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An Unexpected Discovery

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Rezumat

O descoperire neașteptată

Introducere: Diverticulul Meckel (DM) este cea mai frecventă anomalie congenitală a tubului digestiv, cu o prevalență de 2% în populația generală, fiind de două ori mai comun și simptomatic la persoanele de sex masculin. Nu rareori, diagnosticul se stabilește întâmplător, la laparotomiile pentru alte patologii intraabdominale, de obicei apendicita acută. Tratamentul de elecție este diverticulectomie simplă.
Prezentarea cazului: Prezentăm cazul unui pacient în vârstă de 38 de ani care se prezintă la Camera de Gardă a Spitalului Clinic de Urgență București pe data de 10 februarie 2015 pentru durere abdominală localizată periombilical, inițial, cu iradiere în fosa iliacă dreaptă (FID) și vărsături, cu un debut brusc, cu aproximativ 24 de ore înainte de internare. Examenul obiectiv al abdomenului pune în evidență semne de peritonită localizată. Se calculează un scor Alvarado de opt puncte. Se decide și se practică laparotomie pentru apendicectomie. La deschiderea cavității peritoneale, se constată colonul sigmoid în FID și apendicele vermiform măsurând 10 cm într-o poziție subhepatică, ascendentă. La o distanță de 90 de centimetri de la valva ileocecală, se descoperă un DM de dimensiuni de 7/4 cm. Se practică apendicectomie retrogradă, urmată de diverticulectomie simplă cu un stapler TA de 30 mm, cu cartuș albastru. Timpul operator este de 90 minute, fără incidente intra sau postoperatorii. Evoluție postoperatorie este favorabilă cu externarea în ziua cincea postoperatorie.
Discuții: In ciuda prevalenței sale ridicate, DM prezintă o provocare de diagnostic, mai ales în populația adultă și la pacienți asimptomatici. In plus, mucoasa ectopică de origine gastrică sau pancreatică este prezentă în 50% din cazuri, contribuind la o vastă matrice de diagnostice diferențiale. Datorită ratei sale de mortalitate ridicată de 2-15% și numeroaselor complicații, cum ar fi hemoragia, obstrucția intestinală, volvulus, fistulizarea și perforația, un diagnostic precis și tratament prompt sunt esențiale.

Cuvinte cheie: diverticul Meckel, diverticulectomie simplă, apendicită acută, apendectomie

Abstract

Meckel's Diverticulum is the most common congenital malformation of the gastrointestinal tract with a prevalence of 2 % in the general population, being twice as common and symptomatic in males. Not seldom is the diagnosis made incidentally, upon laparotomy for other intra-abdominal conditions, namely acute appendicitis. Simple Diverticulectomy is the surgical treatment of choice. We present the case of S.M., a 38 year-old male who was admitted to the Surgery Department of the Bucharest Clinical Emergency Hospital for sudden onset of initially periumbilical pain, which later migrated and localized in the right iliac fossa (RIF) accompanied by vomiting after the onset of pain, approximately 24 hours prior to admission.

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Examination of the abdomen revealed localized peritoneal signs. An Alvarado score of 8 was calculated. A laparotomy for appendectomy was performed, upon which the sigmoid colon was found in the RIF, and an appendix of 10 cm in length was visualized in a subhepatic, ascendant position. At a distance of 90 cm from the ileocecal valve, a Meckel's Diverticulum with dimensions of 7/4 cm was discovered. A retrograde appendectomy was performed first, along with a simple diverticulectomy, with the use of a TA 30 mm stapler. The operative time was 90 minutes without intraoperative complications, and an uneventful postoperative recovery, culminating with discharge of the patient on the fifth postoperative day. Despite its high prevalence, Meckel's Diverticulum still represents a diagnostic challenge, especially in the adult population, notably in asymptomatic patients. Moreover, ectopic gastric or pancreatic tissue, present in 50% of the cases, leads to a vast array of differential diagnoses. Due to its numerous life-threatening complications such as bleeding, intestinal obstruction, volvulus, intussusception, diverticulitis, fistulization and perforation, accurate diagnosis and timely treatment is crucial.

Key words: Meckel's diverticulum, simple diverticulectomy, acute appendicitis, appendectomy

Introduction

Meckel's diverticulum (MD) is the most common congenital malformation of the gastrointestinal tract. It is the vestigial remnant of the proximal portion of the omphalomesenteric, or vitelline duct, a long narrow tube which joins the yolk sac to the midgut lumen during the first seven weeks of intrauterine life. Failure to obliterate in the eighth week of development leads to several anomalies: primarily MD, but also enterocyst and omphalomesenteric fistula (1). This diverticulum was first described by the German surgeon Wilhelm Fabricus Hildanus in 1598. However the entity was not named until 1809 by Johann Friedrich Meckel, the German anatomist who reported its embryological origin (2). From an anatomical point of view, it is the only true diverticulum, containing all three layers of the intestinal wall, typically located on the antimesenteric border of the small intestine having its own blood supply from the vitelline artery.

In literature, MD is commonly governed by the "rule of two's" since its prevalence is 2% in the general population, measures approximately 2 inches (5 cm) in length, is located within 2 feet (60 cm) of the ileocecal valve, is most prevalent in children under 2 years of age, affects males twice as often as females and may contain 2 types of ectopic tissue (1). From a clinical standpoint, MD is often silent. In a review of 1476 cases over the span of 55 years from the Mayo Clinic, 86% of patients were asymptomatic. As such, its diagnosis is mostly established intraoperatively during laparotomy or laparoscopy in patients presenting with acute abdomen.

However, when symptomatic, intestinal obstruction is the most common presenting symptom in the adult population, followed by painless rectal bleeding (3). The most common causes of intestinal obstruction are represented by intussusception and mechanical volvulus around a fibrous band attaching the MD to the umbilicus (4). Ectopic ulcerated gastric mucosa is found upon histopathological examination in 75-90% of cases presenting as bleeding per rectum (3). Several imaging methods are available which may help diagnose this condition, however, none are sensitive enough to provide a diagnosis of certainty (5). Thus far, the technetium-99m pertechnetate scan, commonly called the "Meckel Scan", is the most accurate non-invasive investigation available at present (6). This nuclear medicine scan is able to detect ectopic gastric mucosa (7), with a sensitivity of 85% in children, but merely 54-60% in adults (8). Direct visualization via exploratory laparoscopy is the only procedure that warrants a definitive diagnosis (9).

Despite the fact that MD is largely asymptomatic, it may also be associated with numerous complications such as obstruction, intussusception, diverticulitis, perforation, hemorrhage as well as malignant transformation (10).

Surgical resection, represented by simple diverticulectomy, is the standard of care in patients with symptomatic MD. When there is evidence of a wide base diverticulum or perforation, resection is extended to the terminal ileum (3). The laparoscopic approach has also been deemed efficient, without an increased risk of complications (11). The main early postoperative complications encountered are surgical site infection, prolonged postoperative ileus and anastomotic leak, with an estimated mortality rate of 1.5% (12).

Case report

We present the case of S.M., a 38 year-old unemployed male patient from a rural area who was emergently admitted to the Surgery Department of the Bucharest Clinical Emergency Hospital due to sudden onset pain in the RIF and vomiting for a duration of approximately 24 hours on February 10th, 2015. The onset of abdominal pain was sudden, initially periumbilical pain, but later migrated and localized in the RIF. The patient vomited once during this 24 hour period, after the onset of pain, which had the aspect of undigested food. History taking was unremarkable except for a history of cardiovascular disease on the patient's maternal side of the family. Physical examination revealed a normotensive, afebrile patient with signs of localized peritonitis (positive McBurney and Bloomberg signs).

Laboratory findings upon admission showed leukocytosis (14.40 x 10^3/μL) with neutrophilia (80.8%) and hemoconcentration (erythrocytosis: 5.98 x 10^3/μL, hemoglobin: 17.80 g/dL). An abdominal ultrasound was performed, which exhibited pericecal free fluid in the peritoneum and the aeric distention of a terminal ileal loop. An Alvarado score of 8 was calculated for our patient and a preliminary diagnosis of acute appendicitis was established. The course of treatment recommended at that point in time was an emergency appendectomy based on the following indications: signs of

localized peritonitis (peritoneal cavity) and an Alvarado score of 8.

The patient received spinal anesthesia and a McBurney incision was used to gain access to the peritoneal cavity. Once the peritoneal cavity was opened, the sigmoid colon was visualized in the RIF, distended with hydroaeric content. Following a cumbersome search for the patient's appendix, the McBurney incision was extended, and the appendix was located in asubhepatic, ascendant position. The appendix measured 10 cm in length and was characterized by a catarrhal aspect. Next, the last 100 cm of the terminal ileum were inspected. At a distance of 90 cm from the ileocecal valve, a MD measuring 7 by 4 cm in diameter was discovered, as depicted in Fig. 1. A retrograde appendectomy followed by a simple diverticulectomy with the use of a TA 30 mm stapler (Fig. 2) was performed. The retrograde appendectomy consisted of skeletonization of the appendix from its base, performing a purse-string suture and the inversion of the appendiceal stump into the cecal wall. After resecting the MD, a simple continuous suture was used to close the ileal wall, as demonstrated in Fig. 3. A single drainage tube was placed in the Douglas pouch and both specimens (appendix and MD) were sent for histopathological analysis.

The operative time was 90 minutes, without intraoperative complications. The patient's postoperative follow-up was uneventful, with resumption of oral alimentation on the second postoperative day and intestinal transit for gas and feces on the third and fourth postoperative days, respectively. The patient was well, displaying a good general status on anti-inflammatory and analgesic treatment. The drainage tube was removed on the fourth postoperative day, before which only serohematic secretions were observed. The blood work performed on the fourth postoperative day, was within normal limits, representing a normalization of the patient's leukocytosis and hemoconcentration from upon admission. Our patient was discharged the next day, on the fifth postoperative day, and returned on the tenth post-operative day for suture removal, without any evidence of a surgical site infection. Twenty-one days after surgery, the histopathological result confirmed catarrhal appendicitis and heterotopic gastric mucosa on the tip of the MD specimen.

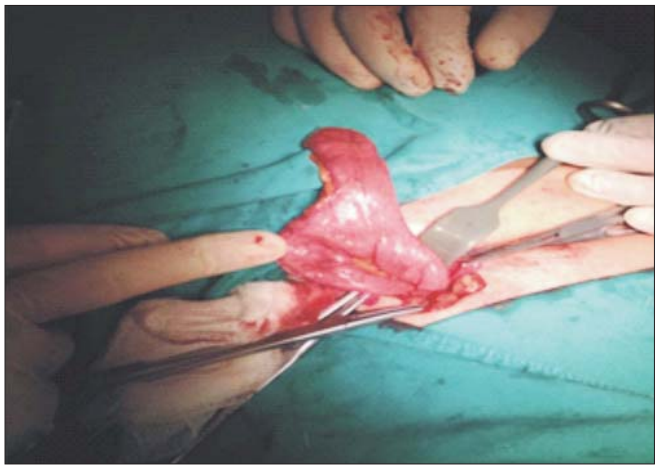

Figure 1. *MD prior to resection*

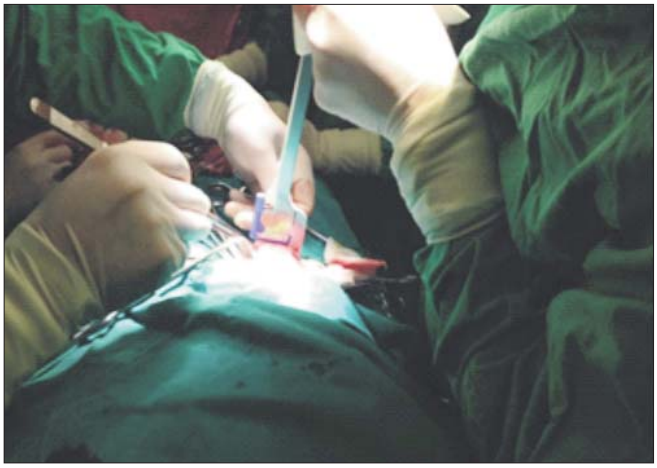

Figure 2. *Resection of MD with the help of a blue cartridge TA 30 mm stapler*

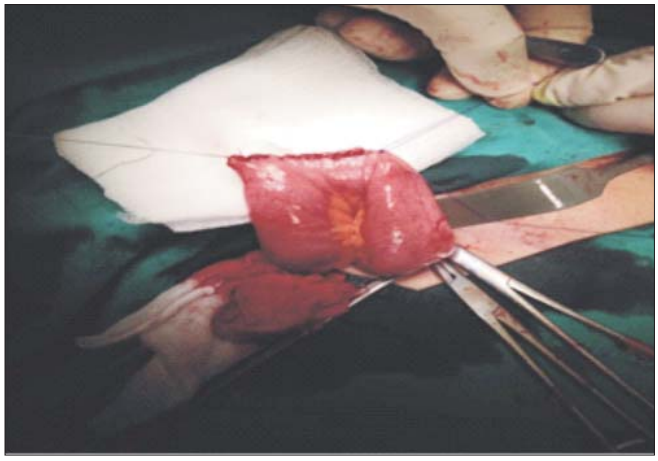

Figure 3. *Closure of the ileal wall with a simple continuous suture*

Discussion

Great interest in the management of incidentally-detected MD has been sparked over the past decade (12). The question of whether to resect incidentally-discovered MD during surgery has been debated for decades (5). In 2005, Park et al. reviewed the records of 1476 patients who were found to have a MD at the Mayo Clinic during the period between 1950-2002. A resection rate of 68% was calculated. The endpoint of this study was to identify risk factors deeming resection as the beneficial course of treatment. The following risk factors were identified: patient age < 50 years, male gender, diverticulum length > 2 cm and ectopic or abnormal features within a diverticulum, hence supporting prophylactic diverticulectomy (3). In the case of our patient, all the risk factors listed above were present. Moreover, Thirunavurkarasu et al. performed a population-based study that exhibited a link between an incidentally-detected MD left in situ and an increased risk of developing ileal malignancy (13).

On the hand, Soltero et al. favoured leaving asymptomatic MD in-situ due to a 4.2% lifetime-risk of developing complications versus a 9% morbidity incidence following incidental resection (14). Furthermore, Ueberrueck et al. advocate that a MD should be left in-situ, unless gangrenous or perforated (15). On the issue of MD-induced mortality, Zani et al. conducted a combined systematic review and population-based database study which included a total of 244 papers published over the course of 55 years in order to assess the risk of leaving an incidentally-detected MD in-situ. Zani et al. concluded that the number needed to treat (NNT) is 758 patients in order to prevent one death (12).

To date, all evidence regarding the management of incidentally-found MD is limited to case series, population-based autopsy and retrospective studies. Based on the aforementioned literature findings, we advocate the resection of incidentally discovered MD.

We identified five particular aspects in our patient. Firstly, our patient's age was well-outside the peak age range. Secondly, the presence of multiple anatomical anomalies was peculiar: a hypermobile, distended sigmoid colon in the right iliac fossa and a subhepatic, ascendant, long appendix in an ascendant position. Meckel's Diverticulum is usually located at a distance of 40-60 cm from the ileocecal valve, in contrast to the 90 cm distance found in our patient. Lastly, concomitant symptomatic and asymptomatic pathology, both being differential diagnoses proved to be a diagnostic challenge.

Conclusions

1. Due to its rarity, MD is a diagnostic challenge requiring prompt surgical treatment.
2. A high index of suspicion is necessary due to its diverse clinical presentation.
3. The last 100 cm of the terminal ileum should be inspected in every case of laparotomy for acute abdomen.
4. The debate regarding management of incidental MD is still on-going due to the lack of large, prospective studies, randomized-controlled trials and meta-analyses.

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Ethics Committee approval: not applicable

Written informed consent was received from the patient.

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References

1. Yahchouchy EK, Marano AF, Etienne JC, Fingerhut AL. Meckel's diverticulum. J Am Coll Surg.2001 May;192(5):658-62.
2. Meckel JF. Uber die divertikel am darmkanal. Arch Physiol. 1809;9(1):421-53.
3. Park JJ, Wolff BG, Tollefson MK, Walsh EE, Larson DR. Meckel Diverticulum. Ann Surg. 2005 Mar;241(3):529-33.
4. Dumper J, Mackenzie S, Mitchell P, Sutherland F, Quan ML, Mew D. Complications of Meckel's diverticula in adults. Can J Surg. 2006 Oct;49(5):353-7.
5. Quarrie R, Lindsey D, Bahner DP. Review of the Incidence and Management of Meckel's Diverticulum. Austin J Surg. 2014;1(3):1015-21.
6. Thurley PD, Halliday KE, Somers JM, Al-Daraji WI, Ilyas M, Broderick NJ. Radiological features of Meckel's diverticulum and its complications. ClinRadiol. 2009 Feb;64:109-18.
7. Harper PV, Andros G, Lathop K. Preliminary observations on the use of six-hour 99Tc as a tracer in biology and medicine. Semiannual report, Argonne Cancer Hospital Research Hospital.1962; 18:76-88.
8. Elsayes KM, Manias CO, Harvin HJ, Francis IR. Imaging manifestations of Meckel's Diverticulum.Am J Roentgenol. 2007 Jul;189(1):81-8.
9. Hosn MA, Lakis M, Faraj W, Khoury G, Diba S. Laparoscopic Approach to Symptomatic Meckel Diverticulum in Adults. J SocLaparoend Surg. 2014 Oct;18(4): e2014.00349.
10. Yamaguchi M, Takeuchi S, Awazu S. Meckel diverticulum. Investigation of 600 patients in Japanese literature. Am J Surg. 1978 Aug;136(2):247-9.
11. Rivas H, Cacchione RN, Allen JW. Laparoscopic management of Meckel's diverticulum in adults. Surg Endosc. 2003 Apr;17(4):620-2.
12. Zani A, Eaton S, Rees CM, Pierro A. Incidentally Detected Meckel Diverticulum To Resect or Not to Resect? Ann Surg 2008 Feb;247;2:276-81.
13. Thirunavurkarasu P, Sathaiah M, Sukumar S, Bartels CJ, Zeh H, Lee KK et al. Meckel's diverticulum- a high-risk region for malignancy in the ileum. Insights from a population-based epidemiological study and implications in surgical management. Ann Surg. 2011;253:223-30.
14. Soltero MJ, Bill AH. The natural history of Meckel's diverticulum and its relation to incidental removal. A study of 202 cases of diseased Meckel's Diverticulum found in King County, Washington, over a fifteen year period. Am J Surg. 1976; 132:168-7.
15. Ueberrueck T, Meyer L, Koch A, Hinkel M, Kube R, Gastinger I. The significance of Meckel's diverticulum in appendicitis- a retrospective analysis of 233 cases. World J Surg. 2005;29:455-8.