Meckel's diverticulum duplication. Case report and literature review

ABSTRACT

Background: Meckel's diverticulum is the most frequent congenital abnormality of the gastrointestinal tract. Preoperative diagnosis is difficult due to its variable clinical presentation that can simulate several causes of gastrointestinal bleeding or abdominal pain.

Clinical case: We present the case of a 61-year-old female patient with multiple abdominal surgeries who developed intestinal occlusion during several admissions beginning 8 months earlier. She was treated with conservative measures. During her last admission she developed dehydration, persistent abdominal pain and bowel dilation with failure to respond to conservative treatment. Surgical intervention was decided upon, ruling out adhesions and revealing the presence of two diverticular defects at 40 and 70 cm from the ileocecal valve with torsion. Histological report described gastric heterotrophic mucosa and inflammatory hemorrhagic process.

Conclusion: Presence of duplicated Meckel’s diverticulum is a rare finding with only nine reports in the international literature to date. Diagnosis is frequently made during surgery. Treatment for symptomatic diverticulum is surgical, whereas management for asymptomatic diverticulum is controversial and relies on the surgeon’s decision and clinical characteristics of the patient.

Key words: Diverticulum, Meckel, duplication.

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ABSTRACT

Meckel’s diverticulum is the most common congenital abnormality of the digestive tract, which arises from a remnant of the omphalomesenteric duct. It was described anatomically and embryologically > 200 years ago. It is a true diverticulum always localized on the antimesenteric border of the ileum with a slight predominance in males. The majority of the cases are asymptomatic and 4.2-6.4% may be symptomatic. Clinical manifestations are as a result of complications and are characterized by bleeding or intestinal obstruction or both.1,2

Preoperative diagnosis requires a high suspicion because laboratory and imaging studies must be requested consistent with the type of clinical presentation. Treatment of symptomatic cases is surgical and there is controversy regarding asymptomatic cases incidentally discovered.2,3

CLINICAL CASE

We present the case of a 61-year-old female patient with initiation of complaint 2 days prior to admission, with a picture of colicky-type, moderately intense abdominal pain in the epigastrium that later became generalized, accompanied by abdominal distention and inability to pass flatus. The patient was prescribed antibiotics (not specified) by a physician but without a favorable response. Subsequently, the patient had nausea and vomiting of bilious content on several occasions, the reason why she presented to our institution.

Included in the patient’s personal medical history is total abdominal hysterectomy 15 years prior due to uterine myomatosis, hiatal hernia surgery plus laparoscopic fundoplication 4 years prior, and left hemicolectomy plus enteroenteroanastomosis for recurrent diverticular disease 3 years prior. There were repetitive incidents of intestinal occlusion in the previous 8 months that required hospitalization, which responded to conservative medical therapy.

Physical examination revealed a well-hydrated female patient appearing her stated age with painful facies. Vital signs were blood pressure 110/80 mmHg, heart rate 70 beats/min, respiratory rate 20/min, and temperature 36.5ºC. She was conscious, neurologically intact, and moaning. The abdomen was found to be globular as a result of adipose pannus with notable distention. Scars were mid-infraumbilical ~15 cm and of laparoscopic ports in the upper mid-abdomen with soft, depressible abdominal wall. On deep palpation of the abdomen the patient expressed pain of 8/10 in intensity, without specific points of peritoneal irritation or radiation. There was generalized tympanism, decreased peristalsis and absence of bowel sounds. Rectal examination did not reveal abnormal findings.

Laboratory studies upon admission revealed total leukocytes of 5700 cells/mm³, neutrophils 67%, hemoglobin 14.1 g/dL, hematocrit 41.2, platelets 227,000 cells/mm, glucose 126 mg/dL, BUN 21, creatinine 0.9 mg/dL, Na 124.8 mEq/L, K 3.7 mEq/L, Cl 94.2 mEq/L, amylase 47 mg/dL, and lipase 137 mg/dL. Plain x-ray of the abdomen revealed significant dilation of the loops of the small bowel, generalized air fluid levels, and absence of air in the colic zone and rectal ampulla.

Subsequent to the correction of the electrolyte imbalance, exploratory laparotomy was done and diagnosis of mechanical intestinal occlusion was made, perhaps secondary to adhesions. During the systematic examination there were no adhesions noted; however, at the antimesenteric border of the ileum two saccular malformations were discovered located at 40 and 70 cm from the ileocecal valve (3×2×1 and 2×1.5×1 cm), respectively; purplish in color and without evidence of perforation (Figure 1). Based on the suspicion of an intestinal congenital malforma-
tion, resection of the affected ileal segment was carried out with a side to entero-enteroanastomosis with a linear stapler and a second plane of reinforcement (Figure 2).

Histopathology study reported two Meckel’s diverticula with hemorrhagic-ischemic changes secondary to torsion and peptic ulcer due to antral heterotrophic gastric mucosa, with surgical margins free of lesion and without evidence of neoplasm. Currently, the patient remains asymptomatic. Postsurgical evolution was satisfactory with discharge on the 4th day without complications.

DISCUSSION

According to Kennedy and Liacouras, Meckel’s diverticulum was first described by Fabricus Hildanus in 1598. Subsequently, in 1908 Johann Friedrich Meckel described in more detail the anatomy and embryology of the diverticulum. This anomaly of the mid-intestine is a remnant of the omphalomesenteric duct and the lack of obliteration of the duct occurs between the fifth and eighth weeks of gestation. It is the most common congenital malformation of the gastrointestinal tract and involves 90-96% of all vitelline sac malformations.5

It is found in 2-4% of the general population with ranges of 0.14 and 4.5%; the infantile population is affected in 2-3%. There is no gender predilection; however, some authors report a greater prevalence in males with a ratio of 3:2. Anatomically it is considered to be a true diverticulum by having three layers that form the normal intestinal wall. Macroscopically, it is an invagination from 1 to 15 cm in length, with an average of 3 cm, and diameter between 2 and 6 cm. They are always located on the antimesenteric border of the ileum;1,5-7 90% of the diverticula are located in the first 90 to 100 cm proximal to the ileocecal valve and there are reports to 180 cm. The median distance of the diverticulum to the ileocecal valve is directly related with age, with the average distance of 30-60 cm in children and 60-100 cm in adults.8,10

There is a mnemonic rule called the “2” rule that mentions that the prevalence is “2%” of the population, is localized at “2 feet” (60 cm) from the ileocecal valve, contains “2” principal types of heterotrophic mucosa (gastric and
pancreatic) and 45% of the patients are < “2 years” of age.2,7

In fact, 75% of the patients are asymptomatic. It is diagnosed incidentally during radiological studies and surgical procedures or during autopsies.11 Clinical manifestations are varied and appear during the first decade of life (especially in the first and second year) in 50-60% of cases.4,5

Approximately 50-55% of the diverticula contain ectopic tissue and the majority of symptomatic cases are related to heterotrophic mucosa, predominantly gastric in origin (23-85%). Those that are asymptomatic were found in the gastric mucosa (10-20%) and pancreatic tissue (5-16%) and have been reported in a smaller proportion in duodenal, jejunal, colon, biliary, endometrial tissues, or a combination of these tissues.5,7,8

Clinical manifestations are due to gastric mucosa in the diverticulum at the level of the ileal mucosa and gastric junction that causes bleeding due to ulceration. Pancreatic tissue was associated with problems of intestinal occlusion.12

Intestinal obstruction is the complication causing the most symptoms in the adult population, with an incidence from 22-50%, whereas during the pediatric age it is bleeding that occurs in 25-50% of the cases and in adults only represents 11.8% of the cases.7,8,12 The majority of the symptomatic cases go through periods of intermittent pain and bleeding secondary to ulceration that is clinically manifested by brick- or red-colored stools. Bleeding could cause severe anemia and even hypovolemia, although it has been demonstrated that the bleeding disappears spontaneously by splanchnic vascular contraction. Another manifestation is the partial or complete intestinal occlusion due to intestinal invagination (ileoleal or ileocolic); other causes are intraperitoneal fibrous bands that can cause volvulus or internal hernias.12-14

In case of enteroliths, fecaliths, parasites or neoplasms, 10-20% of the cases have diverticulitis, especially in patients with a mean age of 8 years and in adults. This disorder can simulate a clinical picture of appendicitis and, less frequently, peptic ulcer, gastroenteritis or biliary colic.10,12

From 10-11% of Meckel’s diverticulum are located within a hernia sac and are called Littré hernia; the common location of this hernia is at the inguinal (50%), femoral (20%), or umbilical level (20%) or in other locations (10%). Littré hernia has the potential risk of incarceration and strangulation.9,10

The risk of complications from a Meckel’s diverticulum is 4-6%,7,9 and these are more common in children compared with adults (26-53%). Males are the most affected with a ratio of 3:1-2. The probability that an asymptomatic diverticulum will become symptomatic and present complications is 4% in those < 20 years of age, decreasing to 2% at 40 years and in elderly patients there are no complications.12,15-17 The main complications are bleeding, obstruction, diverticulitis and perforation. The association of a Meckel’s diverticulum with intestinal atresia (12%), imperforated anus (11%), Crohn’s disease (5-8%) has been reported.2,5,6,15

Neoplasms are extremely rare and are more common in adults. Benign tumors associated with Meckel’s diverticulum are leiomyomas, angiomas, and lipomas; malignant tumors affect 0.5-4.9%, the most common being carcinoid, adenocarcinoma and sarcomas.2,7,8,15

Diagnostic confirmation is difficult, especially in adults, because plain x-rays have no diagnostic value and the use of barium will rarely find a diverticulum. The study with the greatest sensitivity (60-85%) and specificity (95-100%) in children with bleeding is a scan with Tc-99m sodium pertechnate, which is taken up
by the secretory cells of the gastric mucosa and allows for visualization of the diverticulum. This study has a lower application in adults and in order to increase its sensitivity and specificity, cimetidine, glucagon, ranitidine or pentagastrin is used. Other forms of identification are labeled erythrocytes in patients with data of active bleeding, selective arteriography of the superior mesenteric artery, echography, tomo- 
graphy and laparotomy. Treatment of symptomatic cases is surgery. For asymptomatic cases the therapeutic approach is controversial, for example, it is suggested to not resect these patients because the surgical morbidity increases (9-12%) in comparison with 4.2-6.4% morbidity throughout the lifetime of patients who are not operated. The controversy is greater in the case of adults. Other authors such as Cullen et al. suggest prophylactic resection in cases where Meckel’s diverticulum is incidentally found when performing a laparotomy if and when resection is possible; a mortality and morbidity of 1 and 2% has been, respectively, reported. The criteria established by Cullen et al. and Robijn et al. for resection is diverticulum > 2 cm, males, < 40 years of age, with bands or adhesions, and due to the suspicion of ectopic tissue.

The two surgical techniques used with greater frequency are simple diverticulectomy or ileal resection of the affected segment with an entero-entero anastomosis. Recently it was considered that minimally invasive surgery for diagnosis and treatment with linear staplers has become the therapeutic option because it is safe, with good results and low rates of morbidity and mortality in children and adults.

The finding of two Meckel’s diverticula in the same patient is exceptional and the international medical literature has reported only ten cases of duplication of Meckel’s diverticulum; two of these cases were reported in Mexico.

In conclusion, diagnosis of Meckel’s diverticulum is difficult to establish and its presence should always be suspected during laparotomy or laparoscopy for treatment of abdominal pain syndrome. Although x-ray of the abdomen does not provide much assistance with the diagnosis, the use of a scan in patients with diagnostic suspicion is invaluable and of special importance in children. In symptomatic cases surgical treatment is appropriate, whereas in asymptomatic cases found intraoperatively, treatment should be evaluated according to the surgeon’s judgment and based on the inherent characteristics of each patient. Laparoscopic treatment may be a safe alternative with low morbidity and mortality.

REFERENCES