Diagnosis and Surgical Management of Annular Pancreas in an 18-Day-Old Neonate: A Case Report

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Abstract

Background: This case report presents a rare and challenging condition—annular pancreas—in an 18-day-old neonate. Annular pancreas is a congenital anomaly where a ring of pancreatic tissue encircles the duodenum, leading to gastrointestinal obstruction. Early diagnosis and intervention are crucial for optimal patient outcomes. The rarity of this condition in neonates underscores its clinical significance.

Case Description: The patient presented with a history of persistent vomiting since birth, which initially appeared green but later turned yellow. The infant had been fed various types of milk sequentially, with vomiting occurring after each feeding. Additionally, the infant developed jaundice a week prior to presentation, which was treated without improvement in symptoms. Diagnostic modalities included abdominal X-ray, ultrasound, and upper gastrointestinal contrast study, which collectively confirmed a partial obstruction at the gastroduodenal junction due to annular pancreas. The definitive treatment involved a laparotomy for exploratory surgery, followed by a duodenoduodenostomy using the Kimura technique to address the anatomical abnormality. Postoperative management included prophylactic antibiotics, anti-emetic therapy, acid suppression, and probiotics to support recovery. The outcome of the case was favorable, with successful resolution of the gastrointestinal obstruction following the surgical intervention.

Conclusions: This case underscores the importance of early recognition, precise diagnosis, and multidisciplinary intervention in managing congenital anomalies like annular pancreas, ultimately leading to favorable outcomes and improved quality of life for neonatal patients..

Introduction

Annular pancreas is a rare congenital anomaly where a ring of pancreatic tissue encircles the duodenum, leading to gastrointestinal obstruction, occurring in approximately 1 in 10,000 to 15,000 live births globally.[1] Embryologically, this condition arises due to the abnormal rotation and fusion of the ventral pancreatic bud around the duodenum during fetal development, resulting in a complete or

partial ring of pancreatic tissue that can compress the duodenum.[1] The pathophysiology of annular pancreas involves mechanical obstruction of the duodenum, which impairs the passage of gastric contents and leads to symptoms such as vomiting, abdominal distension, and failure to thrive. The rarity of this condition in neonates underscores its clinical significance, as early diagnosis and intervention are crucial for optimal patient outcomes.

The patient presented with persistent vomiting since birth, initially green but later turning yellow, prompting concern for gastrointestinal obstruction. The infant had been sequentially fed various types of milk, with vomiting occurring after each feeding, and developed jaundice a week prior to presentation, which did not improve despite treatment. These symptoms led to further investigation, including abdominal X-ray, ultrasound, and upper gastrointestinal contrast study, confirming a partial obstruction at the gastroduodenal junction due to annular pancreas. In Indonesia, congenital anomalies account for approximately 2% of neonatal morbidity, with conditions like annular pancreas requiring prompt multidisciplinary care.[2] The definitive treatment involved a laparotomy for exploratory surgery, followed by a duodenoduodenostomy using the Kimura technique to address the anatomical abnormality.

The outcome of the case was favorable, with successful resolution of the gastrointestinal obstruction following the surgical intervention. Postoperative management included prophylactic antibiotics, anti-emetic therapy, acid suppression, and probiotics to support recovery. This case underscores the importance of early recognition and a multidisciplinary approach in managing rare congenital anomalies like annular pancreas in neonates, ensuring optimal care and positive patient outcomes.

Case Description

Baby TU, an 18-day-old neonate, presented with a history of persistent vomiting since birth. The vomiting initially appeared green but later turned yellow on the morning of presentation. The infant had been fed formula milk, soy-based formula, and breast milk sequentially, with vomiting occurring after each type of feeding. A week prior to presentation, the infant developed jaundice and was treated at Pusdik Brimob Hospital with ranitidine syrup; however, there was no improvement in symptoms. Subsequently, the patient was transferred to Dr. Soekandar Hospital for further management, where phototherapy was administered under the care of a pediatric specialist. Despite these interventions, the infant's condition did not improve, leading to a referral to pediatric surgery along with an abdominal X-ray

report. At the time of presentation, the infant was no longer jaundiced but exhibited signs of weakness, with a pulse rate of 143 beats per minute, respiratory rate of 45 breaths per minute, oxygen saturation of 99%, and temperature of 36.5°C. The infant weighed 2.5 kg and measured 45 cm in length, with normal nutritional status. Physical examination revealed mild dehydration, abdominal distension, and discomfort upon palpation around the umbilical region.

Laboratory investigations provided additional insights into the patient's condition. Hemoglobin levels were elevated at 18 g/dL, while leukocyte count was high at 16,290 cells/µL. Eosinophil count was 2%, basophil count was 0.4%, neutrophil segment count was 34.9%, lymphocyte count was 54.5%, and monocyte count was 8.2%. Hematocrit (HCT) was 50.8%, and platelet count was 400 x 10^3/µL. Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC) were 93.2 fL, 33 pg, and 35.4 g/dL, respectively. Bilirubin levels were elevated, with total bilirubin at 12.06 mg/dL, direct bilirubin at 1.20 mg/dL, and indirect bilirubin at 10.86 mg/dL. Electrolyte imbalances included hyponatremia (132 mmol/L), hyperkalemia (5.3 mmol/L), and hypochloremia (89.0 mmol/L). Calcium levels were within normal limits at 10.50 mg/dL.

Radiological investigations were conducted to further evaluate the infant's condition. An abdominal X-ray (**Figure 1**) showed gastric distension with increased gas and compressed bowel gas shadows within the abdominal cavity, suggesting a partial obstruction at the gastroduodenal junction. The bilateral renal contours, liver, spleen, psoas shadows, and skeletal structures were all found to be within normal limits. An ultrasound examination (**figure 2**) confirmed the findings of gastric distension with fluid retention and increased gas, while the small intestine appeared normal. There was no evidence of abnormalities in the liver, gallbladder, spleen, pancreas, or kidneys. However, the gastroduodenal junction was difficult to evaluate due to the distension. Based on these findings, a suspected partial obstruction at the gastroduodenal junction was noted, and further evaluation with an upper gastrointestinal contrast study was recommended.

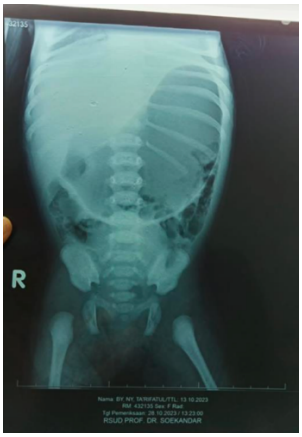

Figure 1. Abdominal X-ray of an 18-day-old neonate demonstrating gastric

distension with increased gas and compressed bowel gas shadows, suggesting a partial obstruction at the gastroduodenal junction.

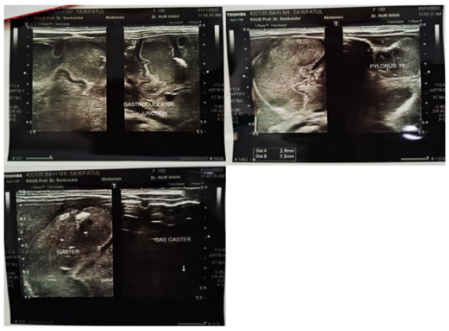

Figure 2. Ultrasound images showing the gastroduodenal junction and pylorus in an infant with suspected partial obstruction, highlighting gastric distension with fluid retention and increased gas.

The upper GI contrast examination (**Figure 3**) using a non-ionic contrast medium administered through a nasogastric tube revealed that the contrast filled the lumen of the esophagus, stomach, gastroduodenal junction, duodenum, and part of the ileum. Notably, there was evidence of gastric distension with narrowing at the gastroduodenal junction, measuring approximately 6.07 mm in diameter over a length of 4.32 mm. No filling defects or additional shadows were observed. These findings led to the conclusion that the patient had stenosis at the gastroduodenal junction, likely due to hypertrophic pyloric stenosis, which resulted in partial obstruction of the stomach.

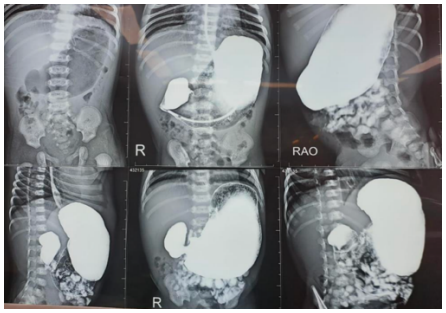

Figure 3. Upper gastrointestinal contrast study images illustrating gastric distension with narrowing at the gastroduodenal junction, confirming stenosis likely due to hypertrophic pyloric stenosis.

Based on these findings, the diagnosis was narrowed down to either annular pancreas or malrotation of the intestines causing proximal duodenal obstruction. Management of the patient involved several key steps. Initially, gastric decompression was achieved through the placement of a size 10 nasogastric tube (NGT) to alleviate the distension and discomfort caused by the partial obstruction. Intravenous fluid therapy was administered in the form of D10 1/5NS at a rate of 300cc per 24 hours to maintain hydration and electrolyte balance. The definitive treatment involved a laparotomy for exploratory surgery, which confirmed the diagnosis of annular pancreas. To manage this anomaly, a duodenoduodenostomy using the Kimura technique was performed. Postoperatively, the patient received prophylactic antibiotics with cefotaxime at a dose of 125 mg twice daily to prevent infection. Anti-emetic therapy was provided with metoclopramide

at a dose of 0.5 mg twice daily to control vomiting. Additionally, ranitidine was administered at a dose of 5 mg twice daily to reduce gastric acid secretion and promote healing. Probiotics were also given in the form of one sachet of Probiokid daily to support gastrointestinal health and aid in recovery. This comprehensive management plan aimed to address both the immediate symptoms and the underlying anatomical abnormality, ensuring optimal care for the patient.

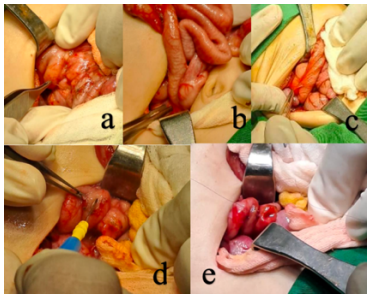

Figure 4. Intraoperative images from laparotomy (a-c) revealing annular pancreas and subsequent duodenoduodenostomy using the Kimura technique (d-e).

Discussion

Annular pancreas is a rare congenital anomaly that poses significant diagnostic and therapeutic challenges, particularly in neonates. This condition can lead to gastrointestinal obstruction, necessitating early recognition and multidisciplinary care for effective management. The rarity of annular pancreas is evident in its estimated occurrence, with global incidence rates ranging from 1 in 10,000 to 15,000 live births.[1] However, studies utilizing endoscopic retrograde cholangiopancreatography (ERCP) suggest a higher prevalence of 1 in 250 adults, indicating variability in detection across age groups. In neonates, the condition remains exceptionally uncommon, with retrospective analyses reporting incidences as low as 3 in 20,000 cases and 3 in 24,519 surgical interventions.[3–5] These figures underscore the importance of maintaining a high index of clinical suspicion when evaluating neonatal duodenal obstruction.

The strengths of this case report lie in its meticulous documentation of the clinical presentation, diagnostic journey, and surgical intervention, adhering to the principles of high-quality case reporting. It provides valuable insights into postoperative care strategies, such as the use of prophylactic antibiotics and probiotics, which could benefit clinicians managing similar cases.[6] However, the absence of long-term follow-up data limits the ability to assess sustained recovery or potential complications. Prior research has highlighted that annular pancreas accounts for only a small fraction of neonatal duodenal obstruction cases, emphasizing the need for extended observation periods to monitor outcomes.[7,8] Future studies with larger sample sizes and prolonged follow-up are essential to evaluate the durability of surgical interventions and the long-term quality of life for patients with this condition.

This report contributes to the existing literature by aligning with prior findings that emphasize the critical role of early surgical intervention in neonates with annular pancreas. Previous case series have identified malrotation without volvulus in 10 cases, with volvulus in 4 cases, and annular pancreas in 6 cases among neonates presenting with duodenal obstruction.[9] Historical studies further corroborate the rarity of this anomaly, reporting its presence in only 3 of 20,000 autopsies and 3 of 24,519 surgical cases. By detailing the sequential diagnostic steps and specific challenges encountered during the neonatal period, this report offers novel insights that distinguish it from cases involving older children or adults. Such contributions reinforce the value of case reports in identifying unique aspects of rare conditions and generating hypotheses for future research.

The implications of this case extend beyond its immediate clinical success, offering lessons that could shape both practice and research. It highlights the need for increased awareness among pediatricians and surgeons regarding the possibility of annular pancreas in neonates exhibiting symptoms such as persistent vomiting and jaundice.[10] The rarity of annular pancreas presents an opportunity for rare congenital anomalies to drive advancements in medical knowledge and refine treatment protocols. Future investigations could explore larger cohorts to assess the generalizability of these findings and evaluate alternative surgical techniques for managing this condition.

Conclusion

This case report highlights the successful management of a rare and challenging condition—annular pancreas—in an 18-day-old neonate presenting with persistent vomiting and signs of gastrointestinal obstruction. Through a comprehensive diagnostic approach involving abdominal X-ray, ultrasound, and upper gastrointestinal contrast study, the partial obstruction at the gastroduodenal junction was accurately identified. The definitive treatment, which included laparotomy and duodenoduodenostomy using the Kimura technique, effectively resolved the obstruction and alleviated the patient's symptoms. Postoperative care, encompassing prophylactic antibiotics, anti-emetic therapy, acid suppression, and probiotics, further supported the infant's recovery. This case underscores the importance of early recognition, precise diagnosis, and multidisciplinary intervention in managing congenital anomalies like annular pancreas, ultimately leading to favorable outcomes and improved quality of life for neonatal patients.

References

1. Aleem A, Shah H. Annular Pancreas. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2025 Feb 19]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK559236/

2. Purnomo E, Novebri N, Fuad A. Navigating Pediatric Surgery in Indonesia: A Comprehensive Tertiary-Level Epidemiological Case Study. Malaysian Journal of Medicine and Health Sciences. 2024 Jan 1;1(1):1–113.

3. Musa A, Witton R, Ali K, McColl E. A five-year retrospective analysis (2017-2022) of reported incidents from a primary care-based education provider. Br Dent J. 2025 Jan 17;

4. Martin G, Ghafur S, Cingolani I, Symons J, King D, Arora S, et al. The effects and preventability of 2627 patient safety incidents related to health information technology failures: a retrospective analysis of 10 years of incident reporting in England and Wales. Lancet Digit Health. 2019 Jul;1(3):e127–35.

5. Tlili MA, Aouicha W, Gambashidze N, Ben Cheikh A, Sahli J, Weigl M, et al. A retrospective analysis of adverse events reported by Tunisian intensive care units' professionals. BMC Health Serv Res. 2024 Jan 16;24(1):77.

6. Prophylaxis and treatment with antibiotics or probiotics in acute pancreatitis [Internet]. [cited 2025 Feb 19]. Available from: http://pancreapedia.org/?q=node/9472

7. Taşdemir Ü, Demirci O. Clinical Analysis of Congenital Duodenal Obstruction and the Role of Annular Pancreas. Medicina. 2025 Jan 21;61(2):171.

8. Dalla Vecchia LK, Grosfeld JL, West KW, Rescorla FJ, Scherer LR, Engum SA. Intestinal Atresia and Stenosis: A 25-Year Experience With 277 Cases. Arch Surg [Internet]. 1998 May 1 [cited 2025 Feb 19];133(5). Available from: http://archsurg.jamanetwork.com/article.aspx?doi=10.1001/archsurg.133.5.490

9. Ali Almoamin HH, Kadhem SH, Saleh AM. Annular pancreas in neonates; Case series and review of literatures. Afr J Paediatr Surg. 2022;19(2):97–101.

10. Bennani H, Azzabi S, Bouardi NE, Haloua M, Alami B, Lamrani YA, et al. Annular pancreas: Radiological features of a rare case of infantile vomiting. Radiol Case Rep. 2022 Nov;17(11):4449–52.

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