

## Foreign Body-Induced Perforation of Meckel's Diverticulum: A Case Series of Two Patients

Abourak Chaimae<sup>1\*</sup>, Guennouni Asmae<sup>1</sup>, Oukassem Siham<sup>1</sup>, Laamrani Fatima Zahra<sup>1</sup>, Jroundi Laila<sup>1</sup>, El Aoufir Omar<sup>1</sup>, El Fellah Youssef<sup>2</sup>, Rehal Mssrouri<sup>2</sup>, El Bouazizi Yassine<sup>2</sup>, El Hamdani Hamza<sup>2</sup>, Aoudad Anas<sup>2</sup>, Mohamed Hamid<sup>2</sup>, Mdaghri Jalil<sup>2</sup> and Benamr Said<sup>2</sup>

<sup>1</sup>Department of Emergency Radiology, CHU Ibn Sina, Faculty of Medicine and Pharmacy of Rabat, Mohamed V University, Rabat, Morocco

<sup>2</sup>Department of Surgery B, CHU Ibn Sina, Faculty of Medicine and Pharmacy of Rabat, Mohamed V University, Rabat, Morocco

**\*Corresponding Author:** Abourak Chaimae, Department of Emergency Radiology, CHU Ibn Sina, Faculty of Medicine and Pharmacy of Rabat, Mohamed V University, Rabat, Morocco.

**Received:** June 26, 2024; **Published:** July 19, 2024

### Abstract

Meckel's diverticulum is the most common congenital lesion of the small intestine. The perforation of a Meckel diverticulum is a very rare complication of this malformation and is usually associated with foreign bodies.

We report two cases of peritonitis caused by perforation of a Meckel diverticulum linked to the enclavement of foreign bodies of different natures.

The goal of this work is to educate everyone, but particularly the radiologist doctor and the surgeon, about this incorrectly diagnosed anomaly and to establish precise radiological signals to prevent diagnostic delay and its frequently fatal complications.

**Keywords:** Meckel Diverticulum; Peritonitis; Perforation; Foreign Body

### Introduction

Meckel's diverticulum is the most common congenital malformation of the gastrointestinal tract [1-3]. Although first described by Fabricius Hildanus in 1593 [1,3,4], it was named after Johann Friedrich Meckel, who established his embryonic origin in 1809 [1,3].

It is the result of the incomplete obliteration of the omphalomesenteral canal, which occurs between the 6<sup>th</sup> and 10<sup>th</sup> weeks of gestation [1,3]. It is a remnant of the omphalo-mesenteric canal that connects the primitive intestinal anus to the vitellin sac and is a nuance of confusion with appendix in surgical emergencies [4].

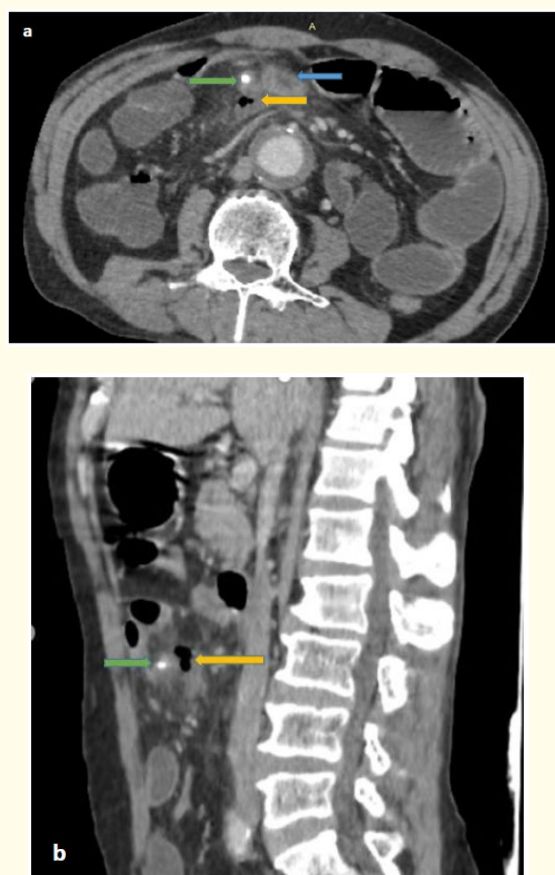
Meckel's diverticulum affects approximately 2% of the population [2,6]. Most cases are asymptomatic, with only 4 to 16% having complications [2,6]. Complications of the Meckel diverticle are more common in childhood before the age of two, usually in the form of gastrointestinal hemorrhage [2,3,6]. Meckel's diverticle is twice as symptomatic in men than in women [2,6].

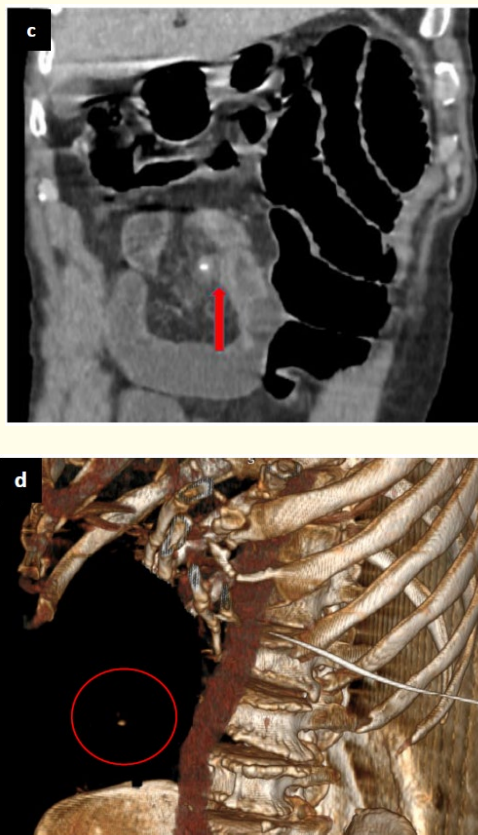
According to the study conducted by Mendelson., *et al.* intestinal occlusion (26%) and peritoneal irritation (55%) are the two main revealing complications of the diverticulum [4]. Perforation is a very rare complication and is responsible for less than 1% of complications, mainly related to foreign bodies [1].

## Case Reports

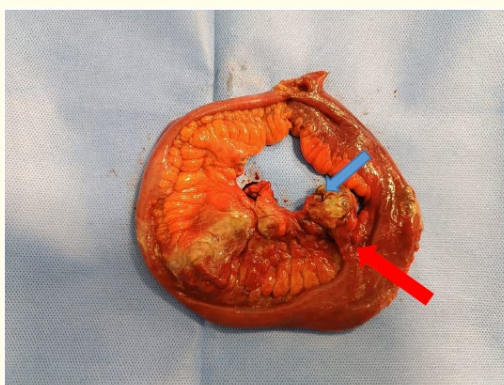
### Case profile 1

A 66-year-old man with a history of controlled hypertension, ischemic heart disease, and chronic renal failure appeared at the emergency department in January 2023 for diffuse abdominal pain with the umbilicus as the origin of the pain, which evolved for three weeks and was associated with vomiting and diarrhea, all of which evolved in a context of alteration of the general condition. The clinical examination revealed diffuse abdominal sensitivity. Biologically, white blood cells were at  $21,000/\text{mm}^3$ , with predominant neutrophilic polynuclear (80%), and CRP was 250 mg/L. In front of this table, several diagnoses were raised: acute appendicitis, mesenteric ischemia, and digestive perforation. An abdominal CT was requested from the outset, objectivizing a diverticular additive image attached to a thick-walled ilial antrax containing a calcium-density foreign body (600 UH). This was accompanied by infiltration of peri-diverticular fat, a few pneumoperitoneal bubbles, a small peritoneal swelling, and moderate distension of the small intestine (Figure 1a-1c). The calcium structure corresponded to the reconstructions in technical volume rendering mode (VRT) with a well-limited oval formation (Figure 1d). The patient confirmed that he accidentally ingested an olive bone a month ago. The diagnosis of peritonitis by perforation of a foreign body is retained. A laparotomy was indicated, the initial route of which was an upper and lower umbilical laparotomy. The per-operative results were an inflammatory Meckel diverticle necrosed and perforated at the tip with a small exfoliation in the face and an olive bone seized endoluminally (Figure 2). A grelic resection removing the diverticulum was performed with a mechanical lateral anastomosis. A drain was placed at the bottom of the Douglas, which brought back 100 cc of serum fluid on the first day. After he brought back a few CCs, the surgical procedures were simple and without complications. The patient resumed his transit to J2, and at this point, the feeding was gradually started. The drain was removed at J3, and the patient went out at J4. The patient has evolved well to this day. The anatomopathological examination of the operating room confirmed the diagnosis. She targeted acute perforated and suppurated diverticulitis with peritoneal reactions. Healthy exercise limits the meso had only one reactive ganglion. No histological sign of malignancy.





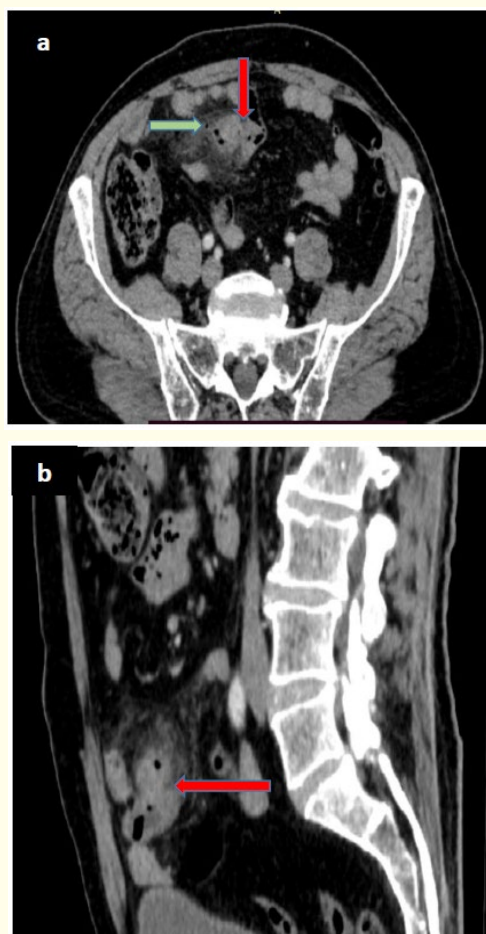
**Figure 1:** Abdominal-pelvic CT after PDC injection: a: axial, b: sagittal, c: coronal plans. Meckel's diverticulum (Red arrow) implanted in an intestinal loop with thickened wall (Blue arrow), with narrow diverticular collar, it contains a foreign body of calcium density (Green arrow), Densification of peri diverticular fat associated with a small effusion and the presence of some pneumoperitoneum bubbles (Yellow arrow). d: Reconstruction in volume rendering mode (VRT): the foreign object included in the Meckel diverticula corresponds to an olive bone (Red circle).

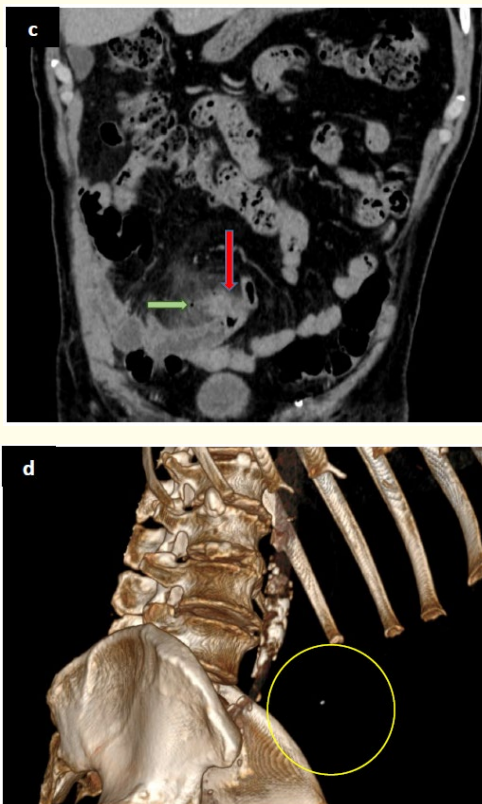


**Figure 2:** Per-operative diagnosis: Meckel's diverticle implanted at the level of an ideal thigh with a narrow implant base (red arrow). It is perforated at its peak with a visible hole (blue arrow), and an olive bone covered with fecal fluid is extracted from the diverticulum.

**Case profile 2**

A 59-year-old man, type two diabetic, appeared in the emergency room in October 2022 for abdominal pain localized at the level of the right iliac cavity, evolving for two days, associated with nausea, vomiting, and diarrhea. The clinical examination revealed an elongated abdomen with a sensitivity to palpation at the level of the right iliac cavity. In front of this table, several diagnoses were raised: acute appendicitis, diverticulitis, nephritic colitis, etc. An abdominal CT was performed at the outset, showing a Meckel diverticle implanted in an intestinal anise with a narrow diverticular neck, associated with an infiltration of peri-diverticular fat and some pneumoperitoneum bubbles (Figure 3a-3c). The foreign body was visible only on reconstructions in technical volume rendering mode (VRT), corresponding to a small, rounded formation of calcium density (Figure 3d). The patient does not remember having ingested a foreign body; the diagnosis of peritonitis by perforation of a foreign body is retained. A laparotomy was indicated, whose first route was an upper and lower umbilical laparotomy. Our per-operative results were an inflammatory Meckel diverticle necrosed at its distal end with a small endoluminally sequestered calculus. A grelic resection removing the diverticulum was performed with mechanical lateral anastomosis. A drain was placed at the bottom of the Douglas, which brought back 150 cc of serohematic fluid on the first day. The surgical procedures were simple and without complications. The patient resumed his transit to J3, and at this point, the feeding was gradually started. The drain was removed at J5, and the patient went out at J7. The patient was seen in consultation twice after his exit at a one-month interval between the two follow-up visits; he was well developed. The anatomopathological examination of the operating room confirmed the diagnosis. She targeted acute perforated and suppurated diverticulitis with peritoneal reactions. Healthy exercise limits. There was no histological sign of malignancy and no ectopic mucosa.





**Figure 3:** Abdominal-pelvic CT after PDC injection: a: axial, b: sagittal, c: coronal plans. Meckel diverticulum implanted at an intestinal loop with narrow diverticular collar (red arrow), Densification of diverticular peri fat and the presence of some pneumoperitoneum bubbles (green arrow). d: Reconstruction in technical volume rendering mode (VRT): the foreign object included in the Meckel diverticule visible only on the VRT reconstruction (Yellow circle).

## Discussion

The Meckel diverticulum is typically found less than 100 cm from the ileocolic valve, on the distal gracilis' anti-mesenteric border, with an average length of 3 cm [3]. It is a true short diverticle with a broad base, containing all layers of the intestinal wall and its own blood supply from the upper mesenteric artery, making it vulnerable to obstruction and infection [2,3,6]. The light of the Meckel diverticle usually contains gastric, pancreatic, or heterotopic mucous membranes [6].

Most cases remain asymptomatic and are accidentally diagnosed during imaging or surgical studies [3]. Many risk factors have been associated with an increased risk of developing symptomatic Meckel diverticula, including male sex, the diverticulum greater than 2 cm in length, the presence of ectopic tissue, and age < 50 years [2].

The main revealing complications in adults are intestinal occlusion, peritoneal irritation, diverticulitis, and neoplastic transformation [2,6-8]. However, gastrointestinal bleeding remains the main complication in children [7]. Perforation of the Meckel diverticle is a more rare complication and occurs in a secondary way to gangrene, inflammation, peptic ulceration, or ingestion of a foreign body [6].



Based on a thorough study of the literature, all cases of foreign strokes in Meckel's diverticulum are associated with a perforation of the diverticulum. This is the case with our patients. The physiopathology for which the perforation occurred in these cases can be explained mainly by two reasons: on the one hand, by a local inflammation due to the irritation of the foreign body against the wall of the diverticle and, on the other, by peristalticism aimed at pushing the alien body towards the end of the diverticle. Both could lead to decreased blood supply, necrosis, perforation, localized peritonitis, and the formation of abscesses, as seen during surgery and as confirmed by histology in our cases [2].

Studies highlight the difficulty of diagnosing MD in the preoperative period due to the absence of specific radiological symptoms and signs [6]. In all the case reports in the literature we looked at, the main clinical differential diagnosis was acute appendicitis. In our cases, several diagnoses have been mentioned, such as acute appendicitis, mesenteric ischemia, digestive perforation, nephrotic colic, etc. So, the perforations of the Meckel by a foreign body can be difficult to distinguish clinically from other more common causes of acute abdominal pain, such as appendicitis, diverticulitis, intestinal infection, or intestine occlusion [2].

CT has become a valuable resource for the study of abdominal pain [2]. In our study of the literature, CT was performed in all cases except in two cases, or the diagnosis was initially preoperative.

The identification of a Meckel diverticle in tomodesitometry remains difficult, especially its distinction with an intestinal anise: It is necessary to look for the borne character and the implantation on the anti-mesenteric edge that are evocative [4]. This was the case with our patients and two other literature reports. In other cases in the literature, Meckel's diverticulum has not been highlighted to me except as an individualization of a hyperdense alien body inside an ileal.

The main differential diagnosis is that of meso-cealic appendicitis; in favor of this diagnosis is the abnormal position of the caecum in a celiac situation with inflammatory signs nearby [4]. In our first two cases, the tubular structure and the presence of endoluminal calcified material initially led to appendicitis with stercolite, but the normal seat of the ileo-caecal crossroads, 3D reconstructions, and anamnese helped the diagnosis [4]. In most case reports in the literature, the normal appendix has been highlighted.

The small size and wide diameter of the diverticular neck explain why the Meckel diverticle is less prone to perforation than the appendix. However, when stretched with a narrow neck, the risk of inflammation and peritonitis increases [4]. This was the case in our patients, with a long, narrow-implanted diverticle and a case from the literature [4].

The gallstones represent the most common foreign bodies enclaved in the diverticular light [4]. Chicken bone, fish bone, melon seeds, corn grain, tooth, rolled tomato skin, cabbage stems, laurel leaves, wooden shards, and bile endoprosthesis are also in the literature [1-6,8,9]. In our cases, we found a calculus, a molar tooth, and an olive bone that had not been described before.

The radiological signs of digestive perforation peritonitis are typically pneumoperitoneum and peritoneal flushing. The densification of mesenteric fat and the proximity of pneumoperitoneum bubbles to the diverticulum have significantly guided the diagnosis of diverticular perforated peritonitis [4]. All these signs are found in our patients and in five cases in the literature.

### Conclusion

Meckel diverticular perforation by a foreign body is a rare complication that should be mentioned in differential diagnoses of abdominal pain. She may have a poor prognosis if the diagnosis is delayed. The anti-mesenteric situation of a digestive structure implanted on the small intestine directs the diagnosis in imaging.

### Ethics Approval

Our institution does not require ethical approval for reporting individual cases or case series.

### Informed Consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

### Author Contributions

C.A, S.O, A.G, Y.E.F, Y.E.B, H.E.H and A.A contributed to the conception, acquisition, analysis, interpretation of data, and drafted the manuscript.

O.E, F.Z. L, L.J, M.R, H.M, J.M and S.B critically revised the manuscript and approved it.

### Bibliography

1. Goncalves A., *et al.* "Meckel's diverticulum perforation by a fish bone: A case report". *International Journal of Surgery Case Reports* 28 (2016): 237-240.
2. De la Cruz Garcia I., *et al.* "Perforated Meckel's diverticulitis secondary to a corn kernel obstruction of lumen in an elderly patient". *Journal of Surgical Case Reports* 6 (2021): rjab244.
3. Santos B., *et al.* "Perforation of Meckel's diverticulum by a swallowed fish bone: case report and literature review". *Journal of Surgical Case Reports* 1 (2019): rjz003.
4. El Aoufir O., *et al.* "Péritonite diverticulaire: une étrange histoire de chasse". *Journal d'imagerie Diagnostique et Interventionnelle* 3.4 (2020): 276-278.
5. Shahid F., *et al.* "Fish bone causing perforation of the intestine and Meckel's diverticulum". *Case Reports in Surgery* (2020): 8887603.
6. Roberto Alves J., *et al.* "Meckel's diverticulum perforation by foreign body: a case report". *Bulletin of Emergency and Trauma* 9.2 (2021): 101-104.
7. A Fraser., *et al.* "Spontaneous perforation of Meckel's diverticulum in an adult female with literature review". *Surgical Case Reports* 4 (2018): 129.
8. Natsuki S., *et al.* "Liver abscess caused by fish bone perforation of Meckel's diverticulum: a case report". *BMC Surgery* 20.1 (2020): 121.
9. Topal U., *et al.* "A rare complication in a liver transplant patient: Meckel diverticulum perforation due to biliary stent". *International Journal of Surgery Case Reports* 53 (2018): 35-38.

### Volume 11 Issue 8 August 2024

©All rights reserved by Abourak Chaimae., *et al.*