CASE REPORT

Consecutive siblings, each with two separate small bowel atresias

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SUMMARY

The familial occurrence of multiple-level intestinal atresia in newborn is extremely uncommon, with very sporadic similar cases reported in the literature. We present a case of multiple intestinal atresia in two consecutive siblings who successfully underwent surgical repair.

BACKGROUND

Intestinal atresia is a common cause of bowel obstruction during the neonatal period. Multiple bowel atresia has been reported in 6%–29% of all atresia. Familial occurrence of multiple intestinal atresia is uncommon and rarely has been reported. The most frequent multiple intestinal atresia is jejunal atresia; however, combined duodenal and jejunal atresia has been also described in literature with rare familial instances. The incidence of duodenal atresia is estimated at 1 in 6000–10000 and jejunal atresia 1 in 5000 live births. It is important to distinguish familial multiple intestinal atresia from ‘Hereditary multiple-level intestinal atresia syndrome’ (HMIA), which is the rarest form of multiple intestinal atresia, associated with immune deficiency and a fatal prognosis, with a presumed autosomal recessive mode of inheritance.

CASE PRESENTATION

Two siblings were born to white, British, non-consanguineous parents. The father had been investigated for poor weight gain during infancy, with unremarkable results. No other relevant family history was noted.

Case 1

Baby 1, a 1975 g female infant, was noted antenatally to have polyhydramnios and dilated bowel loops. She was born at 34 weeks following maternal antepartum haemorrhage (APH). After birth, an abdominal X-ray showed ‘triple bubble’ pattern (figure 1). She was referred for surgical management of suspected duodenal/jejunal atresia and an upper gastrointestinal contrast study was performed. This demonstrated normal rotation of the gut. Baby 1 underwent exploratory laparotomy on day 1, which showed two jejunal atresias (type 2 proximal jejunal atresia and type 1 distal jejunal atresia) with proximal volvulus but intact viable bowel, as well as a sealed antenatal perforation. The rest of the gut was healthy. A primary anastomosis was performed.

Postoperatively, she reached full feeds by day 30 of age. Following frequent large vomits, pH study was performed, demonstrating acid reflux. Ranitidine and Carobel were started with good response and feeding progressed. Furthermore, neonatal screening reported high thyroid stimulating hormone (TSH), with dysmorphogenesis confirmed on nuclear medicine scan. The baby was commenced on thyroxine and TFTs have been improving on medication, under endocrinologist review.

Case 2

The older sibling of the patient described above, Baby 2, was diagnosed antenatally with duodenal atresia following a pregnancy complicated by polyhydramnios. He was 1360 g, born at 32 weeks gestation. On day 2, he was found intraoperatively to have type 3 postampullary duodenal atresia and duodenoduodenostomy was performed. The proximal bowel was examined and nasogastric tube (NGT) passed into stomach. The distal duodenum was also examined and NGT appeared to pass with saline flushed distally. However, when attempting to feed, this infant developed vomiting, and he was diagnosed, on contrast study, with further obstruction. Type 1 proximal jejunal atresia was noted at reoperation on day 13 of age, with jejunojejunostomy performed. This time, the entire length of small and large bowel was examined with enterotomies, with NGT passed and saline flushed until passed out of rectum. Enteral feeding was then rapidly established without any concerns.

INVESTIGATIONS

No specific investigations were performed to rule out concurrent immunodeficiency; no clinical concerns were noted.

OUTCOME AND FOLLOW-UP

Baby 1 was discharged on day 44 of age on 18% PurAmino by bottle, with Carobel in view of feed intolerance. Baby 2, after establishing feeding, was discharged on day 58 of age on Infantrini milk by bottle. Surgical follow-up performed regularly in both siblings has not shown evidence of adhesive small bowel obstruction so far. Genetic investigations have shown normal comparative genomic hybridisation microarray in both siblings, making chromosomal abnormality unlikely, with Baby 1 enrolled into the 100 000 Genomes Project.

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Figure 1 Abdominal radiograph showing gaseous distension of stomach and proximal duodenum.

DISCUSSION

Intestinal atresia commonly presents with signs of bowel obstruction such as bilious vomiting or aspirates associated with abdominal distension and failure to pass meconium in lower obstruction.

An increasing number of intestinal atresias are identified by prenatal ultrasonography. For example, in the presence of polyhydramnios, stomach and duodenal distension from ingesting amniotic fluid would suggest duodenal atresia. It is difficult to detect more distal intestinal atresia by this method. Postnatally, duodenal atresia is characterised radiographically by the classic 'double-bubble' gas pattern, whereas proximal dilated bowel loops suggest jejunoileal atresia.

In patients with multiple intestinal atresia, it is extremely important to consider familial occurrence of multiple-level bowel atresia to be a separate entity distinct from HMIA, a very

rare and fatal condition. HMIA is characterised by multiple intestinal atresia from pylorus to rectum, intraluminal calcification and an autosomal recessive inheritance. In contrast, the above cases had small bowel atresias, no evidence of calcification on plain abdominal radiographs and no concerns with long-term morbidity/mortality were noted (table 1).

The presumed aetiology of congenital intestinal atresia depends on the site of the bowel obstruction. It is believed that the embryogenesis of duodenal atresia is related to the failure of recanalisation of the fetal bowel. Atresia of the jejunum and ileum is considered to be due to a compromised intrauterine gut blood supply, leading to ischaemic damage of the small bowel and affecting its development. Other injuries such as prenatal volvulus, intussusception, perforation and intestinal strangulation via a hernia may result in jejunoileal atresia, compromising previously normal fetal intestine.

In a report of 277 cases of intestinal obstruction, duodenal atresia was present in 92 (33.2%) infants, and it was associated with jejunal atresia in five (5.4%) infants.¹ Familial cases of multiple-level atresia have also been noted. A report of two siblings with both duodenal and proximal jejunal atresia suggested that genetics may play a crucial role in developing multiple small bowel atresia.² The existence of specific embryological pathways, which when disrupted by genetic or non-genetic factors, result in gut atresia, has been mooted by Shorter *et al.*³ This theoretical model suggested that the majority of jejunoileal atresia cases are caused by abnormal embryological development of the gut blood supply rather than the loss of pre-existing vessels as per the classic vascular accident theory. Other authors favoured the possibility of defective recanalisation of the whole gastrointestinal tract during its embryonic development rather than an ischaemic event as the underlying cause of multiple intestinal atresias.⁴

In the above cases, despite the different sites of the obstructions in the two siblings, it is conceivable that intestinal atresia may be a consequence of a malformative process of the gastrointestinal tract and genetics may play an important role. Furthermore, the association of intestinal atresia and congenital hypothyroidism in one sibling could be explained by the same malformative process occurring during fetal embryological development. The thyroid and the gastrointestinal system arise from adjacent primitive foregut, during the

Table 1 Differences between multiple intestinal atresia and hereditary multiple intestinal atresia

	Multiple intestinal atresia	Hereditary multiple intestinal atresia
Site	Small/large bowel	Widespread, small/large bowel
Abdominal calcifications	No	Homogenous, large, round/oval, intraluminal
Biliary duct dilatation	Can be present	Can be present
Combined immunodeficiency	No	Yes
Mortality	Low-moderate, depending on case	High
Genetic defect	Not known	Purported TTC7A gene

Learning points

- ▶ Intestinal obstruction should be considered in infants presenting with bilious vomits/aspirates and abdominal distension. However, this should also be a differential diagnosis in uncommon presentations such as upper right abdominal palpable mass.
- ▶ Our case also demonstrates that fixing one atresia does not necessarily exclude further atresias. It is important to fully examine remaining bowel during the operation. Vomiting can be a sign of a second atresia or even slow gut transit due to thyroid problems.
- ▶ Multiple-level intestinal atresias should be distinguished from the rare syndrome of hereditary multiple intestinal atresias (table 1).
- ▶ History of maternal polyhydramnios and previous sibling with multiple intestinal atresia should be considered as a risk factor for further familial occurrence of multiple intestinal atresia.

first trimester of pregnancy. This allows the opportunity for maldevelopment of one organ to influence the correct development of the other.⁵ It is possible with the advent of whole genome sequencing genes involved in the embryogenesis of both organs could be identified.

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