

Small bowel obstruction in infants due to complicated Meckel's diverticulum: A case series

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World Journal of Advanced Research and Reviews, 2023, 19(03), 060-066

Publication history: Received on 01 July 2023; revised on 28 August 2023; accepted on 31 August 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.19.3.1602>

Abstract

Objectives: Our purpose is to illustrate the radiological aspects of Meckel's diverticulum as an etiology of small bowel obstruction in infants.

Material: We report a group of 4 patients with Meckel's diverticulum complicated with small bowel obstruction that underwent surgery. We reviewed patient records, clinical presentation, ultrasound and CT imaging and intraoperative findings.

Results: All included patients presented symptoms of bowel obstruction, one patient presented acute abdomen symptoms. The median age of our group was 5 years, all patients were males.

All patients underwent radiological explorations. Ultrasound showed small bowel dilatation in all cases, and CT scan confirmed small bowel obstruction with ischemic complications in one patient.

All of the 4 patients had laparotomy with the finding of MD responsible of small bowel obstruction in all cases, with on case of perforated loop and latero-caecal abscess. The obstruction was secondary to fibrous adhesions in three cases and the omphalomesenteric duct in one cases.

All the patients had normal evolution with no post-operative complications.

Conclusion: Meckel's diverticulum represents a rare embryological remnant. It is a differential diagnosis in pediatric bowel obstruction and remains an intraoperative surprise despite the very advanced imaging studies.

Keywords: Meckel's diverticulum; Small bowel obstruction; Pediatrics; Imaging

1. Introduction

Meckel's diverticulum (MD) is the most common congenital malformation of the gastrointestinal tract [1-4], it is defined as an incomplete closure of the intestinal end of the omphalomesenteric duct [1-4]. It occurs in 2% of population [3]. The complication rate of MD is estimated at approximately 4 % [1], and occurs mostly in early childhood [3].

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The most frequent complication is obstruction due to the adhesive bands, and less often intussusception [2, 3].

The symptoms are non specific and may be misdiagnosed with other intestinal disorders [4,6].

Many imaging methods can be used to explore MD's complications, but mostly the results are non specific which is why radiologists and pediatric surgeons should be aware of this diagnosis [3,4]. We will pretend our ultrasound and CT scan results and compare it to the literature.

2. Material and methods

We report a series of 4 cases of children hospitalized in our pediatric surgery department from January 2019 to January 2022. All of those patients had Meckel's diverticulum complicated with small bowel obstruction and underwent surgery. We reviewed patient records, clinical presentation, ultrasound and CT imaging and intraoperative findings.

3. Case No 1

A 4 month-old male infant presented with bilious vomiting, an important abdominal distension with refusal to eat of 3 days duration. His last defecation was noticed 2 days before his admission.

On presentation, the patient's vital signs were stable, he was hypotonic, and had severe dehydration signs (decreased skin turgor and oliguria).

The abdominal examination revealed a distended and soft abdomen. Bowel sounds were normal.

Abdominal ultrasound showed dilated intestinal loops with a 2,5 centimeter diameter and aperistalsis, it also showed free fluid in the pelvis.

A CT scan was performed showing dilated intestinal loops with two "beak signs", without any signs of intestinal ischemia (figure 1).

The patient was taken to the operating room, and underwent laparotomy with the finding of distended small bowel loops obstructed by fibrous band extending from a Meckel's diverticulum (figure 2). Excision of the fibrous band and resection of the diverticulum was realized.

The patient had an uneventful recovery and was discharged in the 6th postoperative day.

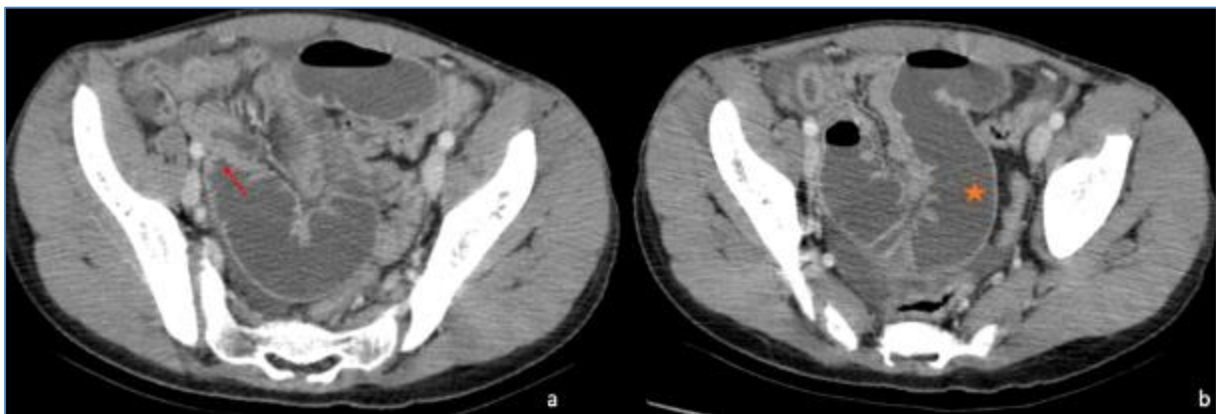


Figure 1 Axial computed tomography showing dilated small bowel loops (star) with a beak sign (red arrow)



Figure 2 Per operative image showing dilated loop obstructed by a fibrous band extending from Meckel's diverticulum (black arrow)

4. Case No 2

A 4-year-old male child with no surgical history, was admitted to the emergency department with abdominal pain, and constipation for 3 days of duration.

On presentation, the temperature was 39 C°, and the pulse rate was 120 beats / min. Abdominal examination showed an important distension with tenderness all over the abdomen.

Laboratory investigation revealed dehydration and leukocytosis. Plain X-ray revealed multiple air fluid levels (figure 3).

Abdominal ultrasound showed dilated intestinal loops and aperistaltis , it also showed free fluid all over the abdomen. A CT scan was performed showing dilated intestinal loops with no enhancement which is a sign of intestinal ischemia , it also showed latero-caecal blind digestive structure that was not the appendix which made us suspect the Meckel-s diverticulum (figure 3).

Abdominal exploration revealed entrapment of proximal ischemic ileal loop due to an adhesion formed between the Meckel's diverticulum and the caecum. The ischemic loop was resected together with the MD and an end-to-end anastomosis was performed (figure 4).

No post-operative complication was noted.

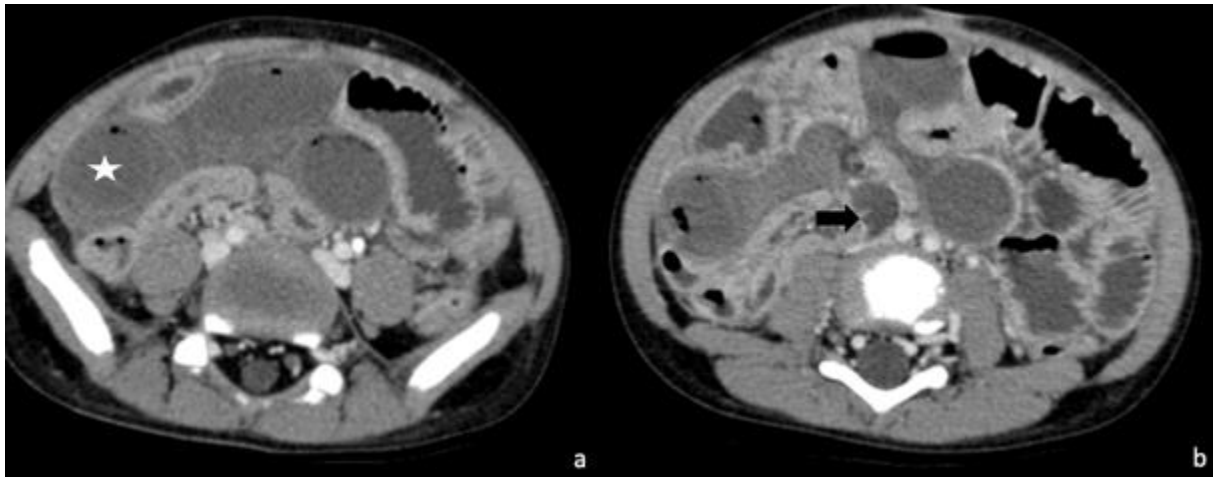


Figure 3 Axial computed tomography showing ischemic (a) with a cystic lesion in the right lower quadrant of the abdomen (b)



Figure 4 Per operative image showing ischemic dilated loops obstructed by a fibrous band extending from Meckel's diverticulum

5. Case No 3

A 10-year-old boy with no surgical history presented at the emergency department with acute lower abdominal pain, vomiting (not bilious) and fever. The patient was tachycardiac and the temperature was 38,7 C°.

He had abdominal distension and tenderness. Laboratory investigation showed elevated inflammation parameters and leukocytosis.

Abdominal ultrasound showed dilated intestinal loops and latero-caecal collection. The appendix was not found. The diagnosis of appendicitis was suspected.

A CT scan was then performed, showing a latero-caecal abscess collection without appendix individualization . It also showed dilated intestinal loops realizing a C-shaped configuration and a beak sign. We put forward the hypothesis of appendicular abscess with a closed loop obstruction secondary to fibrous adhesions (figure 5).

The patient underwent laparotomy with the finding of a small bowel loops strangulation caused by an MD with the omphalomesenteric duct . The loop was perforated and complicated with an abscess. The abscess was drained and no resection had been done.

The evolution was satisfying.

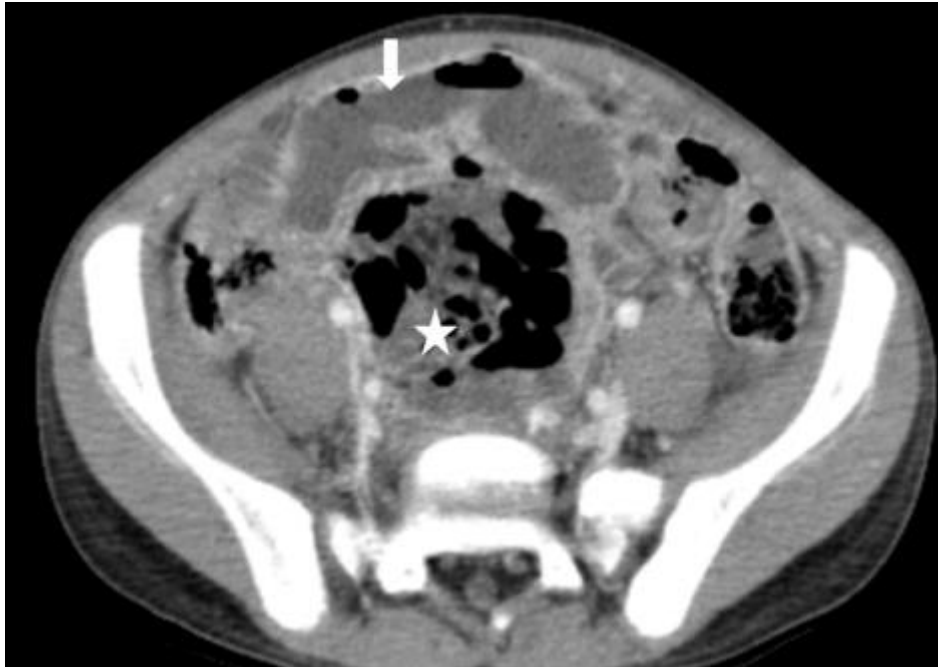


Figure 5 Axial computed tomography showing dilated small bowel loops (star) and latero-caecal abscess collection (white star)

6. Case No. 4

A 6 year -old male infant presented with abdominal pain and distention of 4 days duration. His last defecation was noticed 3 days before his admission.

On presentation, the patient’s vital signs were stable.

The abdominal examination showed a distended and soft abdomen, and hyperaudible peristalsis in the lower abdomen.

Abdominal ultrasound showed dilated intestinal loops, and Plain X-ray revealed multiple air fluid levels .

A CT scan was performed showing dilated intestinal loops with 4 “beak signs” , without any signs of intestinal ischemia. Small bowel obstruction was diagnosed. It also showed a cystic lesion in the middle of dilated loops (figure 6).

The patient underwent laparotomy with the finding of distended small bowel loops obstructed by fibrous band extending from a Meckel’s diverticulum. Excision of the fibrous band and resection of the diverticulum was realized .

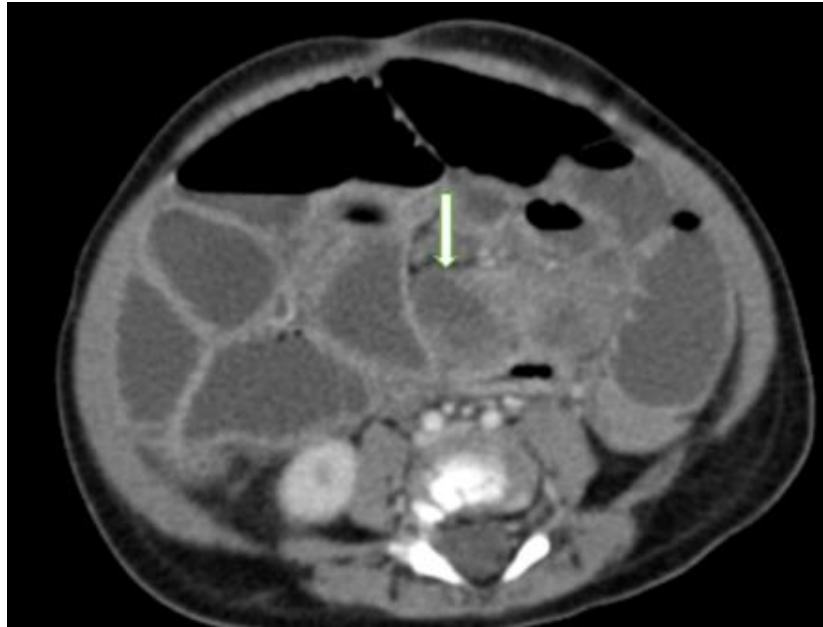


Figure 6 Axial computed tomography showing a cystic lesion in the center of dilated small bowel loops (white arrow)

7. Discussion

Meckel's diverticulum results from an incomplete closure of the intestinal end of the omphalomesenteric duct [1-4]. It is a true diverticulum typically located on anti-mesenteric border, mainly at 2 feet from the ileo-caecal junction [2].

The symptomatic cases are reported to be present most frequently in children under 10 years of age [2].

Although most of the MD cases are asymptomatic, many complications have been described: obstruction, intestinal bleeding, perforation, diverticulitis, volvulus and rarely neoplasms [4-6].

The most frequent complication is obstruction, resulting from adhesive bands or omphalomesenteric bands [2, 3, 7]. It occurs due to twisting of the small bowel around a band. It can also happen secondary to intussusceptions [2, 3, 7].

Diagnosis of complicated MD is challenging. Since there is no specific sign for it in the most used imaging tools.

Plain radiography is the first approach in evaluating small bowel obstruction. But, it is not usually helpful in the diagnosis of MD, it may be normal or show signs of small bowel obstruction [5, 8]. It may show enteroliths which is not specific and may be found in the appendix.

Ultrasound shows dilated loops with zones of constrictions which suggests small bowel obstruction. It may show a non-compressible cystic mass with characteristics of intestinal wall, which may have a teardrop shape. [5,8,9]

This cystic mass is most often found in the right lower quadrant of the abdomen, and should not be mistaken with the appendix especially that the symptoms of acute abdomen in both pathologies are the same.

One of the best imaging findings to differentiate MD from appendicitis is the identification of a normal appendix [3].

It might also be mistaken with intestinal duplication. Thus Meckel's Diverticulum has a more irregular wall than a duplication cyst [9]. In some cases, the diverticulum may cause luminal obstruction and lead to intussusception, with the finding of a bulbous mass inside the intussusciens [8].

In CT scan, Meckel's diverticulum should be thought of in isolated small bowel obstruction with no etiology, intussusception with small bowel obstruction, and the finding of an isolated cystic mass, which was the case in one of our patients [1, 8].

In the case of perforated diverticulum, fluid collection can be seen around the diverticulum and can cause obstruction [8]. In some rare cases, small bowel volvulus secondary to a twisting around omphalomesenteric band has been reported. It showed important dilated loops with bird beak sign and whirlpool sign in the root of the mesentery [10].

However, even if the radiological findings may suggest the diagnosis of MD, the definitive diagnosis is established during surgery. The treatment consists of excision of the fibrous or omphalomesenteric bands to release the digestive loops, and the resection of the diverticulum. In some cases with ischemic complications, the ischemic loop is resected together with the MD and an end-to-end anastomosis is performed [6].

8. Conclusion

Meckel's diverticulum represents a rare embryological remnant. It is a rare differential diagnosis in pediatric bowel obstruction. In most cases it is an intraoperative surprise, despite the availability of recent advanced imaging studies, which is why radiologists and pediatric surgeons should be aware of it.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

If studies involve use of animal/human subject, authors must give appropriate statement of ethical approval. If not applicable then mention 'The present research work does not contain any studies performed on animals/humans subjects by any of the authors'.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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