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Treatment of anastomotic stenosis and leakage after colorectal resection for cancer with self-expandable metal stents

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Abstract

BACKGROUND: Self-expandable metallic stents can be used to treat patients with symptomatic anastomotic complications after colorectal resection.

METHODS: Twenty patients with symptomatic anastomotic stricture after colorectal resection were treated with endoscopic placement of a self-expandable metal stent. Ten patients had "simple" anastomotic stricture. In the remaining 10 patients, a leak was associated with the stricture.

RESULTS: The anastomotic leakage healed without evidence of residual stricture or major fecal incontinence in 8 of 10 patients. Overall, the anastomotic stricture was resolved in 14 of the 20 patients.

CONCLUSIONS: Self-expandable metal stents represent a valid adjunctive to treat patients with symptomatic anastomotic complications after colorectal resection for cancer. They have a complementary role to balloon dilatation in case of simple anastomotic stricture, and they improve the rate of healing when the stricture is associated with a leak.

Self-expandable metal stents (SEMS) are metallic tubes, which once placed at the level of the colorectal obstruction, expand to resume their primitive diameter. This natural expansion derives from the elasticity of Nitinol, which resumes its initial diameter at the body temperature. The procedure presents many advantages in patients with stage IV colorectal cancer causing obstruction, in comparison with a diverting colostomy, which is associated with many psychological negative aspects. SEMS can be placed under light sedation, it does not require a laparotomy with all the related matters, and hospital stay is shorter with reduced costs and less discomfort for the patient and his/her family.[1–5] The procedure has many potential advantages also in patients with resectable obstructing colorectal cancer to allow a better bowel preparation and to stabilize the patient, deferring a definitive colorectal resection to elective conditions.[6–9] Anastomotic complications after colorectal resection represent a challenging problem. In the last 9 years, 110 patients with colorectal obstruction underwent SEMS placement in our "Endoscopy Section" which is a tertiary referral center in Rome. Among those patients,

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there were 20 patients who had SEMS placement to treat anastomotic stricture after anterior rectal resection. In 10 patients, the stricture was associated with a leak. They represent the basis of this report.

Patients and Methods

All patients who had SEMS placement for anastomotic stricture and/or leak were included into the study. During a 9-year period, 20 consecutive patients had SEMS placement for anastomotic stricture after anterior rectal resection, and they represent the basis of our study. The study was approved by the Hospital Ethic Committee, and all patients were fully informed and gave informed consent for the procedure. Patients were prospectively evaluated.

Clinical characteristics

There were 8 women and 12 men. Mean age was 71 years (range 52 to 83 years). Anterior rectal resection was performed for cancer in 19 patients and for endometriosis in 1 patient. In all cases, a stapled end-to-end anastomosis had been performed. Patients with cancer underwent preoperative radiotherapy. In 7 patients, the rectal cancer was defined as T2, in 7 patients T3, and in 5 patients T4. All patients were symptomatic. Ten patients had an anastomotic leakage associated with the stricture. The distance between the rectal anastomosis and the anal verge ranged from 4 to 15 cm (mean 8.2 cm).

Simple anastomotic stricture

Ten patients had only a stricture, without leakage. All patients had symptoms of obstruction. Symptoms started at an average of 5 months from the original colorectal resection. Four patients have had unsuccessful balloon dilatation (3 sessions for each patient). Patients were admitted to the hospital, the day before the procedure they had a low-pressure rectal enema, which was repeated just before the procedure. The stent was placed with the patient in a conscious sedation with benzodiazepine according to his/her body weight. In all patients, multiple biopsies were obtained which did not show recurrent cancer. Computed tomography scan was also performed without evidence of extraluminal cancer recurrence. A diverting proximal stoma was not performed in 7 patients.

In 3 patients, a diverting proximal stoma was performed previously to treat an episode of acute obstruction. After 3 months from insertion, the stent was removed if it was a covered one. In case of uncovered stent, it was not removed. Then, if there was no evidence of residual obstruction, the stoma (when present) was closed.

Anastomotic stricture associated with leak

Ten patients had a leakage associated with the anastomotic stricture. All patients had symptoms of abdominal distension and fever, with increased white blood cell count. Endoscopic stenting was performed at an average of 2 weeks from the initial colorectal resection. A diverting proximal stoma was performed before insertion of the stent (6 patients had ileostomy and 1 patient had colostomy) in all except in 3 patients with rectovaginal fistula. The stent was placed with the patient under conscious sedation with benzodiazepine according to his/her body weight 2 or 3 days after surgery for stoma. In all patients, multiple biopsies were obtained, which did not show recurrent cancer. A computed tomography scan was also performed without evidence of extraluminal cancer recurrence. Four months later, the stoma was closed (after a barium control enema that did not show evidence of anastomotic leakage), and 2 weeks later, the stent was removed endoscopically, unless it was expelled spontaneously previously through the rectum. Uncovered stents were not removed.

Self-expandable metal stents placement

A pediatric nasogastroscope (Olympus GIF N180, Olympus, Tokyo, Japan; 4.8 mm in diameter) has been used to pass the anastomosis. In such a way, it was possible to have a direct vision of the anatomy and pathology and to pass the guidewire above the anastomosis through the nasogastroscope.[10] The length of the stent placed ranged from 60 to 105 mm and the length of the stricture ranged from 20 to 55 mm (mean 33.5 mm). Initially, we used uncovered stents (4 patients; Boston Scientific Corp, Natick, MA) and more recently covered stents (16 patients; Tae Woong Medical Corp, Gimpo-si, Gyeonggi-do, South Korea, fully covered colonic stent). The stent was placed at least 2 cm above and 1 cm below the stricture. The lower end of the stent was always placed at least 1 cm above the dentate line to avoid tenesmus and anal pain.

Follow-up

Patients were seen in the clinic every 2 weeks for the first 3 months and every 3 months thereafter. An initial endoscopy was performed 4 weeks after SEMS placement, thereafter, only if symptoms of obstruction recurred. The mean follow-up was 21 months (range 3 to 52).

Results

Early results

SEMS was placed successfully in all patients (technical success 100%). There was no case of mortality or major morbidity. Two patients complained of anorectal pain, easily under control with light pain medications.

Table 1 Results in patients with simple anastomotic stricture

No.	Follow-up (mo)	Stent migration	Stent removed	Recurrent obstruction	Other adjunctives
1	32	No (uncovered)	No	No	
2	12	Yes (covered)		Yes	Balloon dilatation
3	6	Yes (covered)		Yes	Balloon dilatation
4	9	Yes (covered)		Yes	Balloon dilatation
5	40	No (covered)	No	No	
6	25	No (covered)	Yes	No	
7	19	No (covered)	Yes	No	
8	4	No (covered)	No	No	
9	4	No (covered)	No	No	
10	3	No (covered)	No	No	

Late results

Tables 1 and 2 describes the results in patients with simple anastomotic stenosis and those with associated fistula. During the study period, another patient complained of light anorectal pain (overall 3 of 20 patients complained of anorectal pain). During the follow-up period, 1 patient died for diffuse cancer spread 32 months after surgery. Overall symptoms of obstruction were completely relieved in 14 of 20 patients (70%). Four patients required balloon dilatation for recurrent symptoms of obstruction. Overall, the fistula healed in 8 of 10 patients (80%). The 2 patients with residual leakage had a permanent ileostomy.

Stent-related complications

There was no case of bowel perforation or significant bleeding. None of the patients required a new operation. The stent migrated in 6 patients, and it was expelled spontaneously in 5 of them (all 6 patients had a covered stent). Three of these 6 patients experienced symptoms of recurrent obstruction, and they were treated with balloon dilatation. In a fourth patient, the fistula did not heal. In the remaining 2 patients, the stricture was resolved and the fistula healed despite stent migration. None of the 4 uncovered stents migrated, and no patients had complications related to the uncovered stent itself.

Risk factors for failure

The complication of stent migration was more common for covered stents (6 of 16) than for uncovered stents (0 of 4) ($P < .05$). Stent migration was more common in the treatment of strictures closer to the anal verge, even if a clear threshold could not be determined.

Balloon dilatation

Four patients with "simple" anastomotic stricture had multiple balloon dilatations, which did not resolve the problem before SEMS placement. SEMS placement resolved the stricture in one of these 4 patients. In the remaining 3 patients, the stricture recurred because of early stent migration. They required a new balloon dilatation (a single one), which was successful in the long term in all 3 patients. None of the 10 patients with fistula had previous balloon dilatation. In 1 patient, the fistula healed, but a symptomatic stricture was evident which was treated successfully with 1 single balloon dilatation.

Table 2 Results in patients with anastomotic stricture and leakage

No.	Follow-up (mo)	Stent migration	Stent removed	Leak healed	Recurrent obstruction	Success SEMS
1	34	No (uncovered)	No	Yes	No	Yes
2	42	No (uncovered)	No	Yes	No	Yes
3	13	No (uncovered)	No	Yes	Yes (balloon dilatation)	Yes
4	6	No (covered)	No	No	No	No
5	7	No (covered)	Yes	Yes	No	Yes
6	7	Yes (covered)	No	No	No	No
7	40	Yes (covered)	No	Yes	No	Yes
8	30	No (covered)	Yes	Yes	No	Yes
9	25	Yes (covered)	Yes	Yes	No	Yes
10	5	No (covered)	No	Yes	No	Yes

SEMS = self-expandable metal stents.

Comments

SEMS have been extensively used to treat patients with malignant colorectal obstruction. The procedure is associated with low mortality and morbidity, and good short- and long-term results have been reported.[1–7]

Stents have been not so commonly implanted in patients with benign obstructive colorectal lesion.[11–13] Uncovered stents, which are very difficult to remove, are placed with reluctance in patients with a theoretical long life expectancy, like those with benign colonic obstruction. On the other hand, covered stents, which can be easily removed, migrate and dislodge with a high frequency with the possibility that the obstruction will recur.[11–13] When used in the treatment of benign oesophageal strictures, a high incidence of migration has been noted.[14,15] Whooley et al[16] noted that stents inserted in patients with benign colonic obstructions migrated in all cases. In patients with simple benign anastomotic obstruction after colorectal resection, the pathology at the basis of the stricture is a mechanical process based on a fibrotic reaction, rather than inflammation. This fibrotic reaction depends on many factors, including inadequate bowel mobility, discrepancy in size between the distal and proximal end of the anastomosis, and abnormal collagen synthetic reaction. An uncovered stent has the theoretical potentials to resolve the stenosis; the fact that an uncovered stent is a foreign body that should not influence greatly the persistence of an anastomotic stricture because the inflammation, eventually at the basis of the stricture in case of simple benign lesions,[17,18] is not a major factor in the genesis of anastomotic stenosis. The persistence of the stent is important in preventing the elastic recoil that one should expect once the radial force has been removed. Covered stents offer the attractive theoretical possibility that they migrate spontaneously and expelled through the anus. However, if they migrate too early, there is the possibility of recurrence of the stenosis as it happened in 3 of 10 patients in our series.

The choice of covered or uncovered stents should be selected in an individual basis taking into account the age of the patient and the supposed expected life expectancy. In a very old patient, an uncovered stent should be preferred. In a younger patient, a covered stent seems more appropriate. If the covered stent do not migrate spontaneously, it can be removed endoscopically. Uncovered stents are very difficult to be removed endoscopically.

Boogie or balloon dilatation has been used extensively in this setting with an overall success rate in the medium term of 65%.[19,20] However, multiple dilatations are needed because of the natural elastic recoil of the fibrotic tissue at the basis of the stricture. A steady radial force can be optimal to prevent recurrence of obstruction for these patients, avoiding the risk of bowel perforation. We did not experience any case of bowel perforation, a risk in patients undergoing colorectal sudden and acute dilatation. Noteworthy is the fact that 3 patients in whom the stent did not resolve the obstruction because of early migration were successfully treated later with balloon dilatation. In all 3 patients, balloon dilatation did not resolve initially the stricture. This phenomenon can be related to several modifications induced by the continuous steady radial force applied to the colorectal wall by the stenting: (1) reduced contraction capability of the connective tissue at the basis of the stricture and (2) modification of the elasticity and physiologic characteristics of the muscle and fibro cells. In this setting, seems that balloon dilatation and SEMS placement can have a complementary rather than alternative role, choosing the one or the other technique according to the anatomic and clinical scenario.

The clinical scenario is quite different in patients with leakage associated with the stricture. A covered stent has the potentials to close the leak, decreasing the spillage of fluid and bacteria in the tissue surrounding the rectum, which is a potential factor for chronic infection. It can, then, be easily removed. The placement of a stent (covered or uncovered) is a guide over which the hole can heal properly, with reduced possibility of scarring and stricture. The continuous spillage of intestinal liquid and flora is completely prevented. None of the 8 patients treated successfully with a stent for a leakage that presented a major incontinence at a later examination. Another advantage is that the diverting proximal stoma can be closed with the reassurance that the presence of the stent will prevent any eventual spillage not recognized at the control barium enema.

In patients with simple anastomotic obstruction, in whom balloon or boogie dilatation has failed, endoscopic stenting can represent a valid choice.[21–23] In patients with leakage and stricture, endoscopic stenting with covered stents has many potentials,[24,25] leading to healing of the leakage in most cases. Improvement in stent design can bring to better results in the future.

Our study presents several limitations: small number of patients and no control series. Experiences from different centers with a larger number of patients are needed, before any definitive conclusion or clinical application can be reached.

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