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Expandable stents in digestive pathology – present use in an emergency hospital

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Abstract: *Introduction: Self expandable metal stents (SEMS) are developed lately, as an effective and safe, less invasive alternative of surgery for the treatment of malignant intestinal/biliary obstruction. Recently, SEMS are also introduced in benign pathology.*
Aim: The aim of this presentation is to report a retrospective analysis of the total number of SEMS placed for esophageal, enteral, colorectal and biliary obstruction during the last 3 years in Clinical Emergency Hospital Bucharest, as well to review the literature published on this issue.
Methods: Between 2013-2015 in Clinical Emergency Hospital Bucharest, we have placed: 232 esophageal stents, 23 enteral stents, 5 colonic stents and 75 biliary stents under radiologic guidance. The main parameters followed were represented by: sex, age, grades of obstruction, stent diameter and type, immediate and late complications and survival rate.
Results: Regarding the esophageal stenting, most of the indications were malignant obstruction (155 cases of esophageal cancer and 30 cases of extrinsic compression), but also for esophageal fistula, peptic stenosis and even traumatic esophageal rupture. The majority of the enteral and colonic stents were inserted for malignant obstructions, having only 2 cases with benign obstructions. This is also the case for biliary stenting, were most of the indications were represented by pancreatic cancer. Technical and clinical success rates were approximately 92% and 80%, respectively. There were no major complications of perforation, bleeding, or death.
Conclusions: SEMS insertion can be performed safely, with minimal complications and hospitalization allowing the restart of oral feeding and improvement of nutritional status for the digestive obstruction or jaundice disappearance in case of biliary obstruction. It represents the first option for unresectable digestive/biliary malignant obstruction.

Keywords: *expandable stents, malignant obstruction, fistula, stenosis*.

INTRODUCTION

Over the past decades, the endoscopic approach for palliation of malignant obstruction has overcome the use of percutaneous approach. The options for endoscopic stenting are either self-expandable metal stents (SEMS) or plastic stents (PS). PSs are composed of polyethylene, polyurethane, or Teflon,whereas SEMSs are made of various metal alloys that are constructed to achieve adequate radial expandable force without sacrificing flexibility and conformability to the duct [1].SEMSs can be either uncovered or covered with material to prevent tumour ingrowths. Recently, uncovered self-expandable biodegradable stents were added to this portfolio [2].

The ideal stent have to be pliable, atraumatic but also forceful to maintain patency and position in the

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lumen. However, stents should also be easily removable and without any risk for benign hyperplastic or malignant tumor ingrowths or overgrowth.

The current guidelines from the American Society for Gastrointestinal Endoscopyfor distal malignant biliary obstruction recommend either SEMSs or PSs, with PSs preferred in cases of distant metastasis and short life expectancy. However, studies have shown that although PSs are less expensive, metal stents have better drainage and longer patency,with recent data showing they are more cost-effective [3,4].

METHODS

We have done a retrospective, non-randomized study between 2013-2015 in Clinical Emergency Hospital Bucharest. We have placed: 232 esophageal stents, 23 enteral stents, 5 colonic stents and 75 biliary stents under radiologic guidance. The main parameters followed were represented by: sex, age, grades of obstruction, stent diameter and type, immediate and late complications and survival rate. We had exclusion criteria: an INR more than 3 and an estimated survival time less than 3 weeks. Regarding the dysphagia we have used Mellow and Pinkas's scale.

0 = able to eat normal diet / no dysphagia.
1 = able to swallow some solid foods
2 = able to swallow only semi solid foods
3 = able to swallow liquids only
4 = unable to swallow anything / total dysphagia

We have used most the nitinol stents (alloy of nickel and titanium), because of their ability to conform to anatomical angulations and the latter for their removability.

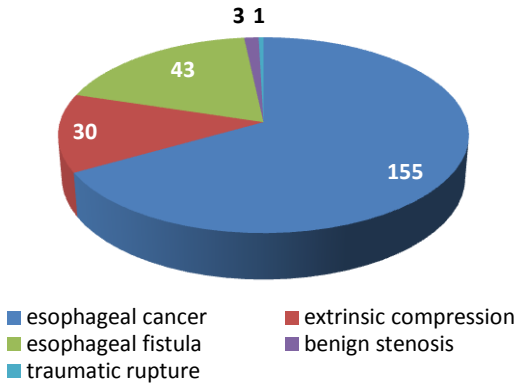
RESULTS

More than 65% of the patients were male with age varying between 49 and 83 years old.

Regarding the esophageal stenting we have placed in Clinical Emergency Hospital Bucharest, 232 oesophageal stents for the following indications (Figure 1):

-155 cases of esophageal cancer
-30 cases of extrinsic compression
-43 cases of esophageal fistula
- 3 cases of benign stenosis
- 1 case of traumatic rupture of the esophageal wall

Figure 1: Graphic representation of esophageal stenting indications



The majority of the cases (> 50 %) have unresectable disease at the time of diagnosis, either because of distant metastases or unsuitable candidates for surgical resection.

The aims of palliative therapy are to ameliorate symptoms of dysphagia, treat complications, maintain oral intake, minimize hospital stay, relieve pain and ultimately improve their quality of life.

We have used: totally covered SEMS or partially covered SEMS. Fully covered stents are more prone to stent migration; removable and theoretically may be more suitable for benign strictures/fistula whereas partially covered stents have a small portion of exposed bare metal in both proximal and distal ends to allow embedding into the oesophageal wall, which helps to decrease stent migration. The uncovered portion of the partially covered stents allows embedding and anchoring. No differences in survival rates were observed between these two types [5].

The techniques used for inserting the stent were: OTG – over the guidewire (most of the cases) or TTS (through the stent) both under radiologic view. At the beginning the lesion is visualized under endoscopy (Figure 2A – oesophageal fistula) and upper end is marked by injection of contrast agent into the

submucosa (Figure 2B).

It is very important for the marking to be done internally and not to put external marks that may move during the procedure. The stents are mounted in a preloaded constrained position on a delivery catheter.

A guide wire is passed through the lumen of the catheter (Figure 2C), and when the wire has been advanced beyond the obstruction, the stent is passed over it and positioned across the stricture with the upper end at the position of the internal contrast mark (Figure 2 D, E, F).

Figure 2A. Esophageal fistula

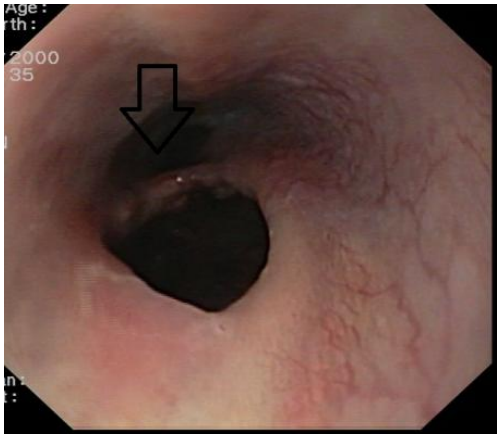
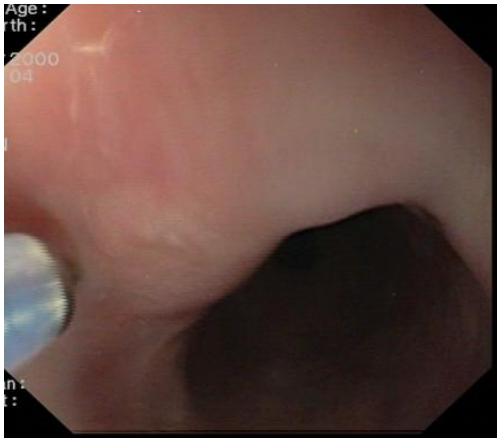


Figure 2B. Contrast injection



The immediate complications encountered were: retrosternal pain (60%), alleviated after antalgics, stent migration while as late complications we had: food impactation (7%),fibrous tissue invasion (4%), tumoral invasion (5%),uncovered fistula and upper GI bleeding.

Figure 2C. Guidewire insertion

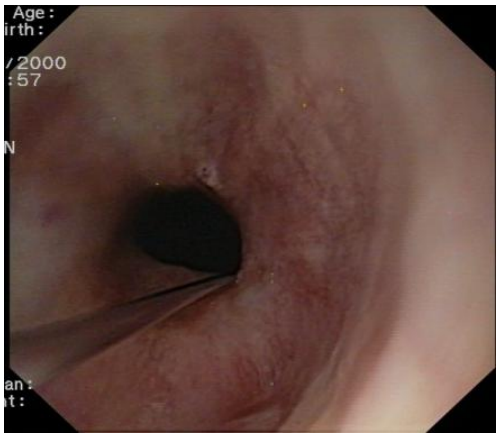


Figure 2D. Stent deployment

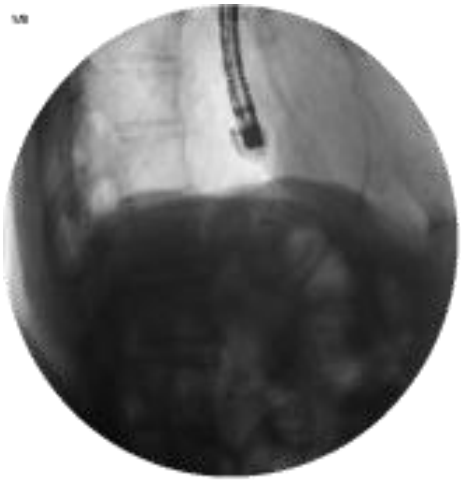
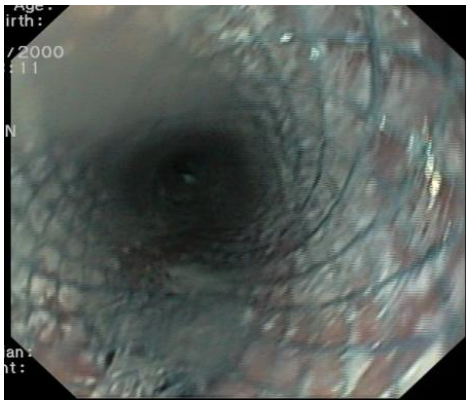


Figure 2E. Stent view on RX

Regarding the enteral stenting we had 23 total cases: 21 for malignant extrinsic compression and 2 cases for benign stenosis. The technique used was TTS (through the scope) with low rate of complications.

Figure 2F. Stent under endoscopy view



A specific situation was double stenting, both enteral and biliary (Figure 3 A, B), especially in pancreatic head malignancies with obstructive components.

Figure 3A. Double stenting (enteral+biliary)

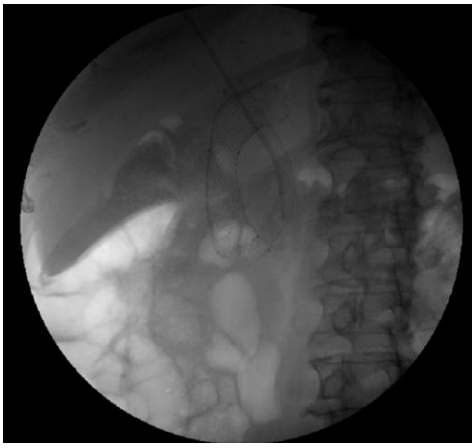
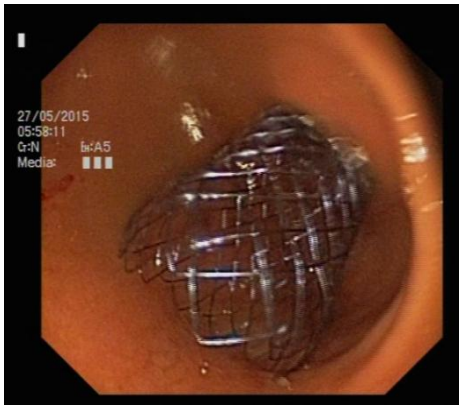


Figure 3B. Enteral stent-endoscopic view



Colonic SEMS placement is recommended as the preferred treatment for palliation of malignant colonic obstruction, except in patients treated or considered for treatment with antiangiogenic drugs [6]. Stent insertion may be considered as an alternative to emergency surgery in those who have an increased risk of postoperative mortality. We have placed only 5 colonic stents (Figure 4), mainly because of ease of accessibility to the surgical service in our hospital.

Figure 4. Colonic stent

In case of biliary stenting we have inserted 73 stents for malignant obstruction (approx. 60% pancreatic cancer) and only 2 for benign obstruction (chronic pancreatitis). SEMSs range from 4 to 12 cm in length with diameters when expanded ranging from 6 to 10 mm.

Self-expanding metal stents (SEMSs) are built from different metal alloys, mainly nitinol, that are used to achieve adequate radial expansive force leading to increased patency duration and reduced recurrent obstruction.

SEMSs are preloaded in an outer sheath with a diameter of 8.5F or smaller, allowing use with a therapeutic duodenoscope. After placement in the duct, the outer sheath is withdrawn, allowing the stent to expand (Figures 5A, B, C).

SEMSs can be covered, partially covered, or uncovered.

Partially or totally covered SEMSs can be repositioned or fully removed, reduce the rate of stent occlusion but they have risk of cholecystitis because of

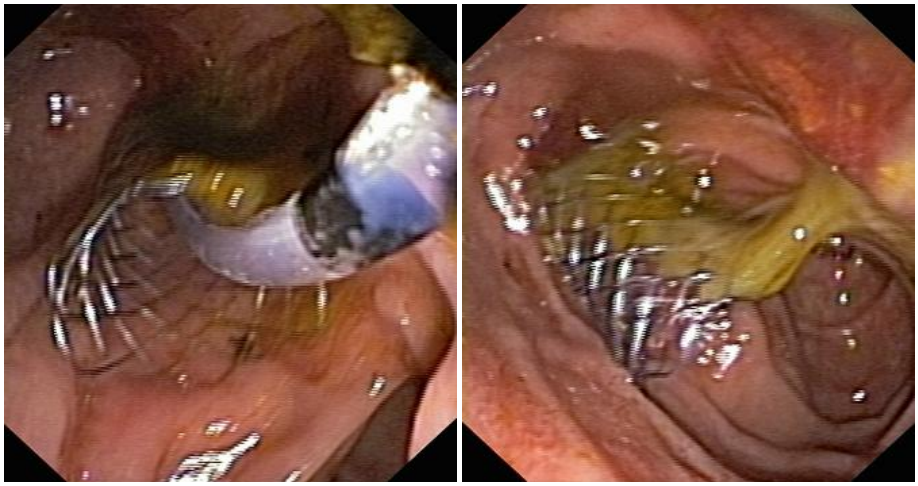
involvement of the cystic duct orifice). Acute cholecystitis may occur in as many as 10% of patients with intact gallbladders after placement of a covered SEMS across the cystic duct. In opposition, uncovered SEMS migrate less but have risk of tumor ingrowths [3].

SEMS insertion at patients with malignant biliary obstruction palliate jaundice, anorexia and most important help the initiation of chemotherapy that otherwise would be contraindicated.

Initial insertion of a plastic stent is most cost-effective if patient life expectancy is shorter than 4 months; if it is longer than 4 months then initial insertion of a SEMS is more cost-effective.

Figure 5A. Distal biliary obstruction; stent insertion radiologic view

Figures 5B, 5C. Endoscopic views



CONCLUSIONS

SEMS represents a very useful alterative, with minimal complications to classic surgery for palliation of unresectable digestive/biliary malignant obstruction. With the current development and applications of new materials and technologies, the future of stenting is evolving.

New trends include drug-eluting stents, biodegradable biliary/esophageal stent and the use of biodegradable polymers for local drug delivery, having also curative aim [7] . Radiation therapy, a cornerstone of treatment for malignant disease of the esophagus, may also be administered in conjunction with placement of esophageal endoprosthetics [8].

Regarding the biliary malignant obstruction, we recommend that SEMSs should be the first option because they have better patency, a lower occlusion rate, less need for reintervention, and fewer adverse events than plastic stents.

In conclusion, expandable metal stent placement is a very effective way of re-establishing luminal patency with negligible complications for an expert endoscopist.

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