Case Report

The use of self-expanding metal stents in the cervical esophagus

Andrew Thrower,¹,² Ayesha Nasrullah,¹ Andy Lowe,¹,* Sophie Stephenson,¹ Clive Kay¹

A B S T R A C T

A case series was conducted at our institution on the use of self-expanding metal stents (SEMS) in the cervical esophagus and their tolerability. Departmental records identified 20 consecutive stents placed in the cervical esophagus of 12 patients at our institution. There were 6 men and 6 women, mean age 67.2 years (range, 47.6–91.6 years). Ten patients had either primary or recurrent malignant disease and two had benign disease; a recalcitrant stricture at the esophago-gastric anastomosis following oesophagectomy and a tracheo-oesophageal fistula secondary to tracheomalacia. Three patients received multiple stents on separate occasions requiring 2, 3, and 6 stents. Nineteen stents were placed radiologically with fluoroscopic guidance via a per-oral route under conscious sedation, and one was placed under direct endoscopic visualisation. Patients were followed up until death or to date. All stents were successfully deployed across the strictures. There was no foreign body sensation (FBS) reported after 16 of the procedures (80%). One patient reported transient FBS. Three stents were removed without complication because of symptoms; the endoscopically placed stent which was within 5 mm of cricopharyngeus and two which were inadvertently deployed across cricopharyngeus. There were no other significant complications related to the stent or procedure. All patients reported significant improvement in dysphagia with dysphagia scores improving from a mean of 3.1/4 to 0.9/4 (Wilcoxon matched-pairs signed-ranks test, \( P = 0.0158 \)). One stent migrated in a patient with malignant disease; however, all 6 stents placed across the benign stricture migrated. Hence our case series concludes that SEMS can be safely and effectively deployed in the cervical esophagus.

Keywords: Cervical; Esophagus; Foreign body sensation; Stenting

Introduction

Self-expanding metal stents (SEMS) are routinely used to palliate dysphagia caused by unresectable primary and recurrent oesophageal carcinomas, and have been shown to be both effective and well tolerated.¹,² In our institution, the majority of these are placed in the mid to distal esophagus, reflecting the pattern of disease; however, we also routinely place them in the upper esophagus, where the proximal margin may lie within the cervical esophagus, up to cricopharyngeus.

The cervical esophagus extends from the cricopharyngeus muscle at approximately C6 level (at rest) to the thoracic inlet, at T1. The cricopharyngeus muscle forms part of the upper oesophageal sphincter, a region of increased resting tone, which is approximately 3 cm in length.

Historically, there has been concern about placing SEMS in this region due to the proximity of the cricopharyngeus muscle and risk of causing foreign body sensation (FBS), in addition to the risks of aspiration and tracheal compression. Given the mobility of cricopharyngeus and the estimated size of the vertebral bodies in relation to the length of the upper oesophageal sphincter, previous studies have considered that stents placed with the proximal margin above the superior endplate of T2 carry a possibility of causing FBS.³,⁴ There have been reports of successful stenting in the cervical esophagus, and even across cricopharyngeus, for a variety of pathologies including carcinomas, tracheo-oesophageal fistulas³–⁷ and recurrence following subtotal oesophagectomy.⁸

The purpose of this case series is to review our own experience of placing SEMS with the upper margins in the cervical esophagus.

Case Report

The records of oesophageal stents placed in our department over a period of 4 years were reviewed. Twenty stents were de-
ployed in twelve patients with the upper margin at the superior endplate of T2 or higher. There were 6 men and 6 women, with a median age of 67.2 years (range, 47.6–91.6 years). The films and notes were reviewed and data collected including underlying pathology, site of stricture, presence of post procedure FBS and survival. Dysphagia scores were also recorded post stent insertion; however, pre insertion dysphagia scores were only available for 7 patients (Table 1). Patients were followed up until death or to date. The images could not be traced for one patient (patient No. 9).

Ten patients had a stricture due to oesophageal carcinoma; two had poorly differentiated carcinoma, three had squamous cell carcinoma (two had received prior chemo/radiotherapy), one had primary adenocarcinoma, two had recurrence of adenocarcinoma at the cervical anastomosis, one had recurrence of carcinosarcoma at the cervical anastomosis and one had a clinical diagnosis of cancer. Two patients had a benign pathology; one had a recalcitrant benign anastomotic stricture, undergoing a total of 6 stent insertions and the other had a tracheo-oesophageal fistula secondarily to tracheomalacia, with a pre-existing tracheal stent (Table 2).

Nineteen stents were placed radiologically with fluoroscopic guidance via a per-oral route under conscious sedation using midazolam and fentanyl. Following the administration of topical anaesthesia (lidocaine 2%), patients were placed in a semi-prone position and the oropharynx canulated with an angled tip 0.035” guidewire and an anaesthesia (lidocaine 2%), patients were placed in a semi-prone position and the oropharynx canulated with an angled tip 0.035” guidewire and a radiopaque guidewire (Terumo, Tokyo, Japan) and an angled biliary manipulation catheter (Torcon NB Advantage Catheter; Cook, Bloomington, IN, USA). An oesophagram was performed using water soluble iodinated contrast media, to outline the proximal margin of the stricture. The stricture was then traversed with the hydrophilic guidewire and a further oesophagram performed to delineate the distal margin. Radio-opaque markers were placed on the skin to mark both the margins and the guidewire exchanged for an Amplatz Super Stiff guidewire (Cordis, Miami, FL, USA). The stent was then inserted across the stricture and deployed. A variety of stents were used: Alimaxx–E (Alveolus Inc., Charlotte, NC, USA), Choo (M.I. Tech, Seoul, Korea), SX ELLA-HV (ELLA-CS, Hradec Kralove, Czech Republic), Polyflex (Boston Scientific, Natick, MA, USA), and Enteral Wallstents (Boston Scientific). All stents were covered and had a distal release mechanism. All stents apart from Alimaxx–E had a proximal purse string for retrieval.

A single stent was placed under direct endoscopic visualisation, following failed fluoroscopic placement. Fluoroscopic intervention failed as the malignant stricture was secondary to a recurrence at the anastomotic site and could not be traversed with a catheter and a wire. Hence stent insertion was carried out as a joint procedure and the stricture was traversed with the aid of direct visualisation with an endoscope.

All stents were successfully deployed across the stricture; however, the cricopharyngeus muscle was unintentionally traversed in two cases. There were no significant complications related to the stent or the procedure.

Nine patients (75%) reported no post-procedure sensations. Three patients reported FBS in the throat (patients No. 3, 5, and 10). This settled spontaneously in patient No. 3, whose stent was immediately below cricopharyngeus (Fig. 1). The FBS persisted in patient No. 5, whose stent traversed cricopharyngeus, necessitating stent removal and subsequent successful stent placement slightly more distally (Fig. 2).

The initial stent in patient No. 10 did not cause significant FBS, but it slipped, requiring a second stent to be placed. This was inadvertently deployed across cricopharyngeus, causing significant FBS and was subsequently removed with a third stent then placed approximately 5 mm below cricopharyngeus under direct

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### Table 1 Dysphagia Score

<table>
<thead>
<tr>
<th>Score</th>
<th>Dysphagia level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal swallowing</td>
</tr>
<tr>
<td>1</td>
<td>Able to eat solids</td>
</tr>
<tr>
<td>2</td>
<td>Able to eat semi-solids</td>
</tr>
<tr>
<td>3</td>
<td>Able to swallow liquid</td>
</tr>
<tr>
<td>4</td>
<td>Complete dysphagia</td>
</tr>
</tbody>
</table>

### Table 2 Patient Cohort

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Pathology</th>
<th>Level of stricture</th>
<th>Indication</th>
<th>FBS</th>
<th>Other complications</th>
<th>Post stent dysphagia score</th>
<th>Post stent dysphagia recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Squamous cell carcinoma</td>
<td>T2–3</td>
<td>Dysphagia/palliation</td>
<td>No</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Squamous cell carcinoma</td>
<td>T2–3</td>
<td>Dysphagia/palliation</td>
<td>No</td>
<td>Retrosternal pain</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Adenocarcinoma</td>
<td>C7–T3</td>
<td>Dysphagia/palliation</td>
<td>Yes</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Polyploid anastomotic recurrence of carcinosarcoma</td>
<td>Cervical anastomosis</td>
<td>Dysphagia/palliation</td>
<td>No</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Anastomotic recurrence of adenocarcinoma</td>
<td>Cervical anastomosis</td>
<td>Dysphagia/palliation</td>
<td>Yes</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>Clinico-radiological diagnosis of malignancy</td>
<td>Aortic arch</td>
<td>Dysphagia/palliation</td>
<td>No</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Stent overgrowth by squamous cell carcinoma</td>
<td>T3</td>
<td>Dysphagia/palliation</td>
<td>No</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Poorly differentiated carcinoma</td>
<td>T1</td>
<td>Dysphagia/palliation</td>
<td>No</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>Poorly differentiated carcinoma</td>
<td>Upper to mid oesophagus</td>
<td>Dysphagia/palliation</td>
<td>No</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>Anastomotic recurrence of adenocarcinoma</td>
<td>Cervical anastomosis</td>
<td>Dysphagia/palliation</td>
<td>Yes</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>Tracheomalacia with tracheo-oesophageal fistula</td>
<td>Fistula</td>
<td>Dysphagia</td>
<td>No</td>
<td>None</td>
<td>0/1</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>Benign stricture at cervical anastomosis</td>
<td>T3</td>
<td>Dysphagia</td>
<td>No</td>
<td>None</td>
<td>0/1</td>
<td>Yes (stent migrated)</td>
</tr>
</tbody>
</table>

FBS, foreign body sensation.
endoscopic visualisation. In spite of its precise positioning, this also caused significant FBS and was removed.

For patients experiencing FBS post stent insertion, stent positions were checked by performing an oesophagogram under fluoroscopy. Stent removals necessitated by FBS were carried out under fluoroscopy as well. However, one patient required endoscopic removal as the stent had become embedded and hence could not be removed under fluoroscopy.

A single patient reported transient retrosternal chest pain (patient No. 2), which settled over the course of a few days. This was a very tight stricture, resulting from a squamous cell carcinoma, previously treated with radical chemo-radiotherapy.

Pre stent dysphagia scores had been recorded in 7 patients, in whom the mean score showed a significant improvement from 3.1/4 to 0.9/4 (Wilcoxon matched-pairs signed-ranks test, \( P = 0.0158 \)). Post stent insertion dysphagia scores showed return to normal diet.

To date, all of the ten patients with cancer have died. The mean post-stent survival in malignancy is 81 days (range, 3–331 days; median, 55 days), reflecting the frail nature of these patients who are frequently malnourished and have advanced disease.

Discussion

SEMS have been used in the esophagus for palliation of dysphagia since 1983.\(^9\) They may be placed either endoscopically or fluoroscopically, and are now the treatment of choice in the palliation of dysphagia in oesophageal malignancy. There has been a historic reluctance to place these in proximity to the upper oesophageal sphincter, due to the possibility of causing FBS.
Placing stents in the cervical esophagus under fluoroscopic guidance requires that the anatomy can be delineated and appropriately marked. An initial esophagram is performed to outline the level of cricopharyngeus and the stricture, and metallic skin markers are placed appropriately. This is subject to two possible errors. First, cricopharyngeus moves during swallowing and therefore may not remain in the same place relative to the marker. Second, due to the distance between the skin markers and the esophagus, any slight change in projection due to a change in the patient’s positioning moves the markers relative to the esophagus. While this is rarely a problem elsewhere in the esophagus, when placing the stent in the close proximity to cricopharyngeus, precision is important. It is perhaps advisable to use bony landmarks in addition to skin markers, since these are less likely to move relative to the esophagus.

Another problem is estimating the degree of shortening of the stent upon deployment, and therefore the exact position of the upper margin. We have found that the Alimaxx-E stent, which does not shorten following release, to be of benefit in this region. It is also possible to obtain proximal release stents the use of which have been reported in the cervical esophagus. These carry the benefit of accurately placing the vital, proximal margin, allowing any stent shortening to occur distally.

The findings in this study are similar to those described elsewhere. Verschuer et al described a series of 104 patients with tumours within 7.5 cm of the upper oesophageal sphincter, and stents placed with the proximal margin within 5.4 cm of the sphincter. Globus sensation was described in 8% of cases, with a complication rate of 33% (haemorrhage, aspiration pneumonia, fistula formation and perforation). Other series report FBS rates of 0%, 12%, 18%, and 100%. These are small series, but the figures are vastly different, which cannot be easily explained. In our series, of the 18 stents placed inferior to cricopharyngeus, FBS was reported in 2 cases, necessitating removal in one case.

A recent case series of 6 patients described the use of a modified SEMS with a smaller proximal funnel of 7 mm with a success rate of 83%. A case report with successful retrograde stent insertion in the cervical esophagus through a gastrostomy tube has also been described in the literature.

In conclusion, this study supports previous studies which show that the fluoroscopic placement of SEMS in the cervical esophagus is both technically feasible and well tolerated. On the occasions when the stent is not tolerated, it may be safely removed endoscopically. Though SEMS placement in the cervical esophagus is successful in patients with malignant strictures, its use is limited for benign stricture due to relatively high risk of migration. However it be offered as a last resort for benign recalcitrant strictures as a last resort.

Conflicts of Interest
No potential conflict of interest relevant to this article was reported.

References