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Enteral stenting for gastric outlet obstruction and afferent limb syndrome following pancreaticoduodenectomy

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Abstract

Background Obstruction of the afferent or efferent limbs of a gastrojejunal anastomosis is a potential complication after pancreaticoduodenectomy (PD) resulting in either gastric outlet obstruction or afferent limb syndrome. The use of self-expanding metal stents for the management of anastomotic strictures after resection of pancreatic cancer has not been well studied. We present four such cases and review published data regarding this population.

Methods Retrospective chart review and literature search. Outcomes were summarized with descriptive statistics.

Results At our institution, 4 patients underwent metal stent placement for gastrojejunal obstruction after PD for pancreatic cancer. Enteral stents were placed in two patients across the afferent limb, in one patient across the efferent limb, and in another patient across both limbs. Similar cases in the literature revealed that the anastomotic stricture was malignant in 26 of 27 cases. Clinical improvement occurred in 88%. Afferent limb syndrome was successfully treated in 5 of 6 cases. Median survival was 3.5 months after stent placement.

Conclusions Effective palliation of both gastric outlet obstruction and afferent limb syndrome after PD can be provided with enteral stenting. Gastrojejunal strictures after PD for pancreatic cancer are usually malignant with median survival of 3.5 months after stent placement.

Keywords Stent, pancreaticoduodenectomy, gastric outlet obstruction, afferent limb syndrome, pancreatic cancer

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Introduction

Obstruction of the afferent or efferent limbs of the gastrojejunal anastomosis is a recognized complication of pancreaticoduodenectomy (PD). Anastomotic obstruction results in either gastric outlet obstruction or afferent limb syndrome. Immediate postoperative obstruction is usually related to a technical error or edema, while late obstruction may be the result of malignancy, adhesions, radiation induced strictures, or internal hernias. Traditionally, obstruction has been managed surgically or with balloon dilation [1,2]. However, the development of self-expanding metal stents (SEMS) has provided a less invasive alternative. While studies have shown SEMS to be an effective treatment option in malignant gastric outlet obstruction [3], the use of SEMS for anastomotic strictures after resection of pancreatic cancer has not been studied.

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Conflict of Interest: None

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Methods

We report a case series of four patients who underwent enteral stenting of the afferent or efferent limb after PD for pancreatic cancer. The patients were identified through an endoscopy database and retrospective chart review. This study was approved by our institutional review board.

Similar reported cases of afferent or efferent limb stenting after PD for pancreatic cancer were identified through PubMed search using the terms: enteral stent, PD, pancreatic cancer, and gastric outlet obstruction. The results were summarized using descriptive statistics.

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Case series

Case 1

A 75-year-old man underwent PD for T3N1 pancreatic adenocarcinoma with negative margins. He developed recurrent disease and eleven months following resection, he developed inability to tolerate solid foods. Computed tomography (CT) scan revealed a dilated stomach consistent with gastric outlet obstruction. Upper endoscopy demonstrated a tight angulation at the efferent limb anastomosis (Fig. 1). An uncovered metal stent (27 mm × 60 mm, Evolution Duodenal Stent, Cook Medical, Bloomington, IN) was placed in the efferent limb and the patient was subsequently able to resume a regular diet. Positron emission tomography CT scan demonstrated malignant recurrence surrounding the stent (Fig. 2). Five weeks later, he developed recurrent vomiting. Repeat endoscopy revealed stent occlusion from tissue ingrowth and food debris. A second uncovered metal stent (22 mm × 90 mm, Boston Scientific WallFlex Duodenal Stent, Natick, MA) was placed within the existing stent with resolution of his symptoms. Four weeks later, the patient developed elevated total bilirubin 5.9 mg/dL, and alkaline phosphatase 488 U/L. An upper GI series demonstrated a patent efferent limb without opacification of the afferent limb, consistent with afferent limb syndrome. Esophagogastroduodenoscopy (EGD) revealed a strictured afferent limb and an uncovered metal stent (22 mm × 90 mm, Evolution Duodenal Stent, Cook Medical, Bloomington, IN) was placed (Fig. 3). The patient's bilirubin normalized after stent placement. Six weeks later, he developed bilious emesis. Endoscopic and fluoroscopic evaluation revealed a narrowing of the distal efferent limb stent followed by a 2 cm stricture immediately beyond the stent. A longer 22 mm × 120 mm stent (Evolution Duodenal Stent, Cook Medical, Bloomington, IN) was placed through the existing stents (Fig. 4). Despite chemotherapy, the patient developed omental metastases and an enlarging porta hepatis mass. The patient passed away 3 weeks after stent placement.

Case 2

A 58-year-old woman underwent PD for T3N0 pancreatic adenocarcinoma with negative margins. She developed recurrent disease and 21 months postoperatively she developed abdominal pain, and fevers. Her labs revealed an elevated WBC count of 12,000, total bilirubin 3.0 mg/dL, and alkaline phosphatase 658 U/L. CT scan demonstrated dilation of proximal small bowel concerning afferent limb obstruction, and blood cultures grew *Escherichia coli*. EGD revealed a strictured afferent limb and a 22 mm × 90 mm metal duodenal stent (Boston Scientific WallFlex Duodenal Stent, Natick, MA) was placed across the stricture with immediate flow of bilious fluid. The patient improved clinically and her bilirubinemia resolved. Ultimately, she developed progressive disease and died 6 months following stent placement.

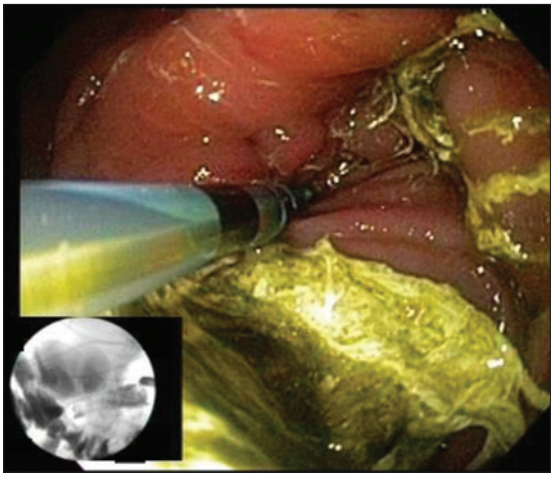


Figure 1 Tight angulation of the efferent limb of a gastrojejunal anastomosis. A catheter is successfully passed across the angulation

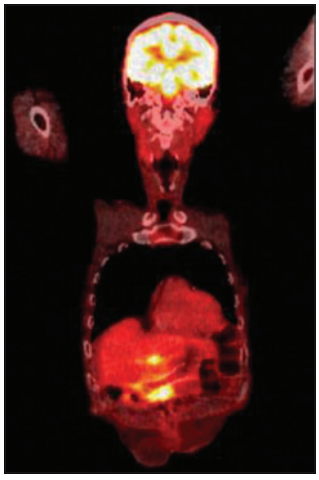


Figure 2 Positron emission tomography computed tomography scan demonstrating malignant recurrence surrounding an efferent limb stent

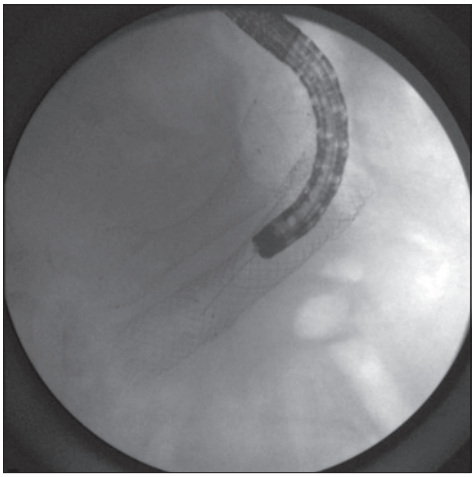


Figure 3 Fluoroscopy image demonstrating placement of an afferent limb stent alongside an efferent limb stent in a patient with both afferent and efferent limb obstruction

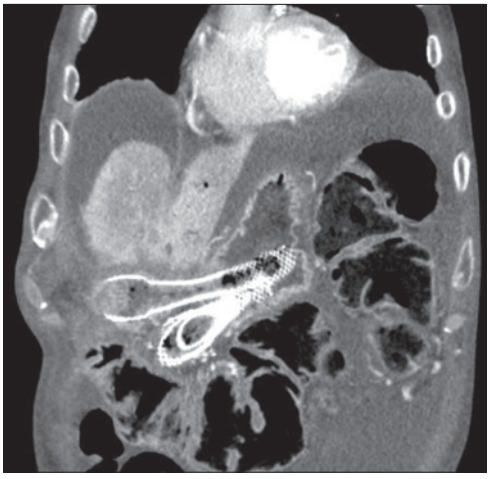


Figure 4 A metal stent in the afferent limb and three metal stents in the efferent limb in a patient with afferent loop syndrome and recurrent malignant obstruction of the efferent limb

Case 3

A 68-year-old woman with T3N1 pancreatic adenocarcinoma presented with progressive vomiting 10 months after PD with positive margins. An upper GI series showed a tight angulation at the efferent limb with minimal passage of contrast. Upper endoscopy was performed and 1000 mL of bilious fluid was aspirated from her stomach. The efferent limb was narrowed and a 22 mm × 90 mm metal stent (Boston Scientific WallFlex, Natick, MA) was deployed successfully. Shortly after deployment, the stent migrated into the stomach likely secondary to the acute angulation of the efferent limb. Repeat endoscopy was performed and a 22 mm × 90 mm uncovered metal stent with dual flares (Evolution Duodenal Stent, Cook Medical, Bloomington, IN) was placed with two hemoclips anchoring the intragastric portion of the stent to prevent migration. The stent remained in good position and the patient experienced symptomatic improvement. She subsequently demonstrated progressive disease with malignant ascites and expired 3 weeks later.

Case 4

A 47-year-old man underwent PD with negative margins for T3N1 pancreatic adenocarcinoma. Shortly thereafter, he developed vomiting and upper GI series demonstrated delayed opacification of the efferent limb. Upper endoscopy revealed 400 mL of bilious fluid in the stomach and an anastomotic stricture of the efferent limb which extended 40 mm. A 22 mm x 60 mm uncovered metal stent (Evolution Duodenal Stent, Cook Medical, Bloomington, IN) was successfully placed allowing him to tolerate a regular diet. He later developed progressive ascites, peritoneal carcinomatosis with biliary dilation and died three months after stent placement.

Results

A literature search for cases of afferent or efferent limb obstruction after pancreatic surgery for pancreatic cancer treated with enteral stent identified an additional 24 cases to our 4 cases. 16 patients underwent PD and 12 patients underwent palliative gastrojejunostomy. 24 patients received efferent limb stents and 8 patients received afferent limb stents (one patient received 2 stents and another from this case series received 4 stents). The etiology of obstruction was malignant in 26 of 27 patients. Stent placement was successful in 100% of cases and the rate of clinical improvement was 88% (22 of 25 patients). A variety of stents were utilized (Table 1) with the Wallstent (Boston Scientific, Natick, Massachusetts) as the most commonly utilized stent (8 patients). The median survival after enteral stent placement was 3.5 months.

Discussion

Late obstruction of the afferent or efferent limbs after PD for pancreatic cancer is often secondary to disease recurrence. Such obstruction impairs quality of life and generally represents a pre-terminal event. Less commonly, adhesions and radiation enteropathy may contribute. Palliative gastrojejunostomy in patients with pancreatic cancer is associated with a high 30-day mortality [4] and reoperation for anastomotic strictures likely carries a similarly high complication rate. A less invasive endoscopic approach is therefore attractive in a patient population with limited survival.

Review of published cases in the literature reveals that the etiology of anastomotic obstruction was malignant in 26 of 27 cases (Table 1). Among our cases, malignant recurrence was not evident endoscopically. Instead, acute angulation at the stricture was the most common finding, seen in half of our cases. Despite the absence of endoscopic evidence of malignancy, all of our patients demonstrated evidence of disease recurrence on imaging either at the time of endoscopy or shortly after and none survived more than 6 months after stent placement. The median survival among pancreatic cancer patients with anastomotic strictures was 3.5 months.

Stenting of anastomotic strictures after PD or palliative gastrojejunostomy for pancreatic cancer was technically successful in all cases. Clinical improvement was observed in 88% of patients (22 of 25 cases), which is consistent with rates of improvement seen in other case series of stenting for malignant gastric outlet obstruction [5]. Obstruction of the efferent limb was more common than afferent limb obstruction (24 efferent versus 8 afferent limb stents). Enteral stent management of afferent loop syndrome was successful in 5 of 6 cases. The single unsuccessful case was performed during early years of enteral stenting where the stent utilized was smaller in diameter than most enteral stents currently in use [6].

It is technically feasible to concurrently place enteral stents in both the afferent and efferent limbs without compromising the patency of either stent. We report the second case of

Table 1 Summary of published cases of anastomotic strictures managed with stents after pancreaticoduodenectomy or gastrojejunostomy for pancreatic cancer

Author year	#	Age sex	Surg	Stent location	Stricture	Stent	Improve	Survival
Kozarek [6], 1992	1	NA	PD	Afferent	Cancer	Z stent	No	3 mo
Binkert [10], 1996	1	30M	GJ	Efferent	Cancer	Wallstent	Yes	5 mo
Nevitt [11], 1998	1	77F	GJ	Efferent	Cancer	Z stent	No	5 mo
Soetikno [12], 1998	1	57M	GJ	Efferent	Cancer	Wallstent	Yes	2 mo
Adler [7], 2002	1	NA	GJ	Afferent Efferent	Cancer	Wallstent	N/A	N/A
Ely [13], 2003	1	NA	PD	Efferent	Cancer	Wallstent	Yes	2 mo
Fiocca [14], 2006	4	NA	GJ	Efferent	Cancer	Wallstent	Yes	N/A
Maetani [15], 2006	2	NA	PD	Efferent	Cancer	Niti-S	N/A	N/A
Stawowy [16], 2007	1	54	GJ	Efferent	Cancer	N/A	Yes	2 mo
Lopes [17], 2008	2	NA	GJ	Efferent	Cancer	N/A	N/A	N/A
Gutzeit [18], 2009	1	30M	PD	Efferent	Cancer	Wallstent	Yes	5 mo
Akaraviputh [19], 2010	1	60M	PD	Afferent	Cancer	Wallstent	Yes	>6 mo
Kim [20], 2011	2	52F 62F	PD PD	Afferent Afferent	Cancer Cancer	Hanaro Niti-S	Yes Yes	N/A N/A
Pannala [2], 2011	4	NA	PD	1Afferent 3Efferent	Cancer	Wallstent	Yes	N/A
Tol [8], 2012	1	NA	PD	Efferent	Adhesion	Hanaro	Yes	>10 mo
Current Series	4	68F 47M 58F 75M	PD PD PD PD	Efferent Efferent Efferent Aff/Eff×3	Cancer Cancer Cancer Cancer	Evolution Evoluion Wallflex Evolution	Yes Yes Yes Yes	3 wk 3 mo 6 mo 5 mo
Totals	28	55.8 yrs	16 PD 12 GJ	8 Aff 24 Eff	26/27 Cancer		22/25 Yes	3.5 mo median

#, number of patients; GJ, gastrojejunostomy; PD, pancreaticoduodenectomy; yrs, years; mo, months; wk, weeks
Survival is after stent placement; Z stent - Wilson Cook, Wallstent - Boston Scientific, Hanaro stent - M.I. Tech, Evolution - Cook Medical, Niti-S - Taewoong Medical

concurrent afferent and efferent stents after pancreatic cancer surgery [7]. Our patient required three efferent limb stents for recurrent malignant obstruction along with an afferent limb stent. This case also demonstrates that recurrent obstruction can be managed with progressively longer stents.

Few complications were reported in the literature. The main complication is stent migration. We reported one patient with proximal migration of the stent into the stomach. A subsequent attempt utilized two hemoclips to anchor a dual flanged stent. There was one reported case of stent migration into the terminal ileum in the only patient with a benign stricture [8]. There were no cases of perforation, bleeding, or death. Potential complications of enteral stent placement include bleeding, tumor ingrowth/overgrowth, fistulas, and obstruction [9]. These complications can usually be managed endoscopically, often with placement of a second stent. We recommend uncovered, dual flanged stents to minimize risk of stent migration. Shorter stents (40 or 60 mm) are preferable if the stricture is not long so as to reduce trauma to the contralateral wall.

In conclusion, the development of an anastomotic stricture after PD for pancreatic cancer is usually malignant and carries a poor prognosis. Palliation of both gastric outlet obstruction and afferent limb syndrome can be provided with endoscopic placement of enteral stents.

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