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악성 소장 폐쇄 환자에서의 경공장 스텐트 설치술의 효용성

Trans-jejunostomy stent placement in patients with malignant small bowel obstructions

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Abstract

Trans-jejunostomy stent placement in patients with malignant small bowel obstructions

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Purpose: To evaluate the clinical effectiveness of trans-jejunostomy stent placement in patients with malignant small bowel obstructions (MSBO).

Materials and Methods: Between March 2009 and December 2016, 23 patients (20-81 years) with one (n=20) or two (n=3) MSBO from advanced abdominal and pelvic malignancies were enrolled. Percutaneous jejunostomy was created at 30-100cm upstream to MSBO, immediately followed by stent placement through the jejunostomy stoma at the same session. A retrospective analysis was conducted for technical success, bowel decompression, improvement of obstructive symptoms (3-point scale) and food intake capacity (4-point scale), and procedure-related complications.

Results: Stent placement was technically successful in 22 patients (95.7%). Obstructive symptoms improved by partially (n=9) or completely (n=13) within 2 weeks after the procedure. Bowel decompression was confirmed by enterography (n=21) and CT (n=16). Food intake capacity improved by 3 (n=1), 2 (n=7), and 1 point (n=14) (p<.0001). Major complications (n=3, 13.0%) including localized peritonitis (n=2) and bowel perforation (n=1), which were successfully treated conservatively.

Conclusions: Trans-jejunostomy stent placement is an effective treatment in patients with MSBO. It is technically feasible in most patients (95.7%) and provides substantial symptomatic improvement. Procedure-related complications are not uncommon, but can be managed conservatively.

Keywords: Intestinal obstruction, Palliative treatment, Decompression, Jejunostomy, Stents

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Table of contents

List of tables

List of figures

Introduction

Malignant small bowel obstruction (MSBO) is a common complication in patients with advanced abdominal and pelvic malignancies. It occurs in 10 to 28% of colon cancer patients, and 20 to 50% of ovarian cancer patients [1]. The patients with MSBO are often unable to eat or drink and frequently suffer from intractable nausea and vomiting as well as pain. Palliative bypass surgery has been considered treatment of choice, but since MSBO is frequently found in patients with advanced diseases, surgery is not tolerable in many patients, and associated with significant morbidity and mortality (7–67% and 6–32%, respectively) [2]. Conservative management generally involves decompression with tube drainage, intravenous hydration and nutrition, and medications including corticosteroids, antisecretors and analgesics. Although these treatments may control for nausea, vomiting, and pain in 80% of patients [3], there remains a group of patients for whom such symptom relief is difficult to achieve. In addition, the conservative management has inherent limitation in that it does not resolve the mechanical obstruction.

In recent years, self-expandable metal stent (SEMS) has been successfully used to recanalize malignant gastric outlet or colonic obstructions [4]. However, application of SEMS in small bowel is still a clinical challenge because of long distance from the mouth and anus and tortuous bowel courses. Although recent endoscopic technique such as double balloon enteroscopy has a potential to address MSBO, only limited data from small case series are currently available [5]. Moreover, the treated lesions largely confined to distal duodenal or proximal jejunal obstructions [6]. MSBO frequently involving distal jejunum and ileum are, therefore, still considered beyond the reach of endoscopic treatment.

Radiological percutaneous jejunostomy (RPJ) was developed for enteral feeding in patients who could not undergo gastrotomy due to previous surgery or underlying malignancy [7]. However, as it allows direct approach the lumen of small bowel, RPJ can be used as a potential percutaneous access route for stent placement in MSBO. The advantage of the "trans-jejunostomy stent placement" is that it can address distal small bowel obstruction, in which conventional endoscopic or radiologic approach is not feasible. However, less than 10 cases have been treated with this technique

so far [8–10], and further studies are needed to confirm its clinical role in treatment of MSBO. Therefore, this study was performed to evaluate the safety and clinical effectiveness of trans-jejunostomy stent placement in patients with MSBO.

Material and methods

Our institutional review board approved this retrospective study and waived the requirement for patient consent.

Patients

Between March 2009 and December 2016, 23 patients (age range 20–81 years; mean 59.5±13.1 years) received trans-jejunostomy stent placement. Indications for the procedure were a) One or two (less than 100 cm distance between the two lesions) MSBO from abdominal and pelvic malignancy confirmed on CT, b) obstructive symptoms such as nausea and vomiting intractable to medical treatment, c) inoperable patients, either because of comorbidity or disease extent. Patients with two obstructions far apart from each other, three or more obstructions, or diffuse MSBO involving >15 cm segment were excluded from stent placement. The baseline characteristics of the patients are summarized in Table 1. Six patients also had synchronous obstructions in the esophagojejunostomy (n=1), gastrojejunostomy (n=1), duodenum (n=1), jejunojejunostomy (n=1), ascending colon (n=1) and rectum (n=1). Twelve patients had grade 2 or grade 3 ascites [11].

Procedures

Informed consent was obtained from patients and/or their family members in all cases. Sedation and analgesia were obtained by administering 50–100 mg of fentanyl citrate (Hana Pharm, Seoul, Korea) and 2–5 mg of midazolam (Bukwang Pharm, Seoul, Korea) intravenously with continuous monitoring of the heart rate, blood pressure and oxygen saturation. In twelve patients with grade 2 or 3 ascites, paracentesis (n=2) or percutaneous catheter drainage (n=10) was performed before RPJ.

The procedure described below was performed by C.J.Y. with 10 years of experience in interventional radiology. RPJ was performed as described in previous literature [9]. Briefly, a distended small bowel loop near the anterior abdominal wall was selected based on CT. Under ultrasonographic and fluoroscopic guidance, target jejunal loop at 30–100cm upstream to MSBO was punctured with a 17-gauge needle preloaded with a T-fastner (Cope suture anchor; Cook, Bjaeverskov, Denmark). In three patients with two obstructions, the puncture site was selected

upstream to the proximal obstruction. A small amount of contrast medium injection through the needle confirmed the intraluminal position. After fixing the jejunal loop using two or three T-fasteners, bowel puncture was performed with an 18-gauge needle. A 0.035-inch hydrophilic guidewire (Radifocus; Terumo, Tokyo, Japan) was advanced into the jejunal lumen. The percutaneous tract was serially dilated, and then a vascular sheath (12- or 14-F) was placed.

Stent placement was performed immediately after jejunostomy creation. A 0.035-inch hydrophilic guidewire and an angiographic catheter were manipulated to cross the target obstruction. After the length of the obstruction was measured using a calibrated catheter and small amount of contrast, the guidewire was exchanged for a 260-cm super-stiff guidewire (Amplatz Medi-tech/Boston Scientific, Watertown, MA, USA). A self-expandable uncovered stent (Hercules, S&G medical, Seongnam, Korea) was placed to cover the obstruction. The stents 18-22 mm in diameter were used. By choosing a stent longer by 2 cm each proximal and distal than the obstructive segment, 6 cm to 12 cm stents were used. In patients with an obstruction longer than longest available stent,

multiple stents were placed with at least 2 cm overlap to achieve complete coverage of the obstruction. In three patients with two obstructions, stents were placed for the distal obstruction firstly, and then for the proximal obstruction in one session. When stent expansion was lesser than 50% of nominal diameter, balloon dilatation was performed using a 14- or 16-mm balloon catheter (Maxi LD; Cordis, Bridgewater, NJ, USA). The contrast passage through the stent was checked with an angiographic catheter to confirm bowel recanalization. A 14-F Cope-type loop drainage catheter (Shetty; COOK, Bloomington, IN, USA) was placed for further decompression of small bowel. The synchronous obstructions in the esophagus, duodenum, surgical anastomosis, colon, and rectum (n=6) were treated by stent placement with peroral or peranal approach at the same session.

Follow-up

After the procedures, obstructive symptoms and abdominal radiographs were daily followed up. A follow-up enterography through jejunostomy tube was performed to check for tube

malfunction, bowel decompression, stent patency, and procedure related complications every other day after procedure. Re-interventions such as jejunostomy tube replacement, balloon dilation or additional stent placement were performed as needed. If obstructive symptom improved and bowel compression was evident on radiograph and enterography, jejunostomy tube was capped, and the patients attempted peroral diet within a tolerable range. When there was no symptomatic and radiologic deterioration for more than 2 days, the jejunostomy tube was removed. After discharge, patients were followed-up in outpatient clinic 2 or 3 month intervals to check for recurrent obstructive symptom. CT follow-up was performed at 3 or 4 month intervals to assess stent patency, recurrent obstruction, and underlying disease progression.

Analysis

The technical success was defined as a) jejunostmy creation at attempted site and b) accurate positioning of the stent to cover the target obstruction(s) and patent contrast passage through the stent [9]. The clinical success was defined by a) improvement of

obstructive symptoms and b) radiologic bowel decompression. The symptomatic relief was evaluated on the following three-scale: 1=persistent, 2=partial relief with reduced requirement for medication, 3=complete relief without medication; 2 or 3 were regarded as clinical success. Radiologic bowel decompression was assessed on enterography and/or follow-up CT if available. Food intake capacity was graded on a previously published scale [12] as follows: 0=no oral intake; 1=liquids only; 2=soft solids; 3=low-residue or full diet. The food intake capacity scores before and after stent placement were compared by paired *t* test; $P<0.05$ was considered statistically significant. Complications that required an extended duration of hospitalization, increased the level of care, led to a specific therapy or resulted in permanent adverse sequelae or death were classified as major complications [13]; the remaining complications were considered minor. Data on patients' survival and jejunostomy tube management were also collected.

Results

Clinical outcomes of the stent placement were summarized in table 2.

Technical and clinical success

Technical success was achieved in 22 patients (95.7%) (Figure 1). One to four stents were placed to recanalize one (n=19) or two (n=3) MSBOs. A technical failure occurred in one patient with 12cm segmental ileal obstruction. A 0.035 ” guidewire and angiographic catheter were successfully manipulated to cross the obstruction, but tortuous bowel course did not be straightened even after a stiff guidewire placement. Consequentially, a 10-F stent delivery system could not be advanced along the guidewire to the target obstruction.

Clinical success was achieved in 22 patients (95.7%) who underwent technically successful procedure. Obstructive symptoms improved partially (grade 2, n=9) or completely (grade 3, n=13) within 2 weeks after the procedure. Bowel decompression was confirmed in all 22 patients by enterography (n=21) and CT (n=16) obtained 1-2 weeks after the procedure. Food intake capacity

improved in all patients with successful stent placement ($P<.0001$). The score improved by 3 in 1 patients, 2 in 7 patients, and 1 in 14 patients. 2 patients could eat normal diet and 16 patients could eat soft solid diet within 2 weeks after the procedure.

Complications

Major complications occurred in 3 patients (13.0%) including localized peritonitis around jejunostomy stoma (n=2) and bowel perforation (n=1). The bowel perforation occurred immediately after balloon dilation during the procedure, which was successfully treated by covered stent placement (Figure 2). The localized peritonitis required prolonged systemic antibiotics for 2 weeks and percutaneous drainage (n=1).

There were 14 minor complications in 9 patients (39.1%) including stent-related complications (n=7), jejunostomy tube malfunction (n=5), and wound infection with peritubal leakage (n=2). Stent-related complications were persistent insufficient expansion (<50% of nominal diameter) after 3-5 days observation (n=5), stent migration (n=1), and stent occlusion (n=1).

Incomplete stent expansions were treated with balloon dilatation (n=3) or with additional stent placement coaxially into the previous stent (n=2). In a patient with distal ileal obstruction, stent migrated distally into the colon 1 day after placement. The migrated stent was removed trans-anally using a biopsy forcep, and re-stenting was performed for the ileal obstruction through the jejunostomy. One stent occlusion by tumor ingrowth was treated by additional stent insertion 23 days after initial procedure. Clogged (n=3) or dislodged (n=2) jejunostomy tubes required replacement. The wound infections were resolved by topical and systemic antibiotic therapy.

Follow-up

Among the 22 patients who received stent placement, 18 patients were discharged 10-45 days (median 17 days) after stent placement. Four patients died of disease progression during the index admission (20-40 days, median 27.5 days). Jejunostomy tube was removed in 18 patients (78.3%) at 10-83 days (median 26 days) after stent placement. Four patients still had their

jejunostomy tubes in place at the last follow-up (n=2: 48, 134 days after stent placement) or at the time of death (n=2: 20, 30 days after stent placement) because of patients' worry about recurrent obstruction despite improvement of obstructive symptom and oral intake capacity. Median follow-up period was 63 days (range, 20-977 days). Twelve patients died 20-256 days after stent placement (median 44 days). The 30-day mortality rate was 8.7% (n=2). The cause of death were disease progression (n=10) and aspiration pneumonia (n=2). Nine patients were lost to follow-up (36-360 days, 93 median days). Two patients are being followed-up for 160 and 977 days without recurrent obstruction.

Discussion

To date, less than 30 cases of percutaneous stent placement for small bowel obstruction has been reported [6]. Most of these procedures involved transhepatic or trans-enterostomy approach and the treated lesions were confined to recurrent malignant obstruction of the afferent loop after gastrectomy [10; 14]. To our knowledge, only one study [9] suggested "trans-jejunostomy stent placement" might be technically feasible for MSBO occurred in patients with native bowel anatomy. However, the study involved only 5 patients, and more experiences are needed to confirm the clinical effectiveness of this procedure. This study supports the results of the previous study with larger population (n=23). Technical success was achieved in most patients (95.7%). In 3 patients with multiple obstructions were successfully recanalized in single session procedure. The biggest merit of this procedure is that it can treat distal jejunal and even ileal obstructions which conventional peroral or peranal approach cannot address. In this study, all 22 patients with technically successful stent placement experienced improvement of obstructive symptoms and food intake capacity. Therefore, trans-jejunostomy stent placement seems not

only technically feasible but also clinically beneficial.

The first step of the procedure is creation of percutaneous jejunostomy. Since patients with MSBO already have significant bowel distension upstream to the obstruction, the small bowel puncture is much easier than percutaneous jejunostomy for feeding purpose in patients without bowel obstruction. However, because of high intraluminal pressure, bowel content can be spilled out into peritoneum during the procedure. Therefore, secure bowel fixation to abdominal wall is crucial for this procedure. Although a study suggested percutaneous jejunostomy can be safely performed using one anchor device [15], we believe 2 or 3 anchor devices would be safer in patients with bowel obstruction. The selection of jejunostomy site is a critical part of this procedure. It should be adequately close to the target obstruction to be recanalized. Our experience suggests that distended bowel 30–100 cm upstream to the target obstruction is most appropriate for stent placement and further bowel decompression through jejunostomy tubes.

It is important to select patients who can possibly gain benefits from the procedure. We selected patients with intractable symptoms from one or two short segmental obstructions. Patients

with three or more obstructions or long segmental obstruction (>15 cm) were excluded from stent placement. However, there was a technical failure in a patient with 12 cm segmental ileal obstruction, in whom the bowel loop could not be straightened even though a stiff guidewire was advanced far beyond the obstruction. The cause of the failure assumed to be small bowel fixation by extensive peritoneal seeding. Therefore, the selection criteria for length of the obstruction might have to be stricter. We treated two obstructions only when they are closely located (<100 cm apart from each other) so that stent placements for the two lesions were feasible through one jejunostomy in single session. However, if multiple jejunostomy are tolerable to the patient, it would be possible to treat obstructions far apart from each other. We assumed that three or more obstructions suggest diffuse disease involvement in almost the whole small bowel, and excluded from the procedure. In these cases, not only the procedure is technically difficult but also clinical benefits cannot be guaranteed even after technically successful procedure.

Since MSBO is a late complication from highly advanced malignancies, it is debatable if an invasive procedure like

percutaneous jejunostomy and stent placement is beneficial or not. This is more arguable in patients with short life expectancy like two patients of this study who died within 30 days due to disease progression. However, symptoms from bowel obstruction such as intractable discomfort/pain and continuous nausea/vomiting can severely impair patients' life quality. Therefore, in our opinion, symptomatic relief might be a crucial issue even though it is only for a short period of time before patients' deaths.

In this study, three patients experienced major complications including localized peritonitis (n=2) and bowel perforation (n=1). The peritonitis was assumed to be caused by bowel content spillage during creation of jejunostomy. In this study, the peritonitis was confined to limited area around jejunostomy stoma, which could be treated by antibiotics with or without catheter drainage. However, it is potentially fatal complication requiring intensive clinical observation, and when disease progression is suspected, emergency surgery should be performed [9]. A bowel perforation occurred during balloon dilation after stent placement. Since small bowel wall is thinner than stomach and the diseased segment is friable, the possibility of perforation is higher than procedures in

gastric outlet obstruction. Therefore, balloon dilation should be reserved for cases with insufficient stent expansion after several days of observation. If it is still positively necessary, it may be better to use a small (<10 mm) balloon with preparation of a covered stent.

This study has several limitations. First, this is a retrospective study with its all inherent limitations. Especially, since the indications to select patients were arbitrary, it is difficult to define precise criteria to select patients in whom the procedure is possibly beneficial. Second, 3-points scale was used to quantify symptomatic relief, but it was inevitably subjective and may not be enough to reflect clinical outcomes of this procedure. More refined quantitative measurement method is needed. In addition, small population of this study precludes generalizing our results.

In conclusion, trans-jejunostomy stent placement is an effective treatment in patients with MSBO from advanced abdominal and pelvic malignancies. It is technically feasible in one or two short segmental MSBO and provides substantial symptomatic improvement. Procedure-related complications are not uncommon, but mostly can be managed conservatively.

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Table 1. Baseline characteristics of 23 patients who received trans-jejunostomy stent placement

Characteristics	Finding
Age (y)*	20-81 (59.5)
Gender (Male/Female)	
Male	17 (73.9)
Female	6 (26.1)
Underlying Malignancy	
Colorectal cancer	7 (30.4)
Gastric cancer	5 (21.7)
Pancreatic cancer	3 (13.0)
Bladder cancer	2 (8.7)
Breast cancer	2 (8.7)
Cholangiocarcinoma	1 (4.3)
Esophageal cancer	1 (4.3)
Ovarian cancer	1 (4.3)
Prostate cancer	1 (4.3)
Previous surgery	
Curative	16
Palliative	3
Characteristics of MSBO	
Location (Jejunum/ileum)	17 (65.4) / 9 (34.6)
Number (one/two)	20 (87.0) / 3 (13.0)
Length (cm)*	2-12 (6.5)
Performance status (ECOG)**	
0	1 (4.3)
1	7 (30.4)
2	15 (65.2)
3	0 (0.0)
Oral intake capacity***	
0	11 (47.8)
1	12 (52.2)
2	0 (0.0)
3	0 (0.0)

Note.- Unless otherwise indicated, data are number of patients, and data in parenthesis are percentages except where indicated.

*Data in parentheses are mean.
**ECOG: Eastern Cooperative Oncology Group;
***oral intake capacity according to reference [12]

Table 2. Clinical outcomes of the stent placement

	Patient no.	1	2	3	4	5	6
Demographic	Age	59	20	55	58	35	73
	Sex	M	M	M	M	M	M
	Underlying malignancy	pancreas	colon	colon	rectum	stomach	bladder
Obstruction	Site	distal ileum	proximal jejunum	distal jejunum	distal ileum	distal jejunum	distal ileum
	Number	1	1	2	1	1	1
	Length (cm)	5	6	5, 6	7	12	12
	Stent number	1	1	4	3	2	0
	Stent size	20*8	22*12	24*10, 24*8, 22*8	24*12 covered	20*10, 20*12	NA
	technical	S	S	S	S	S	F
Symptom improvement	N/V	2	3	1	1	2	1
	Pain	2	3	3	3	2	2
	Diet_pre	1	0	1	1	0	1
	Diet_post	2	2	2	2	1	1
	Diet_change	1	2	1	1	1	0
	Decompression	1	1	2	2	1	–
Complication	Major	NA	NA	NA	NA	NA	localized peritonitis
	Treatment	NA	NA	NA	NA	NA	PCD
	Stent-related	NA	NA	NA	incomplete expansion	incomplete expansion	NA
	Peritubal leak	NA	NA	NA	NA	NA	NA
	Tube clog	NA	NA	O	NA	NA	NA
	Dislogement	NA	NA	O	NA	NA	NA
Follow-up	Last F/U	2009-04-09	2012-02-10	2011-10-12	2012-01-11	2012-06-08	2012-04-19
	F/U period	20	256	93	55	134	63
	Status	death	death	loss	loss	loss	loss
	Death	2009-04-09	2012-02-10	NA	NA	NA	NA
	Cause	aspiration pneumonia	disease progression	NA	NA	NA	NA

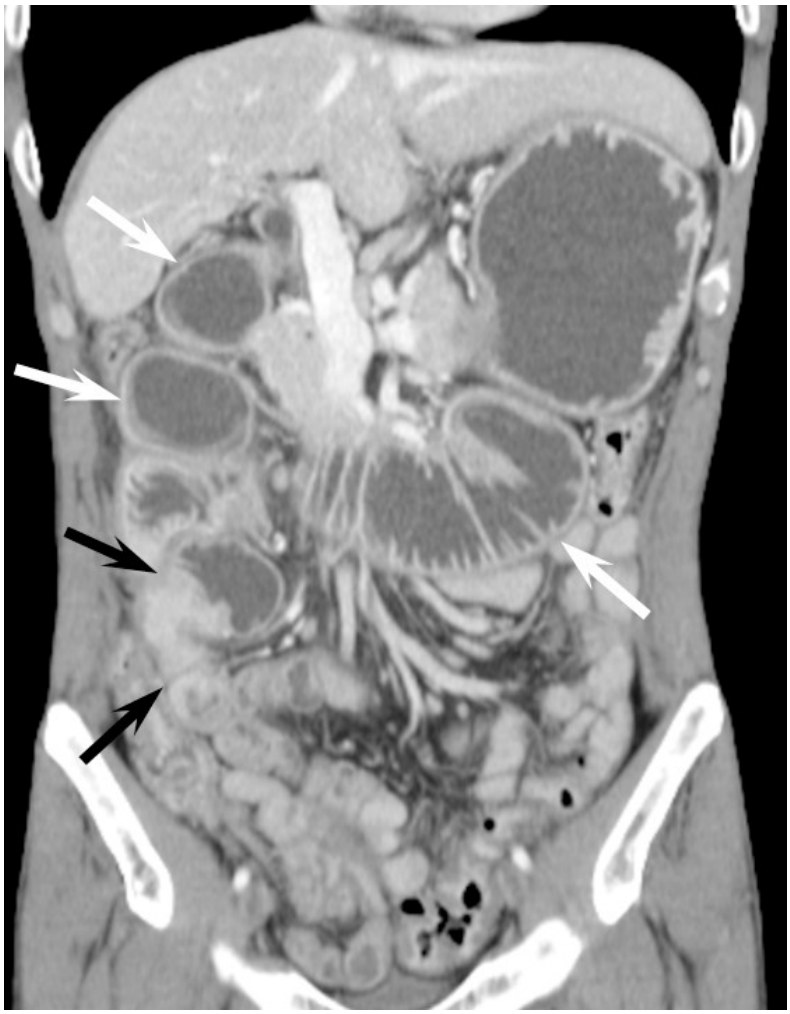
7	8	9	10	11	12	13	14	15	16
59	81	68	72	48	70	61	54	52	56
F	M	F	M	F	F	M	M	M	M
pancreas	prostate	breast	stomach	ovarian	stomach	bladder	colon	colon	stomach
distal jejunum	distal ileum, proximal ileum	proximal jejunum	proximal jejunum	proximal jejunum	proximal jejunum	distal ileum	proximal ileum	distal ileum	proximal jejunum
1	2	1	1	1	2	1	1	1	1
6	7,4	7	8	12	6, 5	8	9	7	9
1	3	1	2	2	2	1	1	2	3
24*12	24*10, 6, 8	22*8	24*8, 6	22*10x2	24*10, 12	22*12	22*12	22*12	22*6, 22*8
S	S	S	S	S	S	S	S	S	S
2	1	2	3	3	3	3	1	1	1
2	3	2	2	2	2	2	3	2	3
0	1	0	0	0	0	0	0	1	1
1	2	1	2	2	2	2	3	3	2
1	1	1	2	2	2	2	3	2	1
1	2	2	2	2	1	2	2	2	2
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	incomplete expansion	NA	NA	incomplete expansion	NA	stent migration	Food impaction
NA	NA	NA	NA	NA	NA	O	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2013-04-29	2014-01-08	2013-12-02	2014-01-17	2014-06-30	2014-05-24	2015-09-21	2017-06-20	2015-02-28	2015-10-16
45	268	31	53	126	25	360	977	93	107
loss	loss	death	death	death	death	loss	alive	death	loss
NA	NA	2013-12-02	2014-01-17	2014-06-30	2014-05-24	NA	NA	2015-02-28	NA
NA	NA	aspiration pneumonia	disease progression	disease progression	disease progression	NA	NA	disease progression	NA

17	18	19	20	21	22	23
61	47	65	79	55	74	67
F	M	M	M	M	F	M
ovary	stomach	esophagus	biliary	colon	pancreas	rectum
distal jejunum	distal jejunum	distal jejunum	proximal jejunum	distal jejunum	distal jejunum	distal ileum
1	1	1	1	1	1	1
5	4	4	5	6	3	2
1	1	3	1	3	1	3
16*10	22*8	22*8 (Zea, bare &	20*6	18*6, 18*8	15*6	16*4
S	S	S	S	S	S	S
1	3	3	1	1	3	1
3	1	2	2	2	2	2
1	1	0	1	1	0	1
2	2	1	2	2	2	2
1	1	1	1	1	2	1
2	2	2	2	1	2	2
NA	NA	perforation	NA	localized peritonitis	NA	NA
NA	NA	covered stent	NA	conservative	NA	NA
NA	NA	NA	NA	NA	NA	tumor overgrowth
NA	NA	NA	NA	NA	O	NA
O	NA	NA	O	NA	NA	NA
O	NA	NA	NA	NA	NA	NA
2016-01-24	2015-12-29	2016-05-01	2016-06-01	2016-09-29	2016-11-02	2017-06-15
179	32	48	36	30	40	183
death	death	death	loss	death	death	alive
2016-01-24	2015-12-29	2016-05-01	NA	2016-09-29	2016-11-02	NA
disease progression	disease progression	disease progression	NA	disease progression	disease progression	NA

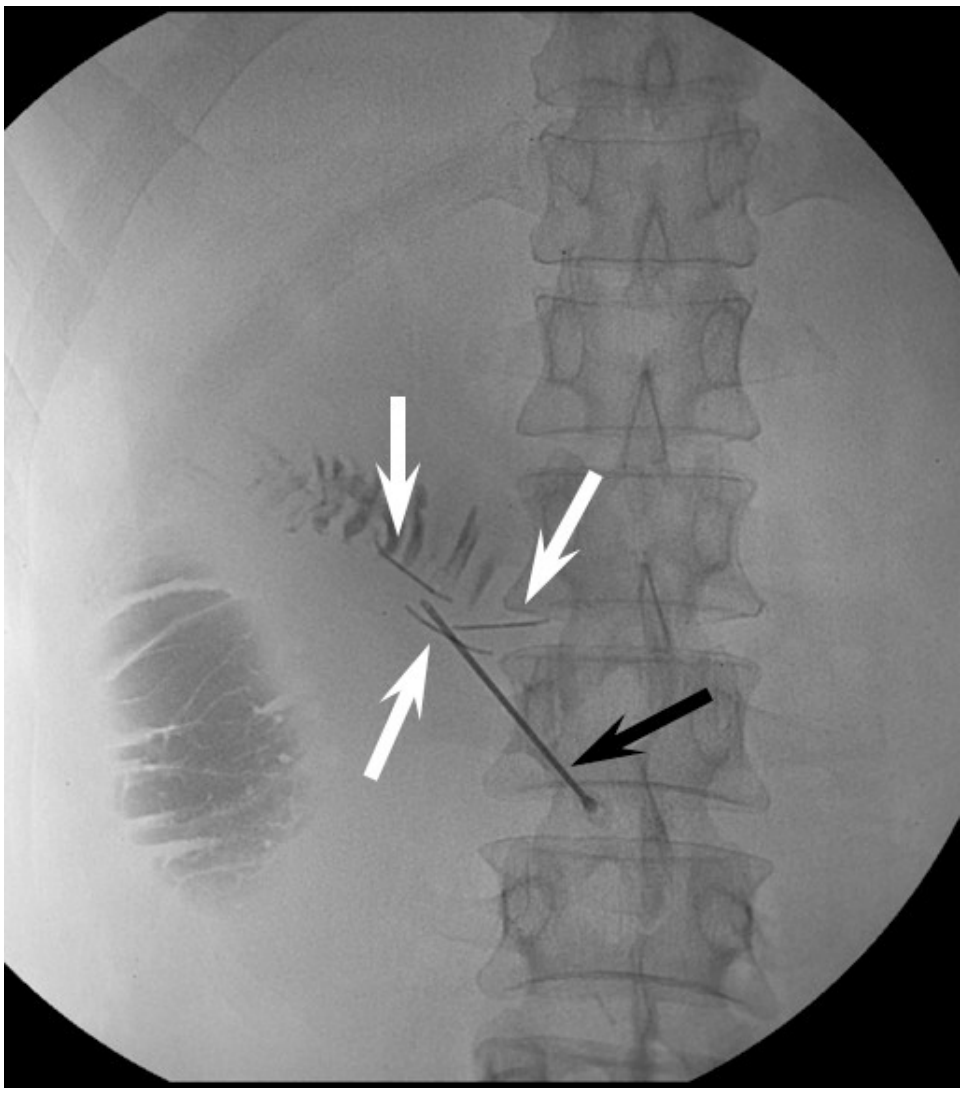
Figure legends

Figure 1.

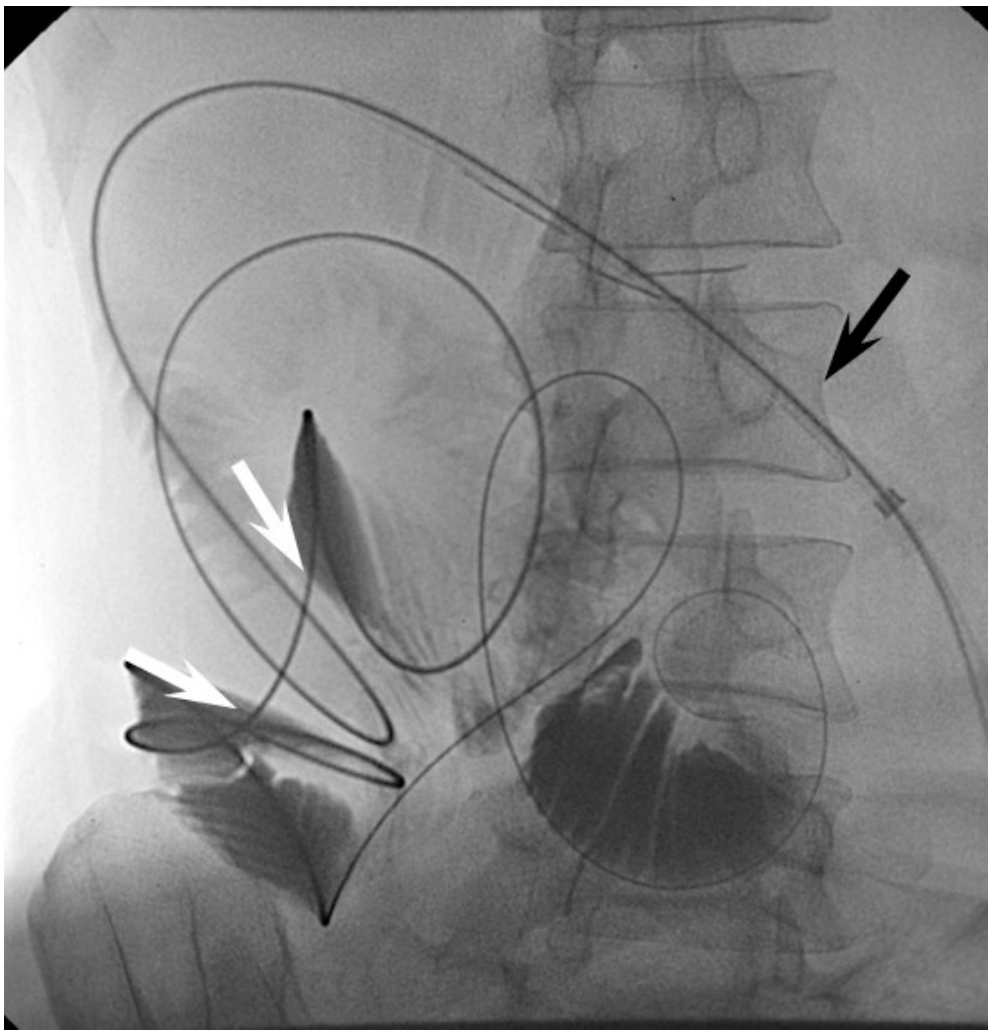
A 47-year-old man with malignant small bowel obstruction from advanced gastric cancer.



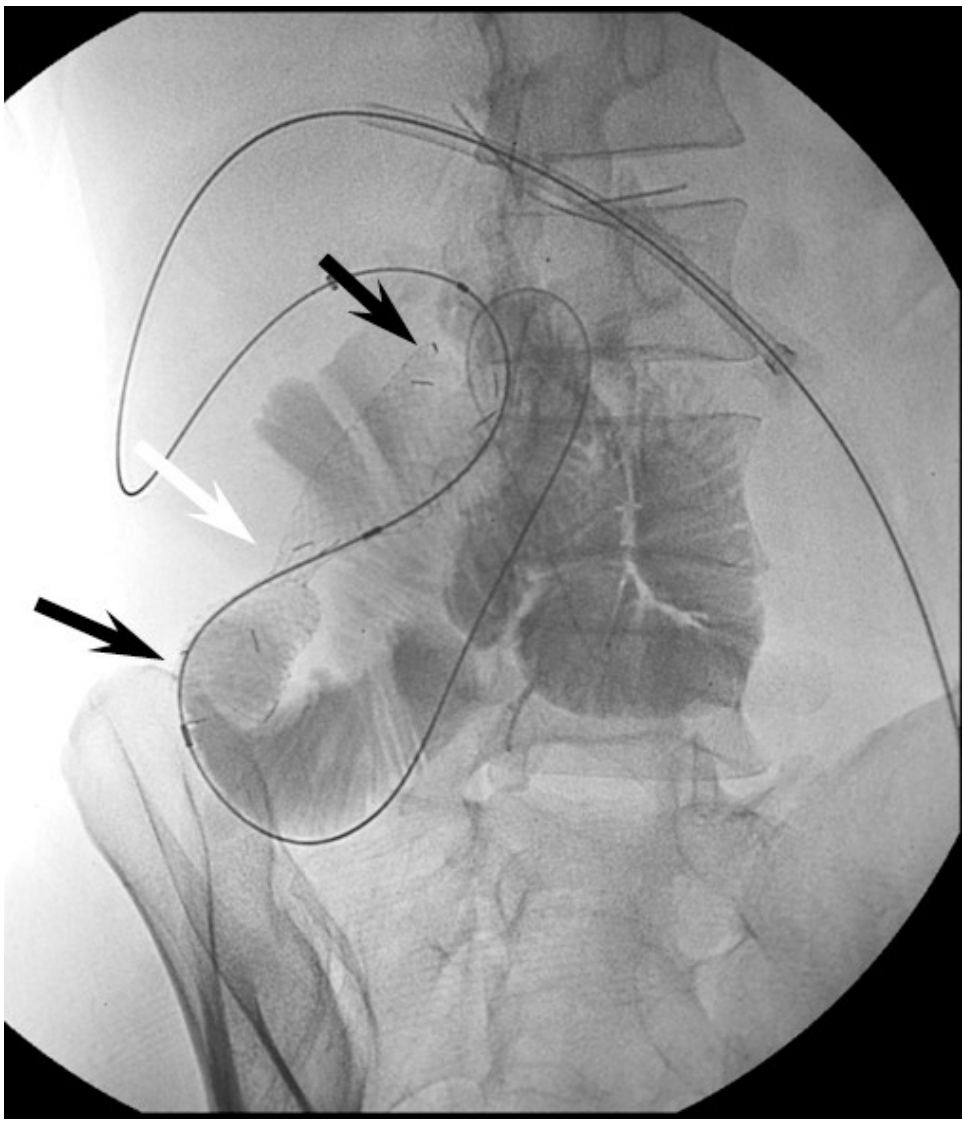
(A) A contrast enhanced CT coronal image shows a short segmental obstruction at distal jejunum (black arrows) with distension of upstream bowel (white arrows).



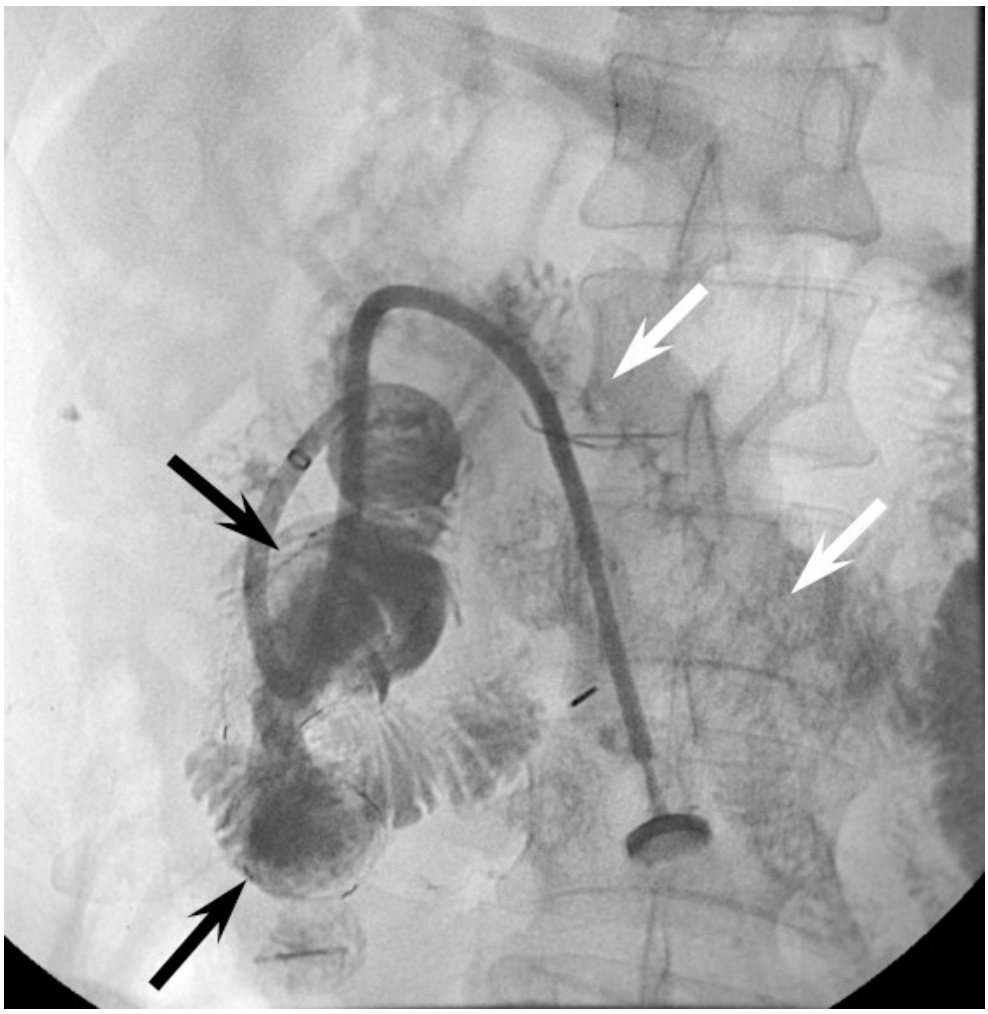
(B) A radiograph obtained during percutaneous jejunostomy. A distended bowel loop 30 cm upstream to the obstruction was selected for jejunostomy based on CT. After placement of three anchoring devices (white arrows), the distended jejunum was punctured with an 18-G needle (black arrow). A small amount of contrast confirmed intraluminal needle position.



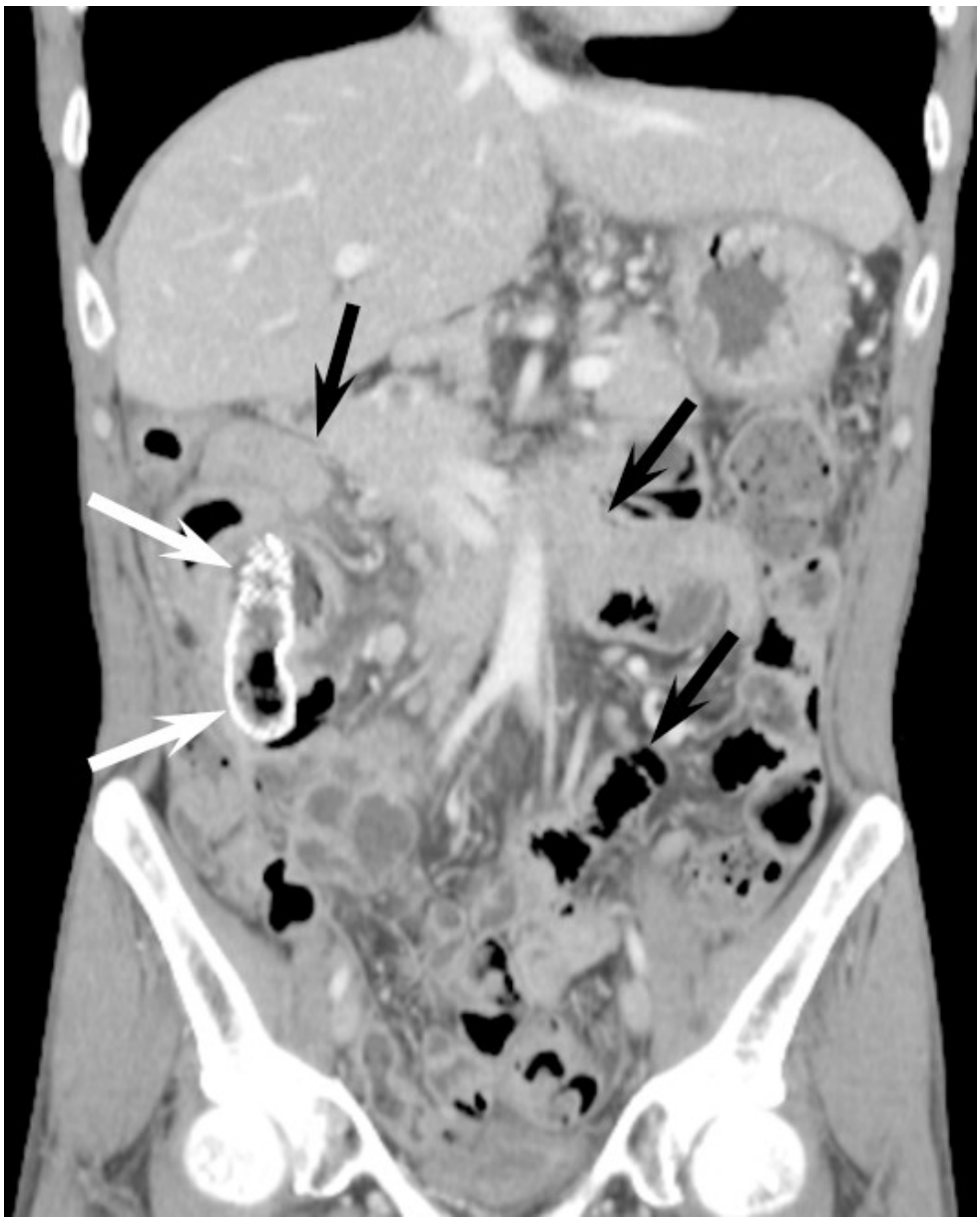
(C) A 0.035” guidewire and 5-F angiographic catheter was introduced through a vascular sheath (white arrow), and manipulated to cross the obstructed segment (white arrows).



(D) A self-expandable stent (18 mm in diameter and 10 cm in length) was placed to cover the obstruction (black arrows). Note short segmental waist of the stent by the obstruction (white arrow).



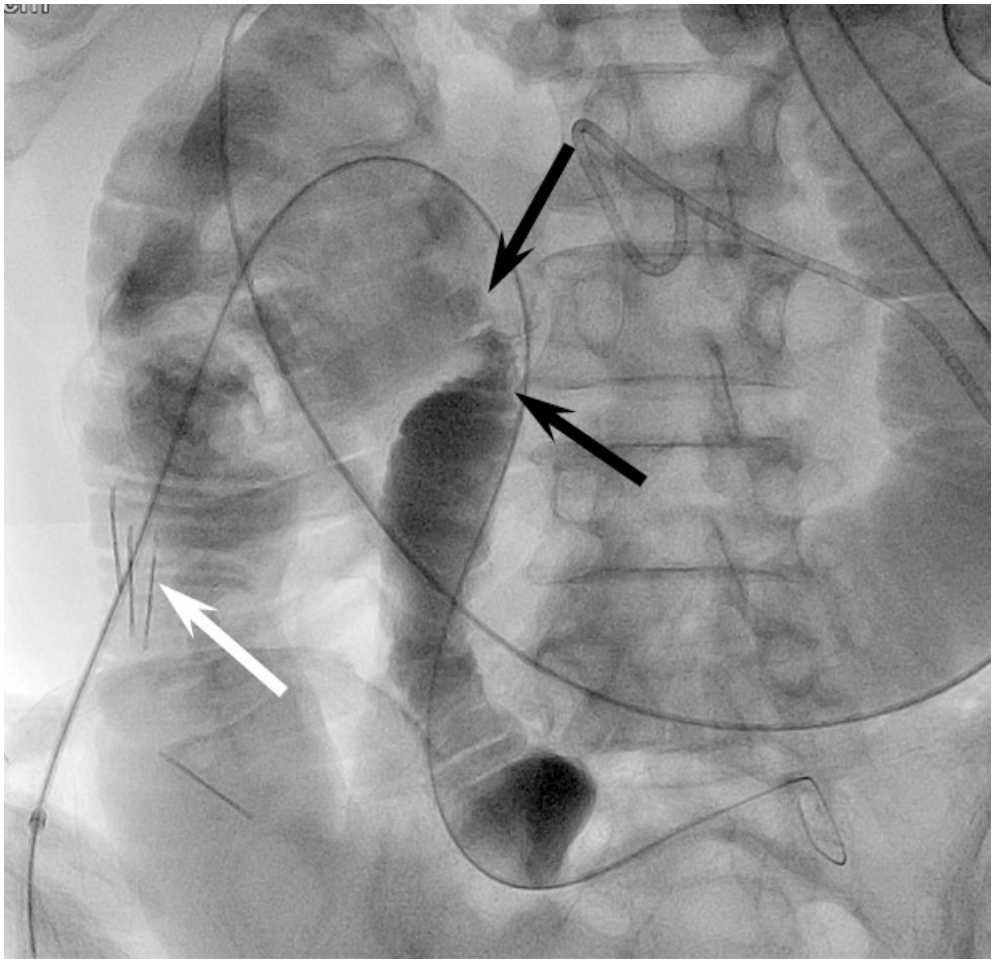
(E) An enterogram obtained 2 days after the stent placement shows patent contrast passage through near fully expanded stent (black arrows). Note decompressed upstream small bowel (white arrows).



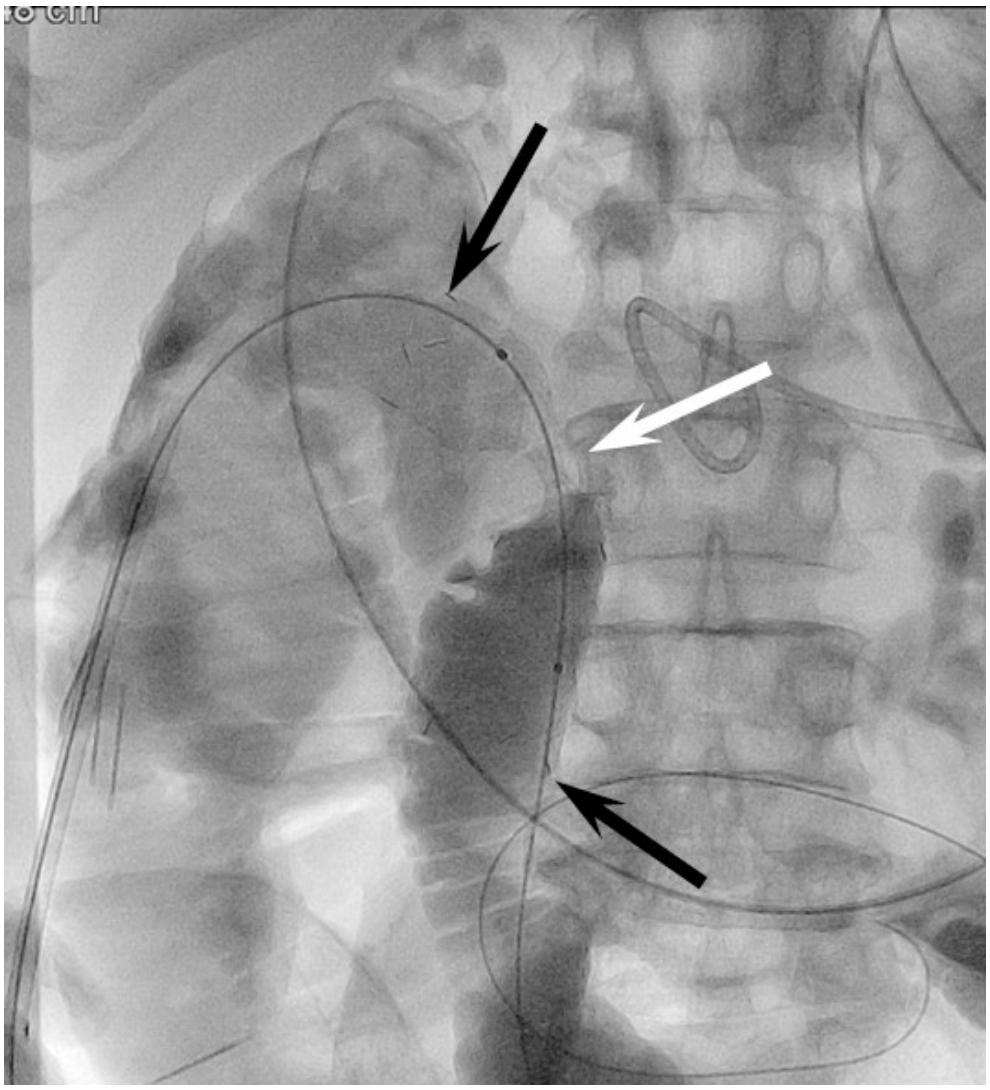
(F) A follow-up contrast enhanced CT obtained 2 months later shows patent stent (white arrows) with complete decompression of small bowel (black arrows).

Figure 2.

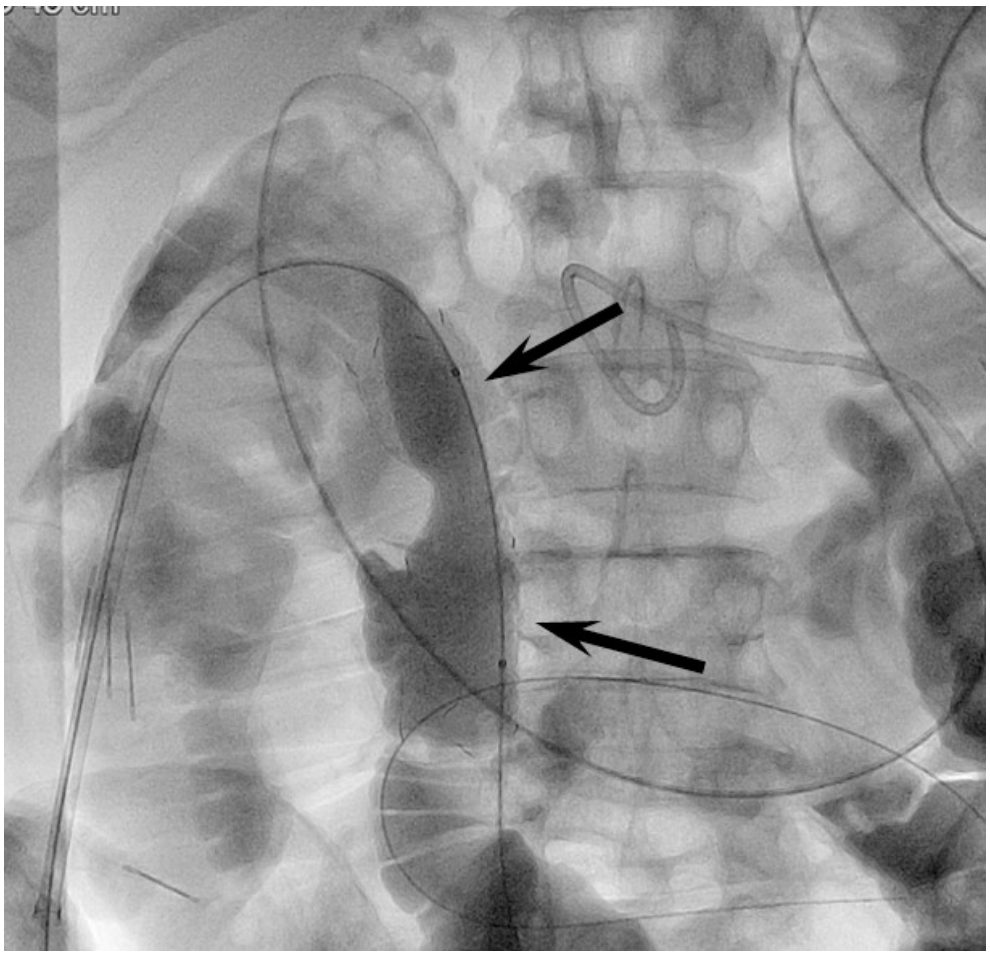
A 65-year-old man with malignant small bowel obstruction from esophageal cancer.



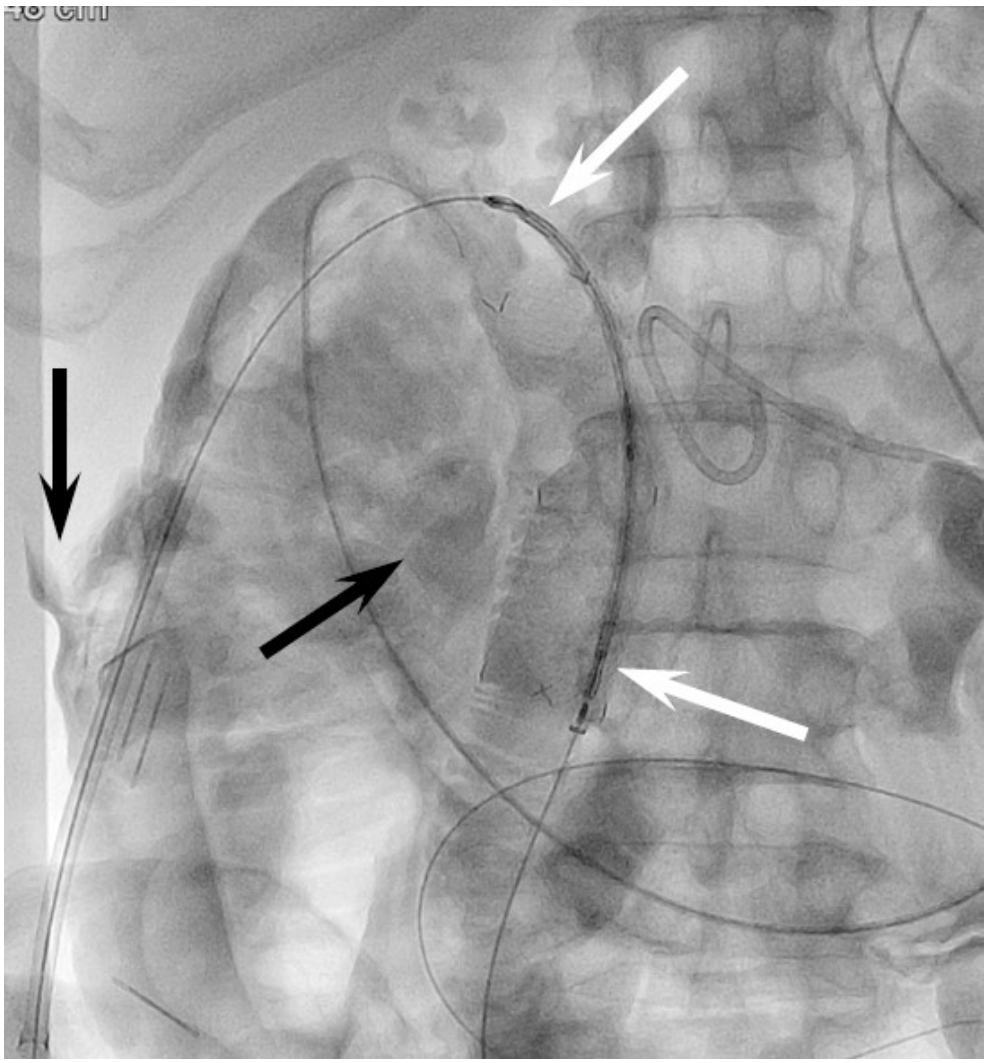
(A) A radiograph obtained during the procedure. After placement of three anchoring devices (white arrow), a 0.035" guidewire and 5-F angiographic catheter was manipulated to cross the short segmental obstruction (black arrows).

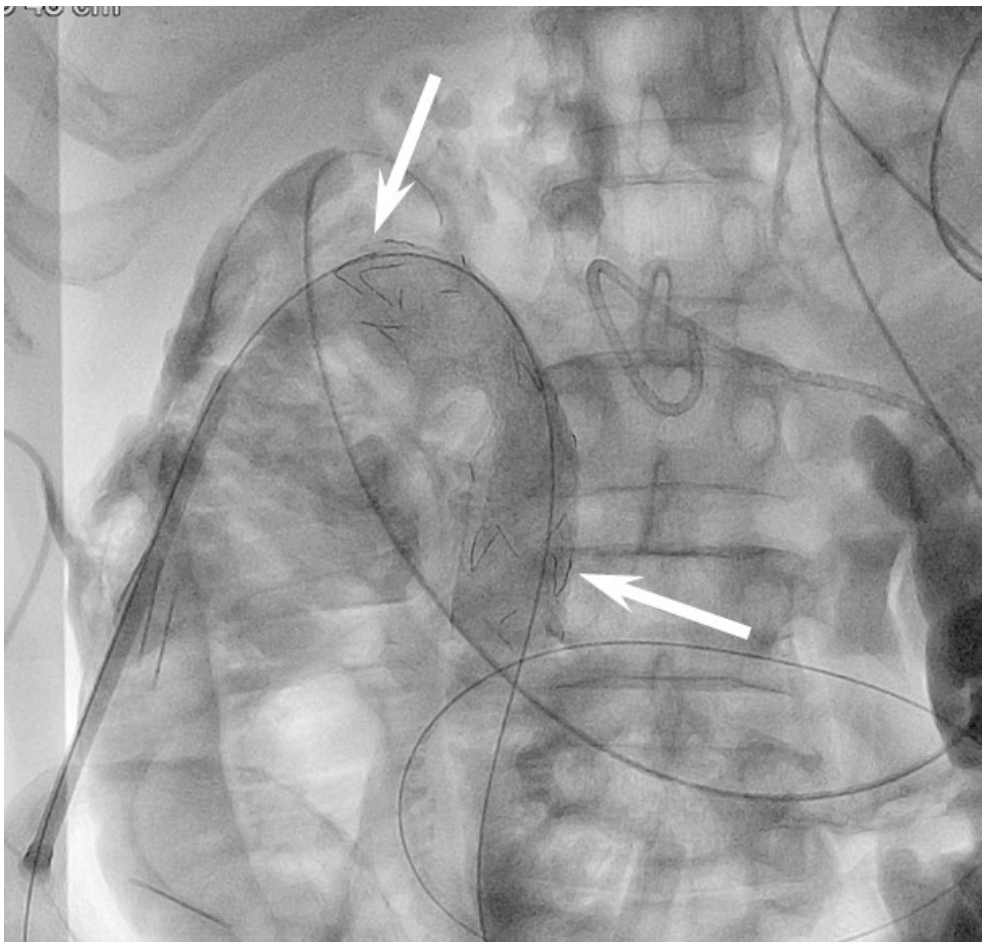


(B) A self-expandable stent (18 mm in diameter and 10 cm in length) was placed to cover the obstruction (black arrows). Note short segmental waist of the stent by the obstruction (white arrow).

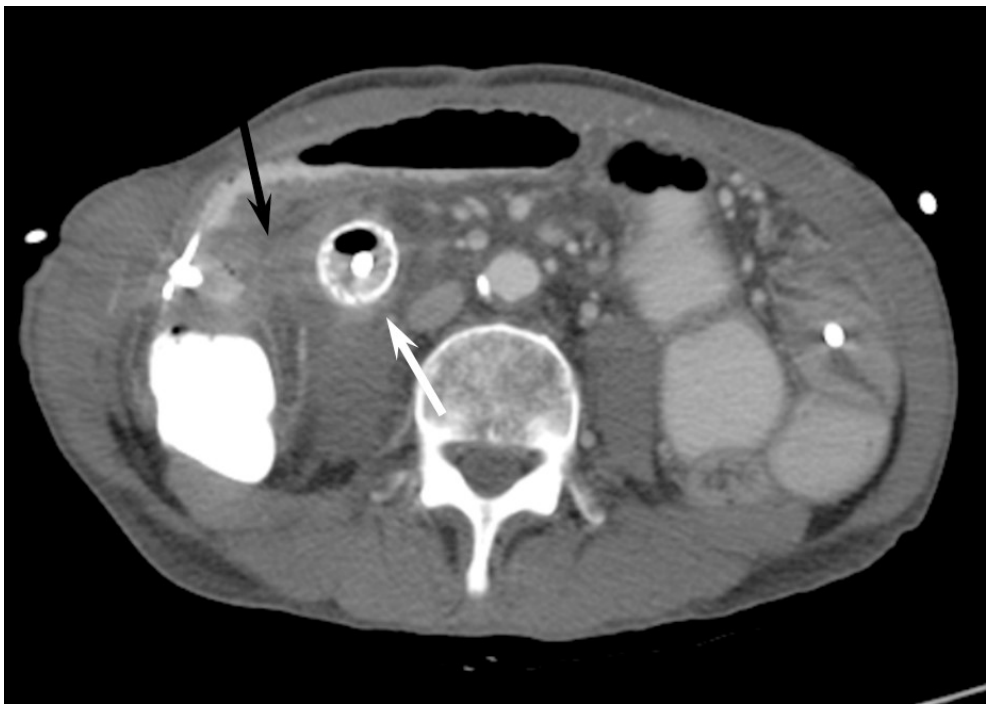


(C) The stent was dilated using a 14 mm balloon catheter (black arrows).





(D-E) Immediately after the balloon dilation, the contrast spillage into the peritoneal cavity around the stent and paracolic gutter was noted (black arrows in D). A self-expandable covered stent (18 mm in diameter and 10 cm in length) was placed coaxially into the previous stent (white arrows in D and E)



(F) A follow-up contrast enhanced CT obtained 2 days after the procedure shows near fully expanded stent (white arrow). Note no abnormal fluid collection around the stent. There was no clinical sign or symptoms of peritonitis.

논 문 초 록

목적: 악성 소장 폐쇄 (malignant small bowel obstruction)로 경공장 스텐트 설치술 (trans-jejunostomy stent placement) 을 받은 환자에서 임상적 효용성을 평가하고자 한다.

대상 및 방법: 2009 년 3 월부터 2016 년 12 월까지 악성 소장 폐쇄로 진단 받은 23 명의 환자를 대상으로 한다. 20 명은 한 군데, 3 명은 두 군데 소장 폐쇄가 있었다. 우선 악성 소장 폐쇄 부위의 30-100 cm 상방에 공장 창냄술을 시행했고, 직후 해당 창냄술 부위를 통해 스텐트 설치술을 시행했다. 기술적 성공 여부, 소장의 감압 여부, 장 폐쇄 증상 호전 (3 단계 평가) 및 식이 진행 여부 (4 단계 평가), 시술 부작용 여부에 대해 후향적 관찰 연구를 시행했다.

결과: 스텐트 설치술은 22 명의 환자에서 기술적으로 성공했다 (95.7%). 장 폐쇄 증상은 시술 2 주 후 부분 호전 (9 명) 혹은 완전 호전 (13 명) 되었다. 소장의 감압은 소장조영술 (21 명) 과 전산화단층촬영 (16 명) 에서 확인되었다. 식이 진행은 세 단계 (1 명), 두 단계 (7 명), 한 단계 (14 명) 호전되었다 ($P<0.0001$). 중등도 부작용은 3 명의 환자에서 발생했으며 (13.0%), 2 명의 환자에서 국소 복막염, 1 명의 환자에서 장 천공이 발생했고 보존적 치료 후에 호전되었다.

결론: 경공장 스텐트 설치술은 악성 소장 폐쇄 환자에서 높은 치료 효과를 보였다. 95.7%의 환자에서 기술적 성공을 보였으며, 이에 따른 임상 증상의 호전도 보였다. 시술 부작용은 드물지 않지만, 보존적 치료로 호전되었다.

주요어: 소장 폐쇄, 완화 의료, 감압, 공장 창냄술, 스텐트
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