sheath of 55 cm, which is long enough to pass through the whole esophagus into the stomach.

Usually there are three ways to find the location and length of the lesion. Firstly, somebody suggests to make a esophagogram first to locate the lesion [8-11]. It is fairly a good method and easy to practice. But we think there are some drawbacks. If the stricture is serious, only a little contrast media could pass the obstructive segment which will make it hard to show the lower margin of the lesion clearly. And the contrast media will accumulate in the lumen above the lesion, that will opaque the guidewire or the catheter and frustrate the operator to manipulate them during the following steps. Esophagograms should be performed cautiously as aspiration could occur during swallowing of the contrast medium if there is a fistula.

Secondly, others choose to use 5F catheter to pass the obstructive segment along the guidewire firstly, then to remove the guidewire and inject contrast media as withdrawing the catheter. This method could avoid the drawbacks of the first one, but the operator need to pass the obstructive segment again using guidewire to deploy the SEMS, which will prolong the procedure, because in some cases, passing the obstructive segment is really a very tuff task.

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Thirdly, gastroenterologists prefer to explore the stricture by endoscopy first [12-14]. It is a very precise way to find out the length and location of the lesion. But usually general anesthesia is needed, which is time consuming and not cost-effective. Sometimes it would fail because strictures remaining refractory to endoscopic passing even after balloon dilation.

The 7F long sheath of 55 cm could solve all of the above problems perfectly. We could make it very clear of the location and length of the lesion by injecting contrast media via the side-arm of the 7F long sheath as the sheath was withdrawn gradually. Meanwhile the guidewire doesn't need to be removed, which make it easy to pass the obstructive segment whenever we wanted.

We are certainly not suggesting that this is the only way to position an SEMS or, indeed, that it is the optimal method. We are simply reporting that, in our hands, this method seems to be both effective and safe. SEMSs are put in by various medical specialists (physicians, surgeons and radiologists) using various techniques (radiology alone, endoscopy alone or a combination of endoscopy and radiology). We are not aware of any evidence that who places the stent, or indeed how it is placed, results in a significant difference in the outcome. Surely what matters is that whoever inserts these stents is doing a sufficient number to maintain their skill and expertise and, most importantly, that they carefully audit their results to ensure comparability to published series.

In this study we didn't use uncovered SEMS because the covered SEMS could prevent tumor in growth and tissue hyperplasia through the metal mesh and easy to be removed if the patient experiences refractory pain. It is suggested that the drawback of covered SEMS is mainly migration [20]. But we don't think so. In our experience, the main reasons of stent migration include the lesion is located at the lower third of the esophagus or at the gastroesophageal junction, nitinol alloy is prone to be softened when it encountered icy food, in proper eating habit after stent placement and severe vomiting caused by chemotherapy of radiotherapy. In this study, there were only 4 migrations, three of which were caused by severe vomiting after radiotherapy. The other patient's lesion was at the gastroesophageal

junction. Compared to other studies, the rate of migration is acceptable. And considering the advantages, we think covered stent should be the first choice for malignant esophageal obstruction and fistula.

Conclusions

In conclusion, the advent of the covered SEMS has contributed greatly to the palliation of dysplasia and fistula caused by esophageal carcinoma with low morbidity associated with the procedure and we now use it as our preferred mode of esophageal stenting. These results of our method of insertion, using 7F long sheath of 55 cm, compare favorably with published series using other techniques. Claims that any particular approach is superior, or indeed mandatory, should not be made unless supported by convincing evidence.

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Disclosure of conflict of interest

None.

Address correspondence to: Dr. Qingliang Wang, Department of Radiology, Qilu Hospital of Shandong University, Jinan, Shandong, China. E-mail: med@mail.sdu.edu.cn

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