

## Diagnostic Dilemma in Diagnosis of Annular Pancreas: A Case Report

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### How to cite this article:

R. Subha, Rajeev Kumar Thapar, Ravi Kale, Diagnostic Dilemma in Diagnosis of Annular Pancreas: A Case Report. *Pediatr. Edu. Res.* 2024;12(2): 47-50.

### Abstract

**Background:** Annular pancreas (AP) is a congenital disorder of the pancreas, thought to result from the malrotation of the ventral pancreatic bud. This causes the duodenum to be encircled by the pancreatic tissue, leading to duodenal obstruction. The management of annular pancreas is usually surgical.

**Clinical Description:** A 10-month-old male infant presented with regurgitation of yellowish feeds for the past few months, with no other positive clinical findings. Radiological investigations revealed an obstruction after the first part of the duodenum. A barium swallow showed duodenal stenosis. The patient underwent surgery, and the diagnosis of annular pancreas was confirmed.

**Management and Outcome:** After clinical and radiological diagnosis, the child was managed surgically and underwent duodenojejunostomy. Postoperatively, the patient remained clinically stable and is symptom-free.

**Conclusion:** Annular pancreas is a rare but significant cause of duodenal obstruction, which can present from the neonatal period to adulthood. The patient may experience bilious or non-bilious vomiting. The definitive diagnosis is made via laparotomy. Surgical management is required, with duodenojejunostomy being the best treatment option.

**Keywords:** Annular pancreas, Duodenal obstruction, Regurgitation, Stenosis.

## INTRODUCTION

Annular pancreas is a congenital disorder of the pancreas, first identified in 1818 by Tiedemann<sup>(1)</sup>. The endodermal lining of the foregut (duodenum) gives rise to two buds: the dorsal and ventral buds, which fuse together after the rotation of the ventral bud to form the pancreas. Annular pancreas is thought to result from the malrotation of the ventral pancreatic bud. It is a type of pancreatic fusion anomaly.<sup>(2)</sup>

There are multiple theories explaining the formation of annular pancreas: failure of the ventral bud to atrophy; the ventral bud adhering to the ventral mesogastrium; or the defect being in the duodenum, with the pancreas filling those defects. Any of these can lead to the second part of the duodenum being encircled by the pancreas, resulting in duodenal obstruction.<sup>(3)</sup>

The most common cause of duodenal obstruction, aside from annular pancreas, in infants is atresia. AP

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Received on: 23-12-2024 Accepted on: 03-02-2025



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is associated with other congenital anomalies, such as Down's syndrome, duodenal atresia, and cardiac anomalies. The child present with typical bilious vomiting due to duodenal obstruction. Diagnosis is made by the presence of the double-bubble sign on X-ray. The definitive diagnosis can be made intraoperatively. When diagnosed before birth, the most frequent presentation is polyhydramnios due to duodenal obstruction. Annular pancreas presenting in childhood tends to be severe.<sup>(4)</sup>

### Clinical Description

A 10-month-old male infant presented with regurgitation of feeds for the past few months. According to the mother, the regurgitant feeds were yellow in color and stained the child's clothes. The child was hemodynamically stable and appropriate for age in terms of growth and development.

Clinically, the abdomen was not distended, with no visible veins or scars, but visible peristalsis was observed in the right upper quadrant, moving from left to right. On palpation, the abdomen was soft, non-tender, and without organomegaly. Normal bowel sounds were present.

An erect abdominal X-ray suggested duodenal

obstruction (Fig. 1). Ultrasound of the abdomen revealed a dilated stomach and first part of the duodenum, with normal wall thickness and peristalsis in the duodenum, indicating an obstruction after the first part of the duodenum.

A barium swallow showed a dilated duodenal bulb, and the second and third parts of the duodenum. Barium swallow showed dilated duodenal bulb, second and third part of duodenum and presence of contrast in the jejunum which was suggestive of duodenal web/stenosis (Fig. 2a & b).

### Management and outcome

Radiological investigations indicated duodenal obstruction, with the barium swallow pointing toward duodenal web/stenosis. The child underwent surgery, and intra operative findings revealed a dilated duodenum up to the third part, while the distal duodenum appeared normal with collapsed jejunal loops. The Ryles tube was able to pass into the jejunum. Annular pancreas was observed encircling the duodenum. Duodenojejunostomy was performed. The postoperative period was uneventful, and the child is doing well on follow-up



Fig. 1: X-ray erect showing dilated stomach and duodenum



**Fig. 2(a):** Barium swallow showing dilatation of duodenum



**Fig. 2(b):** Delayed film showing presence of dye distally

## DISCUSSION

The incidence of annular pancreas (AP) is very low, occurring in approximately 1 in every 20,000 births. The clinical presentation varies based on the extent of the obstruction, with vomiting being the most common symptom in 59-94% of cases, primarily of a biliary nature. Some patients with annular pancreas may remain asymptomatic and only be discovered incidentally during imaging, surgery, or autopsy<sup>(6)</sup>. The diagnosis of duodenal obstruction is typically based on clinical symptoms and the detection of the “double bubble” sign on a plain abdominal X-ray, which appears in 90.9-100% of cases. It can be further confirmed with a gastroduodenal series that shows obstruction in the duodenum. Some also suggest the use of computed tomography (CT) and magnetic resonance imaging (MRI). However, the gold standard for diagnosis remains a thorough examination of the duodenum and pancreatic head during surgery. Sencan et al, reviewed seven cases of annular pancreas and found that most frequent abnormalities linked to duodenal atresia or stenosis is annular pancreas, associated with Down syndrome and congenital heart disease.<sup>(6)</sup> Although the pancreatic tissue surrounding the duodenum in AP may cause extrinsic compression leading to partial obstruction, the true cause of the blockage is often a duodenal atresia or stenotic web beneath the annular pancreas. Traditionally, a plain radiograph has been used to detect congenital duodenal blockage, and a contrast scan is usually not necessary, except in cases of midgut volvulus that mimic duodenal atresia or stenotic web. Management is surgical, and the conventional approach is bypassing the obstructed duodenum through duodenoduodenostomy<sup>(7)</sup>.

Many recent studies report successful results with laparoscopic approaches<sup>(8,9)</sup>

## CONCLUSION

We successfully diagnosed and treated an annular pancreas in a 10-month-old who presented with partial duodenal obstruction without a definitive diagnosis. A barium study helped delineate the

duodenal obstruction, and duodenojejunostomy resolved the patient’s symptoms. Annular pancreas, though rare in childhood, should be considered in patients with unresolved obstructive symptoms.

*Conflict of interest:* NIL

*Funding:* NIL

## REFERENCES

1. Tieddmann F. Uber die Verschiedenheiten des Ausfuhrungsgang der Bauchspeicheldruse bei den Menschen und Saugetieren. Dtsch Arch Physiol. 1818;4:403.
2. Ali Almoamin H.H., Kadhem S.H., Saleh A.M. Annular pancreas in neonates; Case series and review of literatures. Afr J. Paediatr Surg. 2022 Apr-Jun;19(2):97-101. doi: 10.4103/ajps.AJPS\_180\_20. PMID: 35017379; PMCID: PMC8809467.
3. Fusco J.C., Malek M.M., Gittes G.K. Lesions of the pancreas. In: Holcomb G.W. 3rd, Murphy P.J., Ostlie D.J., editors. Ashcraft’s Pediatric Surgery. 7th ed., Vol. 46. London, New York, Oxford, Philadelphia, St. Louis, Sydney and Toronto: Elsevier Saunders; 2020. p. 737.
4. Lloyd-Jones W., Mountain J.C., Warren K.W. Annular pancreas in the adult. Ann Surg 1972; 176:163-70.
5. Wang D., Kang Q., Shi S., Hu W. Annular pancreas in China: 9 years’ experience from a single center. Pediatr Surg Int. 2018 Aug; 34(8):823-7.
6. Sencan A., Mir E., Günsar C., Akcora B. Symptomatic annular pancreas in newborns. Med Sci Monit. 2002 Jun 18; 8(6):CR434-7.
7. Kimura K., Mukohara N, Nishijima E., Muraji T., Tsugawa C, Matsumoto Y. Diamond-shaped anastomosis for duodenal atresia: an experience with 44 patients over 15 years. J. Pediatr Surg. 1990 Sep; 25(9):977-9.
8. Nagai K., Masui T., Anazawa T., Hatano E. Laparoscopic pancreatoduodenectomy for a metastatic tumor in a portal annular pancreas. Surg Oncol. 2022 Jun; 42:101772.
9. Polyakov A.N., Mirzaev T.S., Batalova M.V., Moroz E.A., Petrosyan A.P. Laparoscopic distal pancreatectomy for portal annular pancreas. Pirogov Russian Journal of Surgery. 2023;(6):108-113.