

Clinical research

Endoscopic approach to anastomotic leaks: partially covered self-expandable stents. A single center's experience

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Submitted: 11 January 2017

Accepted: 7 February

Arch Med Sci Civil Dis 2017; 2: e29–e34
DOI: <https://doi.org/10.5114/amsd.2017.66390>
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Abstract

Introduction: Anastomotic leakage is an important and undesirable major complication after upper and lower gastrointestinal surgery. This complication can lead to significant morbidity and mortality and prolonged hospital stay. The objective of this study was to evaluate the safety and technical and clinical outcomes of temporary partially covered self-expandable metallic stent (PCSEMS) placement for treating anastomotic leaks after gastrointestinal tract surgery.

Material and methods: Medical records of 9 patients who had undergone partial covered self-expandable esophageal or colonic stenting either for colorectal anastomotic leak or esophageal anastomotic leak in Kartal Kosuyolu Higher Specialty Training and Research Hospital between April 2012 and October 2015 were collected. Living patients were recalled for the polyclinic follow-up and recent status was recorded.

Results: The mean age was 57 (37–78) years. Six of the patients were male and 3 of them female. Stents were successfully placed in all patients in the fistula localization on the first attempt. Stent migration was encountered in 3 patients and restenting was performed in 2 of these patients. No complications were seen related to the indwelling stents. Stent treatment failure occurred in 2 of the 9 patients. The mean removal time of the stent was 43 (5–70) days and it was not possible to get the stent out in 1 patient.

Conclusions: Endoscopic stenting is a minimally invasive and highly effective procedure that gives promise for the treatment of fistula after digestive surgery in the future.

Key words: anastomotic leak, endoscopy, fistula, stent.

Introduction

It is important to point out that the anastomosis complications that occur after gastrointestinal surgery are crucial. An anastomotic leakage is a serious complication that can arise after upper and lower gastrointestinal surgery [1, 2]. This complication can lead to significant morbidity and mortality and prolonged hospital stay. The reported incidence of lower gastrointestinal anastomosis leaks ranges from 1% to 30% [3, 4]. Despite advances in surgical techniques, anastomotic leakage after left colon surgery continues to occur at a high rate [1]. Anastomotic leakages also cause

high mortality and morbidity after upper gastrointestinal surgery. Particularly after an esophagectomy, anastomotic leakage occurs at a rate of 4–30% and has a high mortality rate [2, 5, 6].

Until recently, the approach for managing post-operative anastomotic leaks was mainly surgical or radiological percutaneous drainage, as well as antibiotic therapy, bowel rest, parenteral nutrition and, if necessary, diversion [1, 2, 5–7].

In recent years, self-expandable stents, which were already used for the palliative treatment modality of malign obstructions in the gastrointestinal tract, began to be used for treatment of gastrointestinal anastomosis leakages [5–8]. Today, endoscopic self-expanded covered stent placement is well accepted as an effective treatment modality for anastomotic leakage in the gastrointestinal tract, and its usage is gradually increasing [2, 5–8].

The aim of this study was to evaluate the safety and technical and clinical outcomes of placing temporary partially covered self-expandable metallic stents (PCSEMS) to treat anastomotic leaks after gastrointestinal tract surgery.

Material and methods

In this retrospective study, medical records were reviewed for 9 patients who had undergone partial covered self-expandable esophageal or colonic stenting either for colorectal anastomotic leak or esophageal anastomotic leak in Kartal Kosuyolu Higher Specialty Training and Research Hospital, Gastroenterological Surgery Department, between April 2012 and October 2015. This study was approved by the institutional review board of Kartal Dr. Lütfi Kırdar Education and Research Hospital (prot: 89513307/1009/517). The details of the endoscopic procedures were explained to the patients and informed consent was obtained. When the retrospective study was completed, living patients were recalled for the polyclinic follow-up and their recent status was recorded.

Demographic properties of patients, primary diagnosis, surgical method, preoperative chemoradiotherapy delivery status, fistula localization, stenting time, duration of stenting, complications related to stenting and clinical results were recorded. Surgical and endoscopic procedures were identified in which treatment failure and long-term follow-up complications had occurred with stenting.

Fistula was defined as: intestinal drainage from thoracic or abdominal drains following upper gastrointestinal surgery; detection of fistula tract or fluid collection on oral-intravenous contrasted computed tomography (CT); intestinal drainage from drain, incision of vagina upon lower gastrointestinal surgery; detection of fistula tract or fluid collection on rectal-intravenous contrasted CT. Mid-

azolam and/or fentanyl sedation was applied to all patients by the anesthesiology team while under endoscopic stenting. Intervention was done under direct vision and fluoroscopy was not needed.

Success was determined by completion of leakage clinically and regression of collections radiologically. Failure of the treatment was defined as inability to place the stent or surgical attempt due to the ongoing fistula despite the stent placement. The patients for whom the stenting was successful underwent endoscopic evaluation twice a month for the first month and then were evaluated when the stent was taken out.

Statistical analysis

Statistical Package for the Social Sciences (SPSS 21 Inc., Chicago, IL, USA) was used for biostatistical analyses. The data collected were expressed as mean (minimum – maximum) or in percentages.

Results

The mean age was 57 (37–78) years. Six of the patients were male and 3 of them female. All had undergone a stenting procedure due to postoperative fistula. The diagnosis of the patients were as follows: 3 patients rectum cancer; 1 patient gastric cancer; 1 patient pseudomyxoma peritonei; 1 patient distal esophagus squamous cell cancer; and 1 patient caecum cancer which originated from attenuated familial adenomatous polyposis (AFAP). The remaining 2 patients were operated on for benign conditions: 1 had symptomatic esophagus diverticula and the other suffered from jejunal perforation related to bevacizumab therapy. We performed defunctioning stoma on 2 of the 5 patients who had undergone a colorectal resection procedure. The clinical and demographical properties of the patients are shown in Table I.

The operation procedures were performed as follows: 3 patients underwent low anterior resection for rectum cancer; 1 patient underwent a total abdominal colectomy + iliorectal anastomosis procedure for caecum carcinoma derived from AFAP; cytoreductive surgery + hyperthermic intraperitoneal chemotherapy (CRS + HIPEC) was performed on 1 patient who had a diagnosis of pseudomyxoma peritonei; one primary suture repair and jejunal patch plasty was performed due to afferent intestinal loop perforation in a patient who had undergone right hemicolectomy and antrectomy + Bilioth II gastrojejunostomy for advanced colon cancer 10 months before perforation and was under bevacizumab therapy. The procedure was unsuccessful and the stent was placed for the fistula that had developed after multiple relaparotomy sessions.

Stents were successfully placed in all patients in the fistula localization on the first attempt. The

Table I. Clinical and demographic properties of patients

Patient no.	Age	Gender	Diagnosis	Neoadjuvant CRT	Surgical procedure	Defunctioning stoma
1	37	M	Attenuated FAP + caecal cancer	No	Total colectomy + IRA	No
2	34	M	Distal esophagus SCC	Yes	Ivor-Lewis esophagectomy	
3	66	M	Rectal cancer	Yes	LAR	Yes
4	65	F	Rectal cancer	No	LAR	No
5	58	M	Pseudomyxoma peritonei	No	Subtotal colectomy + cytoreductive surgery + HIPEC + ileosigmoidal anastomosis	No
6	76	F	Gastric cancer	No	TG + EJ	
7	52	M	Esophagus diverticula		Diverticulectomy	
8	44	M	Proximal jejunal perforation		Primary repair	
9	78	F	Rectal cancer	No	LAR	Yes

CRT – chemoradiotherapy, EJ – esophagojejunostomy, F – female, FAP – familial adenomatous polyposis, HIPEC – hyperthermic intraperitoneal chemotherapy, IRA – ileorectal anastomosis, LAR – low anterior resection, M – male, SCC – squamous cell carcinoma, TG – total gastrectomy.

mean stenting time was 18 postoperative days (6–53). Stent migration was encountered in 3 patients (patients 2, 7 and 8) and restenting was performed on 2 of these patients. No complications were observed related to the indwelling stents (Table II). Stent treatment failure occurred in 2 of the 9 patients. Anastomotic leakage was continued despite the proper placement of the stent in 1 patient (no. 5) leading to stoma creation with anastomotic region resection eventually. Stent migration was the reason for ongoing leakage in the other patient (no. 8); he finally underwent surgery for the fistula. The mean removal time of the stent

was 43 (5–70) days, and it was not possible to get the stent out in 1 patient (no. 3).

The mean follow-up time of living patients was 29 (18–45) months. Two patients underwent endoscopic dilatation due to stenosis. Peritoneal and liver metastases occurred in 1 patient (no. 3). His chemotherapy is still ongoing and stent removal and ostomy closure was impossible for him. No recurrence was seen in 5 of the remaining patients. Two patients died because of multiorgan failure related to fistula-associated sepsis. One of these patients (no. 9) was clinically unresponsive although the fistula was controlled by the in-

Table II. Stent application and clinical outcomes

Patient no.	Stent insertion time [PO day]	Stent removal time [day]	Localization of anastomosis	Stent migration	Restenting	Success	Complication
1	21	62	Ileorectal	No	No	Yes	No
2	14	45	Esophagogastric	Yes	Yes	Yes	No
3	53	Could not be removed	Colorectal	No	No	Yes	No
4	10	70	Colorectal	No	No	Yes	No
5	11	5	Ileosigmoid	No	No	No	No
6	17	29	Esophagojejunostomy	No	No	Yes	No
7	6	72	Esophagus	Yes	Yes	Yes	No
8	15	11	Jejunum	Yes	No	No	No
9	16	51	Colorectal	No	No	Yes	No

PO – post-operative.

Table III. Long-term follow-up outcomes

Patient no.	Stenosis	Follow-up time [months]	Patient status	Additional application
1	–	43	Alive	
2	+	24	Alive	Dilatation
3	–	27	Alive	
4	–	24	Alive	
5	–	20	Alive	
6	–	18	Alive	
7	+	45	Alive	Dilatation
8		0	Death	
9		0	Death	

dwelling stent. Long-term follow-up outcomes are shown in Table III.

Discussion

Stent usage has become more popular in the era of endoscopic innovations for complications in gastrointestinal surgery such as anastomotic leakage, fistula and stenosis [8, 9]. Stent implantation through the fistula location avoids fluid collection and prevents infection by formation of a barrier between the defect and the intraluminal space [10].

Surgeons encounter a variety of life-threatening complications after upper gastrointestinal surgical procedures. Anastomotic leakage ratios are 3–25% for esophageal surgery and 5–8% for gastric surgery [11, 12]. The mortality rate is extremely high for redoing gastrointestinal surgery. For this reason self-expandable metallic stent utilization receives more attention every day. It has been reported that the endoscopic stent success rate is 40–80% [11–13].

Stent migration stands out in the context of treatment failure. To prevent this event, clip application, large size of indwelling stent, suture fixation and partial covered stent usage have been shown to decrease the treatment failure rates [2, 14, 15].

The PCSEMS was reapplied to 4 of the 9 patients (nos. 2, 6, 7 and 8) due to the developed fistula after various upper digestive tract operations. Stent migration occurred in 3 patients. In 2 of these patients (nos. 2 and 7), fistulas were controlled after inserting larger stents. Stent migration developed in the other patient (no. 8) with an afferent jejunal loop fistula. Although the leak was controlled for the first week after the first stenting attempt, the patient died because of sepsis related to stent migration.

According to the current literature, the suggested stent removal time is 2–8 weeks [2, 12, 14, 15].

Postponing of stent removal is associated with ulcer formation, stricture, perforation and bleeding. There are conflicting reports on the length of removal time among different kinds of stents. Van Heel *et al.* [16] reported that complications and failure rates are higher when the removal time is longer.

Two stenoses developed in 2 of the 9 patients (nos. 2 and 7), for whom endoscopic dilatation was needed. The patients symptoms were relieved after repeating dilatation applications. Stent length of stay time was long in these patients (45 and 72 days), and this was probably related to the developed stenosis.

Anastomosis leakage following colorectal surgery is a significant cause of high levels of morbidity and mortality. Conventional approaches involve antibiotics, bowel rest, percutaneous drainage of collections and surgical drainage with stoma creation in the context of excessive peritoneal contamination [17]. An increasing number of reports indicate the efficacy of self-expandable metallic stents in the treatment of malignant and benign obstructive colorectal diseases and postoperative fistulas [18–21]. DiMaio *et al.* [10] concluded after their small case series that they had an 80% stenting success rate following lower digestive tract surgery. Fistulas which develop after cancer surgery are associated with a low quality of life and increasing hospital stay and cost [18]. Lamazza *et al.* [22] reported that they had successfully treated 8 of 10 fistula patients after colorectal surgery.

Chi *et al.* [23] also claimed that they had achieved healing of colorectal anastomosis fistula in 10 of 12 patients with covered self-expandable stents. Anal pain and migration related to the stent were a significant problem and were frequently encountered when the anastomosis was within 5 cm of the anal canal. Partially covered stents have proximal and distal mesh flares for

tissue in growth to prevent stent migration and create an effective seal [14]. On the other hand, this feature may result in impaction of the stent to the tissue wall by excessive fibrosis and granulation tissue leading to perforation or inability to remove the stent [24, 25]. In the case of stent removal difficulty, the 'stent-in-stent' procedure can be used to prevent complications [25].

In this study, 5 patients underwent a PCSEMS procedure to treat a lower gastrointestinal surgery leak after surgery. No documented anal pain or migration were seen in the patients. Four of the 5 (80%) patients were treated with stent placement. Failure occurred in 1 patient who had an ongoing leakage from the ileosigmoidal anastomosis despite the stent placement. This patient underwent a surgical procedure by resection of the anastomotic region and creation of a stoma. In one of our patients (no. 3), the stent could not be removed because of the dense fibrosis and granulation, even though the leakage was healed. Peritoneal dissemination and liver metastases developed in the 27-month follow-up and no complication was seen related to the stent. Limitations of our study are the small sample size, retrospective study, the patients being non-homogeneous according to the etiologies, anatomic localizations and lack of a control group.

In conclusion, the treatment of life-threatening fistulas following gastrointestinal surgery with redo surgery has high morbidity and mortality rates. Endoscopic stenting is a minimally invasive and highly effective procedure that holds promise in the future treatment of fistulas after gastrointestinal system surgery. New and different kinds of stents are required because of observed complications such as stent migration, stenosis following stent removal and difficulty in taking out the stent, particularly for partially covered stents.

Conflict of interest

The authors declare no conflict of interest.

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