

Laparoscopy in Afferent Loop Obstruction Presenting as Acute Pancreatitis

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ABSTRACT

Background: We describe an afferent loop obstruction caused by an adhesion band in a case of distal gastrectomy with Roux-en-Y end-to-side jejunal anastomosis for cancer.

Methods: An initial clinical presentation of acute pancreatitis was ruled out by a computed tomography scan, which revealed intestinal obstruction; it was then confirmed on laparoscopy. Definitive treatment was laparoscopic adhesiolysis. A complete review of the literature concerning afferent loop obstructions is presented.

Results: The treatment was successful, with minimal post-operative pain, and the 5-day hospital stay was uncomplicated. The patient remains asymptomatic at 1-year follow-up.

Conclusions: The authors advocate minimally invasive surgery as a complete diagnostic and therapeutic alternative to emergency laparotomy in cases where afferent loop syndrome is suspected, and acknowledge that prompt surgery has a higher rate of success and reduces operative morbidity and mortality.

Key Words: Afferent loop obstruction, Acute pancreatitis, Laparoscopy, Surgery.

INTRODUCTION

Acute obstruction of an afferent loop (AALO) is an uncommon event, difficult to diagnose clinically. It is usually described as a consequence of Billroth II (BII) reconstructions after gastrectomy, but might also appear in Roux-en-Y gastrectomies, gastric bypasses, biliary diversions, and even in some internal hernias that resemble a functional blind loop.¹⁻³ In our discussion, we will refer to the duodenal branch of the Roux-en-Y as the "afferent loop," as in this case, the functional consequences are similar to those brought about by an afferent loop syndrome in a BII gastrojejunostomy.

Symptoms are often quite divergent from the biochemical and radiological findings, and misdiagnosis can lead to rapid worsening and sudden death of the patient. The conventional management offered in acute pancreatitis (AP), biliary dilatation or pancreatic pseudocysts is not only ineffective but also harmful in afferent loop obstruction.

In this report, we describe a case of AALO in a Caucasian woman, presenting 1 year after subtotal gastrectomy with Roux-en-Y reconstruction for early gastric cancer. She complained of abdominal pain, with clinical presentation, biochemistry, and roentgenograms mimicking AP. This report highlights laparoscopy as a valuable tool in the surgical management of AALO.

CASE REPORT

Our patient was a 54-year-old female who had undergone a distal gastrectomy for early gastric cancer a year earlier. As per our department protocol then, her surgery comprised a 4/5 distal gastrectomy with D2 lymphectomy extending to the hepatic pedicle, Roux-en-Y gastrojejunostomy and prophylactic cholecystectomy through a transverse bilateral subcostal incision. No recurrence was found at the follow-up visits until a few days before the present admission.

The patient was transferred to our ward from a nearby hospital where she had presented with epigastric colicky pain, elevated serum amylase level, and an ultrasound (US) scan showing slight edema of the pancreatic head.

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She was treated there for acute pancreatitis for 2 days with a regimen that included fasting, nasogastric suction, antibiotics, and crystalloids.

In our ward, she complained of severe epigastric pain, nausea, a sense of fullness without vomiting, and had low-grade fever. Abdominal examination was remarkable for epigastric and mesogastric tenderness with a discernible elastic mass with localized rebound in the epi-mesogastric area, creating a visible (due to the slimness of the subject) bulging towards the left.

Her laboratory workup revealed a normal white blood cell count and bilirubin; abnormal laboratory values included aspartate aminotransferase 1039 units/L, alanine aminotransferase 925 units/L, amylase 1649 units/L, lactic dehydrogenase 2446 units/L.

Roentgenograms of the abdomen were normal, and a computed tomography (CT) scan showed marked fluid-filled distension of the proximal jejunum and duodenal stump (recognized thanks to its metallic suture line), associated with parietal thickness. The pancreas was normal and no dilatation of the ductal system was observed (**Figure 1**). A US scan, performed to better visualize the biliary tree and the dilated loop, now showed no evidence of peristalsis in the real time mode scan.

The previous diagnosis of acute pancreatitis now looked more like small bowel obstruction affecting the afferent loop, with probable local ischemia (thus justifying the chemistry values). We proceeded with emergency laparoscopy. The induction of the pneumoperitoneum was made through a 10-mm Hasson trocar through a perium-

bilical access using an “open technique” to prevent visceral damage due to parietal adhesions. Two other trocars (10 mm and 5 mm) were positioned in the suprapubic region and the right iliac fossa. After adhesiolysis, a markedly swollen duodenum, afferent and efferent (to a lesser degree) loops were noted in the supramesocolic space. No evidence of pancreatic damage, neoplastic recurrence, or metastases was present. In the submesocolic space a single adhesion had caused an obstruction to the afferent loop of the Roux, a concomitant torsion of the end-to-side jejunojejunal anastomosis, and also an intermittent closure of the efferent loop. The duodenum and the first jejunal loop were found to be ischemic. The section of the adhesive band with a monopolar hook immediately freed the afferent loop and derotated the anastomosis, thus giving way to the fluid that filled the obstructed loops along with the prompt normalization of serosal appearance (**Figure 2**).

A drain was left in the pouch of Douglas for 3 days and oral intake resumed on the second postoperative day. Symptoms and chemistry values normalized quickly. The patient was discharged on the fourth postoperative day, returning to work after a week without any complications. She was asymptomatic at the 6- and 12-month follow-ups.

DISCUSSION

Afferent loop syndromes (ALS) are classically distinguished in chronic and acute forms. The initial work of Jordan in 1971 reported an incidence of 0.3% of these complications in gastrectomies.⁴ From a review of the literature, we found the descriptions of 70 cases of AALO up to 2004 (**Table 1**). What is curious is that Roux-en-Y loops account for 37.1% of the cases in a complication



Figure 1. Computed tomographic scan: dilated duodenum stump (clearly identified by metallic suture line).

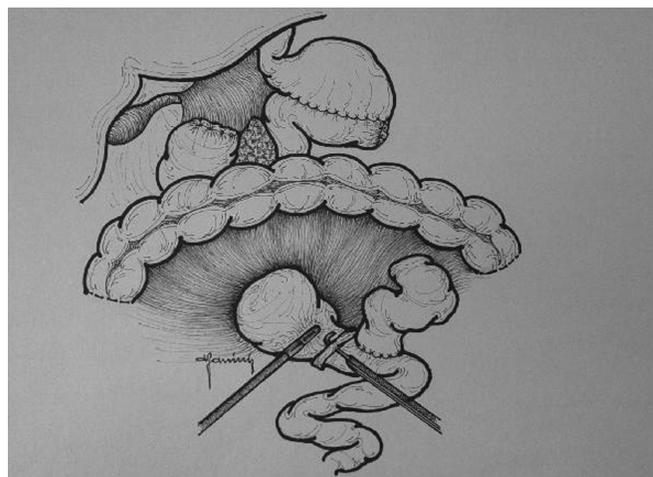


Figure 2. Intraoperative findings: lysis of the adhesive band.

Table 1.

Cases of Acute Obstruction of an Afferent Loop Up to 2004

Author	Billroth II (43 Cases)	Roux-en-Y (26 Cases)	No Previous Surgery (1 Case)
Moschopoulos ^{23*}	19		
Mithofer ¹⁹	3		
Crescimanno ²⁶		1	
Yao ⁹	2		
Wise ¹⁷	1		
Parea Garcia ²⁵	1		
Gayer ¹⁶	4	1	
Kawakami ^{6*}		14	
Joo ³			1
Kim ^{7*}	10	8	
Kaya ²¹	1		
Mann ⁸	1		
Nakao ²⁷	1		
Zissin ¹⁸		1	
Vettoretto (present case)		1	

*Previous case collection (review).

usually described for BII reconstructions; even a case of a patient without a history of previous abdominal surgery is reported by Joo.³ So the term “afferent loop syndrome” should be redefined, or at least not used in its literal significance: maybe the original definition of “proximal jejunal obstruction” introduced by Quinn and Jifford⁵ to describe the first case in 1950 sounds more appropriate today. In fact, the same condition can be found in post-surgical states other than gastrectomies, as in liver transplantation, biliary diversions, gastric bypasses, Whipple procedures.⁶

The cause of AALO is various. Neoplastic recurrence or peritoneal seeding is frequently reported as a cause of obstruction.^{7–9} Also inflammatory stricture, kinking at the anastomosis, intussusception, internal hernia, preferential gastric emptying, and adhesions (like in our case) can be causes of AALO.¹⁰ We have neither in our experience nor in the literature found any evidence in support of changes in the type of procedure, reconstruction or the use of expensive anti-adhesion adjunct that might affect the risk of postgastrectomy adhesions, which anyway remain an infrequent cause of obstruction.

The enhanced backpressure on the proximal loop due to

obstruction, especially in acute situations, can cause AP or jaundice. The mechanism has been reproduced in vivo in animal studies: closed duodenal loop in dogs and cats produces AP resembling human pathology and is probably due to reflux of intestinal content in pancreatic ducts consequently activating pancreatic zymogens by enterokinases.^{11,12} In real life, pancreatitis in acute loop obstruction is rarely necrotic or life threatening, but it worsens in chronic obstructions, probably due to repeated subclinical pancreatic stimuli. Symptoms are more evident in chronic syndromes, with the classical postprandial pain resolving with vomiting. For those with an acute onset, the symptoms may be insidious, varying from epigastric pain to colicky pain or a sense of fullness, which can quickly worsen to intolerable pain refractory to common analgesics.¹³

Physical examination is often remarkable for tenderness in the upper quadrants, and only rarely and in nonobese patients (like ours) a distended afferent loop is palpable.

Biochemistry may reveal elevated serum amylase and lipase levels, generally not due to intestinal ischemia (absorption of pancreatic enzymes), but instead to backpressure through the papilla Vateri.¹² In fact, a rise in hepatic enzymes is frequently associated with AP in AALO. White blood cell count rises in case of persistent obstruction (together with perforation cholangitis, bowel necrosis), which should not be a cut-off for emergency surgery (our patient underwent surgery with a normal WBC count).

Plain abdomen films are mostly unhelpful for diagnosis, showing isolated distension with little gas within. In the current case, and most likely in Roux-en-Y loops, no gas at all is contained in the dilated loop, resembling therefore normality.

Abdominal sonography may be of help, in excluding other causes of biliary obstructions and in localizing the dilated loop (characterized by multilayer thickened walls and liquid content) in the upper middle abdomen. Enhanced peristaltic movements might be seen in the early onset of obstruction, when using real-time mode US.¹⁴ Furthermore, the visualization of fluid collection in the pelvic space might be an indication for surgery.

Abdominal CT scan, the gold-standard diagnostic tool in an emergency, offers a more precise view. Landmarks of CT diagnosis are a U-shaped, cystic-looking mass in the upper abdomen (recognized as bowel by the internal bulging of valvulae conniventes), distension of the biliary tree and duct of Wirsung, pancreatic damage, neoplastic recurrences, peritoneal nodules greater than 1 cm, and

fluid collections or free peritoneal air.^{15–18} In the present case, a dilated duodenum has been recognized without contrast media thanks to the metallic suture chain from the previous mechanical duodenum closure for gastrectomy (**Figure 1**).

Endoscopy has a role in the palliative therapy of BII-AALO, whenever the stricture of the afferent loop is seen and passed through, in order to deflate the loop and prevent tension rupture.^{19,20}

This anomalous event, and the relative rarity of presentation, has led clinicians to a plethora of therapeutical solutions, often guided by wrong initial diagnosis. This is why we can find in the literature various ways to resolve the obstruction, with varying degrees of invasiveness, from a conservative approach, to endoscopically positioned trans-stricture drainage, to percutaneous (transhepatic or transabdominal) drainage of the loop, to repeated punctures of what seemed recurrent pseudocysts and indeed to various degrees of surgical solutions (Braun anastomoses, partial jejunal, or duodenal resections, serosal patching or plications) depending on the degree of intestinal or pancreatobiliary impairment (varying with the interval from symptoms to correct diagnosis), and where necessary of radical or palliative solutions (as in neoplastic recurrence)^{21–24} Explorative laparotomy is advocated as the procedure of choice, and should be performed as soon as possible.^{25–27}

Since the first laparoscopies for intestinal obstruction, carried out by Bastug,²⁸ this technique has not gained wide acceptance, even if, in a recent review,²⁹ laparoscopic adhesiolysis has been shown to be safe and feasible in experienced hands and for select patients. Many factors, like bowel distension, cause, and site of obstruction, can impair the positive outcome of laparoscopy. Early operation, single-band adhesions and ileo-parietal or ileo-ileal site are associated with a higher rate of diagnosis, low morbidity, and lower rate of conversion. Franklin,³⁰ who performed more than 92% of the operations by laparoscopy with a success in diagnosis of 100%, reports small bowel as the commonest site of obstruction (69.5%) and adhesions as the prominent cause (46.6%). To our knowledge, this is the first case of acute afferent loop obstruction resolved with minimally invasive surgery to be reported in the literature, not related to obesity surgery. Laparoscopy was the ideal option for this patient, because the diagnosis remained unclear, even after preoperative examinations. The lysis of the adhesion band was easily performed, without risks of damage to surrounding viscera. The advantages of minimally invasive surgery are

nowadays evident in terms of better outcome, fewer infections (of the wounds and pulmonary), less pain, earlier return to work.

As for the induction of pneumoperitoneum, we prefer the use of “open access” with a Hasson trocar, in every patient who has undergone previous abdominal surgery, to prevent visceral damage and keep at an appropriate distance from previous scars. In this case, the access was made at the level of the umbilicus, 5cm away from the subcostal incision, and the other 2 trocars were positioned to obtain the best visual triangulation and thus optimize movements.

CONCLUSION

We acknowledge that early laparoscopic exploration can be the procedure of choice every time there is a suspicion of acute afferent loop obstruction. These patients have generally undergone a gastrectomy or a biliary diversion in the past (choice of reconstruction being unimportant) and might have clinical signs of intestinal obstruction, together with chemistry values and radiological appearance of acute pancreatitis or biliary stasis. Abdominal CT scan is an optimal tool for preoperative diagnosis, although it may be difficult to diagnose by those with less experience in this field. Early explorative laparoscopy is diagnostic in most cases of obstruction, if carried out in a well-equipped hospital with experienced surgeons in emergency laparoscopic surgery. In select cases of acute afferent loop syndrome, it can even resolve the cause of obstruction, thus resulting in a better outcome in terms of hospital stay, morbidity, postoperative pain and patient satisfaction.

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