

Complicated Meckel's diverticulum. Fifteen years of experience in an interzonal hospital in the Province of Buenos Aires

Rocío Pérez Domínguez, Guillermina Candia, Hernán Alejandro Santilli, Sergio Schlain

Hospital Interzonal General de Agudos San Roque, Gonnet, Provincia de Buenos Aires

ABSTRACT

Introduction: Meckel's diverticulum is the most common congenital malformation of the gastrointestinal tract. It can present with bleeding, intestinal obstruction or diverticulitis, complications that decrease with age, so in adults the diagnosis is usually incidental. Treatment of complications is surgical, through diverticulectomy or segmental resection of the small intestine, depending on its morphological characteristics.

Objective: to analyze our experience in the management of complicated Meckel's diverticulum over a period of 15 years.

Design: descriptive, observational, cross-sectional, retrospective study.

Materials and methods: the medical records of patients operated on for complicated Meckel's diverticulum in the General Surgery Service of the San Roque Hospital during the period 2007-2022 were reviewed. Demographic data, clinical presentation, preoperative diagnosis, surgical treatment, postoperative complications, and histopathological findings were recorded.

Results: twenty-five patients were included, 21 (84%) men, 3 under 18 years of age. The clinical presentation was a right iliac fossa syndrome in 80% of cases, intestinal obstruction in 16% and hemorrhage in 4%. In only 2 cases was the preoperative diagnosis made, confirmed by computed tomography. Diverticulectomy was performed in 68% of patients and segmental resection in 32%. The approach was by laparotomy in 64%, mainly in the initial period, and by laparoscopy in 36%. There was a Clavien-Dindo IIIb complication in a pediatric patient treated with percutaneous drainage. In only one patient (4%), who presented with massive gastrointestinal bleeding, gastric-type epithelium and ectopic pancreas were found in the diverticulum.

Conclusions: in our experience, complicated Meckel's diverticulum occurred predominantly in men. The most frequent complication in adults was diverticulitis. Preoperative diagnosis was infrequent and was made by computed tomography. Diverticulectomy is sufficient in most cases. Currently, laparoscopy is a safe, profitable and efficient tool that allows for the timely diagnosis and treatment of this entity.

Keywords: Meckel's diverticulum, adult, abdominal pain, diverticulitis, intestinal obstruction, intestinal bleeding, surgical treatment

INTRODUCTION

Meckel's diverticulum is the most common congenital malformation of the gastrointestinal tract with an incidence of 0.3-2.9%.¹ It represents the incomplete involution of the omphalomesenteric duct that is normally obliterated between the fifth and seventh week of intrauterine life. It is usually asymptomatic or an intraoperative finding in surgeries for other abdominal pathologies. It can present with symptoms of bleeding, intestinal obstruction or diverticulitis, depending on age, which is why it is sometimes called "the great pretender." These complications decrease with age, so the diagnosis of Meckel's diverticulum in adults is usually incidental. Although only a low percentage of the adult population can suffer complications throughout life, their consequences can be serious. For diagnosis, imaging studies have low sensitivity and specificity, however, exploratory laparoscopy is an important tool. Surgical treatment with resection of the diverticulum is mandatory in the presence of complications, but remains debatable when they are found incidentally. Intestinal resection followed by anastomosis appears preferable to wedge resection or side-

to-side stapled suturing because of the risk of leaving abnormal heterotopic mucosa.

The objective of this presentation is to communicate the experience of 15 years in an interzonal hospital in the Province of Buenos Aires.

MATERIAL AND METHODS

A descriptive, observational, retrospective, cross-sectional study was carried out, analyzing the medical records of the General Surgery Service of the San Roque Hospital during the period 2007-2022. All patients who presented with an acute abdomen due to a complicated Meckel's diverticulum were included, excluding those found incidentally.

RESULTS

Distribution by age and sex

Twenty-five patients were included in the 15-year study period, 1.66 cases per year, with an age range of 7 to 61 years. Twenty-one patients (84%) were men, 3 were younger than 18 years of age, and 4 (16%) were women.

Clinical presentation

The most frequent clinical presentation was right iliac fossa pain in 20 patients, followed by intestinal obstruction in 4 and intestinal bleeding in 1 (Fig. 1).

Diagnostic methods

The diagnosis of acute abdomen was carried out through physical examination and complementary studies. Laboratory tests showed neutrophilia. Plain abdominal X-ray, performed in all patients, showed air-fluid levels of the small intestine in patients who presented obstructive symptoms. In 6 cases, abdominal ultrasound was performed, which showed little free fluid in the right iliac fossa. Only in 2 patients with suspected complicated Meckel's diverticulum, an abdominal CT scan was requested, which certified the diagnosis. The first was a 67-year-old patient who presented with central abdominal pain and vomiting for 2 days, with no response to medical treatment. The CT scan showed the presence of a diverticular sac with inflammatory characteristics dependent on the small intestine, associated with marked air-fluid levels. The second corresponds to a 17-year-old man who attended the emergency room for episodes of hematochezia lasting 36 hours, with hemodynamic compromise, in whom colonoscopy did not show colonic bleeding. The CT scan showed a blind cul-de-sac arising from the small intestine with contrast inside.

The authors declare no conflicts of interest **Sergio Fernando Schlain: sergioschlain@gmail.com**

Received: October 2022. Accepted: July 2023.

Rocío Pérez Domínguez: <https://orcid.org/0001-8347-0849>, Guillermina Candia: <https://orcid.org/0000-0003-2515-8923>, Hernán Alejandro Santilli: <https://orcid.org/0001-6749-0655>, Sergio Schlain: <https://orcid.org/0002-5615-3503>

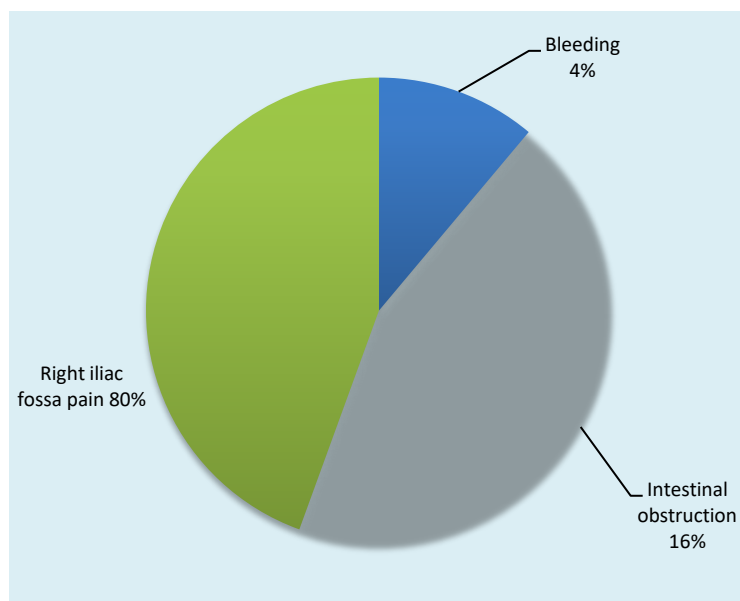


Figure 1. Clinical presentation of complicated Meckel's diverticulum in the 25 patients in the series.

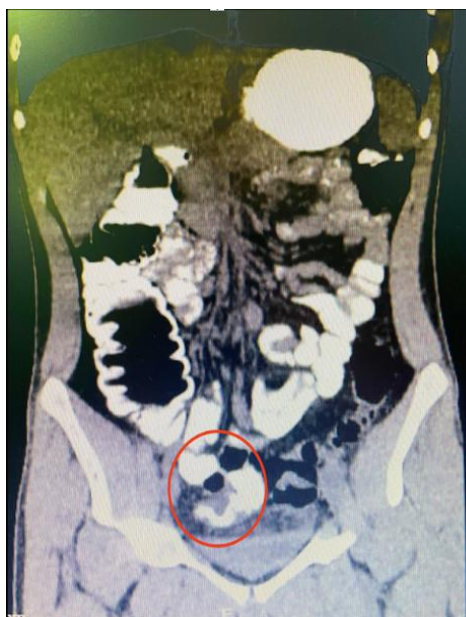


Figure 2. Abdominopelvic tomography showing the presence of a blind tubular structure with contrast inside, compatible with Meckel's diverticulum.

Surgical treatment

Sixty-eight percent (17) of the patients were treated by diverticulectomy (Fig. 3 A and B), while the remaining 32 percent (8) underwent ileal resection with end-to-end anastomosis (Fig. 3 C). The approach used was predominantly laparotomic (64%) using a Mc Burney incision, mainly during the first years of the study, while 36% underwent laparoscopy.

Complications

A IIIb complication of the Clavien-Dindo classification was recorded in a pediatric patient, who was referred for percutaneous drainage. There was no associated mortality.

Histopathology

The diverticula had intestinal-type epithelium, associated with vasocongestion and edema. Only 1 (4%) had gastric-type epithelium, formed by polypoid projections and fundic glands in the lamina propria, and ectopic pancreas. It corresponds to the patient who presented massive intestinal bleeding. No malignant neoplasms were identified.

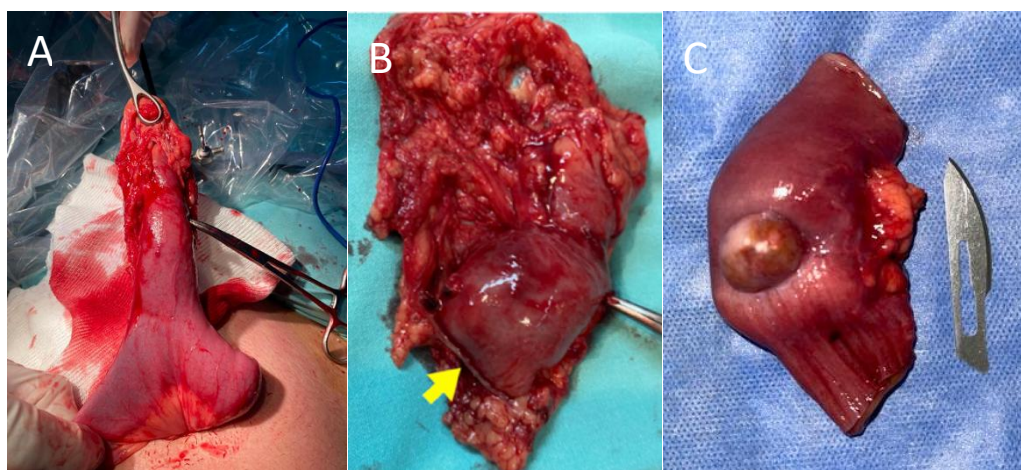


Figure 3. Surgical treatment of different Meckel's diverticula. **A.** Exteriorization of the small intestine with the presence of a diverticulum more than 5 cm long on its antimesenteric border. **B.** Resection line after diverticulectomy using an endostapler (arrow). **C.** Resection of the small bowel segment that includes a diverticulum with a wide, indurated base.

DISCUSSION

Meckel's diverticulum was described for the first time in an article published by the German anatomist Johann Friedrich Meckel in 1809. Its appearance is the same in men and women, although according to Park et al.² the incidence of complicated diverticula is higher in men with a 3:1 ratio. In our series it was 5:1.

The diverticulum is usually located on the antimesenteric border at an average distance of 46 cm from the ileocecal valve and its average length is 3 to 5 cm. It is made up of the three layers of the intestinal wall and its arterial supply is through the superior mesenteric artery. It is lined mainly by typical ileal mucosa, but because the yolk canal cells are pluripotent, other heterotopic gastric (50%), pancreatic (5%) and, more rarely, hepatobiliary, duodenal, colonic and endometrial tissues can be found.³

The most common clinical presentation in adults is intestinal bleeding, which occurs in 25-50% of patients, while intestinal obstruction predominates in children under 2 years of age.

Intestinal bleeding can be acute or chronic. The main mechanism of hemorrhage is acid secretion from the ectopic mucosa, which leads to ulceration of the adjacent ileal mucosa.

The etiology of intestinal obstruction is diverse; may be due to a fibrous band extending from the diverticulum to the umbilicus (14-53%), ulceration (<4%); intussusception, Littre hernia or stenosis secondary to chronic diverticulitis.^{3,4} According to Sharma et al.,⁵ diverticulitis represents 20% of symptomatic cases of Meckel's diverticulum, although in our series its incidence was notably higher, reaching 80%. The pathophysiology is analogous to that of acute appendicitis and the symptoms simulate this clinical picture, so it should be considered the main differential diagnosis in those patients who present pain in the right iliac fossa.

Preoperative diagnosis of Meckel's diverticulum remains challenging. Ultrasound, X-ray, angiography, CT scan or MRI can help in the diagnosis but the sensitivity and specificity are low.⁵ However, they contribute by demonstrating the presence of air-fluid levels suggestive of small bowel obstruction, or by identifying a cecal appendix with normal characteristics, thus increasing the suspicion of a complicated diverticulum. Exploration with labeled technetium-99 pertechnetate is the most accurate non-invasive test to determine the presence of Meckel's diverticulum due to the propensity of the tracer to concentrate in the ectopic gastric mucosa.⁶ In children it has a sensitivity of 80-90%, a specificity of 95% and an accuracy of 90%, but in adults it is less

reliable, with a sensitivity of 62.5%, a specificity of 9% and an accuracy of 46%.³ However, its availability in health centers, it is very limited.

In this series, a preoperative diagnosis of complicated Meckel's diverticulum was made in only two cases, confirmed by oral contrast-enhanced CT scan showing a blind tubular structure arising from the small intestine.

The treatment of choice for symptomatic Meckel's diverticulum is surgical resection. This can be achieved by diverticulectomy or by segmental intestinal resection and anastomosis.¹ The extent of resection is determined based on intraoperative findings and the characteristics of the omphalomesenteric remnant. The external appearance criteria have been studied, concluding that long diverticula can be eliminated by simple transverse resection with a stapler since the presence of ectopic tissue is usually lodged at its distal end, while in short diverticula it can occur in any area. Therefore, it is recommended to evaluate the base; if it is narrow, without the presence of a palpable mass within the lumen of the ileum, a simple wedge resection followed by primary closure of the defect can be chosen. On the other hand, if the base is wide, heterotopic tissue is palpable, or there are associated inflammatory or ischemic alterations, resection of an ileal segment and subsequent end-to-end anastomosis with manual suture or staples should be chosen.

Regarding the approach, open surgery has long been used as an effective method to treat complicated Meckel's diverticulum. However, in the era of minimally invasive surgery, laparoscopic management has become a very appropriate diagnostic and therapeutic tool.⁷⁻¹¹

CONCLUSIONS

In our experience, complicated Meckel's diverticulum occurred predominantly in men. The most frequent complication in adults was diverticulitis, so the most common presumptive diagnosis was acute appendicitis. Preoperative diagnosis was infrequent and was performed using CT scan.

In two thirds of the cases the treatment was diverticulectomy. Currently, laparoscopy is a safe, cost-effective and efficient tool that allows for timely diagnosis and treatment.

All surgeons must keep this entity in mind when faced with an atypical abdominal syndrome that could reveal a complication of the diverticulum, or due to the possibility of its incidental finding during surgery for another reason.

REFERENCES

1. Hansen CC, Søreide K. Systematic review of epidemiology, presentation, and management of Meckel's diverticulum in the 21st century. *Medicine (Baltimore)*. 2018; 97: e12154.
2. Park JJ, Wolff BG, Tollefson MK, Walsh EE, Larson DR. Meckel's diverticulum: the Mayo Clinic experience with 1476 patients (1950-2002). *Ann Surg*. 2005; 241: 529-33.
3. Sagar J, Kumar V, Shah DK. Meckel's diverticulum: a systematic review. *JRSoc Med*. 2006; 99: 501-5.
4. Kuru, Serdar. Meckel's diverticulum: clinical features, diagnosis and management. *Rev Esp Enf Dig*. 2018; 110: 726-32.
5. Sharma RK, Jain VK. Emergency surgery for Meckel's diverticulum. *World J Emerg Surg*. 13;3:27.
6. Levy, A. Meckel's diverticulum: radiologic features with pathologic correlation. *RadioGraphics*. 2004; 24:565-87.
7. Martin JP, Connor PD, Charles K. Meckel's diverticulum. *Am Fam Physician*. 2000; 61: 1037-42.
8. Sanders, LE. Laparoscopic treatment of Meckel's diverticulum. *Surg Endosc*. 1995; 9: 724-27.
9. Chan KW, Lee KH, Mou JW, Cheung ST, Tam YH. Laparoscopic management of complicated Meckel's diverticulum in children: a 10-year review. *Surg Endosc*. 2008; 22:1509-12.
10. Hosn MA, Lakis M, Faraj W, Khoury G, Diba S. Laparoscopic approach to symptomatic Meckel's diverticulum in adults. *JSLs*. 2014; 18: e2014.00349.
11. Parvanescu A, Bruzzi M, Voron T et al. Complicated Meckel's diverticulum: Presentation modes in adults. *Medicine*. 2018; Sep; 97(38): e12457.