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Laparoscopic treatment of Meckel's diverticulum perforation caused by a chicken bone. A case report.

We describe an uncommon case of a Meckel's diverticulum perforation by a chicken bone in a patient with symptoms of acute appendicitis. Meckel's diverticulum is the most common congenital abnormality of the gastrointestinal tract. The incidence is approximately 2% of the population. Most patients are asymptomatic, only 4-16% presenting complications, including bleeding, obstruction, and diverticulitis. The perforation due to a foreign body is a very infrequent complication and may have a bad prognosis in case of a delayed diagnosis. Only in a few cases, a careful evaluation of the CT scan leads to correct preoperative diagnosis. Definitive treatment is surgical intervention and should not be delayed in patients with peritonitis. Laparoscopy is a safe diagnostic and therapeutic tool to treat complicated Meckel's diverticulum. In our case, a stapled laparoscopic diverticulectomy has been performed with an excellent outcome.

KEY WORDS: Laparoscopy, Meckel's diverticulum, Perforation

Introduction

Meckel's diverticulum is the most common congenital abnormality of the gastrointestinal tract, caused by incomplete obliteration of the omphalomesenteric or vitelline duct during the embryonic development [1-4]. Meckel's diverticulum represents a true diverticulum of the ileum containing all three layers of the bowel wall and is found on the antimesenteric side of the distal ileum, usually 40 to 60 cm from the ileocaecal valve [2-5]. The incidence is approximately 2% of the population [2,4,6-10]. Most patients are asymptomatic, only 4-16% have complications [7-9], more frequent in males than in females [3-5,8-10]. The three most common complications are intestinal bleeding, obstruction, and inflammation [1-3,6-7]. In these cases, acute appendicitis is the most frequent preoperative diagnosis [2,4]. The perforation of a Meckel's diverticulum by a foreign body is a very rare complication, with few cases reported in the literature [7-10]. We describe an uncommon case of a Meckel's diverticulum perforation by a chicken bone in a patient with symptoms of acute appendicitis.

Case Report

A 31-year-old female presented to the Emergency Room with abdominal pain in the right lower quadrant that started insidiously 24 hours before presentation with a continuous intensification. Physical examination revealed sharp abdominal pain after palpation with tenderness in the right lower quadrant, suggestive of acute appendicitis. An abdominal CT was performed, showing a regular appendix and a linear and pointed hyperdense image inside the ileal lumen (Fig. 1A). The presence of moderate free fluid in pelvic cavity and a small air bubble near the hyperdense image (Fig. 1B) were indicative for intestinal perforation due to a foreign body. The patient

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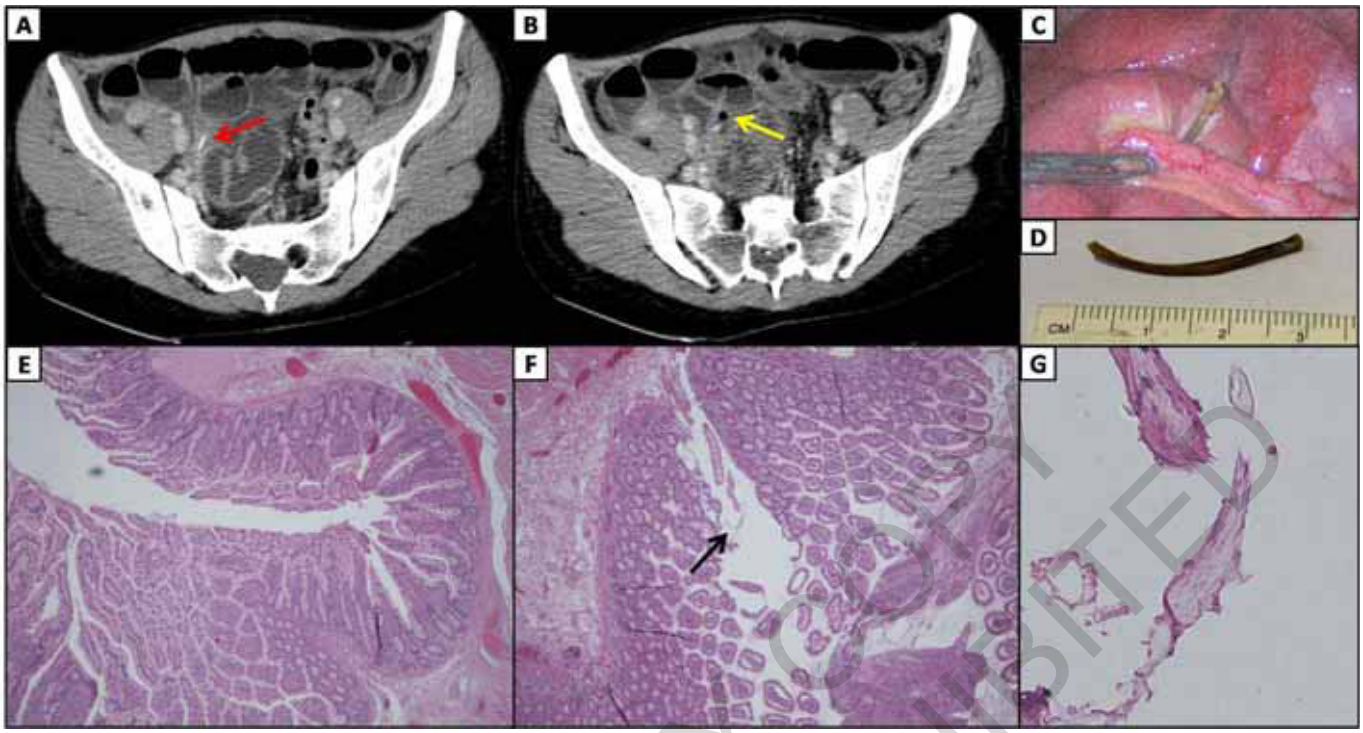

Fig. 1: Axial CT image showed a linear and pointed hyperdense image (red arrow) inside the ileal lumen, and a small air bubble (yellow arrow) near the hyperdense image in right iliac fossa (A, B). Laparoscopic exploration of abdominal cavity revealed a perforation of Meckel's diverticulum by foreign body, protruded from the free margin of this blind segment (C). The foreign body has been identified as a 3 cm chicken bone (D). The histopathological examination (Haematoxylin and Eosin stain – H&E; 4X) showed a diverticular formation compatible with Meckel's diverticulum presenting normal mucosa of small bowel, in absence of ectopic mucosa (E). The probable site of the mucosa perforation (H&E stain; 4X) with residual fragments of bone-like tissue (black arrow), and an associated chronic and acute inflammatory infiltrate including leucocytes, fibrin, and necrosis (F). Magnification (H&E stain; 40X) of the residual fragments of bone-like tissue (G).

was submitted to a laparoscopic exploration that revealed inflammatory adhesions from the cecum, appendix, and distal ileal loops to the abdominal wall. After intraoperatively dissection, a perforation of Meckel's diverticulum by foreign body was detected, protruded from the free margin of this blind segment (Fig. 1C). The foreign body has been carefully removed and identified as a 3 cm chicken bone (Fig. 1D). A stapled diverticulectomy was performed, with the endo-stapler applied to the base of the diverticulum, perpendicular to the long axis of the ileum. Then, an appendectomy was done, after isolation of the appendix from its meso through monopolar forceps. The procedure was followed by an abundant washing of the abdominal cavity until cleaning and a laminar drainage was placed in the Douglas pouch. The post-operative course was uneventful, and the patient was discharged on the 4th post-operative day. Macroscopically, the diverticulum and the appendix were long 3.2 cm and 4 cm, respectively. The histopathological examination showed a normal appendix with hyperemic serosa and a diverticular formation compatible with Meckel's diverticulum presenting normal mucosa of small bowel, in absence of ectopic mucosa (Fig. 1E). Moreover, the probable site of the mucosa perforation with residual fragments of bone-like tissue, and an associated chronic and acute inflammatory infiltrate including leucocytes, fibrin, and necrosis were also identified (Fig. 1F-1G).

Discussion

Meckel's diverticulum is asymptomatic in most of the affected individuals (incidence of 2-4%), with a 4% lifetime risk of developing complications [2,4,9]. The clinical presentation ranges from intestinal obstruction, to bleeding, inflammation, and perforation [1-3,6-9]. Tumours rarely lead to complication, but Caricato et al. report an uncommon case of a gastrointestinal stromal tumour causing perforation of the Meckel's diverticulum [2].
Moreover, Mifsud et al. describe a rare case of a strangulated femoral hernia containing Meckel's diverticulum [3]. Foreign body perforation of a Meckel's diverticulum is an extremely rare event with about 300 cases being reported in medical literature [10] and less than 10 previously reported cases of a chicken bone respon-

sible for the perforation [9]. A very small percentage of ingested foreign bodies can cause perforation of the bowel, leading to acute abdomen requiring surgical intervention. The most common objects causing bowel perforation are dentures, fish bones, chicken bones, toothpicks, cocktail sticks, bay leafs, wood splinters, melon seeds [4,7,11-12]. Intestinal perforation by a foreign body is rarely diagnosed preoperatively because most patients do not recall or not say they have ingested something, so a history of foreign body ingestion is rarely obtained [11]. Grasso et al. describe an unusual case of spontaneous perforation of Meckel's diverticulum in a woman with severe abdominal pain and diarrhoea [4]. Perforation of Meckel's diverticulum remains a differential diagnosis of right iliac fossa pain, but clinical symptoms are nonspecific and mimic other surgical conditions, such as appendicitis in our case. Meckel's diverticulum is notoriously difficult to diagnose also radiologically as the imaging features are non-specific [4]. Conventional radiography is not useful to detect the Meckel's diverticulum as well as to locate chicken or fish bones [5]. Although Meckel's diverticulum may be seen as a tubular blind-ending structure arising from the antimesenteric border of the terminal ileum on CT scan, the appearance of an uncomplicated case can resemble a normal small bowel loop [4-5]. In a few cases, like ours, careful evaluation of the CT scan leads to preoperative diagnosis of perforation of the Meckel's diverticulum by a foreign body [13]. In our CT scan, it appeared as a linear hyperdense image in a small bowel loop with an adjacent very thin extraluminal air bubble. The sensitivity of diagnosing the complicated Meckel's diverticulum on CT scan has increased owing the availability of higher spatial resolution and multiplanar reconstruction ability of the latest CT scanners [5]. In most cases, especially in adults, the presence of Meckel's diverticulum is asymptomatic and is often diagnosed intraoperatively or during autopsy [2-4,6]. Instead, the treatment of symptomatic Meckel's diverticulum has always been surgical resection [4]. Laparoscopy is a safe diagnostic and therapeutic tool that can decrease diagnostic time and avoid the morbidity and mortality of a delayed diagnosis. It allows visualization of the whole of the abdominal cavity and the detailed examination of the small bowel and colon. Compared to laparotomy, laparoscopic management of intra-abdominal pathologies allows early discharge and significantly reduced morbidity [14]. A laparoscopic tangential resection with a linear cutter and stapler device across the base of the diverticulum has been demonstrated to be a safe procedure [15-16]. The only exception to excision is if the diverticulum is so broad-based or so short that stapled excision cannot be technically performed [16]. In our case, since the Meckel's diverticulum base was narrow and intact, a stapled laparoscopic diverticulectomy has been performed with an excellent outcome.

Conclusions

Meckel's diverticulum is the most common congenital anomaly affecting the gastrointestinal tract. The perforation of a Meckel diverticulum due to a swallowed foreign body is an extremely rare event and may have a bad prognosis in case of a delayed diagnosis. Only in a few cases, a careful evaluation of the CT scan leads to correct preoperative diagnosis. Definitive treatment is surgical resection and should not be delayed in patients with peritonitis. Laparoscopy is a safe diagnostic and therapeutic tool emerging as the preferred approach to treat complicated Meckel's diverticulum.

Riassunto

Descriviamo un caso non frequente di perforazione del diverticolo di Meckel da parte di un osso di pollo in un paziente con sintomi di appendicite acuta. Il diverticolo di Meckel è l'anomalia congenita più comune del tratto gastrointestinale. L'incidenza è di circa il 2% della popolazione. La maggior parte dei pazienti è asintomatica, solo il 4-16% presenta complicanze, tra cui sanguinamento, ostruzione e diverticolite. La perforazione dovuta a un corpo estraneo è una complicanza molto rara e può presentare una prognosi sfavorevole in caso di diagnosi ritardata. Solo in alcuni casi, un'attenta valutazione della TAC porta alla corretta diagnosi preoperatoria. Il trattamento definitivo è una resezione chirurgica che non deve essere ritardata nei pazienti con peritonite. La laparoscopia è uno strumento diagnostico e terapeutico sicuro per il trattamento del diverticolo di Meckel complicato. Nel nostro caso, è stata eseguita una diverticolectomia laparoscopica con punti metallici con un risultato eccellente.

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