Original article

The role of metallic expandable stents in treating patients with inoperable esophageal stenosis: The experience of a Greek Cancer Hospital

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SUMMARY

Aim: The evaluation of efficacy and safety of autoexpandable metal covered stend endoscopic placement in patients with malignant esophageal obstructions or stenoses.

Patients and Method: We retrospectively analysed a total of 61 patients with malignant esophageal obstruction due to esophageal (n=25), pancreatic (n=1), breast (n=4) and lung cancer (n=29), primary esophageal melanoma (n=1) and recurrence of gastric adenocarcinoma after gastrectomy (n=1). The site of obstruction was in the upper (n=1), middle (n=34) and lower esophagus (n=23). In 9 cases gastro-esophageal junction was included. In all patients the tumour was considered nonresectable. Between 5/1997-6/2001, 61 Ultraflex covered stents and 4 Flamingo type were introduced endoscopically. 36 patients required dilation.

Results: Stents were placed successfully in all cases. After 48h all patients were able to tolerate solid or semi-solid diet. Thirty-seven died 32±6 weeks later, none due to a cause related to the stent. During the follow-up period, 5 patients developed dysphagia due to food impaction. One stent 3 weeks after placement, in a case involving gastro-esophageal junction, migrated to the stomach and a new one was placed. Eight patients presented recurrent dysphagia. Four of these with tumour overgrowth at the distal end of the stenosis were treated with introspective application of Diamed laser (contact fiber) in a total of 13±6 sessions per patient (6782 joules, range 4380-10584 j per session). In the remaining 4 cases, a second stent was placed. No other side effects were noted.

Conclusion: Placement of self-expanding metal stents is a safe and effective treatment modality for malignant esophageal obstruction. In case of expansion of the mass, laser therapy or placement of a second stent could be used.

Key words: Esophageal malignant obstruction, metal stent, Diomed laser, palliative treatment

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INTRODUCTION

Dysphagia due to esophageal strictures caused by endoluminal malignancies or external pressure from adjacent neoplasms is a difficult condition to treat despite numerous therapeutic modalities.

At the time of diagnosis, more than 50% of patients with neoplastic disease of esophagus and esophagogastric junction are not suitable for curative surgical resection because of advanced local disease, extensive distant metastases, or both.[1-3]

Therefore, these patients are treated palliatively, either by surgery, radiotherapy, chemotherapy or endoscopic therapy.

With a mortality rate of 13%-22% and a high complication rate of 36%-71%, surgery is an unsuitable palliative treatment for patients who have a median survival rate of 6 months.[2,4,5] Chemotherapy is an ineffective method of palliation[6] and radiotherapy can cause a temporary increase in dysphagia and has

shortlasting effect.[7,8]

Endoscopic options currently available include esophageal dilation,[9] bipolar electrocoagulation,[10] injection of sclerosing agents,[11] photodynamic therapy[12] and brachytherapy,[13] but none provide adequate palliation in a single treatment session with a low complication rate.

Today, the most common endoscopic treatment modalities are laser ablation of the tumour[14] and stenting.

Laser therapy restores patency of esophageal lumen to near normal with a complication rate ranging between 1% and 7%,[15,16] but must be repeated frequently.

On the other hand, stenting provides a satisfactory and longlasting palliation in one session.

Two types of esophageal endoprostheses are commercially available:

I. Rigid plastic stents (e.g. Atkinson, Celestine), usually requiring general anesthesia for insertion, are associated with an overall complication rate of 36% and a mortality rate ranged between 4% and 13%.[5,17] In addition, the quality of swallowing is often poor and many patients can eat only semi-solid diets, because of the rigidity and the small lumen of the device.

II. Self-expanding metallic endoprostheses are most effective in the palliation of symptomatic esophageal malignant strictures.[3,18,19] Due to their large diameter (18-25 mm), relief of dysphagia is immediate and usually permanent once the stent is in place. Despite their higher cost, the metal stents prove cost-effective, given a shorter hospital stay and fewer fatal complications than plastic tubes[3]. They can usually be inserted with the patient under light sedation and local anesthesia, do not require excessive dilation and they expand progressively, adapting to the force of the stenosis.

PATIENTS AND METHODS

We retrospectively analysed all patients with inoperable malignant esophageal obstruction treated in our hospital with endoprosthesis placement between May 1997-June 2001.

During this period, a total of 61 highly flexible, covered, knitted, self-expanding metal stents (Ultraflex Esophageal Prosthesis, Microvasive Division, Boston Scientific) and 4 conical, self expanding covered stents (Flamingo Wallstent, Microvasive Division, Boston Scientific) were placed in 61 consecutive patients (44 men, 17 women, age range 53-102 years, mean 71.16 years) with malignant obstruction of the esophagus.

The etiology of obstruction was adenocarcinoma of the esophagus in 25 patients, pancreatic cancer in one patient, breast cancer in 4 patients, lung cancer in 29 patients, primary melanoma of esophagus in one patient and recurrence of gastric adenocarcinoma after total gastrectomy in one patient.

The site of obstruction was located in the upper third of the esophagus in one patient, in the middle third in 37 patients and in the lower third in 23 patients. In 9 cases gastro-esophageal junction was includeed. Four patients had broncho-esophageal fistulas. All patients were considered surgically incurable, either because they had end-stage disease with extensive primary local tumour or presence of distant metastases, or because of their poor general status.

The length of the stenosis varied from 3.5 to 7.2 cm (mean 4.72$\pm$1.87 cm).

Dysphagia was graded on a five-point scale (I=no dysphagia, II=dysphagia to normal solids, III=dysphagia to soft solids, IV=dysphagia to solids and liquids, V=complete dysphagia, even to saliva). Twenty-six patients (42.62%) had grade II-III, 26 (42.62%) had grade IV and 9 (14.76%) patients had grade V dysphagia. The scoring system was modified from that described by Mellow and Pincas.[20]

Before stenting, an esophagogram with barium or gastrographine was obtained to determine the precise length of the stenosis and the presence or not of broncho-esophageal fistulas (Fig. 1A).

In 36 cases, dilation with Savary dilators was performed over a stiff-angled metallic guide wire. The stenosis was dilated to 12.8 or 15 mm, under image intensifier control.

Under a light sedation with midazolam i.v. (Dormicum; Roche, Basle, Switzerland) and administration of a local pharyngeal anesthetic (Xylocaine Spray; Astra, ASTRA-ZENECA AB, Sweden) the procedure was performed with the patient initially in the left lateral and later in the prostrate position. In cases involving gastro-esophageal junction, the patient was continuously in the left lateral position.

Oxygen was administered via nasal canulas. If chest pain was experienced during the procedure, 0.5 mg Pethidine i.v. was given.

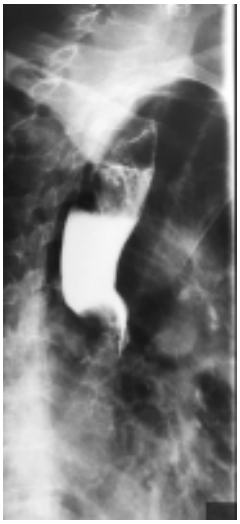

Figure 1A. Malignant obstruction of the middle esophagus.

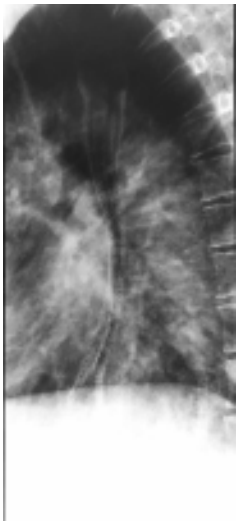

Figure 1B. Insertion of autoexpandable metal endoprostheses.

After dilation, the position and length of the stricture was defined endoscopically and the upper and lower margins of the stenosis were marked under fluoroscopic guidance with external radiopaque markers. Following this procedure the gastroscope (Olympus GIF-V2) was introduced into the duodenum and through the working channel the guide wire was inserted. The scope was then removed, leaving the guide wire in place with the distal end in the duodenum to provide as stable a position as possible.

Over the guide wire, the stent compressed onto the delivery system was introduced and passed beyond the lesion. Using the radiopaque markers as a guide, under fluoroscopic control, the endoprosthesis was then deployed (Fig. 1B).

Plain chest radiography was obtained a few minutes after placement to assess stent's expansion. Clear fluids were given to the patients for 18-24 hrs. Esophageal function was assessed by means of a barium swallow 24 hrs after the procedure (Fig. 1C). If the positioning of the stent was satisfactory, and the flow of barium into the stomach was unhindered, esophagoscopy was performed after 48 hrs to document patency of the stented esophageal lumen and to confirm the final accurate position of the stent (Fig. 2). From this moment, patients were allowed a semi-solid and, after 72 hrs, a normal diet but advised to avoid large lumps of solid food, to chew thoroughly, and to drink water and carbonated beverages after eating to help clear the stent of food debris. In 5 out of 9 cases with ultraflex stents placed in the gastro-esophageal junction antisecretory treatment

Figure 1C. Complete lumen patency.

(PPI's) was administered, to prevent reflux esophagitis.

The dysphagia score was carried out during outpatient visits every 6-12 weeks until the patient died. Patients were asked to come to the hospital immediately upon recurrence of dysphagia or any other problems related to the stent implantation.

The quality of life was determined monthly, performed by an experienced psychiatrist and was based on a questionnaire slightly modified from the QLQ-C30 proposed by EORTC.[21] No statistical analysis was made due to the small patient population, to the retrospective profile of the study and to the absence of a control group.

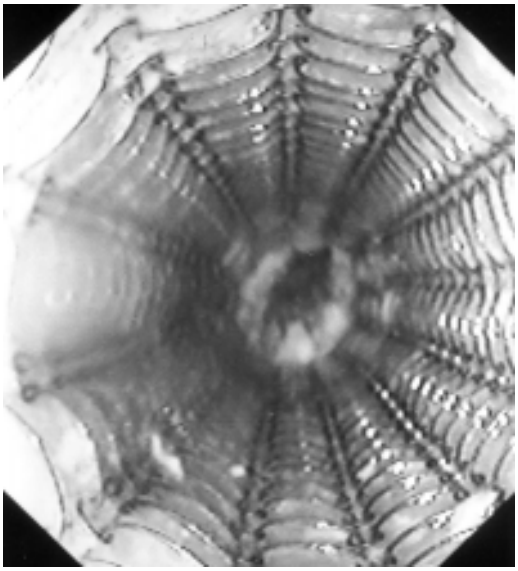

Figure 2. Endoscopic view of self-expanding metallic esophageal endoprostheses.

Dysphagia grades before and after stenting were compared by the paired Student-t-test.

RESULTS

Stenting was technically successful in all patients, as determined endoscopically and fluoroscopically. All stents overlapped the tumour stenosis by at least 10 mm at the proximal and distal ends. Mean duration of the procedure was 28 minutes. Mean inpatient stay after stenting was 3.2±1 days.

Forty-eight hours after endoprostheses placement all patients were able to tolerate a solid or semi-solid diet. No procedure-related mortalities or major complications occurred (aspiration, bleeding, perforation or misplacement of the stent). Stents were well tolerated with no foreign-body sensations. Only one patient presented side effect immediately after endoprostheses placement (chest pain, fever, leucocytosis) but without radiologic signs of mediastenitis. Nothing by mouth, supportive treatment and antibiotics intravenously were administered for 48 hours.

Sealing of esophagorespiratory fistulas and relief from symptoms of aspiration were achieved in all patients with broncho-esophageal communications.

The mean dysphagia grade of 2.91±0.36 before stenting, was improved to a mean grade of 1.17 after endoprostheses placement ($p=0.04$).

One Ultraflex endoprostheses, in a case involving gastro-esophageal junction migrated to the stomach 3 weeks after placement and was replaced by a new one, Flamingo type.

Further weight loss was stopped in all patients, except 8 who died 4-6 weeks after stenting because of their advanced malignant disease. Due to the shortness of their lifetimes after the stent placement, our data for this group of patients (quality of life, late complications etc) are very limited. The others gained between 1 and 6.3 kg during the time of follow-up.

Thirty-seven patients died 32±6 weeks after stent placement, none due to a cause related to endoprostheses, and 16 are still alive.

During the follow-up period 5 patients developed dysphagia due to food impaction which was successfully treated endoscopically. Eight patients (13.11%) presented recurrent dysphagia, 4-16 weeks after stenting, due to tumour overgrowth in 7 cases and to tumour ingrowth in one patient with an uncovered stent that had been placed in another hospital 8 weeks earlier. The primary tumour was adenocarcinoma of the esophagus in 7 cases, including gastroesophageal junction in 3 cases, and recurrence of gastric adenocarcinoma after total gastrectomy in one patient.

Three of these patients, with tumour overgrowth at the distal end of the stenosis and site of obstruction in the upper and middle third of the esophagus and also the patient with the recurrent gastric adenocarcinoma were treated with introspective application of Diomed laser (contact fiber) in a total of 13±6 sessions per patient (6782 joules, range 4380-10584 joules per session) using the stented esophageal lumen as a guide for the gastroscope and the laser fiber. No side effects were noted.

In the remaining 3 cases and also in the patient with the uncovered stent, a second stent was placed.

In the case of the primary melanoma of esophagus, endoscopy revealed new lesions at the proximal esophageal level, 14 weeks after stenting, but further intervention was avoided due to patient poor general status.

Although the evaluation of quality of life is very difficult and the number of the study patients is small, the quality of life questionnaire analysis showed a significant improvement in well-being status in all patients.

A percentage of 88% of patients (53 out of 61) presented major problems of the QLQ-C30 scales at the baseline. The most prominent features were problems in stenuous activity, limitations in work and hobby performance, worry, depression and interference in family and social life in scales concerning functionality, and tiredness, nausea, vomiting, sleeping troubles and lack of appetite in scales concerning symptoms.

Comparing the baseline score with the one and two month scores, a significant improvement was noted (96% and 75% respectively) in items concerning mainly emotional and social functioning, emesis and additional symptoms.

After the first month, a progressive decrease in global health /quality of life was observed, according to the analogic scales of the QLQ-C30 questionnaire. Also lower scores in physical and role functioning and higher values in fatigue and pain were noted, as was expected.

DISCUSSION

During the last quarter of the past century the incidence of adenocarcinoma of the esophagus has risen by more than 350%.[22] The vast majority of patients with esophageal cancer will not be surgical candidates at the time of diagnosis, because of either advanced disease or the presence of significant comorbidities.[23]

Rigid plastic endoprostheses have been used for at least one hundred years for this reason, with varying success. The new generation of rigid stents have been shown to palliate malignant dysphagia and seal esophago-respiratory fistulas satisfactory.[24]

After the first publication by Domschke *et al*[25] several authors have reported excellent palliative relief of dysphagia with implantation of self-expanding metal stents.[3,26,27]

Comparing the metallic with the plastic stents, most studies show that the expandable type are easier to implant, result in less patient discomfort and are associated with lower procedure-related complication rates than the plastic type.[28,29] The results of published series show immediate technical success of 100% with improvement in the dysphagia score of 83% to 100% of patients.[19,30,31]

Although safer and easier to place, expanding stents are not without their own complications.

The main complication of metal stents is distal migration, with an incidence rate ranging between 10% and 30% of cases.[32] Migration is most common (50%) when covered endoprostheses are used to treat distal esophageal lesions involving the gastroesophageal junction.[33,34] In our study group this complication was noted in one out of 9 patients (11%) with lesions involving gastroesophageal junction and was resolved with the placement of a new conical endoprosthesis. Additionally, in 3 of these patients a Flamingo type endoprosthesis was placed from the beginning. This is the explanation for the lower percentage of this complication in our study than that reported above. The conical covered esophageal endoprostheses, is a relatively new type of stent related to a significantly lower rate of distal migration and indicated for lesions involving gastro-esophageal junction.[35] If a stent migrates completely into the stomach, it may be left in situ unless it causes symptoms, in which case it should be removed via a small gastrotomy.[36]

If a stent migrates partially, insertion of a second uncovered stent can prevent further movement and also can overlap the upper end of stenosis.[34,37] Re-placement of a totally or partially migrated stent is a common and safe technique with optimal results.

Another complication of esophageal stents is tumour ingrowth through the stent mesh (uncovered) which occurs in 17%-36% of cases[38,39] or overgrowth (covered) in as many as 9% of cases.[34] In our study population a similar percentage (11.6%, 7 out of 60 patients) developed recurrent dysphagia due to tumour overgrowth. Recurrence of dysphagia secondary to tumour overgrowth or ingrowth can be treated successfully either with placement of additional stents or by endoscopic laser therapy.[37]

An uncommon complication of stenting, usually mild and self-limiting, is hemorrhage.[40] Perforation of the esophagus as procedural complication is very rare.[41] Esophageal pain after stenting is common but usually resolves in a few days. Placement of self expanding covered metal endoprosthesis is a safe and effective palliative treatment modality for patients with unresectable malignant esophageal obstructions.

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