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Case report and review of literature



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Spontaneous performance of Meckel's diverticulus. Case report and review of the literature

AIMS: Meckel's diverticulum is a congenital anomaly found in approximately 2% of the general population. The complications caused by Meckel's diverticulum include intussusception, volvulus in adolescents and acute bleeding in adults ³.

This is an interesting and unusual case of spontaneous perforation of Meckel's diverticulum, in a Caucasian woman.

METHODS: A 46-year-old Caucasian woman was admitted because of severe abdominal pain and diarrhoea. A CT (Fig. 1) scan of the abdomen and pelvis was obtained, which demonstrated free air and a moderate amount of free fluid in the pelvis tracking up the gutters. The patient was consented and taken to theatre for diagnostic laparoscopy. A normal appendix was identified during laparoscopic examination of the abdomen. An inflammatory mass was seen with turbid fluid collection in the pelvic area on laparoscopy. The inflammatory mass turned out to be a perforated Meckel's diverticulum (Fig. 2). Wedge resection of the perforated Meckel's diverticulum was performed with endoGIA stapler fired at the base of diverticulum. Histopathology showed heterotopic gastric mucosa within the diverticulum and evidence of acute inflammation with perforation. The patient was followed up for two years and is symptom-free.

DISCUSSION: The total lifetime rate of complications is widely accepted at 4%, with a male-to female ratio ranging from 1.8:1 to 3:1 ^{4,5}. Hemorrhage is the most common presentation in children and is reported in over 50% of cases ¹⁰. In adults, hemorrhage occurs often but only in 11.8% is present ⁵. 90% of bleeding diverticula contain heterotopic mucosa, most often gastric mucosa ¹³. In one study, 11% of children with complicated Meckel's diverticulum (MD) were initially diagnosed with appendicitis.⁸

CONCLUSIONS: The diagnosis of ruptured MD was ultimately made by laparoscopy. This case demonstrates that a healthy degree of suspicion for complicated MD should be present when dealing with a questionable diagnosis of appendicitis. Laparoscopy has a definite role in patients with symptomatic Meckel's diverticulum, especially when the diagnosis is in doubt and it has proved definitive in facilitating diagnosis.

KEY WORDS: Gastric mucosa, Heterotopic mucosa, Meckel's diverticulum

Introduction

Meckel's diverticulum is a congenital anomaly found in approximately 2% of the general population. It is a diverticular remnant of the omphalomesenteric duct that is

located on the antimesenteric border of the ileum, a short distance from the caecum (60 cm proximal to the ileocaecal valve). On average, the diverticulum is 2.99 cm long and 1.92 cm wide.

Although jejunal, colonic, rectal, pancreatic, duodenal, and endometrial tissues have all been found in the diverticulum, the heterotopic mucosa is likely to be gastric in origin in 80% of cases ¹.

Complications develop in only 4% of patients with this malformation, with most cases presenting in childhood ². The complications caused by Meckel's diverticulum include intussusception and volvulus in adolescents and acute bleeding in adults ³.

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As a result, the gastric acid secreted from this lining erodes tissue, ultimately causing haemorrhage, until the perforation and often simulating acute appendicitis with acute abdomen.

This is an unusual case of spontaneous perforation of Meckel's diverticulum, in a Caucasian woman.

Case report

A 46-year-old Caucasian woman was admitted because of severe abdominal pain and diarrhoea.

On examination, the patient had tenderness in the right iliac fossa. She initially declared to be complaining of a sudden onset of stabbing peri-umbilical pain, 8/10 in severity. Up until the onset of the pain he had been in good health, without fever or chills, and normal bowel movements. She denied any associated nausea or vomiting, preceding viral illnesses or bloody stools.

Her vital signs were as follows: BP 100/70, HR 78, RR 16 and temperature of 36.9 °C.

Examination of the abdomen showed some rigidity, voluntary guarding and mild tenderness to palpation in the peri-umbilical area and right lower quadrant. Bowel sounds were present but diminished throughout. The remainder of her physical exam was unremarkable and within normal limits for her age.

Laboratory data were as follows: sodium 135, potassium 3.4, chloride 102, CO₂ 28, creatinine 0.6 and glucose 83. The complete blood cell count was as follows: white blood cell count 10.8, 63% neutrophils, hemoglobin 14, hematocrit 40.5 and platelets 294.

On this admission, vital signs were within the normal range. Routine blood tests, standing chest and abdominal X rays were unremarkable.

An ultrasound showed free fluid in the abdomen and pelvis. A CT (Fig. 1) scan of the abdomen and pelvis was obtained, which demonstrated free air and a moderate amount of free fluid in the pelvis tracking up the gutters.

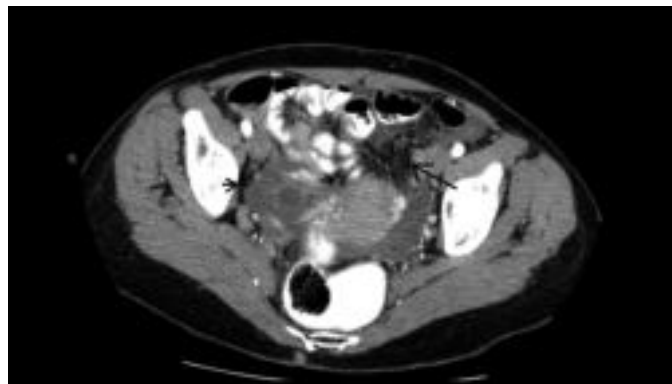


Fig. 1: A fluid-filled, round structure with mural enhancement is indicated by the arrow. Two small foci of extraluminal free air (arrowheads) are consistent with perforation.

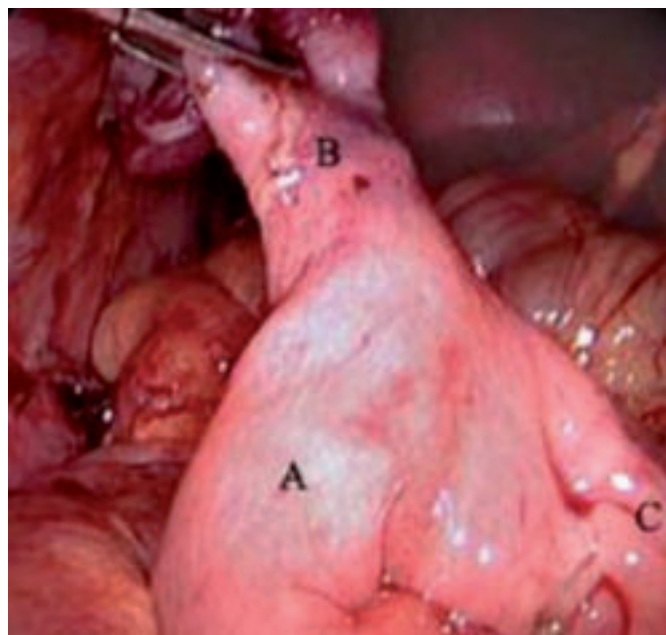


Fig. 2: A) Laparoscopic examination showed the terminal ileum; B) inflamed Meckel's diverticulum; C) proximal ileum

As the presence of peritonism in acute abdomen demands urgent surgical intervention, the consenting patient was taken to theatre for diagnostic laparoscopy with the option of appendectomy under general anaesthesia.

A normal appendix was identified during laparoscopic examination of the abdomen. An inflammatory mass was seen with turbid fluid collection in the pelvic area on laparoscopy. The inflammatory mass turned out to be a perforated Meckel's diverticulum (Fig. 2).

The adjacent loop of small bowel was grossly inflamed and dilated. Wedge resection of the perforated Meckel's diverticulum was performed with endoGIA stapler fired at the base of diverticulum.

Abundant washing of the peritoneal cavity and the Douglas, not being affixed drainage. The patient was allowed liquids orally on the third postoperative day (POD) and soft diet the next day. The drainage tube was removed on the second POD. There was no port site infection.

Histopathology showed heterotopic gastric mucosa within the diverticulum and evidence of acute inflammation with perforation. The patient was followed up for two years and is symptom-free.

Discussion

The total lifetime rate of complications is widely accepted at 4%, with a male-to female ratio ranging from 1.8:1 to 3:1^{4,5}. The largest study, by Yamaguchi et.al, with 600 patients, 287 of whom were symptomatic, showed the following complication rates: obstruction, 36.5%; intussusception, which often presents as obstruction,

13.7%; inflammation or diverticulitis and perforation, 12.7% and 7.3%, respectively; hemorrhage, 11.8%; neoplasm, 3.2%; and fistula, 1.7%⁵.

Intestinal obstruction is the most common complication in adult patients, with incidence rates varying from 22% to visualization in the operating room⁵.

Mifsud et. al. describe a rare case strangulated femoral hernia containing Meckel's diverticulum⁶.

Meckel's diverticulitis may mimic appendicitis. The correct diagnosis is usually established at the laparotomy or laparoscopy. None of the clinical features are pathognomonic, and the diagnosis is rarely made preoperatively. Routine laboratory studies, such as leukocyte and erythrocyte counts, serum electrolytes, blood glucose and urea, serum creatinine and coagulation screen are helpful in the general work-up. These tests will show evidence of acute infection.

Moore and Johnston⁷ reported that 40% of patients in a series of 50 patients with Meckel's diverticulum had a preoperative diagnosis of acute appendicitis.

Many of the other presenting symptoms, such as abdominal pain and nausea, are nonspecific and may mimic appendicitis. In one study, 11% of children with complicated Meckel's diverticulum (MD) were initially diagnosed with appendicitis⁸.

Initially, a fecalith obstructs the diverticulum, leading to inflammation, necrosis and eventual perforation.

Additional complications of the perforation include both abscess and fistula formation.

These complications are often seen in association with Crohn's disease or ulcerative colitis⁹.

More rarely, Meckel's diverticulum can be perforated by foreign bodies, including fish bones, marbles, gallstones, toothpicks and even bullets¹⁰.

Hemorrhage is the most common presentation in children and is reported in over 50% of cases¹¹. Children often present with dark red or maroon stools or stools with blood or mucus, whereas adults usually present with melena and crampy abdominal pain. This is felt to be owing to a slower colonic transit time in adults¹².

90% of bleeding diverticula contain heterotropic mucosa, most often gastric mucosa¹³. Tumors and perforation of MD are infrequent, but sometime are associated with neoplasms of a small intestine GIST causing perforation of the Meckel's diverticulum¹⁴.

This mucosa allows the diverticulum to be picked up radiologically by a Meckel's scan. The 99m Tc-perchnetate Meckel's scan is designed to detect gastric mucosa of at least 1.8 cm²¹⁵.

The reported accuracy of 46% in an adult series is much lower¹² than in children but can theoretically be increased by the use of adjunctive agents.

Pentagastrin accelerates Tc uptake and Cimetidine decreases Tc release by the gastric mucosa^{16,17}. H. pylori has been unquestionably linked with the ulceration of gastric mucosa in the stomach and duodenum, but more recent literature suggests that it likely plays no role in

bleeding Meckel's diverticula¹³. Neoplasm is reported at a rate of 3.2%, with carcinoid tumours comprising 33% of these cases¹⁸.

Other reported cases include sarcomas, adenocarcinomas, benign mesenchymal tumours, melanoma, lymphoma, phytobezoars and lipomas^{10,13,19}.

Radiological diagnosis of MD can be difficult, particularly when the diagnosis is not initially suspected. Ultrasound is often used in the setting of non-specific abdominal pain, as it was in our patient; however, it is of limited value for diagnosing MD except in the case of intussusceptions²⁰. A group of ten patients with Meckel's diverticulitis who underwent ultrasound¹⁸ were initially misdiagnosed with appendicitis²¹. CT scan of uncomplicated MD generally resembles a normal loop of the bowel. In the case of diverticulitis and perforation, inflammatory changes and extraluminal air may be present¹⁹, but a high degree of suspicion for MD must be present, as this can resemble other common conditions. The technetium-99m pertechnetate scan, or Meckel's scan, is generally regarded as the most accurate, non-invasive diagnostic technique. However, false-negative rates are higher in patients without bleeding²², and ectopic gastric mucosa must be present in the MD for a positive result.

Treatment of symptomatic Meckel's diverticulum has always been surgical resection.

Conclusion

In our patient, perforated appendicitis was suspected on CT and ultrasound because of the inflammatory changes, free air and the fact that the appendix could not be visualized. Additionally, the patient had no rectal bleeding. The diagnosis of perforated MD was ultimately made by laparoscopy. This case demonstrates that a healthy degree of suspicion for complicated MD should be present when dealing with a questionable diagnosis of appendicitis.

Laparoscopy has a definite role in patients with symptomatic Meckel's diverticulum, especially when the diagnosis is in doubt and it has proved definitive in facilitating diagnosis.

Riassunto

Il diverticolo di Meckel è un'anomalia congenita che si trova nel 2% della popolazione generale.

Le complicanze causate dal diverticolo sono l'intussuscezione, volvolo negli adolescenti e sanguinamento acuto negli adulti.

Si tratta di un caso insolito di perforazione spontanea del diverticolo di Meckel.

Una donna caucasica di 46 anni è stata ricoverata a causa di forti dolori addominali e diarrea.

A una TC dell'addome e della pelvi (Fig. 1) si è dimostrato aria libera e una moderata quantità di liquido libero nel bacino di tracciamento fino alle ovaie.

La paziente è stata portata in sala operatoria per una laparoscopia diagnostica che ha mostrato un'appendice normale e una massa infiammatoria con raccolta di liquido torbido nella zona pelvica. La massa infiammatoria rivelava una perforazione del diverticolo di Meckel (Fig. 2)

Si esegue una resezione con endoGIA del diverticolo di Meckel perforato. L'esame istopatologico ha mostrato mucosa gastrica ectopica all'interno del diverticolo e l'evidenza di infiammazione acuta con perforazione. Il paziente è stato seguito per due anni ed è senza sintomi.

DISCUSSIONE: Il tasso totale di complicanze del diverticolo di Meckel è del 4% con rapporto M/F compreso tra 1,8:1 e 3:1. L'emorragia è la presentazione più comune nei bambini ed è riportato in oltre 50% dei casi. Negli adulti l'emorragia si verifica spesso ma viene dichiarata solo nell'11,8% dei casi. Il 90% del sanguinamento del diverticolo di Meckel è dovuto alla presenza di mucosa ectopica, il più delle volte gastrica. In uno studio, dove si è dimostrato un quadro clinico del diverticolo di Meckel complicato, nell'11% dei pazienti è stata diagnosticata nella fase iniziale un'appendicite acuta.

CONCLUSIONE: La diagnosi di perforazione del diverticolo di Meckel si effettua per via laparoscopica. Questo caso dimostra che una particolare attenzione deve essere prestata al diverticolo di Meckel complicato, quando si delinea un quadro clinico diagnostico di appendicite acuta discutibile.

Laparoscopia ha un ruolo definito in pazienti con diverticolo sintomatico Meckel, soprattutto quando la diagnosi è in dubbio e si è dimostrata definitiva nel facilitare la diagnosi.

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Commento e Commentary

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Il caso presentato riconferma l'esperienza comune che l'esistenza di un diverticolo di Meckel, sia indenne che complicato, rappresenta una sorpresa operatoria, anche se l'intervento è di tipo laparoscopico. Il considerare la laparoscopia un mezzo diagnostico in casi del genere è una forzatura perché deve di necessità essere eseguita in anestesia generale, e dunque rappresenta quanto meno una "laparoscopia esplorativa" come nel caso di addome acuto senza diagnosi precisa si decide l'esecuzione di "laparotomia esplorativa", che non è considerato una procedura diagnostica ma il mezzo più efficace di diagnosi e terapia.

C'è da chiedersi se è utile fare la corretta diagnosi preoperatoria.

Se la patologia del diverticolo di Meckel è di tipo flogistico non fa molta differenza porre la diagnosi in fase preoperatoria piuttosto che in fase intraoperatoria, purché il reperto di una appendice indenne faccia applicare la norma aurea di esaminare sempre – e comunque – gli ultimi 60 cm dell'ileo. L'esistenza di una sindrome perforativa, con dolore localizzato in regione ombelicale e accompagnato da reazione peritoneale in quella sede, come nel caso descritto, dovrebbe far escludere in linea di principio una diagnosi preoperatoria di "appendicite" perché quando questa si perfora dà luogo inevitabilmente ad una vera e propria peritonite, per lo più localizzata, e dunque con dolore in fossa iliaca destra e non attorno all'ombelico. Importante è invece sottolineare come la laparoscopia, nell'incertezza diagnostica, offre la possibilità di evitare le difficoltà chirurgiche di un accesso secondo Mc Burney, che può risultare del tutto inadeguato.

* * *

The case report confirms the common experience that a MD, whether undamaged or inflamed, is generally an unexpected intraoperative discovery even if suspected, and this is true both for open and for laparoscopic access.

It is inappropriate to consider in such cases the laparoscopic approach a diagnostic tool because it is done in general anesthesia. Therefore it has to be considered at least as a "laparoscopic exploration", as in the event of acute abdomen without preoperative diagnosis a "laparotomic exploration" was generally performed before the laparoscopic era. In short a diagnostic-therapeutic tool.

Now we have to consider the question: is it useful a preoperative diagnosis?

If the pathology of the MD is inflammatory it is not too different to have a preoperative diagnosis rather than an intraoperative one, provided that the finding of an undamaged appendix is followed by the golden rule of an evenly exploration of the last 60 cm of ileum.

The clinical syndrome of a bowel perforation, with localized pain and peritoneal reaction around the umbilical area, as described in the case report, should be sufficient to preventively exclude a preoperative diagnosis of appendicitis because in case of appendicular perforation a true peritonitis follows, mostly localized, and in this case the pain is in the right lower abdomen, not around the umbilicus.

It is important to emphasize that the laparoscopic procedure, in case of diagnostic doubt, give the possibility to avoid the surgical difficulties of a initial Mc Burney access, that can demonstrate itself not adequate at all.

