

CASE REPORT

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Preduodenal portal vein causing duodenal obstruction associated with situs inversus, intestinal malrotation and polysplenia: a case report

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Abstract

Background Preduodenal portal vein is a rare anatomical abnormality in which the portal vein passes anteriorly relative to the duodenum instead of posteriorly. It is believed to occur during embryonic development and is commonly associated with other congenital anomalies.

Case Presentation In this case report we discuss a 3-day-old male patient, presenting with symptoms consistent with gastric outlet obstruction.

An initial plain abdominal radiograph demonstrated an abnormally situated right sided gastric bubble, with an upper gastrointestinal contrast study confirming situs inversus with a markedly dilated stomach and dilated first part of the duodenum.

Subsequently the patient was taken to theatre, with intraoperative findings of preduodenal portal vein causing duodenal obstruction, which was managed surgically with gastro-duodenostomy.

Conclusion This case contributes to limited existing literature on a rare congenital abnormality; it highlights the importance of considering preduodenal portal vein as a potential contributor to congenital duodenal obstruction, especially in cohorts found to have additional anatomical variants such as situs inversus, as it is recognised that preduodenal portal vein often occurs as part of a syndromic collection of anatomical anomalies.

Keywords Preduodenal portal vein, Congenital duodenal obstruction, Intestinal malrotation, Duodenal obstruction

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Background

Preduodenal portal vein (PDPV) is a rare congenital vascular abnormality which involves the portal vein passing anteriorly relative to the duodenum instead of posteriorly [1]. The portal vein is formed from the vitelline veins during embryonic development and it is believed that PDPV occurs during this process [1]. The embryological left and right vitelline veins involve several anastomoses. Typically, between the fourth and twelfth week of gestation, the dorsal anastomosis persists with the caudal-ventral aspect regressing, creating the usual posterior course of the duodenal vein. However, in PDPV the caudal-ventral anastomotic aspect of the vitelline veins pathologically persists, leading to an anterior course [2].

The first reported case of preduodenal portal vein (PDPV) was reported by Knight in 1921 [3], it is a rare anomaly with a reported prevalence of 1:10,000 [4], with diagnoses of PDPV either being made via imaging or via intraoperative findings [5, 6].

PDPV is commonly associated with duodenal obstruction, this is either due to the abnormally situated portal vein causing obstruction directly, or obstruction secondary to other anatomical anomalies often associated with PDPV [7]. These congenital anomalies include portal vein duplication, bowel malrotation, annular pancreas and situs inversus [8].

PDPV is commonly diagnosed in paediatric cohorts who present with symptoms associated with intestinal obstruction, such as bilious vomiting, abdominal distension and poor feeding, with 4% of duodenal obstruction cases being attributed to PDPV [5]. However, there are also recorded cases of asymptomatic PDPV incidentally found in the older adult population [9].

Here we discuss a case of a 3-day old male who presented with non-bilious vomiting and epigastric fullness, he was later found to have preduodenal portal vein and

situs inversus abdominalis, which was managed successfully with gastro-duodenostomy.

Case presentation

A 3-day old male patient presented with non-bilious vomiting starting from the second day of life, which later became bilious. Apart from findings of epigastric fullness the child was otherwise well, they appeared active and was self-ventilating on room air. Their abdomen was soft on palpation, reported to be passing normal stool and all blood work was normal.

Apart from a potential risk factor for neonatal sepsis due to maternal urinary tract infection (UTI), there was no other significant antenatal history. The patient was born at term via caesarean section, with two other siblings, who were well with no noted antenatal complications.

Initial abdominal plain film imaging demonstrated dilated gastric bubble which was abnormally located on the right side of the abdomen. Due to these findings and the suspicion of gastric outlet obstruction, the patient was transferred to the neonatal intensive care unit for nasogastric tube insertion, fluid resuscitation and further investigations. These included an echocardiogram which indicated an interrupted inferior vena cava, situs ambiguous (Heterotaxia) and a normal structure of the heart. In addition, abdominal ultrasound demonstrated polysplenia with a central level extending to the left. Furthermore, an upper gastrointestinal contrast study further confirmed situs inversus with a markedly right sided dilated stomach and dilated first part of the duodenum (Fig. 1).

Based on the above findings the decision was then made to proceed with surgical intervention. Laparotomy was performed via a central transverse supraumbilical incision, where gastro-duodenostomy was undergone using a 4/0 vicryl single layer. Surgical findings included situs inversus, dilated stomach and a PDPV crossing over the distal half of the first part of the duodenum. Malrotation was identified as part of heterotaxy, but due to wide mesentery and no Ladd's bands being present, the rest of the bowel was left untouched (Fig. 2).

The post-operative course was uneventful with no complications, feeds were recommenced 3 days post procedure with the patient being able to be discharged home 6 days post operation.

Conclusion

This case represents one of the few documented cases of PDPV, therefore contributing to limited existing literature.

The combination of PDPV associated with duodenal obstruction, situs inversus, intestinal malrotation and



Fig. 1 Pre-operative Imaging: Left image of plain erect chest and abdominal film demonstrating dilated gastric bubble, which is abnormally located on the right side of the abdomen. Right image of upper gastrointestinal contrast study, demonstrating a markedly right sided dilated stomach and dilated first part of the duodenum

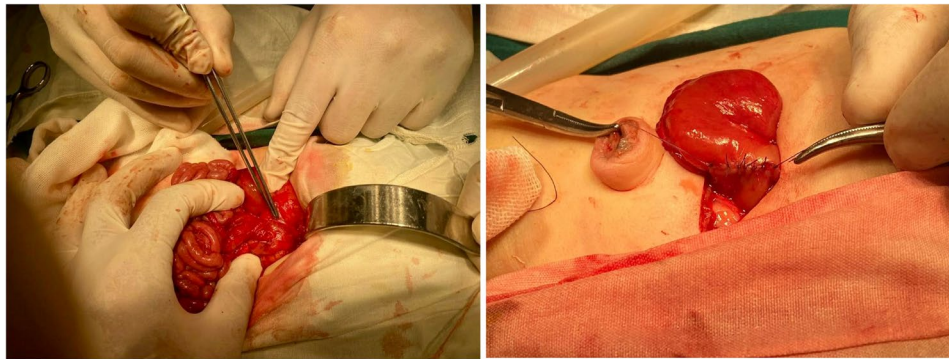


Fig. 2 Surgical Procedure: Left image demonstrating intraoperative findings of PDPV. Right image demonstrating completed gastro-duodenostomy

polysplenia is very rare, with only two cases evident upon reviewing the relevant literature [10, 11].

In these cases, two differing surgical approaches were taken, in Ohno et al. [10] they perform a duodenoduodenostomy, as opposed to case of Mordehai et al. [11] which involved gastroduodenostomy, as was done in this case. Although duodenoduodenostomy may be considered a more direct physiological repair with less complications, in this case a gastroduodenostomy was preferred. Due to the first part of duodenum being immobile and the portal vein crossing in front of the distal half of first part of the duodenum, it was technically much easier to undergo a gastro-duodenal anastomosis. This approach also avoids a gastro-jejunal anastomosis, which is associated with higher risk of marginal ulceration and stenosis [12].

As the duodenal segment proximal to the PDPV was markedly dilated, with no other signs of intrinsic obstruction, the PDPV was considered the cause of obstruction, rather than an incidental associated finding. This is another unique aspect of the case, as most commonly the cause of obstruction is related to the presence of associated anomalies including malrotation, annular pancreas or duodenal web, rather than the PDPV itself [13].

In this case the neonate presented with non-specific symptoms at a very early stage of life, main features of which included non-bilious vomiting and epigastric fullness.

This highlights the importance of appropriate and focused imaging in these cohorts, which provided the initial indicator of an anatomical anomaly.

Although rare, and often an incidental intraoperative finding, there is an importance in recognising that PDPV often occurs as part of a syndromic like collection of anatomical anomalies. Therefore, it should be considered especially in those who are found to have duodenal atresia and anatomical variants such as situs inversus, to ensure its identification and appropriate management.

Abbreviations

| | |
|------|---------------------------------|
| PDPV | Preduodenal portal vein |
| CDO | Congenital duodenal obstruction |

UTI Urinary tract infection

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s43054-025-00482-4>.

Supplementary Material 1

Authors' contributions

Dr James Matthews: Writing the manuscript and analysis of data. Mr Ahmed Azzam: Data collection, writing the manuscript, operator and guarantor. Mr Mohamed Abdellatif: operator and data collection.

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Data availability

Not applicable.

Declarations

Consent for publication

Consent has been sought and gained for the publication of this case report.

Competing interests

The authors declare no competing interests.

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