

## Management of afferent loop obstruction from recurrent metastatic pancreatic cancer using a venting gastrojejunostomy

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**Key words:** Afferent loop; Cholangitis; Pancreatic cancer; Biliary obstruction; Gastrojejunostomy

**Core tip:** Complications from recurrent pancreatic cancer can result in afferent loop obstruction. This leads to stasis of the biliary, intestinal and pancreatic secretions. We present here a unique approach to manage afferent loop obstruction caused by recurrent peritoneal metastases from pancreatic cancer. The patient underwent decompression of the afferent limb as well as the biliary tree using a venting gastrojejunostomy to the blind loop. This represents a novel surgical approach for management of this complicated and difficult problem.

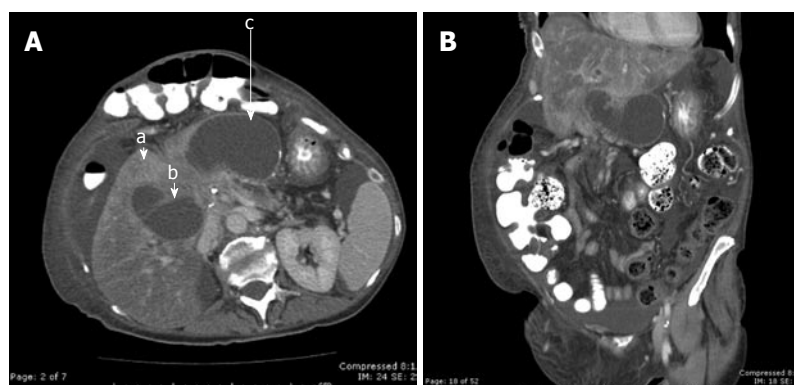
### Abstract

Pancreatic cancer is an aggressive malignancy potentially curable with surgical intervention. Following pancreaticoduodenectomy for suspected pancreatic head malignancy, patients have a high risk for both immediate and delayed problems due to surgical complications and recurrent disease. We report here a patient with pancreatic cancer treated with pancreaticoduodenectomy who developed recurrent disease resulting in obstruction of the afferent limb. The patient developed biliary obstruction and cholangitis at presentation. Her biliary tree failed to dilate which precluded safe percutaneous biliary decompression. During surgical exploration, she was found to have a dilated afferent limb at the level of the transverse mesocolon. The patient underwent decompression of the afferent limb as well as the biliary tree using a venting gastrojejunostomy to the blind loop. This represents a novel surgical approach for management of this complicated and difficult problem.

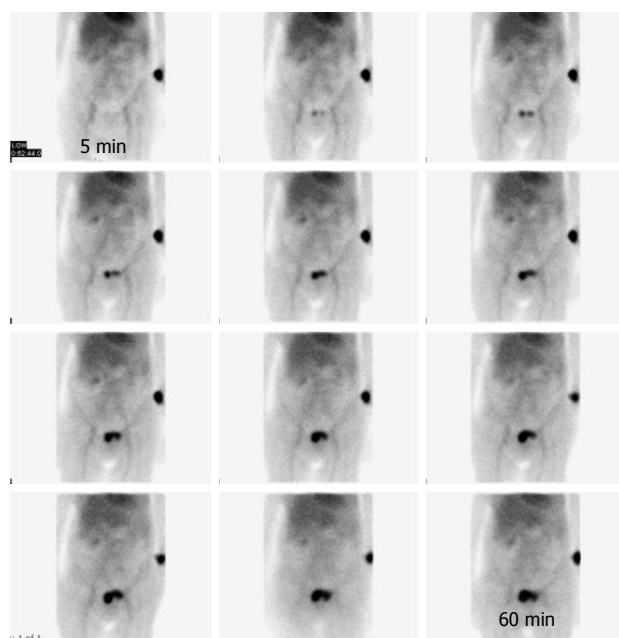
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### INTRODUCTION

Pancreatic cancer is the fourth leading cause of cancer in the United States<sup>[1]</sup>. Pancreaticoduodenectomy (Whipple procedure) remains a mainstay of treatment for resectable pancreatic head malignancy. Unfortunately, the incidence of recurrent disease remains high with frequent peritoneal metastases<sup>[1-3]</sup>. Complications from recurrent disease range from bowel obstruction, pancreatitis, sepsis, and cholangitis due to biliary obstruction<sup>[2-4]</sup>. A unique type



**Figure 1** Computed tomography horizontal image. A: Dilated jejunal Roux limb in the right upper quadrant. No evidence of biliary dilatation was evident of the computed tomography scan. Furthermore, the liver parenchyma showed evidence of hepatic steatosis. There is also the presence of a large incisional hernia in the anterior abdominal wall. Arrow a points to an intrahepatic metastasis from cancer. Arrow b points to the dilated Roux limb prior to the obstruction at the level of the mesentery of the colon. Arrow c points to the proximal portion of the dilated Roux limb that was close to the stomach used for the venting gastrojejunostomy; B: The close proximity of the stomach to the dilated Roux limb.



**Figure 2** Hepatobiliary iminodiacetic acid scan showing delayed uptake of the liver up to 60 min after administration of radiotracer. The cause of the delayed uptake likely reflects long term liver dysfunction and likely contributed to the inability of the biliary tree to dilate in a prompt fashion.

of obstruction occurs at the retrocolic jejunal limb of the afferent loop which can lead to stasis of the biliary, intestinal and pancreatic secretions<sup>[3-6]</sup>. We present here a case of afferent loop obstruction caused by recurrent peritoneal metastases from pancreatic cancer.

## CASE REPORT

The patient was a 70-year-old Caucasian female who first presented with painless jaundice leading to the diagnosis of pancreatic cancer. The patient underwent a pancreaticoduodenectomy at an outside institution for management of her condition followed by adjuvant chemotherapy and radiation. The patient required another operation a year later due to an episode of small bowel

obstruction, complicated with postoperative development of a small enterocutaneous fistula along with a large ventral hernia. She then presented to our hospital 2 years from her pancreaticoduodenectomy procedure with new onset abdominal pain along with jaundice. The patient had evidence of cholangitis with fevers, chills, leukocytosis of 21700/mm<sup>3</sup> and a bilirubin level of 16.0 mg/dL. Preoperative imaging, including a computed tomographic scan, showed severely dilated afferent limb in the right upper quadrant (Figure 1). A cholescintigraphy (DISIDA) scan showed poor visualization of the liver even 2.5 h after isotope injection suggesting intrinsic liver dysfunction (Figure 2). Her case was complicated by the lack of significant biliary dilatation precluding the use of interventional radiology techniques to percutaneously manage her cholangitis. Therefore, the patient underwent surgical exploration for management of her afferent loop obstruction. Intraoperative findings showed the obstruction to be secondary to a tight stricture at the jejunal limb as it traversed the mesentery of the colon. Biopsy of the area confirmed peritoneal recurrence from pancreatic cancer. The presence of the small enterocutaneous fistula at the level of mid-jejunum precluded the use of another small bowel loop for Roux-en-Y reconstruction. Because of the proximity of the stomach to the dilated afferent limb, we employed a primary anastomosis between the dilated afferent limb and the lesser curvature of the stomach as a venting gastrojejunostomy. The patient also had primary repair of her incisional hernia without the use of a mesh. She recovered uneventfully from surgery and was discharged from the hospital to rehabilitation center following 10 d. Her bilirubin level slowly improved and tapered off to a level of 4.1 mg/dL about 35 d postoperatively. The patient eventually succumbed to her metastatic pancreatic cancer 4 mo later.

## DISCUSSION

Complications from advanced pancreatic cancer remain common. After pancreaticoduodenectomy for resect-

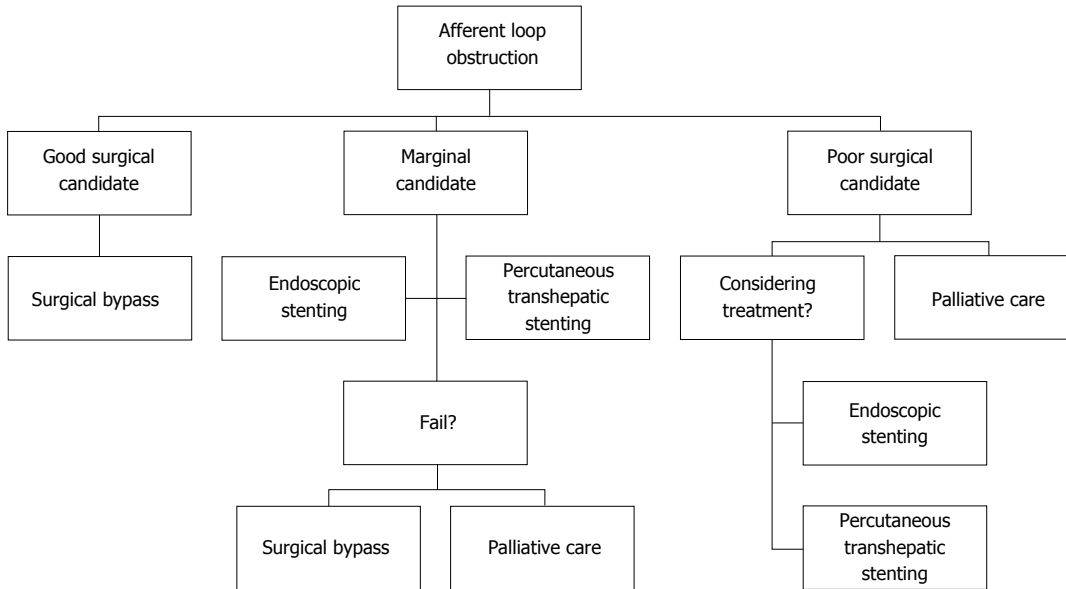


Figure 3 Management algorithm for afferent loop obstruction following pancreaticoduodenectomy.

able pancreatic cancer, patients present with substantial morbidity following chemotherapy and radiation along with the effects of recurrent pancreatic cancer<sup>[1,2]</sup>. Jacobs *et al*<sup>[3]</sup> noted that even long term survivors of pancreatic cancer develop multiple complications including infection, diabetes, depression, bowel obstruction and other malignancies<sup>[4]</sup>. Although not well described until more recently, the incidence of afferent loop syndrome developing in a cohort of patients after pancreaticoduodenectomy may be as high as 13%, as described by Pannala *et al*<sup>[5]</sup> from Virginia Mason Medical Center. The occurrence of this uncommon condition has been well described in the literature following gastrectomy with Bill-roth II reconstruction, with an incidence of 0.5%-2%<sup>[6]</sup>.

Clinical and radiographic presentations associated with this condition have been separated into acute and chronic afferent loop obstruction<sup>[6-11]</sup>. Acute and chronic afferent loop syndromes differ by the timing of presentation with the acute afferent loop syndrome more often in the postoperative period and the chronic type presenting years later<sup>[6-11]</sup>. The first case of afferent loop syndrome was described by McNealy *et al*<sup>[12]</sup> in 1942 as a cause of early postoperative duodenal stump leak. Roux *et al*<sup>[12]</sup> eventually coined the terms afferent loop syndrome in 1950.

Pancreaticoduodenectomy employs a roux limb of jejunum for reconstruction of the pancreatic and biliary drainage. Since the reconstruction following a pancreaticoduodenectomy employs an afferent limb for drainage of the bile, pancreatic and proximal intestinal secretions, it is functionally similar and also frequently termed afferent loop obstruction in the literature when obstructed<sup>[11]</sup>. However, the etiology, clinical presentation, and management options can vary from those following gastric surgeries.

The presentation of a roux limb obstruction is associated with high rates of morbidity and mortality<sup>[7,8]</sup>.

Patients are frequently malnourished due to long standing history of underlying malignancy. The most common presenting symptom following pancreaticoduodenectomy is cholangitis at 50% followed by nausea and abdominal pain<sup>[5]</sup>. The presentation is different from those following gastric surgeries, which is exemplified by bilious vomiting for chronic afferent loop obstruction. Complicating the presentation is that patients with pancreatic cancer frequently have a poor long term prognosis which frequently leads to a minimalist approach for management of these patients.

Prior to the introduction of endoscopic and percutaneous techniques, initial management options for afferent loop obstruction were first centered on surgical approaches. However, surgical approaches are limited due to the location of the Roux limb, which is through the mesentery of the colon. Resection of the obstructed afferent loop is a poor choice because of the necessity for reconstruction of both the pancreatic and biliary anastomoses. In addition, an *in situ* jejuno-jejunal bypass at the obstructed site is not feasible because of the vascular anatomy. Therefore, the most common approaches described in the literature involved the use of another jejunal Roux limb to decompress the dilated afferent loop<sup>[7,8,13]</sup>. Recently, advances in endoscopic and percutaneous techniques have been described in the literature to offer options for management of these patients<sup>[14-19]</sup>. More commonly, biliary decompression by interventional radiology manages to treat the acute cholangitis seen in these patients<sup>[15-17]</sup>. In addition, successful endoscopic stenting with dual stents of the stenotic segment avoids external drains and its associated long term problems<sup>[17,19]</sup>. Even transgastric drainage endoscopically has been reported recently<sup>[18]</sup>. Unfortunately, long term survival is usually unaffected regardless of the approach employed for salvage of this situation. As shown in Figure 3, we provided an algorithm for the management of

these patients based on their medical co-morbidities.

The case presented here is a long term complication following pancreaticoduodenectomy, frequently seen for recurrent disease<sup>[5]</sup>. In the case described here, our patient presented several unique challenges precluding the use of conservative and traditional surgical approaches. Our patient lacked biliary dilatation on the CT imaging which precluded the use of interventional radiology as a means for biliary decompression. Furthermore, the presence of enterocutaneous fistula, albeit small, made another Roux limb not feasible during surgery due to the lost of additional length of small bowel following resection and reconstruction. Our approach for performing a venting gastrojejunostomy was an idea developing following preoperative imaging review and surgical planning. The dilated jejunal Roux limb was in close proximity of the stomach making the anastomosis rather straight forward. Our goal of extending the life of our patient was also accomplished without significant post-operative morbidity. The patient lived approximately 4 mo postoperatively, which is consistent with the historically described outcome for this disease.

In summary, recurrent pancreatic cancer is associated with a poor prognosis. Afferent loop syndrome is a known complication from recurrent pancreatic cancer, with the classic radiographic presentations of a dilated small bowel loop and clinical evidence of cholangitis due to failure of biliary excretion. Early recognition of this serious condition, due to the ascending cholangitis, can lead to prompt management. Management options are evolving with improved endoscopic techniques and percutaneous options. However, surgery remains a viable option in appropriate candidates to establish a lasting decompression of the dilated Roux limb.

## COMMENTS

### Case characteristics

Afferent loop syndrome is a known complication from recurrent pancreatic cancer, with the classic radiographic presentations of a dilated small bowel loop and clinical evidence of cholangitis due to failure of biliary excretion.

### Clinical diagnosis

A unique type of biliary obstruction following pancreaticoduodenectomy occurs at the retrocolic jejunal limb of the afferent loop, leading to stasis of the biliary, intestinal and pancreatic secretions.

### Differential diagnosis

Complications from recurrent pancreatic cancer range from bowel obstruction, pancreatitis, sepsis, and cholangitis due to biliary obstruction.

### Laboratory diagnosis

Patients typically have evidence of cholangitis with fevers, chills, leukocytosis and hyperbilirubinemia.

### Imaging diagnosis

Radiographic imaging using a computed tomographic scan typically shows a severely dilated afferent limb in the right upper quadrant.

### Treatment

Management of afferent loop syndrome has traditionally relied on surgical approaches using another jejunal Roux limb. However, recent advances in endoscopic and percutaneous techniques have been described in the literature to offer other options for management of these patients.

### Experiences and lessons

Early recognition of afferent loop syndrome can lead to prompt management

using endoscopic, percutaneous, or surgical techniques to decompress the dilated Roux limb.

### Peer review

The manuscript is well-written, concise and easy to comprehend. Venting Gastrojejunostomy for recurrent pancreatic cancer has not been described before.

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