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CASE REPORT

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Unusual cause of neonatal intestinal obstruction

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Abstract There are many causes of intestinal obstruction in the neonatal age. The most common types are mechanical and result from congenital malformations of the gastrointestinal tract. However, functional disorders also occur. In some cases, diagnosis can be made prenatally but in others manifestation occurs after birth.

The aim of this article is to present the case of a newborn with intestinal obstruction characterized by microcolon, dilated small bowel and megacystis known as Megacystis-Microcolon-Intestinal Hypoperistalsis syndrome, a very rare cause of intestinal obstruction. So far, less than three hundred cases have been reported in the literature. The prognosis of this syndrome is generally poor with most affected children dying in the neonatal period or infancy.

Intestinal obstruction is a serious and life threatening condition. It may be explained by gross anatomical, histological or other abnormalities affecting the gut of the fetus. [1] Differential diagnosis may also take into account various anatomical, histological, or other abnormalities that may result in the obstruction of gut. [1] The incidence of intestinal obstruction is estimated at about one in 1500 live births.[2] The cause of obstruction can be extrinsic or intrinsic.[3] Atresia is quite common in the anorectal region, while atresia of the stomach occurs rarely.[4] Colonic atresia is a rare condition of bowel obstruction in neonates.[5] Membranous or complete obstruction may be present in the small intestine and may affect multiple sites. Stenosis may result from extrinsic or intrinsic factors.[4] It arises from the failure of physiological rotation or fixation of the intestine in utero. Malrotation is one of the most serious cases, when there is incomplete rotation of the intestine into flexura duodenojejunalis or incomplete rotation of the caecum. Duodenal obstruction may also result when adhesion bands of Ladd straps down the second part of the duodenum.[1]

The second group of causes of bowel obstruction in the newborn consists of functional intestinal obstructions. It develops due to defects of bowel inervation and differentiation of ganglion cells.[4] It includes small left colon syndrome or neuronal intestinal dysplasia type A and neuronal intestinal dysplasia type B.[6]

Case report

The authors present the case of a female newborn of third pregnancy order. At the 30th gestational week, ultrasonography showed cystic formation in the abdomen. The patient was born by Caesarean section in the 36th week of gestation with a weight of 3350 grams (corresponding to more than the 95th percentile) and a length of 50 centimeters. Apgar score was 10/10.

On the second day of life, abdominal distension and a palpable mass were observed. The patient had recurrent bile stained vomitus. She did not pass meconium within 48 hours. Abdominal ultrasound examination confirmed mild dilatation of renal pelvis on the left side and an extremely dilated urine bladder (8x10cm). Foley catheter was inserted to decompress the urinary bladder, reduce abdominal distension and prevent vesicoureteral reflux.

Plain radiography showed features of intestinal obstruction (figure 1) while contrast enema identified a microcolon (figure 2). These findings were confirmed at

surgery. Findings at surgery also included hyperfixation of duodenum was found in the duodenojejunal region, mesenterium commune and volvulus. Distal chimney end-to-side ileostomy was performed.
Post-operatively, intestinal obstruction recurred necessitating repeat laparotomy. During the second laparotomy surgeons found a huge urinary bladder (megacystis) which they attributed to Berdon's syndrome. The earlier distal chimney ileostomy was revised and separate orifices created. This time, samples were taken for histological examination from terminal ileum.

Fig 1

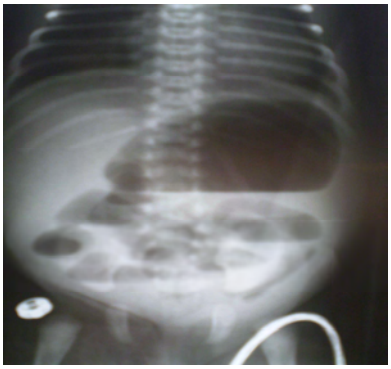
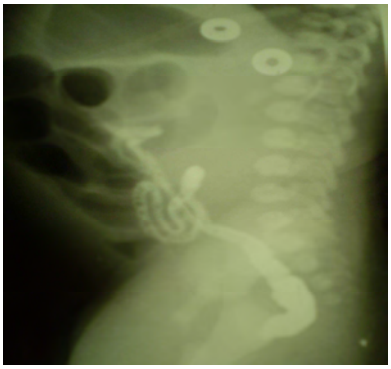


Fig 2



Postoperatively, the baby was offered minimal enteral feeds consisting of elemental infant formula based on free amino acids. However, the feeds were not tolerated as the baby was vomiting repeatedly. Consequently a third laparotomy was performed during which adhesiolysis was done and full thickness biopsies of the small and large bowel and also urinary bladder were taken. Biopsy from the gut confirmed hypoplasia of individual smooth muscle layers of the small intestine and aganglionosis of both nervous plexi of the small intestine. Cytogenetic examination confirmed female karyotype 46, XX.
On the 32nd day of hospitalization, the baby developed septicaemia (*Klebsiella pneumoniae*). Despite comprehensive treatment, the child died as a result of multiorgan failure in the 41st day of life.

Discussion

Megacystis-microcolon-hypoperistalsis syndrome (MMIH syndrome) is a rare cause of neonatal intestinal obstruction in neonatal age. It was first described in literature in 1976 in five female infants. Patients had abdominal distension, intestinal obstruction, dilated small intestine and microcolon.[7] A total number of 277 cases had so far been reported in literature.[8] The pathogenesis of the MMIH syndrome is unknown. It is assumed that the primary event is an intramural inflammatory process with secondary impairment of digestive and urinary function, followed by hypoperistalsis and bladder distension.[9]

Histological examination confirmed vacuolar degenerative changes in smooth muscle cells, with excess amount of connective tissue: nerve cells may be present in both the dilated bowel as well as in microcolon.[10] In our patient hypoplasia of the smooth muscle layers and aganglionosis of both nervous plexi of the small intestine were confirmed.

Intestinal nervous system of newborn is often immature and develops after birth. There are ganglion cells in different stages of morphological and functional maturation.[6] A similar case of aganglionosis is described by Chamyan et al[11] in 2001 in a patient with trisomy of 18. Genetic testing in our patient confirmed a female karyotype 46, XX. Vezina et al[12] in 1979 reported the case of a patient with histological examination showing focal areas without ganglion cells and other areas with an apparent increase in mature ganglion cells. Couper et al[13] in 1991 presented the case of a child who had MMIH syndrome multiple cardiac rhabdomyomata concurrently. The authors therefore commented on the need to exclude tuberous sclerosis in these patients, which are often frequently associated with it.
Affected newborns are usually born prematurely but their weight is often above-average for the given gestational age.[14] Our patient's weight at birth was above the 95th percentile for gestational age.

Megacystis-microcolon-hypoperistalsis syndrome is an autosomal recessive disorder with the evidence of consanguinity, with unknown pathogenesis whose genes map to 15q24.[11] There is no effective treatment as neither surgery nor medical treatment proves successful.[15]

Experimentally, the detailed analysis of 15q24 gene in homozygous mice confirmed the failure of this gene. Mice in which the alfa3 subunit or both the beta2 and beta4 subunits of neuronal nicotinic acetylcholine receptors were lacking had features in comparable to those of megacystis-microcolon-intestinal hypoperistalsis syndrome; however high frequency of polymorphism was detected.[16] Some patients survived in response to multivisceral transplant surgery; however all of them tolerated enteral feedings and showed appropriate gastric emptying. [17, 18] Intermittent catheterisation remains obligatory due to persistent bladder dysfunction.[8]

Prenatal diagnosis is possible in the second trimester of pregnancy with the finding of enormously enlarged fetal bladder and subsequently in the third trimester by polyhydramnios. [12, 19] Penman et al[20] in 1989 presented a case report on congenital hydronephrosis and bladder

dilatation without an organic cause of obstruction. In the case of our patient, symptoms were mainly observed in the digestive system but a permanent urinary catheter was introduced to prevent vesicoureteral reflux.

Despite prenatal diagnosis and comprehensive care of the newborn, it is not possible to prevent the progressive changes that occur in the intestinal wall and bladder.
The prognosis is generally poor and most children die in the neonatal period due to progressive changes in the intestinal wall and associated complications. Oka et al[19] in 2008 referred to the case of a patient, who lived nearly two years with frequent episodes of infection and sepsis. At one and half years of life, the child was prepared for liver and gut transplant. The child went through a turbulent period of long-term parenteral nutrition with multiple complications, including pulmonary edema, portal hypertension with repeated sclerotherapy of esophageal varices, liver failure and subsequent multiple organ failure.

Conclusion

Megacystis-microcolon-intestinal hypoperistalsis syndrome is a rare cause of neonatal intestinal obstruction. It may be suspected prenatally on the basis of indirect findings like polyhydramnios and dilatation of the bladder. MMIH syndrome is an autosomal recessive disorder of unknown pathogenesis, which is probably due to the failure of the gene for nicotinic-acetylcholine receptors localized on chromozome 15.

There is no definitive treatment for this disease. Patients die due to progressive and irreversible changes in the intestinal wall and bladder. Despite it being a rare cause of intestinal obstruction, it is necessary to consider it in terms of differential diagnosis of intestinal obstruction and pathology of urinary bladder in the newborn.

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