Perforated mesenteric Meckel's diverticulum: Case report

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Abstract

Meckel’s diverticulum is a common congenital anomaly found in ~2% of the population, its classic location aiding in its diagnostic criteria, is the anti-mesenteric side of the distal ileum. However, reported cases of Meckel’s diverticulum found on the mesenteric side are present but rare. Here we report a case of a perforated mesenteric Meckel’s diverticulum with synchronised anti-mesenteric Meckel’s diverticulum, in a 70-year-old male, initially misdiagnosed as left strangulated inguinal hernia. The purpose behind this paper is to raise clinical suspicion regarding this rare pathology, so that timely diagnosis and management could be carried out.

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1. Introduction

Meckel’s diverticulum is a remnant of the prenatal vitelline duct that failed to regress between the fifth and seventh week of foetal life and is a common congenital anomaly found in ~2% of the population. The anomaly’s clinical significance is that the persistent diverticulum can lead to complications such as intestinal obstruction, inflammation of the diverticulum, bleeding, ulceration or perforation, which may often be misdiagnosed. The anti-mesenteric side of the distal ileum, is the classic location of a Meckel’s diverticulum and aids in its diagnostic criteria. However, this diagnostic concept is challenged by few reported cases of Meckel’s diverticulum found on the mesenteric side of the ileum. Like previously reported cases, the pathology in our case was misdiagnosed at first; the pre-operative diagnosis was of left groin swelling.

This work has been reported in line with the SCARE criteria [1].

2. Case report

70-year-old male patient, medically and surgically free, presented to the emergency department complaining of left groin swelling for 3 days’ duration. The patient’s swelling started gradually over a course of 3 days, associated with pain, nausea and vomiting, constipation and subjective fever. Patient denied previous history of trauma, chronic constipation and work-related heavy object lifting. Patient has no previous surgical history, no family history of similar presentation and no pharmacological history.

Physical examination: patient was conscious, alert and oriented; but hypotensive, tachycardic, tachypneic and in pain. Abdominal examination revealed a right sided inguinoscrotal swelling, around 20 × 15 cm, non-tender, reducible, with no skin changes. Also, there was another 5 × 7 cm left sided inguinal swelling but severely tender with bluish discoloration and hotness of the skin. Patient received initial fluid resuscitation, antibiotics and analgesia. Meanwhile, patient’s laboratory findings showed a white blood cell count of 27.55 × 10⁹/L, haemoglobin concentration of 8.1 g/dL, creatinine level of 484 μmol/L and urea level of 24.8 mmol/L. Electrolytes and other routine analysis were all within normal values. Patient’s chest and abdominal X-rays were unremarkable.

Patient was diagnosed with left strangulated inguinal hernia and was pushed directly to the operating room. Intraoperatively, a left inguinal approach was used. Around 20 cc of pure pus was drained, and the bowel looked healthy to the surgeon; so no resection was done and the hernia was repaired primary without mesh.

Post-operatively, the patient was doing fine, tolerating oral feeding and passing stool. On post-operative day 4, the patient became febrile with a temperature of 39 and his leukocytic count increased up to 30. Therefore, abdominal CT was done, which reported unremarkable findings, except for some subcutaneous oedema which was expected post-operatively. Yet the patient was still sick.

On post-operative day 5, the wound was draining faecal matter. Patient underwent urgent exploratory laparotomy, where two Meckel’s diverticula at the terminal ileum were identified; one of them was perforated in the intra-abdominal wall, communicating with the left inguinal opening through the retro-pubic canal. Release of the bowel from the abdominal wall was done, resection
of the part that contained the diverticulum was also done, with side to side anastomosis.

As for the two Meckel's diverticula; one was on the anti-mesenteric side, while the other was on the mesenteric side, which was perforated. Histopathology result of taken samples revealed perforated Meckel's diverticulum associated with dense inflammation and ischemia (Images 1 and 2).

Post operatively, the patient was kept in high dependency unit, NPO and on antibiotics. On post-operative day 4, patient spiked fever again with a sudden onset of severe lower abdominal pain. The patient underwent CT abdomen and pelvis which showed complete disruption of the anastomotic site. Another laparotomy was carried out were the anastomotic site was taken down and double barrel ileostomy was created.

The operator was a general surgery consultant with years of experience. In the following post-operative period, the patient unfortunately acquired a pulmonary embolism and passed away and no further follow up nor outcomes could be measured.

3. Discussion

Meckel's diverticulum, known as the most common malformation of the gastrointestinal tract, is a remnant of the prenatal vitelline duct that failed to regress between the fifth and seventh week of foetal life, first described by Johann Friedrich Meckel in 1809 [1].

The diagnostic criteria for Meckel's diverticulum include the rule of 2, characterised by: 2 in. long, 2 feet away from ileocecal valve, occurring in 2% of population, containing 2 types of heterotopic mucosa (gastric and pancreatic), 2 years of age is the most common age of presentation and 2:1 male to female ratio. Commonly, it arises from the anti-mesenteric side of the ileum, located ~40 cm proximal to the ileocecal valve, containing all 5 layers of small intestine and has a separate mesentery for blood supply [3].

Despite these criteria, the diagnostic concept that a Meckel's diverticulum must arise from the anti-mesenteric side is challenged by its variant, the mesenteric type that is even rarer, with only few cases reported in the literature. First report was published by Chaffin in 1941, as an unusual variant of Meckel's diverticulum located on the mesenteric side of the small bowel [3]. Meckel's diverticulum is either discovered incidentally during surgery for other pathology, or in diagnostic imaging or as a complicated Meckel's diverticulum. The most common complications include haemorrhage, obstruction, inflammation of the diverticulum, perforation or the presence of a tumour within the diverticulum. Concerns may rise due to the abnormal location of the diverticulum on the mesenteric side as it could rupture or erode into the mesentery putting the patient at risk for bleeding or further serious complications [4].
Haemorrhage, as reported in over 50% of cases, is the most common presentation of Meckel’s diverticulum in young children, while bowel obstruction is the most common in adults. Whereas perforation is considered the least faced complication, as reported in less than 0.5% of symptomatic Meckel’s diverticulum cases [1]. Perforation, however, can be life-threatening and the diagnosis can be delayed or missed considering the overlap of clinical symptoms with other causes of acute abdomen, in addition to the often-non-specific findings on imagining. As previously reported, CT scans and ultrasound are not diagnostic as they are unable to differentiate between a diverticulum and a loop of bowel [5]. Therefore, establishing the correct pre-operative diagnosis can be challenging due to the non-specific symptoms Meckel’s diverticulum can present with. Complicated Meckel’s diverticulum may be often misinterpreted as acute appendicitis with less than 10% of symptomatic cases of Meckel’s diverticulum successfully diagnosed preoperatively [1].

Upon reviewing previous literature and case reports made on similar findings, it was found that they are very often misdiagnosed until the surgical intervention. However, no previous literature reported similar pre-operative diagnosis as our case, where the mesenteric Meckel’s diverticulum was perforated into the inguinal canal, resulting in a sealed perforation leading to the diagnosis of strangulated inguinal hernia. The following is a collection of mesenteric Meckel’s diverticulum cases reported in the surgical literature. The following table, extracted from a previously made table by a previous study [3], alongside 3 extra cases reported recently [1,4,5] list the reported cases in summary (Table 1).

The table summarises how often, although the total number of cases is few, mesenteric Meckel’s diverticulum cases are misdiagnosed as they present with a variation of non-specific symptoms. However, once intra-operatively encountered, cases of mesenteric Meckel’s diverticulum underwent similar approaches of treatment.

Surgical resection is the treatment of choice for symptomatic Meckel’s diverticulum. Procedures made to achieve treatment most commonly include diverticulectomy, segmental bowel resection and anastomosis and wedge resection [6]. Moreover, finding of an incidental mesenteric Meckel’s should prompt consideration for resection as its location may erode the mesentery and its vasculature causing devastating consequences. Lastly, studies agreed on

| No. | Author/Yr          | Presentation                  | Pre-op Diagnosis             | Procedure                      | Operative Finding                             | Histopathology                                      |
|-----|-------------------|-------------------------------|-------------------------------|--------------------------------|-----------------------------------------------|---------------------------------------------------|
| 1   | Current Case      | 70 y/o male with left groin swelling | Strangulated inguinal hernia | Segmental bowel resection + side-to-side anastomosis | Perforated mesenteric Meckel’s diverticulum + anti-mesenteric Meckel’s diverticulum | Perforated Meckel’s diverticulum associated with dense inflammation and ischemia; Meckel’s diverticulum; gastric mucosa |
| 2   | Das et al. [11]   | 32 y/o male with lower abdominal pain | Infected collection post umbilical piercing | Small bowel resection + end-to-end anastomosis | Perforated mesenteric Meckel’s diverticulum | Mesenteric Meckel’s diverticulum; Diverticulitis |
| 3   | Melissa et al. [4] | 27 y/o male with right lower quadrant pain | Acute appendicitis | Small bowel resection + anastomosis | Perforated mesenteric Meckel’s diverticulum | Mesenteric Meckel’s diverticulum; Diverticulitis |
| 4   | Al-Qahtani et al. [12] | 26 y/o female with right lower quadrant pain | Acute appendicitis | Diverticulitis | Mesenteric Meckel’s diverticulum | Mesenteric Meckel’s diverticulum; Diverticulitis |
| 5   | Abbas et al. [3]  | 45 y/o female with lower abdominal pain | Chronic abdominal pain | Segmental bowel resection + end-to-end anastomosis | Mesenteric Meckel’s diverticulum | Mesenteric Meckel’s diverticulum; Diverticulitis |
| 6   | Toure et al. [16] | 45 y/o male with epigastric pain | Acute abdomen | Small bowel resection + anastomosis | Mesenteric Meckel’s diverticulum | Mesenteric Meckel’s diverticulum; Diverticulitis |
| 7   | Mohanty et al. [13] | 16 m/o male with rectal bleeding | Bleeding Meckel’s diverticulum | Mesenteric Meckel’s diverticulum | Mesenteric Meckel’s diverticulum | Chronic inflammation, no heterotopic tissue |
| 8   | Ahmad et al. [2]  | 25 y/o male with right lower quadrant pain | Small bowel mass | Segmental resection + anastomosis | Mesenteric Meckel’s diverticulum | Chronic inflammation, no heterotopic tissue |
| 9   | Singh [7]         | 2 y/o with umbilical serous discharge 3 y/o | Small bowel resection + anastomosis | 1 + 2 = 3 + Mesenteric diverticulum | Mesenteric Meckel’s diverticulum | Chronic inflammation, no heterotopic tissue |
| 10  | Carpenter et al. [14] | 35 y/o male with black stool | Meckel’s diverticulum | Small bowel resection + side-to-side anastomosis | Mesenteric diverticulum | Ectopic gastric mucosa |
| 11  | Karaman et al. [8] | 23 y/o male with right lower quadrant pain | Meckel’s diverticulum | Appendectomy + diverticulectomy | Inflamed Meosenteric diverticulum | Acute appendicitis with Mesenteric diverticulum |
| 12  | Seitz et al. [15] | 65 y/o female with right lower quadrant pain | Meckel’s diverticulum | Appendectomy + diverticulectomy | Inflammatory changes of distal ileum and diverticulum with mesenteric abscess | Severe acute transmural phlegmonous inflammation; focal area of heterotopic gastric mucosa within the head of the diverticulum with perforation|
| 13  | Walczak et al. [16] | 25 y/o male with incidental finding on US | Hypogastric mesenteric cyst | Small bowel resection + side-to-side anastomosis | Adherent mesenteric cyst | Ectopic gastric mucosa + inflammatory changes |
| 14  | Manukyan et al. [9] | 15 y/o female with abdominal pain | Acute abdomen | Ideal segmental resection | Perforated mesenteric diverticulum and pus and intestinal content in pelvis | Pancreatic tissue + oxyntic and antral type gastric mucosa |
| 15  | Buke et al. [10]  | 8 m/o male with Painless rectal bleeding | Meckel’s diverticulum | Segmental resection + anastomosis | Inflamed diverticulum and lymphadenopathy | Heterotopic gastric mucosa |
| 16  | Segal et al. [17] | 19 y/o male with diffuse abdominal pain | Acute appendicitis | Small bowel resection + wide local excision of mesentery + appendectomy | Mesenteric mass, mesenteric thickening, adenopathy | Ectopic gastric mucosa + inflammatory changes |
mesenteric Meckel’s diverticulum resection to avoid further complications [3].

4. Conclusion

In summary, Meckel’s diverticulum can be in the mesenteric side despite its classic anti-mesenteric location as a variant, possibly proceeded by a misdiagnosis or a delay of diagnosis until surgery, despite pre-operative workup and examination. Therefore, high clinical suspicion of this pathology and its complications should be encouraged and kept in mind as a differential diagnosis for acute abdomen, as the learning point and purpose of this report, so that timely diagnosis and management of resection could be carried out.

Declaration of Competing Interest

None of the authors have any conflict of interest to declare.

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Ethical approval

The study is exempt from ethical approval.

Consent

Signed consent couldn’t be taken from deceased patient nor family members, despite exhaustive attempts made to contact the family. However, the report has been sufficiently anonymised not to cause harm to the patient or their family.

A signed document by the head of department to the above is available.

Author contribution

Orjuana Khudari gathered patient’s data, designed the case report and drafted the manuscript. Basem AlShareef participated to the manuscript editing to its final version, supervised the report and revised it critically. All authors read and approved the final manuscript to be published.

Registration of research studies

Not Applicable.

Guarantor

Orjuana Khudari is the guarantor of submission and accepts full responsibility.

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