

# Laparoscopic Treatment of Annular Pancreas Causing Duodenal Obstruction in an Adult: A Case Report

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## ABSTRACT

Annular pancreas is a rare congenital anomaly characterized by the presence of a pancreatic tissue of variable amount which completely or partially obstructs the second part of duodenum. It usually affects infancy, but in adulthood it can mimic a wide range of clinical entity. Gastrojejunostomy or duodenojejunostomy are common operations in adults because the duodenum is less mobile. We report a case of annular pancreas in a 60-year-old male that presented with clinical condition of gastric outlet obstruction and was successfully treated with a laparoscopic Roux-en-Y gastrojejunostomy.

**Keywords:** annular pancreas; gastric outlet obstruction; gastrojejunostomy; minimally invasive surgery

## INTRODUCTION

Annular pancreas is an infrequently reported congenital anomaly that pancreatic tissue retains from the embryonic developmental period forms a ring around the second part of duodenum leading to complete or partial duodenal obstruction.<sup>1,2</sup> Although the condition is usually

found in infants, annular pancreas in adults were reported with incidence varying from 0.005% to 0.015% of life long incidence.<sup>3</sup> More than 70.0% of cases are symptomatic<sup>3</sup> and the most common presentation is gastric outlet obstruction when bile drainage is spared. Treatment of annular pancreas is to relieve the duodenal obstruction

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bypassing procedures. Laparotomy is the most widely used methods, currently. However, with increasing popularity of minimally invasive surgery for its benefits in shorter length of hospital stay, less pain, and more rapid recovery<sup>4</sup>, the procedure is expected to be the future standard. Herein, we report a case of annular pancreas who was successfully treated with laparoscopic Roux-en-Y gastrojejunostomy.

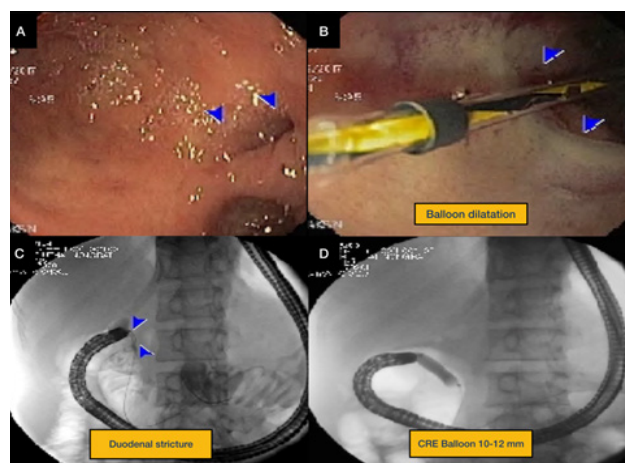
## SHORT REPORT

A 60-year-old male was admitted with a problem of increasing frequency and severity of postprandial vomiting for 4 weeks. The patient had been experiencing episodic vomiting for more than 10 years with no accompanying hematemesis, bowel habit change, nor abdominal pain. He denied any other chronic disease. Physical examination showed upper midline abdominal scar from previous blunt abdominal trauma 12 years before. The laboratory studies including complete blood count and serum electrolytes were unremarkable. Initial diagnosis was malignant gastric outlet obstruction. A gastroduodenoscopy showed partial obstruction at the second part of duodenum for which a balloon dilatation was performed (Figure 1). His clinical condition was not improved, and the follow-up gastroscopy still found stricture at the second part of duodenum. The computed tomography (CT) of the abdomen demonstrated a soft tissue mass encircling the second portion of the duodenum with dilation of the first part of the duodenum (Figure 2). The CT did not show any significant lymphadenopathy or any other mass lesion.

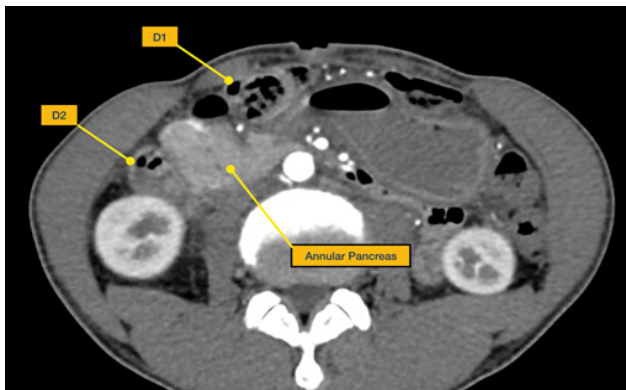
The operative approach was chosen under informed consent from the patients. A laparoscopy was performed under general anesthesia with the patient placed in supine position. A 12 mm-sized camera port was introduced into the abdominal cavity through an infra-umbilicus and pneumoperitoneum was established with carbon dioxide at a pressure of 12–15 mmHg. Three 5 mm-size working trocars were placed as shown in Figure 4A. Intraoperative

findings showed that the second part of duodenum was encircled by a band of pancreatic tissue causing partial obstruction, thus confirming the diagnosis of annular pancreas (Figure 3).

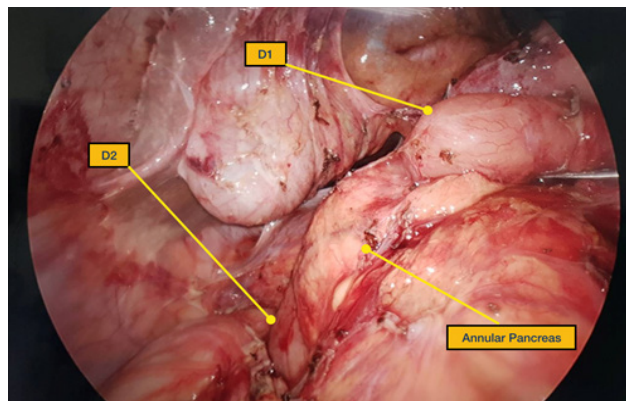
The antecolic gastrojejunal anastomosis was performed in a Roux-en-Y fashion with a Roux limb divided at 30 cm distal to the ligament of Treitz. Small enterotomies were made (Figure 4B), followed by side-to-side anastomosis using a 60 mm linear stapler (Autosuture™ Endo GIA, Covidien, Mansfield, MA, USA) (Figure 4C), fired between the opposing walls of the viscera. The gastrotomy and jejunotomy were closed laparoscopically with absorbable suture and a reinforcing layer of anti-tension barbed suture (Figure 4D). Then, a 60 mm linear stapler (Autosuture™ Endo GIA, Covidien, Mansfield, MA, USA) was used to construct a the side-to-side jejunojejunostomy at 40 cm from the gastrojejunal anastomosis. Gastrojejunal anastomosis was evaluated for any leakage with intraoperative gastroscopy. A Jackson-Platt drain was then put in place.



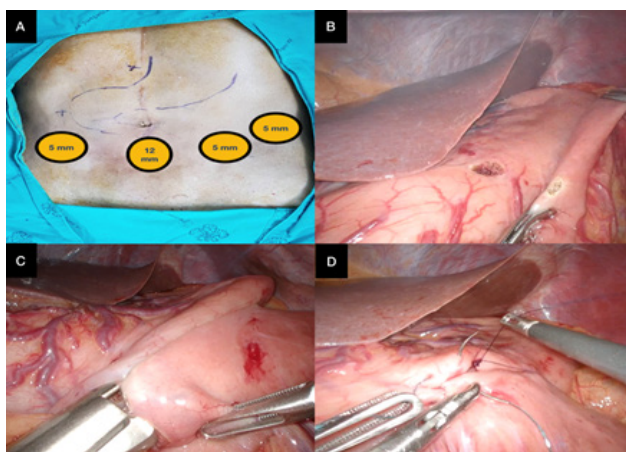
**Figure 1** Gastroscopy images (A) Obstruction of the second part of the duodenum; (B) Balloon dilatation; (C) The contrast was partially passed; (D) Balloon dilatation under fluoroscopy



**Figure 2** The computed tomography (CT) demonstrated a mass encircling the second part of the duodenum



**Figure 3** Laparoscopic view found a band of pancreatic tissue causing partial obstruction confirming the diagnosis of annular pancreas



**Figure 4** (A) Trocar position; (B) Gastrotomy and jejunostomy; (C) Side-to-side gastrojejunal anastomosis; (D) Enterotomy was closed



**Figure 5** Upper GI study showed contrast material could pass into jejunum without difficulty. No contrast extravasation was detected. Patent anastomoses without narrowing

The patient recovered successfully without major complication. Upper GI contrast study was performed on the postoperative day 7, showing contrast material passing into the jejunum without difficulty. No contrast extravasation was detected. The anastomoses were in good patency without narrowing or contrast extravasation (Figure 5). On follow-up, the patient was doing well at six months after surgery.

## DISCUSSION

Annular pancreas is a rare congenital anomaly in which tissue from the head of the pancreas partially or surrounds the second part of the duodenum. Although the true incidence is difficult to be estimated, autopsy and diagnostic imaging studies has estimated an incidence between 1 in 1,000 and 1 in 6,000 people<sup>5</sup>. The incidence in adults is from 0.005% to 0.015%<sup>5</sup>. Several hypotheses have been proposed to describe the embryonic development of annular pancreas. Two major hypotheses include

persistence of the left ventral bud (Baldwin's theory) and adhesion of the right ventral bud to the duodenal wall (Lecco's theory).<sup>6</sup>

Of annular pancreas cases, 25.0% form a complete pancreatic ring, and 75.0% have a partial ring.<sup>7</sup> Clinical severities vary with the degree of duodenal obstruction. In adults, the symptoms of annular pancreas may occur at any age from the 20s to 50s.<sup>7</sup> In contrary to duodenal obstruction in neonates, obstruction in adults is partial in almost all cases, except for those aggravated with a food particle. Most common presentations are post-prandial fullness, abdominal pain, pancreatitis, vomiting, upper gastrointestinal hemorrhage from peptic ulcer disease, and less commonly, obstruction of biliary tract. The presenting symptoms are often mild and intermittent, and caused by partial pancreatic ring constricting the duodenum. The possibility of a periampullary carcinoma should be considered when obstructive jaundice occurs.<sup>8,9</sup>

The double-bubble sign, indicative of duodenal obstruction, is seen in an abdominal plain film of a patient with an annular pancreas. However, X-rays have a low specificity and sensitivity to diagnose this condition in adults.<sup>10</sup> The study of choice is oral contrast studies which show typical findings, including annular defect on the second part of the duodenum, retrograde intestinal movement, and dilatation of the proximal lumen.<sup>11</sup> An endoscopic retrograde cholangiopancreatography (ERCP) can make a specific diagnosis when the pancreatic duct is outlined. However, it is an invasive procedure and it may be difficult to use ERCP in duodenal obstruction cases.<sup>10</sup> An abdominal CT scan or a magnetic resonance cholangiopancreatography (MRCP) is a less invasive diagnostic tool. In addition, MRCP is the most useful method to study abnormal pancreatic duct.<sup>11</sup> CT scan usually demonstrates tissue from the head of the pancreas partially or completely surrounding the second part of the duodenum, which can be seen as in this patient. The definitive diagnosis is established only during surgery.<sup>12</sup>

There are no specific guidelines for the treatment of annular pancreas. Acute pancreatitis can be treated symptomatically. Surgical approach is the definitive treatment of the obstructing annular pancreas, with an aim to resolve an obstructive symptoms.<sup>11</sup> Bypass surgery is preferred to local resection of the pancreatic parenchyma, which may post the risk of pancreatic fistula, recurrent duodenal stenosis, and pancreatitis.<sup>11</sup> Although duodenoduodenostomy is a procedure of choice in infancy, gastrojejunostomy or duodenojejunostomy have been considered in adult patients due to less mobility of the duodenum.<sup>3,4,12</sup>

The minimally invasive surgery is generally performed due to less postoperative complications and a short hospital stay. Laparoscopic gastrojejunostomy is a useful treatment modality of the annular pancreas. It has been reported that laparoscopic duodenoduodenostomy and laparoscopic gastrojejunostomy are successfully performed in pediatric and adult patients.<sup>3-5,11</sup> To our experience, we suggest that laparoscopic Roux-en-Y gastrojejunostomy is a good procedure option for annular pancreas in adults.

## CONSENT

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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## CONFLICT OF INTEREST

The authors declare no conflict of interests for this article.

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