

Acute small bowel obstruction due to phytobezoar within Meckel diverticulum

PL COLOMBO, MD, PhD*; S. DINI, MD; E. De VECCHI, MD;
C BIANCHI, MD; F BULBOACA, MD

*Professor of Surgery, University of Pavia, Pavia, Italy,
Department of general surgery, Policlinico di Monza, Monza, Italy

ABSTRACT

Acute bowel obstruction by Meckel's diverticulum is not a frequent clinical finding and presents a difficult symptomatological approach to situate and to define preoperatively.

The observation of a patient with bowel obstruction due to phytobezoar in Meckel's diverticulum allows the authors to discuss the etio-pathological aspects connected with vegetarian diet and the presence of dysfunction of intestinal motility, the clinical and surgical aspects of this rare form of ileal obstruction, and to show the new diagnostic opportunities offered by CT.

Key words: phytobezoar, Meckel diverticulum, intestinal occlusion

Meckel's diverticulum is an embryological residue resulting from an incomplete obliteration of vitelline duct during the fifth week of gestation.

Described in 1598 by the German surgeon Wilhelm Fabricius Hildanus (1-3), it was studied in 1809 under the embryological and anatomical profiles by Johann Friedrich Meckel.(3-5) This author also demonstrated that from the incomplete obliteration of the vitelline duct re-

sults not only Meckel's diverticulum, but also enterocysts, intestinal-umbilical fistulas and mesodiverticular bands.(6-9)

Because the cells of the vitelline duct are pluripotent, different heterotopic tissues can be seen often in the diverticulum: ectopic gastric mucosa is present in 50 % of the cases, pancreatic mucosa only in 5 %, the presence of colonic mucosa (2%) or of carcinoid tissue (2%) indeed is very rare. Some of the complications occurring in Meckel's diverticulum, such as

Address for correspondence:

Florin Bulboaca, MD, 9 San Bernardino da Siena Street, Novara (NO), Zip Code 28100, Italy
email address: ulisero2000@yahoo.it

haemorrhage (6), perforation and pancreatitis are due to the presence of such heterotopic tissues.

Intestinal obstruction is the most frequent complication of Meckel's diverticulum. This complication generally is due to a volvulus of a small bowel loop around a cord or a fibrous band which fixes the diverticulum to the abdominal wall or to intestinal intussusception.(6)

The occurrence of small bowel obstruction due to a phytobezoar within a Meckel diverticulum is very uncommon and seldom reported in literature and deserves to be described. □

CASE REPORT

A 65 years-old-man who complained in the 24 hours before hospitalization sudden onset of acute intermittent abdominal pain diffused to the all abdomen was admitted to our Department. Nausea, first alimentary and then biliary, vomiting, progressive abdominal distension, no emission of stools and gas prompted hospitalization.

The medical history revealed a myocardial infarction at 59 years, followed by a second cardiac ischemic episode in the same year, arterial hypertension, non-insulin-dependent diabetes mellitus, vascular pathology of the carotid artery, chronic renal insufficiency and dyslipidaemia. Appendectomy was performed at the age of 38 years.

Clinical examination revealed normal body temperature, 36.7°C, mild abdominal distension with tenderness and guarding more pronounced on the right quadrants, no peritoneal signs. Timpanism was increased on the entire abdomen, associated to hyperactive peristalsis on the right abdominal quadrants, torpid on the remaining areas. Empty ampulla was noticed at the rectal exploration. No presence of hernias.

The laboratory findings at the hospitalization were substantially normal with very low leukocytosis (85 % neutrophils), moderate renal dysfunction.

Abdominal radiography showed multiple dilated gas-filled loops of small bowel on the middle area of the abdomen, with air-fluid levels suggesting acute ileal obstruction.

After initial conservative therapy, with intestinal detention by naso-gastric tube and fluid resuscitation, the patient was submitted to an explorative laparotomy for the progressive

worsening of his clinical conditions and also for the appearance of remarkable gastric stagnation of enteric material.

Midline laparotomy. Minimal amount of free yellowish fluid in the peritoneal cavity and notable distension of the stomach and of the small bowel loops was noticed. A large Meckel's diverticulum 50 cm proximal to the ileocaecal valve was found, (its base measures approximately 4 cm of length), with an endoluminal palpable mass (FIGURES 1-2), 6 x 4 cm in size, of fibrous-like consistence, obstructing and deforming the diverticulum and with retrograde extension into the proximal ileal loop. Longitudinal section of the small bowel wall on the anti-mesenteric side of the diverticulum. Presence of intraluminal mass of vegetable fibers (phytobezoar composed by Savoy leaves FIGURE 3) impacted and totally obstructing the diverticular cavity and the afferent bowel. Extraction of the fibrous mass and toilette of the small-bowel lumen were performed. Resection of the diverticulum and transverse suture of the bowel with



FIGURE 1. Grossly dilated and distended small bowel loops with large Meckel's diverticulum containing a solid intraluminal mass



FIGURE 2. At the enterotomy the diverticular lumen is completely obstructed by a solid vegetable mass.



FIGURE 3. Macroscopical aspect and dimensions of the phytobezoar.

mechanical stapler GIA 55; intreflexion of the suture with additional sero-muscular stitches in Vicryl 3-0. At the histological examination of the diverticulum there were not pathological findings.

In the post-operative period, at a further anamnestic investigation, the patient confirmed to eat frequently vegetables; also some days before the acute intestinal obstruction, he had an excessive intake of vegetable fibers, and in particular food containing Savoy.

The patient was dismissed 10 days after surgical intervention. □

DISCUSSION

The lifetime risk of complications in patients with a Meckel's diverticulum is usually small and occurs only in up to 4%. Complications differ according to the age of the patient at the moment of the clinical presentation. (7)

From the Mayo Clinic experience on 1,476 patients with Meckel's diverticulum observed in the period from 1950 to 2002, only 16% of the diverticula were symptomatic. The most common clinical presentation of symptomatic Meckel diverticula (180 cases) in adult patients was bleeding, observed in 38% of cases (69 patients), obstruction in 34% (61 patients) due to volvulus, intussusception, incarcerated hernia and invasive carcinoid tumor; diverticulitis in 28% (50 patients), often associated with peritonitis due to diverticular perforation. Among pediatric patients, the most common presentations of symptomatic Meckel diverticula (58 patients) were obstruction (23 patients, 40%), due to intussusception and volvulus; bleeding (18 patients, 31%) and diverticulitis (17 patients, 29%). Hemorrhage in adults is less common in

comparison with pediatric patients and is the result of heterotopic gastric or pancreatic mucosal remnants causing ulceration and bleeding. (7-8)

Small bowel obstruction by Meckel's diverticulum is caused by rolling up a loop of small bowel around a fibrous cord, which fixes the diverticulum to the umbilicus or to the anterior abdominal wall, by intussusception or incarceration within a hernia sack. Other possible causes of small bowel obstruction in Meckel diverticulum are foreign bodies as biliary stones and consequent biliary ileus, enterolithiasis or neoplasms arisen in the diverticulum. (7-12)

Obstruction in Meckel diverticulum due to enterolithiasis and trichobezoar or phytobezoar formation is rare, with few cases previously reported in the literature.

Excessive intake of fruits and vegetable fibers, as feeding habit, can predispose to phytobezoar formation. This is presumably due to collection of fibrous and indigestible food, rich of slags of alimentary material, in an altered or slow flow area or into a stenotic narrowed area.

The presence of intestinal dysmotility and of poor coordination of the peristaltic waves at the site of the Meckel diverticulum could produce decreased ileal motility and slow intraluminal flow with impaction and stickiness of boluses of food (9,13).

Retrograde propagation of collected material, obstructing the diverticulum, into the intestinal lumen produces small bowel obstruction

The volume of the diverticulum and particularly its length > 2 cm would be significant features associated to complications and make the diverticulum symptomatic, above all for obstructive episodes.

The diagnosis of acute intestinal obstruction is not difficult, both on the clinical symptoms and on the finding of expanded small bowel loops containing air-fluid levels at the abdominal radiography, without preparation. More difficult is to know the exact location, the nature and the cause of the obstruction.

Barium studies of the small bowel are relatively insensitive for the detection of a Meckel's diverticulum, and are not indicated in case of acute intestinal obstruction, but enteroclysis is a better technique useful in case of GI bleeding. (7,14) Ultrasonography of the abdomen can show a bowel mass in the right iliac fossa with mixed echogenic patterns. Arteriography

and technetium Tc99m-pertechnetate scintiscan are useful only if there is significant bleeding or ectopic gastric mucosa (15,16).

Some new studies prove the ability of CT imaging in determining ileal obstruction (sensitivity of 81-96%, with up to 96% specificity and 95% accuracy) and in detecting a Meckel's diverticulum causing obstruction, overall in patients who have not undergone prior laparotomy.

The occurrence of small bowel obstruction due to phytobezoar must be considered when a small dilated segment of ileal bowel contains heterogeneous materials (solid contents, fluid or also gas bubbles) while the intestinal proximal loop is only dilated by fluids and the distal loop is collapsed without heterogeneous and different images of such intraluminal material.

CT moreover, should allow a better study of the aspect and configuration of the bowel wall, the evaluation of extraluminal abnormalities, the study of other abdominal viscera, so to exclude any pathology correlated to them (7,9-11,16,17).

The close contiguity between a small bowel tract with heterogeneous contents and a distended fluid-filled loop proximal and a collapsed

small bowel distal, suggests the obstruction level.

The relief of persistent heterogeneous images in the viscus over many levels, outlined by the bowel wall, but without connection to the surrounding intestinal loops, implies that it represents a distended diverticulum (10). □

CONCLUSION

The complications due to Meckel's diverticulum are relatively rare, interesting only 4% of the patients in their life. Small bowel obstruction is, after bleeding, one of the most frequent presentations of symptomatic Meckel diverticula in adults, causing a volvulus or by rolling up a loop of small bowel around a fibrous cord. The acute obstruction of Meckel's diverticulum lumen caused by a foreign body, as phytobezoar, is unusual. Indeed the preoperative diagnosis is difficult, if not impossible.

It seems actually that a little help to identify Meckel's diverticulum as cause of bowel's obstruction, can derive only from CT, but the real etiologic factor and the diverticulum's involvement in the obstruction, can be correctly identified only during the surgical act, as shown in the reported clinical case.

REFERENCES

1. **Jay GD III, Margulis RR, Mc Graw AB, et al** – Meckel's diverticulum: a survey of 103 cases. *Arch Surg* 1950; 61:158-169
2. **Haber JJ** – Meckel's diverticulum: a review of literature and analytical study of 23 cases with particular emphasis on bowel obstruction. *Am J Surg* 1947; 73:468-485
3. **Park JJ, Wolff BG, Tollefson MK, et al** – Meckel diverticulum: the Mayo Clinic experience with 1476 patients (1950-2002). *Ann Surg* 2005 Mar; 241(3):529-533
4. **Christie A** – Meckel's diverticulum: a pathologic study of 63 cases. *Am J Dis Child* 1931; 42:544-553
5. **Edmonson JM** – Johann Friedrich Meckel the younger: Meckel's diverticulum. *Gastrointest Endosc* 2001; 54:19A-20A
6. **Townsend CM, Beauchamp RD, Evers BM, et al** – Sabiston textbook of surgery. The biological basis of modern surgical practice. 17th Ed. Elsevier-Saunders 2004, pag. 1366-1368
7. **Prall RT, Bannon MP, Bharucha AE** – Meckel's diverticulum causing intestinal obstruction. *Am J Gastroenterol* 2001 Dec; 96(12):3426-3427
8. **Turgeon DK, Barnett JL** – Meckel's diverticulum. *Am J Gastroenterol* 1990; 85:777-781
9. **Frazzini VI Jr, English WJ, Bashist B, et al** – Case report. Small bowel obstruction due to phytobezoar formation within Meckel diverticulum: CT findings. *J Comput Assist Tomogr* 1996 May-Jun; 20(3):390-392
10. **Hamada T, Ishida O, Yasutomi M** – Inverted Meckel diverticulum with intussusception: demonstration by CT. *J Comput Assist Tomogr* 1996; 20:287-289
11. **Nigogosyan M, Dolinskas C** – CT demonstration of inflamed Meckel diverticulum. *J Comput Assist Tomogr* 1990; 14:140-142
12. **DiGiacomo JC, Cottone FJ** – Surgical treatment of Meckel's diverticulum. *South Med J* 1993; 86:671-675
13. **Sorensen JB, Ghani A** – Phytobezoar obstruction of a Meckel's diverticulum. *Am Surg* 1992; 58:61-64
14. **Maglante DD, Elmore M, Isenberg M, et al** – Meckel's diverticulum: radiologic demonstration by enteroclysis. *AJR Am J Roentgenol* 1980; 134:925-932
15. **Ikard RW** – Diagnosis of Meckel's diverticulum by computerized tomography. *Tenn Med* 1996; 5:164-165
16. **Rossi P, Gourtsoyiannis N, Bezzi M, et al** – Meckel's diverticulum: imaging diagnosis. *AJR Am J Roentgenol* 1996; 166:567-573
17. **Rossi P, Gourtsoyiannis N, Bezzi M, et al** – Meckel's diverticulum: imaging diagnosis. *AJR Am J Roentgenol* 1996; 166:567-573