

**ENDOSCOPIC STENTING FOR COLORECTAL CANCER. THE IMPORTANCE OF COLLABORATION BETWEEN SPECIALISTS.**

**ANTONIO V STERPETTI, MD, ANTONIETTA LAMAZZA, MD, LUCA DI MARZO, MD, ENRICO FIORI, MD**

**UNIVERSITY OF ROME SAPIENZA**

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**CORRESPONDENCE**

**Antonio V Sterpetti Policlinico Umberto I- Viale del Policlinico 00167 Rome-Italy**

**Ph 39-6-49972188 Fax 39-6-49972215**

**e-mail [antonio.sterpetti@uniroma1.it](mailto:antonio.sterpetti@uniroma1.it)**

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## ABSTRACT

**BACKGROUND:** Endoscopic placement of Self Expandable Metal Stents to relieve malignant colorectal obstruction has become a common therapeutic advancement in clinical practice.

**MATERIAL:** In a 16 year period 167 patients had endoscopic placement of a Self Expandable Metal Stent in a center where gastroenterologists and surgeons cooperate in a daily basis, discussing indications.

**RESULTS.** There was no operative mortality and no major complication in placement of the stent. Technical and clinical success was respectively 95.1% and 92.9%. Consultation among specialists changed the preoperative indication in 60 patients, during the same time period.

**CONCLUSIONS.** Self expandable metal stents placement represents an important tool to treat patients with obstructing colorectal cancer and complications after colorectal resection . A proper training is required, and this training in operative endoscopy is not always available and possible. In this scenario, a close collaboration among specialists in selecting the most appropriate operative procedure is essential and brings to better results.

Operative endoscopy has become a common therapeutic advancement in clinical practice [1,2,3,4,5]

New techniques generate comparisons with established techniques. The positive aspects of these comparisons can get lost in a field of mere competition when different medical specialties are involved.

In the last 12 years, we have created in our Department of Surgery, a center for operative endoscopy, where gastroenterologists and surgeons perform operative endoscopy. We report our experience in this endoscopic section, analyzing the results of endoscopic placement of colorectal stenting, we started to use since 1999.

## **MATERIAL AND METHODS.**

**THE ENDOSCOPIC CENTRE:** The endoscopy center has been established in 2006.

Every day more about 10 procedures are performed; the operators, surgeon or gastroenterologists, discuss with the other members of the staff any possible therapeutic option. Not rarely, the original therapeutic option is changed on the basis of a positive and constructive discussion. All patients are informed about the details of the procedures and about the different possible choices. Informed consent is obtained. All procedures have been previously approved by the Department Council, composed by all the medical and paramedical staff.

**COLORECTAL ENDOSCOPIC STENTING:** In a 16 year period (August 1999-December 2016), 167 patients with colorectal cancer had endoscopic placement of a Self Expandable Metal Stent (SEMS) for treatment of an obstructing colorectal cancer (145 patients), or for treatment of complications after colorectal resection for cancer (22 patients). They were prospectively evaluated in a data base, and they form the basis of this report

**SEMS PLACEMENT :** Patients with complete obstruction as determined by preoperative sigmoidoscopy and CT scan, had only a low pressure water enema few hours before the procedure. In selected patients a complete bowel preparation was performed, if there was no evidence of complete obstruction. The procedure was performed under light sedation with benzodiazepine, at a dosage depending on patient body weight. A guidewire was passed through the obstruction. In the initial experience, the guidewire was passed blindly through the obstruction, under fluoroscopic and endoscopic guidance. The guidewire was directed towards the obstruction with a colonoscope which remained distally to the tumour,

to avoid the risk of perforation. Thanks to the suggestion of an endoscopist , a modified technique has been introduced [6,7,8] (Fig 1, Fig 2). A pediatric nasogastroscope (4,8 mm in diameter) has been used to pass the obstruction. This manoeuvre makes possible to have a direct vision of the anatomy and pathology , and to pass the guidewire above the obstruction, through the nasogastroscope, under direct vision [6]. This has made the procedure much simpler, faster, and theoretically with reduced risk of perforation or bleeding. Time of exposure to radiation (fluoroscopy) has diminished from 15 to 4 minutes. The SEMS apparatus (Precision Stent System Microvasive, Boston Scientific Corporation, Boston, USA) is placed at the level of the obstruction, through the guidewire previously inserted, and deployed under fluoroscopic guidance, with a landing zone of 2 cm above and below the tumor. The length of the stent ranged from 9 to 12 cm. We used mainly uncovered stents: initially Ultraflex OTS stent, lately Wallflex TTS stents (Boston Scientific, Boston, USA). The majority of the patients had one stent placed. In 10 patients two stents were required. The diameter of the stent was 24 mm at least

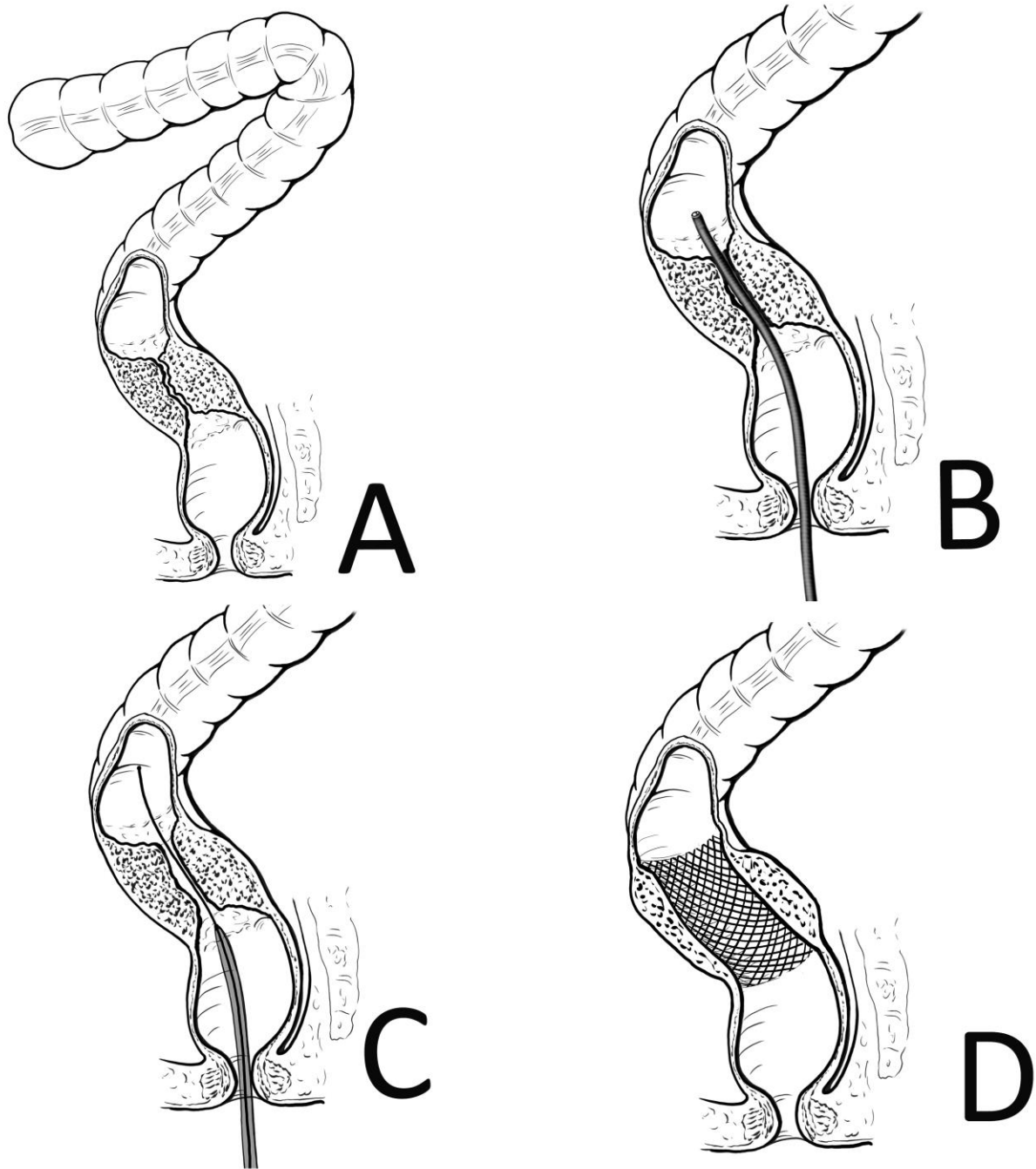


FIG 1: Schematic drawing of placement of a SEMS using a pediatric nasogastroscope to pass the obstruction.

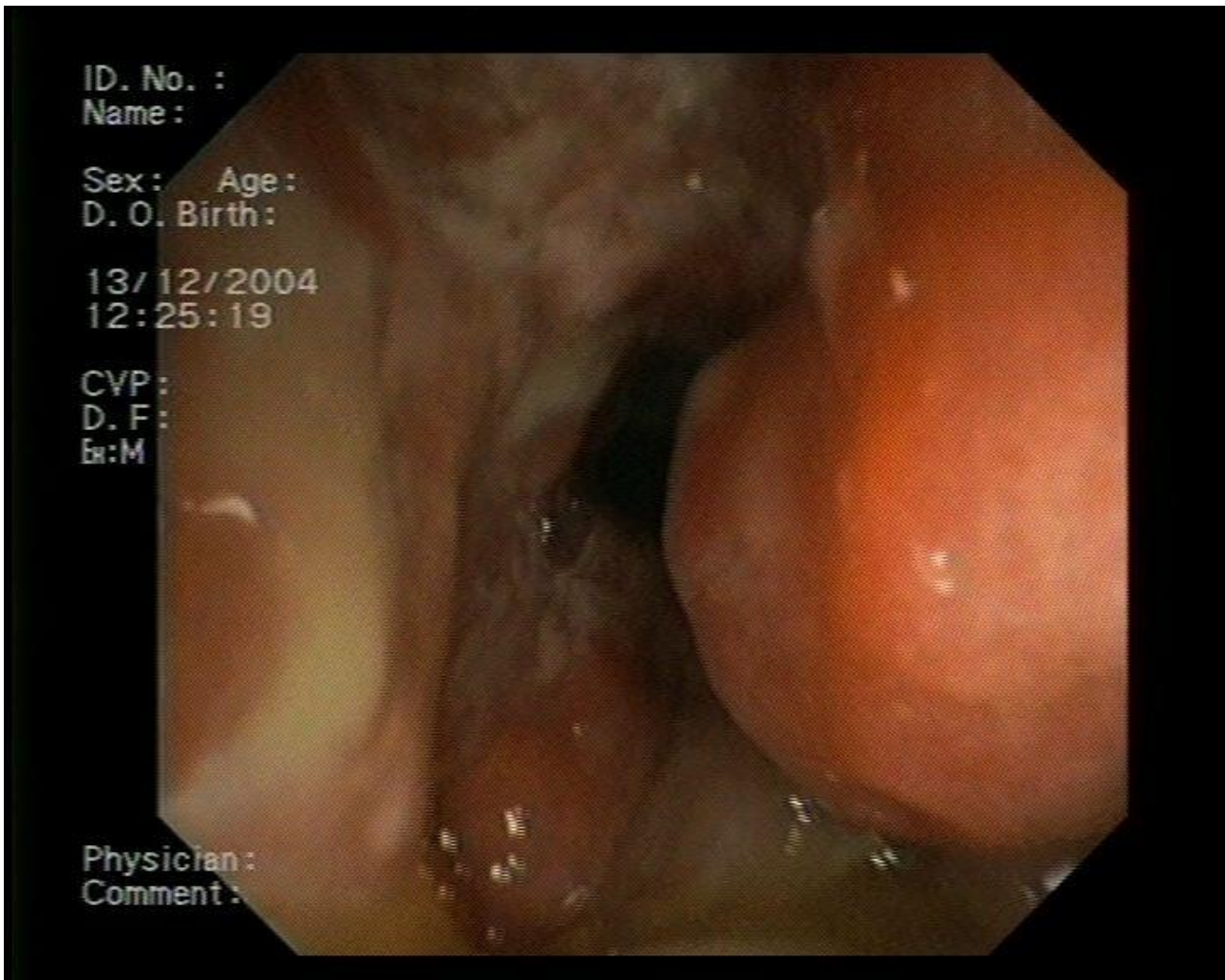


Fig 2 A Obstructing cancer in the upper rectum . Endoscopic view

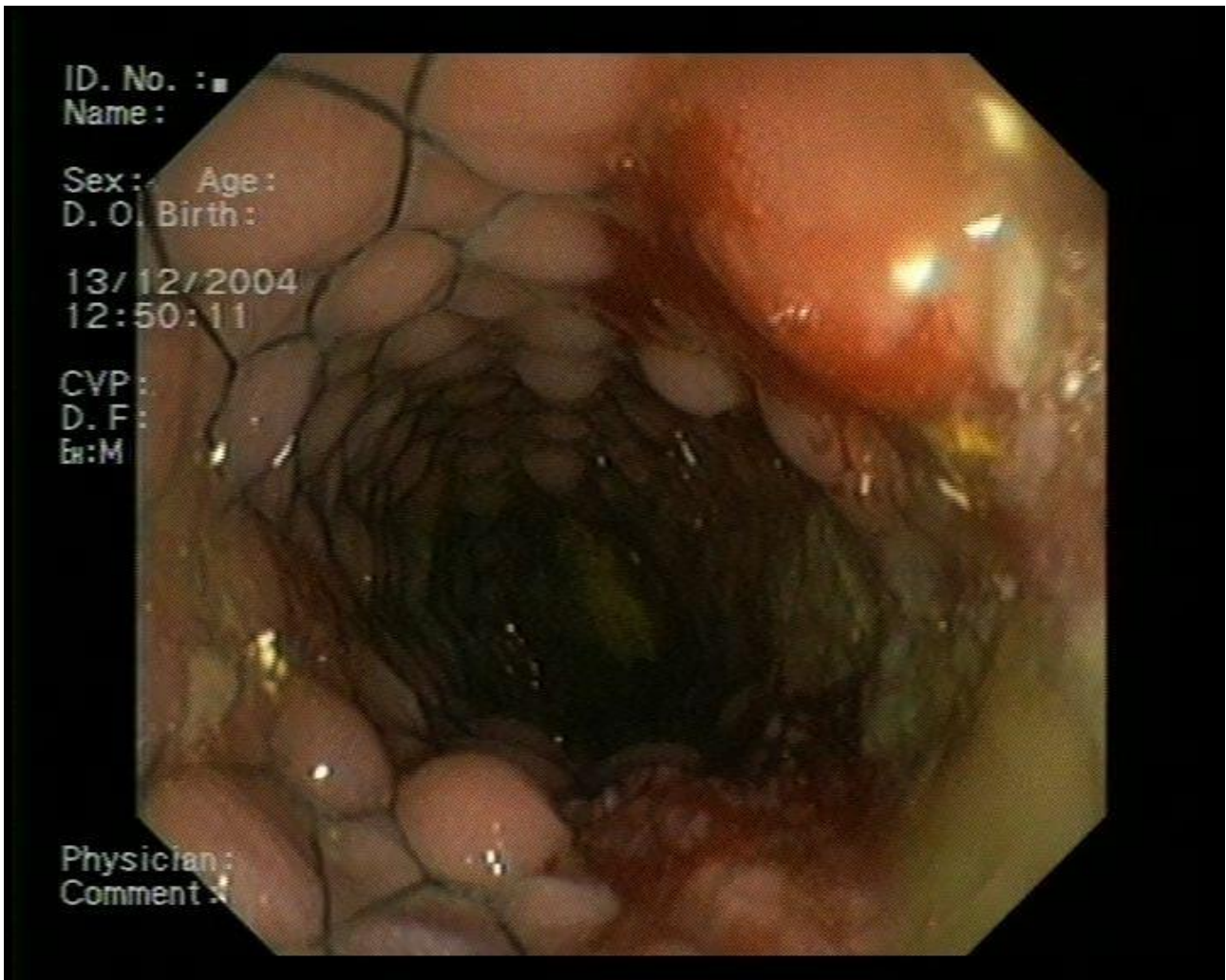


Fig 2 B Resolution of the obstruction with placement of a Self Expandable Metal Stent.

Endoscopic view



## RESULTS.

**Mortality and Morbidity:** There was no case of postoperative mortality or major morbidity after SEMS placement. There were no cases of bowel perforation or major bleeding. Technical success was obtained in 95.1% of the 167 patients. In 8 patients it was not possible to pass the guidewire through the obstruction, due to sharp angulation of the obstruction. After consulting a surgeon, the procedure was not continued. Surgical colorectal resection appeared a more appropriate procedure.

Clinical success was obtained in 92.9% of the patients. In 4 patients with ascites and peritoneal implants, despite technical success of stent placement, symptoms of obstruction persisted. In another 10 patients, with ascites and stage IV colorectal cancer, placement of a stent was not considered appropriate. Results have improved significantly ( $p < 0.05$ , HR 1,2) after the establishment of the endoscopic centre. Technical success increased from 87% to 98% and clinical success from 80% to 95%.

**Surgical Resection:** During the same time period, 35 patients with stage IV colorectal cancer and 25 patients with acute obstruction, underwent surgical colorectal resection. After consultation between surgeons and gastroenterologists, the option of surgery was considered the safest and best option. The operative option, chosen before intervention, was changed in 60 patients. In thirty five patients, initially considered candidate for stenting, surgery was considered a more appropriate choice after consultation among specialists. Twenty five patients, initially considered candidates for surgery, had endoscopic stenting after consultation among the specialists of the centre. (Fig 3)

## Changing of operative option after consultation among specialists (Table 1)

TABLE 1

### CHANGE OF OPERATIVE PROCEDURE AFTER CONSULTATION AMONG SPECIALISTS

CONDITION (n)	PRECONSULTATION DECISION	POST DECISION	MAIN REASON
ACUTE OBSTRUCTION (10)	SEMS *	RESECTION	LEFT COLON TUMOR
ACUTE OBSTRUCTION (15)	RESECTION	SEMS	LOWER RECTUM TUMOR
CHRONIC OBSTRUCTION (15)	STOMA	SEMS	BETTER QUALITY OF LIFE
CHRONIC OBSTRUCTION(10)	SEMS	RESECTION	SIGMOID-LEFT COLON TUMOR
CHRONIC OBSTRUCTION (10)	RESECTION	SEMS	MIDDLE-LOWER RECTUM TUMOR

\*SEMS Self Expandable Metal Stents

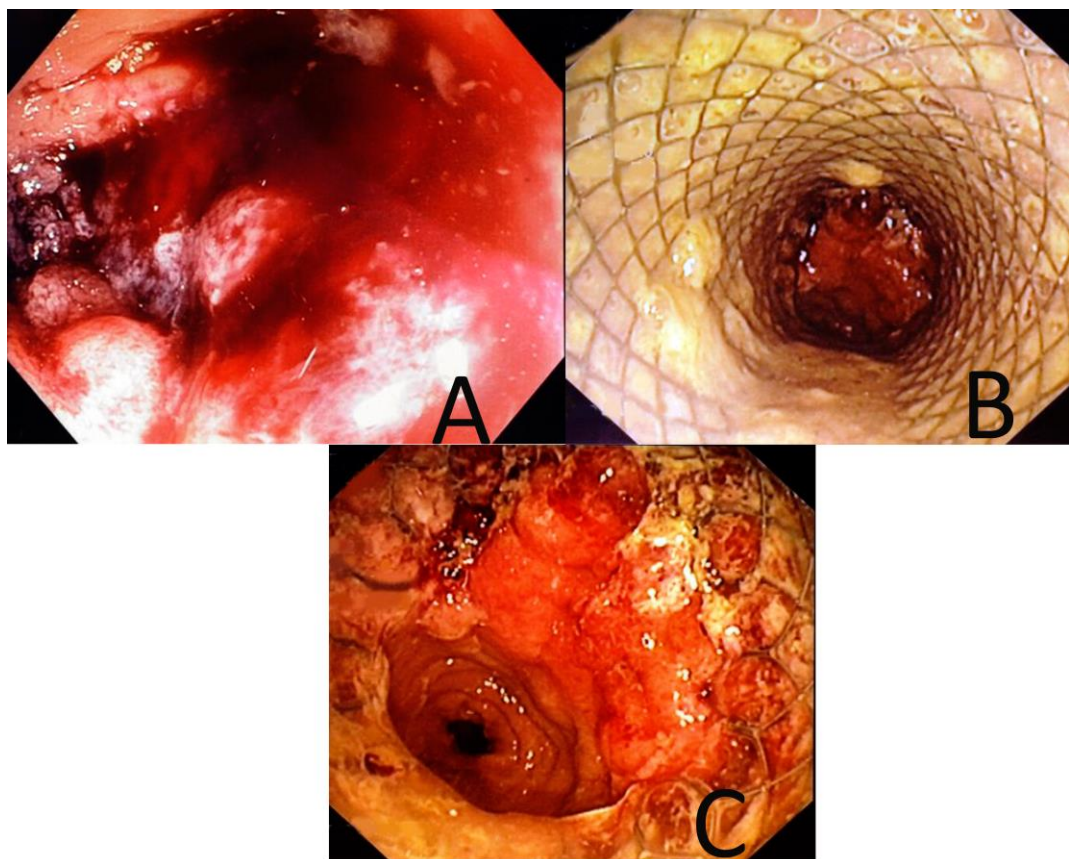


Fig 3: Example of the importance of consultation among specialists. Patient with Stage IV colorectal cancer and unresectable metastases. Argon laser treatment did not stop completely the bleeding (A). A difficult colorectal resection appeared unavoidable. Instead, a covered self expandable metal stent was placed (B). Thanks to its radial pressure the bleeding stopped completely. Nine days later, the covered stent was removed and an uncovered stent was placed (uncovered stents dislodge less frequently than covered stents)(C). Endoscopic view.

**Follow-up:** Patients were followed by the same team who was involved in stent placement. As concern stent placement for stage IV colorectal cancer, endoscopic re-intervention was performed in 28% of the patients during a mean follow up of 22 months. There were 2 cases of stent displacement, 2 cases of tumor ingrowth within the stent. The majority of the complications were related to fecal impaction. All complications were treated successfully endoscopically .

## **DISCUSSION.**

SEMS placement has been accepted in daily clinical practice [5,9,10,11,12,13,14]. In the last 15 years there has been a steady increasing number of reports analysing the results of SEMS in patients with malignant colorectal obstruction. SEMS offers many theoretical advantages either in patients with resectable colorectal cancer as a bridge to surgery or in patients with Stage IV unresectable colorectal cancer as a definitive palliative treatment.

SEMS positioning as a temporary solution, as a bridge to surgery, in patients with resectable colorectal cancer and acute obstruction has the potentials to transform an emergency clinical condition into an elective situation. The patient can be treated properly, correcting any electrolyte and fluid unbalance, not rare in elderly patients with bowel obstruction. A proper bowel preparation and a complete colonoscopy can be performed before surgery. The possibility of the synchronous presence of colonic adenoma or cancer above the obstruction is relatively high, ranging from 4 to 8%[15]

The role of SEMS in this setting has been source of controversies [16,17]

Randomized prospective studies comparing SEMS placement as a bridge to

surgery to emergency resection have shown a relatively high technical and clinical failure for stenting. There is also the theoretical risk that SEMs could lead to perforation, as it has been shown by two prospective randomized studies by van Hooft et al. [18] and by Pirlet et al. [19]: both studies were not continued because 18 out of 77 patients had open or sealed perforation after stenting. Emergency surgery after perforation of an obstructing colorectal cancer is associated to higher mortality and morbidity than standard emergency surgery. Perforation per se could lead to cancer spread, with negative oncological outcomes, including increased local cancer recurrence. Four other prospective randomized studies, comparing resection after stenting versus emergency resection have shown more favorable results for resection after stenting than for emergency resection [5,10,20,21]. Meta analyses have concluded that SEMs stenting in this clinical setting reduces the rate of complications and of permanent stoma formation [22,23,24]. All these studies showed a highly significant heterogeneity, raising the doubt that the large variability of reported results could be a consequence of a significant patient selection. [25]. Four reports analyzed the five year oncological outcome of patients who had resection after SEMs placement and after emergency surgery, and no difference was found in terms of local or distant recurrence between the two groups of patients [26,27,28, 29]. More recently Foo et al found contrasting results, with increased rate of distant metastases in patients who had stenting before colorectal resection [30].

In patients with Stage IV colorectal cancer, and symptoms of acute and sub acute obstruction, stenting can represent a valid choice, especially when

colorectal resection carries a significant operative risks. Short hospital stay and almost immediate resume of oral feeding can be expected after stenting.

Prospective randomized studies and review of regional data bases [31, 32] comparing stenting versus diverting colostomy have shown lower complication rate and shorter hospital stay in patients who had a stent. Diverting colostomy represents a significant problem for patients in whom general conditions slowly deteriorate. Chemotherapy can be started without any delay. In patients with Stage IV obstructing colorectal cancer and good general conditions, surgical resection offers many theoretical advantages in comparison to stenting: conceptual more effective action of chemotherapy [33, 34,35] and prevention of recurrent cancer obstruction, with the possibility of a better quality of life[36]

Reports [23,37,38,39] have analyzed the results in patients with Stage IV colorectal cancer who had stenting versus those who had tumor resection. The studies included 837 patients (404 stenting; 433 surgery). Hospital stay and complication rates were significantly lower in the stenting group. Clinical success in relieving the obstruction was higher in the surgery group (99.8% versus 93.1%). Permanent stoma rate was higher in the surgery group (54% versus 13%). The overall number of complications was similar in the two groups, but complications in the stent group occurred later. The most common complications in the stent group were re obstruction (18%), migration (9%) and perforation (10%). Median survival in the two groups of patients was similar (7.6 versus 7.8 months). Perforation was more common during stent placement. The possibility of perforation related to chemotherapy in patients

who had stenting has been raised in the past. Recent meta analyses have shown that the risk of perforation is not increased in patients with stenting receiving chemotherapy without bevacizumab (7%) in comparison to patients who had no chemotherapy at all (9%). Patients who had stenting and chemotherapy with bevacizumab had increased perforation rate (12.5%)[40,41].

Stents can be completely covered, partially covered or uncovered. It has been shown that the complications rates are similar, with dislodgment more frequent in covered stents, and re obstruction by tumor ingrowth more frequent in uncovered stents [42,43,44].

Endoscopic stenting can offer the best and more convenient solution in patients with complications after colorectal resection, including anastomotic leakage, anastomotic stricture and recto vaginal fistula [1,3,45].

Despite the large number of reports analyzing the results of SEMS placement, complications are still relatively high. Results have significantly improved in a study in which we compared reported results from 2004 to 2011, probably related to a learning curve and larger clinical experience[3]. Parks et al [46] showed better results with increased experience. Retrospective studies have shown that technical success is higher when the operator has performed more than 20 procedures[16,47]. However, in more recent reports we found increased complication rates [48]. This fact was more evident in reports describing a larger number of patients in comparison to reports with smaller

number of patients. This fact could be explained by a more aggressive use of SEMS placement in centers with larger experience, in comparison to a more selected, and prudent indication in centers at their initial experience.

Very few papers have focused the attention to a proper collaboration between specialists before and during the SEMS placement.

In our experience, there has been no case of mortality or major morbidity.

SEMS is not so simple as it could appear, and it should be done by experienced endoscopists and with the right indications. A close collaboration between surgeons and gastroenterologists allows to determine the therapeutic option with an acceptable balance between risks and benefits, avoiding the risk of a difficult SEMS insertion when surgery is a much easier option and viceversa. SEMS placement should be performed in ideal conditions such as well-known environment, availability of the right instrumentation and expert assistance. For all these reasons, it is preferable to place the SEMS in an elective setting, even in patients with symptoms of acute obstruction. When a stent is placed for correcting a colorectal obstruction during the night time, without proper fluoroscopy and assistance, by an endoscopist who is on call, without an adequate training and without the assistance of a surgeon with experience in the matter, there is the possibility of serious complications. Emergency surgery after perforation has a significant higher mortality and morbidity. A patient with acute malignant colorectal obstruction, unless there is a significant risk of perforation, can be treated conservatively for 1-2 days, which is the time needed to correct any fluid and systemic imbalance, and to place the stent in an appropriate environment, with experienced staff.



Blind maneuvers should be avoided. Colorectal stents can be placed either through the scope or through a guide wire , but it is recommended that the stent should be placed under simultaneous endoscopic and fluoroscopic guidance. Risk factors for technical success include complete obstruction, with sharp angulation of the large bowel above the recto sigmoid junction. The blind passage of the guide wire, can lead to the perforation of the large bowel wall which, above the obstruction, is thin, dilated, and partially ischemic. We have used a technique, suggested by one of the endoscopists (AL) in which a thin pediatric nasogastroscope is passed through the obstruction, under endoscopic and fluoroscopic guidance, so that the guidewire goes above the obstruction, through the nasogastroscope, under direct vision [3,6]. Even in the case of complete obstruction the centre of the obstruction is usually soft, and the nasogastroscope, with the simultaneous help of the guidewire, can pass without causing any concern. We do not use the balloon technique for fear of causing a risk of perforation. Balloon dilatation of the obstructing tumor leads to increased possibilities of perforation [16].

In such a way, SEMS can be placed in the right position. As suggested by the European Society for Gastrointestinal Endoscopy, the stent should have a landing zone at least for 2 cm and 2 cm below the tumor[16].

The location of the tumour is an important point to be considered. A majority of the colorectal cancers, which presents with obstruction, are located in the rectosigmoid junction . In these situations, a proper evaluation is fundamental. If the patient does not have major clinical problems , and the colon above the obstruction is not very dilated, surgical resection with a primary anastomosis is

quite a simple and straightforward procedure. In these selected cases, a low ligation of the inferior mesenteric artery is advisable. If needed, a protective proximal diverting stoma can be fashioned, to be closed easily 2 weeks later under local anesthesia. It can be difficult to place a stent in the proper position, in these relatively high locations, namely in case of complete obstruction just at the level of a sharp the curvature of the rectosigmoid junction. In the other cases (middle-lower rectum, inferior aspect of the rectosigmoid junction), stent placement is much easier and it is preferred to a more demanding operation. Colorectal stenting, as suggested by the European Society for Gastrointestinal Endoscopy should be avoided in the right and transverse colon. It is very difficult to place the stent in the right position in these anatomic locations, and the risk for complications is high.

There is a high possibility of complications related to the stent itself, during the follow up. Considering patients with stage IV obstructing colorectal cancer, in an average follow up of 21 months, 28% of the patients required a new endoscopy in our experience. Even if these complications (fecal impaction, stent migration, tumour ingrowth within the stent) can be treated with success endoscopically, a very careful follow up is required. In this context, it is imperative to consider the possibility and willingness by the patient and her/his family for a close follow up, in choosing the best therapeutic option.

## **CONCLUSIONS**

. The therapeutic options in patients with acute or subacute malignant colorectal obstruction, including endoscopic placement of a stent, should be based on a careful analysis of the different risk factors. In this scenario, a close collaboration among

specialists in selecting the most appropriate operative procedure, is essential and brings to better results.

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