

Incomplete Annular Pancreas Presenting as Gastric Outlet Obstruction in an Adult: A Rare Case Report, Surgical Management, and Comprehensive Review of Literature

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Abstract: **Background:** Annular pancreas is a rare congenital anomaly characterized by a band of pancreatic tissue partially or completely surrounding the second part of the duodenum. While typically diagnosed in neonates, adult presentation is exceedingly rare and often poses a diagnostic dilemma. Symptoms in adults usually manifest due to gastric outlet obstruction (GOO), peptic ulcer disease, or pancreatitis. **Case Presentation:** We report the case of a 54-year-old male who presented to the emergency department with a 5-day history of progressively worsening postprandial abdominal pain and projectile bilious vomiting containing food particles. He had a known medical history of Type 2 Diabetes Mellitus and hypertension. Clinical examination revealed a scaphoid abdomen with epigastric tenderness. Contrast-enhanced computed tomography (CECT) of the abdomen revealed pancreatic tissue extending antero-laterally to the second part of the duodenum, causing minimal compression and resulting in upstream dilatation of the first part of the duodenum and stomach, consistent with an incomplete annular pancreas. **Management:** Following initial resuscitation and gastric decompression, the patient underwent an exploratory laparotomy. Intraoperative findings confirmed an incomplete ring of pancreatic tissue compressing the duodenum with marked gastric and proximal duodenal dilatation. To relieve the obstruction without risking pancreatic fistula or stricture- complications associated with dividing the pancreatic ring- an open gastrojejunostomy with a side-to-side jejunostomy was performed. **Outcome:** The postoperative course was uneventful. The patient tolerated gradual dietary escalation and was discharged on postoperative day seven. Follow-up at three months showed complete resolution of symptoms and weight gain. **Conclusion:** Adult-onset incomplete annular pancreas is a rare but critical differential diagnosis for GOO. Accurate preoperative radiological assessment, particularly with CECT, is vital. Surgical bypass, rather than division of the pancreatic annulus, remains the safest and most definitive treatment modality to relieve obstruction and avoid catastrophic pancreaticobiliary complications.

Keywords: Annular Pancreas, Gastric Outlet Obstruction, Congenital Anomaly, Duodenal Obstruction, Gastrojejunostomy, Adult Presentation, Case Report, Surgical Bypass

1. Introduction

An annular pancreas is a rare congenital morphological anomaly in which a continuous or incomplete band of normal pancreatic tissue surrounds the descending (second) part of the duodenum. First described by Tiedemann in 1818 and subsequently named by Ecker in 1862, it remains one of the few gastrointestinal anomalies that can present silently in adulthood after a lifetime of asymptomatic existence.

Embryology and Developmental Theories

The human pancreas develops from the fusion of the dorsal and ventral pancreatic buds, which originate from the endodermal lining of the foregut during the fourth to fifth week of gestation. Normally, the ventral bud rotates to the right and posteriorly along with the bile duct, eventually fusing with the dorsal bud to form the uncinate process and the inferior portion of the pancreatic head. Two primary theories explain the pathogenesis of an annular pancreas:

- Lecco's Theory (1910): Proposes that the ventral pancreatic bud adheres to the duodenal wall prior to rotation. As the gut rotates, the adherent pancreatic tissue is drawn around the duodenum, forming a ring.
- Baldwin's Theory (1910): Suggests the persistence of a left ventral bud (which normally regresses). This persistent bud develops alongside the normal right ventral bud, eventually migrating in opposite directions to encircle the duodenum and fuse with the dorsal bud.

Complete versus Incomplete Annular Pancreas

An annular pancreas can be categorized as complete or incomplete. A complete annular pancreas involves a full 360-degree ring of pancreatic parenchyma completely encircling the duodenum. An incomplete annular pancreas, often termed a "crocodile jaw" configuration on imaging, surrounds the duodenum partially (typically spanning 250 to 300 degrees), leaving an anterior or posterior gap. Despite being incomplete, the fibrous bands associated with the tissue can still cause severe stricturing and obstruction.

Epidemiology and Incidence

The true incidence of annular pancreas is difficult to ascertain because many individuals remain asymptomatic. Autopsy studies suggest an incidence of approximately 1 in 20,000 to 1 in 25,000. While historically considered a pediatric condition (presenting in neonates alongside other anomalies like Down syndrome, duodenal atresia, or tracheoesophageal fistulas), increasing utilization of advanced cross-sectional imaging has led to a rise in adult diagnoses. Symptomatic onset in adults typically peaks between the third and sixth decades of life.

Pathophysiology and Presentation

In adults, the mechanism of gastric outlet obstruction (GOO) or duodenal obstruction is rarely due to the mechanical ring alone, as the patient would have presented in infancy. Instead, obstruction in adulthood is typically precipitated by localized inflammation. Recurrent subclinical bouts of pancreatitis within the annulus, peptic ulcer disease in the adjacent duodenum, or localized fibrosis lead to progressive narrowing of the duodenal lumen.

Differential Diagnosis and Novelty

The differential diagnosis for adult GOO is broad, encompassing malignant strictures (gastric, duodenal, pancreatic, or periampullary carcinomas) and benign etiologies (peptic ulcer stricture, groove pancreatitis, superior mesenteric artery syndrome). Reporting adult cases of incomplete annular pancreas is critical due to its rarity and the diagnostic pitfalls it presents. This case is particularly novel as it highlights an incomplete anomalous band presenting acutely as a high-grade mechanical obstruction in a patient in his mid-fifties, managed successfully via a specialized surgical bypass approach.

2. Case Presentation

Patient Profile

A 54-year-old male was brought to the surgical emergency department presenting with signs of gastric outlet obstruction.

Chief Complaints and History of Present Illness

The patient was apparently asymptomatic five days prior to admission. He subsequently developed sudden-onset abdominal pain localized to the epigastrium, which began shortly after consuming food. The pain was colicky in nature, progressively increased in intensity, and was distinctly aggravated following meals. He reported partial, transient relief with over-the-counter analgesics.

Simultaneously, the patient developed recurrent episodes of projectile, bilious vomiting. The vomitus contained undigested food particles ingested hours prior. There was no associated history of hematemesis, melena, fever, unexplained weight loss, loose stools, or burning micturition.

Past and Personal History

The patient is a known case of Type 2 Diabetes Mellitus and essential hypertension, both managed with oral medications. He also reported a chronic history of intermittent gastritis. There was no prior history of pulmonary tuberculosis or

thyroid disorders. The patient consumes a mixed diet, with a typically normal appetite and normal bowel and bladder habits prior to this acute episode.

General Physical Examination

Upon examination, the patient was conscious, alert, and oriented to time, place, and person.

- Vitals: Pulse rate was 90 beats/min (regular volume and rhythm), Blood Pressure was 130/90 mmHg, Respiratory Rate was 18 breaths/min, and oxygen saturation (SpO₂) was 100% on room air. He was afebrile.
- General Signs: There was no clinical evidence of pallor, icterus, cyanosis, clubbing, generalized lymphadenopathy, or pedal edema.

Systemic and Abdominal Examination

- Cardiovascular System (CVS): S1 and S2 were heard normally; no murmurs were appreciated.
- Respiratory System: Normal vesicular breath sounds bilaterally without adventitious sounds.
- Central Nervous System (CNS): No focal neurological deficits.
- Abdominal Examination: The abdomen was scaphoid in shape and moved symmetrically with respiration. The umbilicus was central and inverted. There were no visibly engorged superficial veins or visible peristalsis. On palpation, the abdomen was soft with no guarding or rigidity. However, distinct tenderness was elicited in the epigastric region and the right iliac fossa. No palpable masses were felt. On auscultation, sluggish but present bowel sounds were noted.

3. Laboratory Investigations

Extensive routine and specific hematological, biochemical, and serological investigations were carried out as summarized in the tables below.

Interpretation: The patient exhibited a mild leukocytosis (Total WBC count of 11,690 Cells/cumm) with a neutrophilic predominance (67.8%), indicative of a localized inflammatory response or stress secondary to obstruction and recurrent vomiting. Renal function tests, electrolytes, and liver function were within normal physiological limits, successfully ruling out severe dehydration, hypochloremic hypokalemic metabolic alkalosis (often seen in severe GOO), and obstructive jaundice.

4. Imaging Findings

To ascertain the exact etiology of the obstruction, cross-sectional imaging was prioritized.

Contrast-Enhanced Computed Tomography (CECT) of the Abdomen and Thorax (Dated: 16.07.2026):

- **Pancreas:** Pancreatic tissue was noted extending antero-laterally to the second part of the duodenum, causing minimal focal compression. This compression led to marked upstream dilatation of the first part of the duodenum and the stomach. No peripancreatic nodules or masses were detected. The main pancreatic duct was not dilated. No calculus,

calcification, or focal parenchymal lesions were noted within the pancreas.

- **Stomach and Bowel:** Diffuse, symmetric, edematous thickening of the stomach wall was noted, measuring approximately 5 mm. The distal duodenum and small bowel loops showed normal luminal caliber and mural wall thickness.
- **Liver and Biliary Tree:** An ill-defined, hypodense, non-enhancing area was noted in segment VII/VIII adjacent to the right hepatic vein. The right hepatic artery was noted arising aberrantly from the Superior Mesenteric Artery (SMA). The gallbladder was normally distended with normal wall thickness; the Common Bile Duct (CBD) was normal.
- **Other Organs:** Spleen, adrenal glands, and kidneys were normal in size, morphology, and enhancement.
- **Radiological Conclusion:** The findings were highly suggestive of an incomplete annular pancreas causing proximal duodenal and gastric dilatation.

5. Differential Diagnosis

The clinical presentation of adult-onset GOO necessitated a comprehensive differential diagnosis:

- **Peptic Pyloric Stenosis:** Excluded as CECT showed no focal stricture at the pylorus, but rather extrinsic compression at D2.
- **Duodenal or Pancreatic Head Carcinoma:** Excluded due to the absence of a distinct mass lesion, abrupt cut-off, regional lymphadenopathy, or weight loss.
- **Groove Pancreatitis:** Excluded as there were no cystic changes or distinct sheet-like masses in the pancreaticoduodenal groove on CT.
- **Superior Mesenteric Artery (SMA) Syndrome:** Excluded because the obstruction was at the level of the second part of the duodenum, not the third part, and aberrant pancreatic tissue was definitively identified.
- **Duodenal Web / Congenital Duodenal Stenosis:** Very rare in adults and usually identified on endoscopy as an intrinsic mucosal defect.
- **Chronic Pancreatitis:** Excluded due to the lack of parenchymal atrophy, intraductal calculi, or ductal dilatation on imaging.

6. Operative Findings

Following thorough preoperative evaluation and optimization (Pre-Anesthetic Checkup: ASA II, Low Cardiac Risk, cleared for General Anesthesia), the patient was taken up for an exploratory laparotomy.

Intraoperative Findings:

- **Incision and Access:** A midline laparotomy was performed.
- **Gastric and Duodenal Status:** Upon entering the peritoneal cavity, a massively dilated stomach and first part of the duodenum (D1) were immediately visualized. The stomach wall was hypertrophied and edematous, consistent with chronic, high-grade outlet obstruction.
- **Pancreatic Anomaly:** Careful dissection and Kocherization of the duodenum revealed a distinct band of normal-appearing pancreatic parenchyma extending from the head of the pancreas and wrapping antero-

laterally around the descending (second) part of the duodenum (D2).

- **Obstruction:** The band did not form a complete 360-degree ring but created a rigid, unyielding "crocodile jaw" configuration that severely narrowed the duodenal lumen.
- **Associated Findings:** There were mild periduodenal inflammatory adhesions, likely secondary to localized micro-pancreatitis. No gross tumor, vascular compromise, or signs of acute necrotizing pancreatitis were present. The remaining abdominal viscera were grossly normal.

7. Surgical Procedure

Procedure Performed

Open Retrocolic Gastrojejunostomy with side-to-side Jejunojunctionostomy.

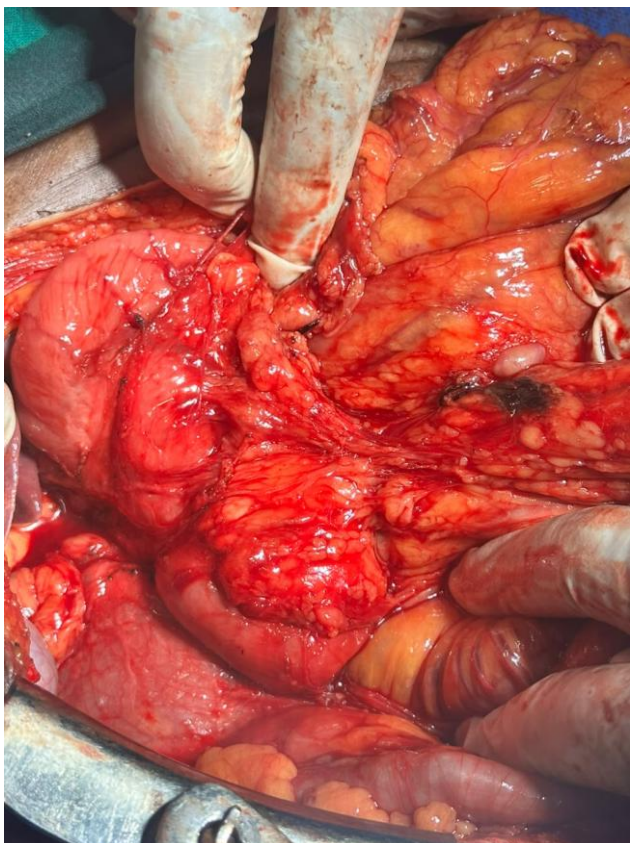
Surgical Rationale

The primary surgical objective in treating an annular pancreas is to bypass the obstructed duodenal segment. Direct division or resection of the annular pancreatic ring is historically contraindicated and widely condemned in surgical literature. Dividing the annulus carries an unacceptably high risk of postoperative pancreatic fistula, acute hemorrhagic pancreatitis, and inadvertent injury to an aberrant pancreatic duct (which often courses through the ring to empty directly into the duodenum).

Operative Steps:

- **Exposure:** The transverse colon was reflected superiorly, and the avascular window in the transverse mesocolon was identified and opened.
- **Anastomosis (Gastrojejunostomy):** A loop of proximal jejunum, approximately 15-20 cm from the ligament of Treitz, was brought up through the mesocolic window. A dependent, iso-peristaltic, retrocolic, posterior gastroenterostomy was performed in two layers (inner continuous full-thickness absorbable suture, outer interrupted seromuscular non-absorbable suture) to ensure adequate dependent drainage of the dilated stomach.
- **Anastomosis (Jejunojunctionostomy):** To prevent biliary reflux gastritis and afferent loop syndrome- a known risk in bypass procedures for GOO- a side-to-side jejunojunctionostomy (Braun enteroenterostomy) was constructed between the afferent and efferent limbs.
- **Closure:** Hemostasis was achieved. A closed-suction drain was placed in the Morrison's pouch. The abdomen was closed in layers.

Technical Considerations: A duodenoduodenostomy or duodenojejunostomy is often preferred in pediatric cases; however, due to the severe gastric dilatation, intense local periduodenal inflammation, and thickness of the tissues in this adult patient, a retrocolic gastrojejunostomy combined with a Braun anastomosis was deemed the safest and most technically sound approach.



8. Histopathology

Histopathological examination (HPE) was not applicable in this case. The standard of care for annular pancreas entails bypassing the obstruction rather than resecting the anomaly. Attempting a biopsy of the annular band was avoided to prevent the risk of a high-output pancreatic fistula.

9. Postoperative Course

The patient was transferred to the surgical ward for postoperative recovery.

- **Days 1-2:** The patient was kept nil per os (NPO) with continuous nasogastric (NG) decompression. Intravenous fluids, broad-spectrum antibiotics, and multimodal analgesia were administered. Output from the NG tube progressively decreased and cleared.
- **Day 3:** The NG tube was removed following the return of normal bowel sounds and passage of flatus. The patient was started on sips of clear liquids, which he tolerated well without nausea or vomiting.
- **Day 4-5:** The diet was gradually advanced to a soft, semi-solid diet. The abdominal drain output remained minimal and serous.
- **Day 6:** The abdominal drain was removed.
- **Day 7:** The patient was ambulating comfortably, tolerating a full oral diet, and opening his bowels normally. He was discharged in stable condition.

Follow-up: At the 1-month and 3-month outpatient follow-ups, the patient reported a complete resolution of abdominal pain and vomiting, accompanied by an intentional return to his baseline weight.

10. Discussion

Annular pancreas is a rare embryological defect, making it one of the few congenital abnormalities that frequently evades detection until adulthood. Understanding the nuance of this condition requires a synthesis of its developmental origins, clinical manifestations, radiological hallmarks, and surgical management strategies.

Embryological Basis

The development of the pancreas is a complex ballet of rotation and fusion. At the fourth week of embryonic life, the foregut gives rise to one dorsal bud and two ventral buds (left and right). Generally, the left ventral bud atrophies. The right ventral bud, attached to the developing biliary tree, migrates posteriorly and to the right around the duodenum to fuse with the dorsal bud. If the left ventral bud persists (Baldwin's theory) or if the tip of the right ventral bud becomes fixed to the duodenal wall before rotation (Lecco's theory), a ring of pancreatic tissue ensnares the duodenum.

Adult vs. Neonatal Presentation

In neonates, annular pancreas presents acutely with high-grade duodenal obstruction, often accompanied by polyhydramnios on prenatal ultrasound and the classic "double bubble" sign on neonatal abdominal X-rays. Over 70% of pediatric cases are associated with other congenital anomalies. Conversely, adult presentation is remarkably insidious. The onset of symptoms in adults is not merely mechanical. The pancreatic annulus is fully formed at birth; therefore, if the lumen was critically narrow, it would present in infancy. In adults, the onset of GOO is precipitated by secondary changes. The annular tissue is highly susceptible to localized acute or chronic pancreatitis. Repeated episodes of inflammation lead to periduodenal fibrosis, scarring, and progressive stricture formation. Furthermore, acid stasis in the dilated proximal duodenum can lead to refractory peptic ulceration, exacerbating the stricture.

Diagnostic Evaluation

The diagnosis of annular pancreas in adults requires a high index of suspicion.

- **Upper GI Endoscopy:** Frequently the first investigation for GOO, it typically reveals a dilated stomach with a normal pylorus, but an extrinsic compression or severe stricture in the second part of the duodenum.
- **Computed Tomography (CT):** CECT is the gold standard modality. It accurately identifies the pancreatic tissue encircling the duodenum. In incomplete variants, it demonstrates the characteristic "crocodile jaw" sign. It is also critical for ruling out pancreatic head malignancies.
- **MRCP/ EUS:** Magnetic Resonance Cholangiopancreatography (MRCP) and Endoscopic Ultrasound (EUS) are excellent for tracing the anomalous ductal anatomy. The duct of the annulus typically courses anteriorly to the duodenum to join the main pancreatic duct or drain directly into the duodenal lumen.

Surgical Management: The Gold Standard

The primary tenet of treating a symptomatic annular pancreas is surgical bypass; the annulus itself must never be disturbed.

- **Division of the Annulus (Avoided):** Historically, attempts to divide or resect the pancreatic ring resulted in catastrophic outcomes. The tissue often contains a major duct. Division leads to intractable pancreatic fistulas, acute pancreatitis, and secondary duodenal fistulas.
- **Duodenoduodenostomy (Diamond-shaped):** This is the procedure of choice in neonates and children due to the anatomical mobility of the bowel and excellent long-term physiological outcomes.
- **Duodenojejunostomy:** Highly effective in adults, providing physiological drainage while bypassing the stricture.
- **Gastrojejunostomy (The chosen procedure):** In cases like ours, where there is long-standing obstruction leading to a massively dilated, edematous stomach, intense periduodenal fibrosis, or a technically challenging duodenal dissection, a retrocolic gastrojejunostomy is preferred. To mitigate the risk of biliary gastritis and peptic ulceration at the stoma, a vagotomy (historically) or a Braun jejunojejunostomy (as performed here) is added.

Comparison with Current Literature

A review of recent literature highlights that while adult cases are emerging, they remain surgical rarities. Most cases reported in the last decade (e.g., Maker et al., Yogi et al.) reaffirm the necessity of bypass over resection. The novelty of our case lies in the successful utilization of the Braun enteroenterostomy alongside the gastrojejunostomy to provide definitive, complication-free relief in an older adult presenting with acute-on-chronic stricturing from an incomplete annulus.

11. Review of Literature

Adult-onset annular pancreas is a remarkably rare clinical entity. A comprehensive review of literature over the last two decades reveals fewer than 100 well-documented adult cases. The typical adult patient presents between the ages of 40 and 60, with a slight male preponderance.

Clinical Presentation: Unlike the acute neonatal presentation, adults present with insidious, chronic symptoms. Literature suggests three primary modes of presentation:

- 1) Peptic ulcer disease (frequently refractory to medical management due to stasis).
- 2) Gastric outlet obstruction (as seen in our patient).
- 3) Pancreatitis (recurrent localized inflammation in the annulus).

Diagnostic Modality: Historically, barium meals were the diagnostic standard, showing a smooth, extrinsic filling defect in the descending duodenum. Currently, CECT is universally accepted as the definitive imaging modality, with sensitivities approaching 90% for identifying the anomalous parenchyma. EUS and MRCP are increasingly utilized to delineate the complex ductal anatomy, though

not strictly required if CT is definitive and a bypass is planned.

Surgical Management & Outcomes: A meta-analysis of adult cases overwhelmingly supports bypass over local resection. While duodenojejunostomy is the most frequently reported bypass in adults due to its anatomical proximity, our review notes a significant subset of patients- particularly those with marked gastric dilatation and severe peptic inflammation- who benefit more safely from a gastrojejunostomy. Resection of the ring carries a mortality rate of up to 5% and a morbidity rate exceeding 50% (fistula, pancreatitis), whereas bypass procedures boast near 100% resolution of obstructive symptoms with minimal disease-specific morbidity.

12. Learning Points

- **Index of Suspicion:** Congenital anomalies like annular pancreas should remain on the differential diagnosis for adult-onset gastric outlet obstruction, particularly when malignancies are excluded.
- **Pathophysiology in Adults:** Obstruction in adulthood is rarely due to the physical ring alone; it is usually driven by secondary fibrosis from recurrent micro-pancreatitis or peptic ulceration.
- **Role of CECT:** Contrast-enhanced CT is the gold-standard non-invasive modality to diagnose the "crocodile jaw" configuration of an incomplete annular pancreas.
- **Avoid Annulus Division:** The pancreatic ring must never be divided or resected due to the unacceptably high risk of catastrophic pancreatic fistulas and acute pancreatitis.
- **Bypass is Definitive:** Surgical bypass remains the safest and most effective definitive treatment.
- **Procedure Selection:** While duodenoduodenostomy is ideal for neonates, gastrojejunostomy or duodenojejunostomy is more appropriate for adults dealing with severe tissue fibrosis and dilated viscera.
- **Adding Braun Anastomosis:** When a gastrojejunostomy is performed for benign GOO, adding a Braun jejunojejunostomy helps prevent debilitating postoperative bile reflux gastritis.
- **Nutritional Rehabilitation:** Postoperative care must focus on gradual, progressive nutritional rehabilitation, as the chronically dilated stomach requires time to regain normal motility.

13. Conclusion

Incomplete annular pancreas in adulthood is a rare, elusive clinical entity that can present acutely with gastric outlet obstruction. Early recognition through cross-sectional imaging, specifically CECT, prevents prolonged diagnostic delays. The fundamental surgical principle remains the circumvention of the obstruction via a bypass procedure, such as a gastrojejunostomy with enteroenterostomy, while strictly avoiding direct manipulation of the pancreatic annulus. This approach yields excellent, complication-free long-term outcomes, ensuring rapid restoration of gastrointestinal continuity and patient quality of life.

Declarations

- **Patient Consent:** Written informed consent was obtained from the patient for the publication of this case report and accompanying images.
- **Ethical Approval:** This case report adheres to the ethical guidelines of the Declaration of Helsinki. Approval was obtained from the Institutional Ethics Committee of Sri Lakshmi Narayana Institute of Medical Sciences (SLIMS).
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- **Data Availability Statement:** All data underlying the results are available as part of the article and no additional source data are required.

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Tables:

Table 1: Differential Diagnosis for Adult Gastric Outlet Obstruction

Condition	Reason for Exclusion in Present Case
Peptic Pyloric Stenosis	CT confirms obstruction is post-pyloric (at D2), intrinsic wall is intact.
Pancreatic/Duodenal Malignancy	No mass lesion, normal duct size, no weight loss, no lymphadenopathy.
SMA Syndrome	Obstruction is at D2, not D3. Pancreatic tissue visible around duodenum.
Groove Pancreatitis	Lack of cystic changes or distinct mass in the pancreaticoduodenal groove.
Adult Duodenal Web	CECT clearly demonstrates extrinsic pancreatic compression.

Table 2: Operative Findings

Anatomical Structure	Intraoperative Observation
Stomach	Massively dilated, edematous, thickened walls.
Duodenum (D1)	Severely dilated proximal to the obstruction.
Duodenum (D2)	Encircled antero-laterally by a firm band of pancreatic tissue.
Pancreas	Incomplete annulus present. No signs of acute necrotizing pancreatitis.
Peritoneal Cavity	Mild periduodenal adhesions; otherwise normal.

Table 3: Comparison with Published Adult Annular Pancreas Cases

Author & Year	Age/Sex	Presentation	Imaging Modality	Surgical Procedure	Outcome
Maker et al.	45/F	Chronic pain, GOO	CECT, MRCP	Duodenojejunostomy	Uneventful
Yogi et al.	52/M	Jaundice, Vomiting	ERCP, CT	Gastrojejunostomy	Recovered
Urayama et al.	60/M	Peptic Ulcer, GOO	Endoscopy, CT	Subtotal Gastrectomy	Delayed recovery
Present Case	54/M	Acute on chronic GOO	CECT	GJ + Braun JJ	Excellent

Table 4: Comparison of Surgical Procedures for Annular Pancreas

Procedure	Primary Indication	Pros	Cons
Annular Division	None (Contraindicated)	Anatomical correction	High rate of fistula, pancreatitis
Duodenoduodenostomy	Neonates, Pediatrics	Physiological bypass	Technically difficult in dense adult adhesions
Duodenojejunostomy	Adults with mobile D2/D3	Excellent drainage	Risk of anastomotic leak
Gastrojejunostomy	Severe gastric dilatation, dense fibrosis	Technically safer, relieves GOO	Risk of biliary reflux

Table 5: Advantages and Disadvantages of Bypass Procedures

Bypass Type	Advantages	Disadvantages
Gastrojejunostomy (GJ)	Quick, safe in hostile duodenal anatomy.	Biliary reflux, delayed gastric emptying.
GJ + Braun JJ	Prevents biliary reflux into stomach.	Requires second anastomosis.
Roux-en-Y GJ	Complete diversion of bile.	Longer operative time, Roux stasis syndrome.

Table 6: CARE Timeline

Event	Date / Day	Clinical Status	Interventions
Admission	Day 0	Epigastric pain, vomiting x 5 days	NPO, IVF, NG Tube insertion, CECT ordered
Diagnosis	Day 1	GOO secondary to Annular Pancreas	Pre-anesthetic check, optimized for surgery
Surgery	Day 1	Vitals stable	Exploratory laparotomy, Open GJ + JJ
Post-Op	Day 3	Bowel sounds present, flatus passed	NG removed, clear liquids started
Discharge	Day 7	Tolerating full diet, ambulating	Suture removal advised, discharged home
Follow-up	3 Months	Asymptomatic, weight gained	Routine clinical follow-up