CASE REPORT

Prolapse of inverted ileal loops through a patent vitellointestinal duct

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SUMMARY

We report a case of a prolapsed patent vitellointestinal duct (PVID) in a 2-month-old girl child who presented with sudden increase in size of a polypoidal lesion into a large, 'Y'-shaped reddish, prolapsing lesion, discharging gaseous and faecal matter at her umbilicus. The lesion was diagnosed as a prolapse of inverted ileal loops through the PVID. The child had no associated congenital anomalies. A transumbilical exploration was performed, followed by wedge resection and anastomosis. The child tolerated the procedure well and the postoperative course was uneventful. If the omphalomesenteric duct fails to obliterate a range of congenital defects related to the umbilicus, it can become clinically apparent. Meckel's diverticulum is the commonest of these defects but is most often asymptomatic. PVID is the most common symptomatic anomaly of the patent omphalomesenteric duct and requires prompt surgical correction to avoid complications.

BACKGROUND

The primitive gut is derived from endoderm of the developing embryo by folding of the embryonic disc. This primitive gut is in free communication with the yolk sac through the omphalomesenteric duct (OMD) or vitelline duct (VD) during the third week of gestation. The OMD/VD provides nutrition to the growing embryo until placenta is developed. Between the fifth to seventh weeks of gestation, the OMD/VD attenuates and separates from the primitive gut.¹⁻³ A range of congenital anomalies occur secondary to partial or complete failure or involution of the OMD.¹⁻³ These anomalies of the OMD include Meckel's diverticulum, patent vitellointestinal duct (PVID), umbilical fistulas, umbilical sinus tracts, umbilical cysts, umbilical polyps and congenital bands.¹⁻² OMD anomalies affect approximately 2% of the population globally and most of those affected often remain asymptomatic throughout their life.¹⁻² Symptomatic defects of the OMD might require surgical correction.¹⁻² Meckel's diverticulum is the most common among OMD anomalies, however, the PVID is more commonly symptomatic.¹⁻⁴ We present an interesting case of an ileal prolapse through PVID in a 2-month-old child.

CASE PRESENTATION

A 2-month-old infant girl presented to the emergency department of Department of Paediatrics at RD Gardi Medical College, Ujjain, Madhya Pradesh, India, with evisceration of bowel loops

through the anterior abdominal wall in the region of the umbilicus for 3 days. Over the last 1 day, the mother also noted gaseous and faecal matter passing from the ends of the defect whenever the baby cried. The child was active and accepting breast feeds well, and passing urine and normal coloured stools, according to the parents. On enquiry, the mother gave a history of the presence of a small reddish coloured polypoidal mass at the base of the umbilicus with occasional mucoid and white discharge, which was noticed after the cord fell (around the 14th day of life). The mass suddenly increased to the present size over the past 3 days.

The child was born to a primiparous, 21-year-old mother, at home, by spontaneous vaginal delivery at term, assisted by a trained traditional-birth attendant; the baby had cried immediately after birth. The mother gave no history of antenatal drugs apart from iron and folic acid, and there were no apparent high-risk factors based on her history. The father was a farmer. The parents belonged to a low socioeconomic class with a monthly income of around US\$70. The child was exclusively breast fed and had not yet received any immunisation at the time of admission.

On examination, the child had stable vitals with a heart rate of 140 bpm, respiratory rate of 36 breaths/min and a normal blood pressure of 90/56 mm Hg in the right upper limb in supine position. The weight of the child was 3.8 kg, length 54 cm and head circumference 38 cm; which fell between the 25th and 50th centile for age and sex. The general examination did not reveal any clinically significant anomalies. Systemic examinations including the cardiovascular system were normal.

Abdominal examination revealed a 'Y'-shaped bowel loop prolapsing through the umbilicus, with the vertical limb being short and lying at the umbilicus, presenting a classic 'ram's horn appearance' (figure 1). Bowel mucosa was pink and healthy. When the baby cried, faeculent matter was expelled from the base, as shown in figure 1. The abdomen was soft and bowel sounds were audible.

INVESTIGATIONS

On admission, the haemoglobin was 11.5 g/dL, total leucocyte count 14 600/mm³ with polymorphs 74%, lymphocytes 20%, eosinophils 4% and monocytes 2%. Peripheral blood smear showed a mild shift to the left with presence of toxic granules in polymorphs, suggestive of sepsis. Serum C reactive protein was >3 mg/dL, suggestive of probable sepsis. Serum electrolytes were normal. Serum creatinine was 80 µmol/L.

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Figure 1 Photograph of patent vitellointestinal duct showing prolapse of proximal and distal small intestine with intussusception (arrow).

TREATMENT

The child was started on intravenous fluids, antibiotics intravenous ceftriazone (100 mg/kg/day) and metronidazole (30 mg/kg/day), and was shifted for surgery within 2 h of admission.

Intraoperative findings revealed prolapse of the PVID seen as a vertical limb of the 'Y', as shown in figure 2. Inverted small intestine was emanating from the vertical limb as a fountain, shown as two limbs of 'Y' as in figure 2. The patient was operated via a transverse infra-umbilical incision. The intussuscepted ileal loops were reduced manually. At the ileal end of the PVID, a wedge resection and end-to-end ileoileal anastomosis was carried out. The umbilical end of the defect was dissected from the umbilical wall; healthy bowel loop with preserved vascularity was reduced. Reconstruction of the umbilical defect was performed with primary closure of the abdominal wound. No significant postoperative complication was observed.

OUTCOME AND FOLLOW-UP

Enteral feeding was started on postoperative day 6. The child was discharged after 8 days of hospitalisation after completing

due immunisations. She was asymptomatic and gaining weight at follow-up after 1 month.

DISCUSSION

Meckel's diverticulum is the most common of OMD/VD anomalies but it is one of the most unlikely to cause symptoms, being symptomatic only in 2% of the population.^{1 2 4} In developing countries, PVID is the most common OMD anomaly to present with symptoms.⁴ Various clinical presentations include gastrointestinal bleeding (40–60%), obstruction (25%), diverticulitis (10–20%) and umbilical discharge.^{2 3 5}

Intestinal obstruction may result from intussusception, with the diverticulum as a lead point or by herniation or prolapse of the bowel through a PVID (with a characteristic 'ram's horn' appearance).⁶ Other causes of obstruction include volvulus and bezoar.

Ileal prolapse through the PVID is an extremely rare entity. The exact incidence is not known. However, it has been reported in children by the following researchers: Elebute and Ransome-Kuti⁷ in 1965, Davis and Kehm⁸ in 1967, Lal and Dhall⁹ in 1976 (reported three cases), Rohatgi and Gorthi¹⁰ in 1984, Gvalani *et al*¹¹ in 1985, Mohite *et al*¹² in 2007, Zea *et al*¹³ in 2009, Agrawal and Memon¹⁴ in 2010, Singh *et al*¹⁵ in 2011, Pauleau *et al*¹⁶ in 2012, Patel *et al*¹⁷ in 2013 and Kadian¹⁸ in 2015.

Wide defects of PVID with predisposing conditions such as cough and constipation, which increase intra-abdominal pressure, may lead to partial or total prolapse of the intestine through the patent duct. In our patient, a cough could have been responsible for the prolapse of the small bowel loop. Prompt surgical intervention is required to prevent complications, including subacute or acute intestinal obstruction, strangulation and gangrene of the prolapsed intestinal loop.² If the patient arrives early, primary closure of the PVID following reduction of the prolapse may be possible. If the defect is large, resection of the loop of intestine near the patent duct can be carried out followed by primary anastomosis.² If the patient arrives late with gross oedema, or the viability of the intestinal

Figure 2 Line diagram showing intussusception of both proximal and distal ileum through the patent vitellointestinal duct (blue—outer wall and red—inner wall of the ileum).

loops is in question, then exteriorisation of the suspected loop or loop ileostomy is the option.¹²

Patient's perspective

I, as the father of the child, was concerned about how my child got a problem of this extent. How could this problem remain concealed for 2 months? I was also concerned about how such a young child would undergo surgery successfully. The team of doctors responsible for the care of my child alleviated my anxiety and my child underwent successful surgery.

Learning points

- Failure of obliteration of the omphalomesenteric duct (OMD) produces a range of congenital defects related to the umbilicus.
- Meckel's diverticulum is the most common among OMD anomalies, however, the patent vitellointestinal duct (PVID) is the most common symptomatic anomaly.
- Ileal prolapse through PVID is quite rare and can produce a 'Y'-shaped, or 'ram's horn', defect.
- Prompt repair of PVID is needed to prevent complications.

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