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Case report

Acute abdomen following axial torsion of a Giant Meckel's diverticulum in a young male: A case report

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ABSTRACT

Introduction and importance: Among Meckel's diverticulum (MD), the 'Giant' category is relatively rare. Most Giant MDs lead to complications such as torsion and diverticulitis.

Presentation of case: A 20-year-old South Asian male presented with a three-day history of vomiting and left-sided abdominal pain. X-ray and ultrasound scan of the abdomen illustrated features of small bowel obstruction. He underwent laparotomy under general anaesthesia. A gangrenous, axially torsed 25-cm Giant MD with concurrent ileal compression by a mesodiverticular band was detected and diverticulectomy and segmental resection with end-to-end anastomosis of the ileum was performed. Histology revealed ectopic gastric and pancreatic tissue. He had an uneventful postoperative stay and was devoid of any surgery-related complications at one-year follow-up.

Clinical discussion: Adults mainly present with bowel obstruction following complicated MDs. Multiple mechanisms have been elaborated as causalities of bowel obstruction where the presence of bands of congenital or inflammatory origin, intussusception, and enteroliths are relatively common. The presence of ectopic tissue in MDs is associated with increased complications. Symptomatic MDs need resection to abate future complications such as haemorrhage and obstruction.

Conclusion: Despite the low diagnostic potential of clinical examination and radiological studies, a high degree of suspicion is warranted in cases of probable MD-resultant complications, where more common aetiologies have been ruled out, as delay in diagnosis and definitive surgical therapy are invariably associated with worsened morbidity and mortality. It is high time to elucidate related demographics and clinical data on Giant MDs to identify high-risk categories and develop safer follow-up protocols.

1. Introduction

Meckel's diverticulum (MD), first described extensively by the German anatomist Johann Friedrich Meckel the Younger in 1809, is the commonest congenital anomaly of the gastrointestinal tract [1]. It is located in the terminal ileum, the majority located within 100 cm from the ileocaecal valve in the antimesenteric border in contrast to other gastrointestinal diverticula [2,3]. The majority of MDs do not lead to symptoms and out of the symptomatic cohort, 60 % are represented by the pediatric group [4]. Common complications in the adult population are accounted for by intestinal obstruction, bleeding, perforation, and diverticulitis [5]. The diagnosis of MD in adults is difficult due to its rarity, nonspecific symptomatology and routine radiological findings, and a multitude of commoner differential diagnoses such as appendicitis, gastroenteritis, diverticular disease of the colon, etc. [4,6]. The delay in diagnosis could lead to fatal outcomes, thus a high index of suspicion is required, specially in cases when symptoms persist despite exclusion and/or non-operative treatment of more commonly considered aetiologies [7]. The objective of reporting this case was to contribute to already existing yet a few data on Giant MDs with rare complications such as axial torsion and to increase awareness of this rare entity among our peers. The case report is reported in line with SCARE criteria [8].

Abbreviations: MD, Meckel's diverticulum; CT, Computed tomography.

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2. Case description

A 20-year-old South Asian male presented to the surgical unit of District General Hospital of Sri Lanka with a three-day history of left lower abdominal pain and vomiting. He was a manual labourer with no significant medical or surgical history. He was a non-smoker and an occasional alcoholic. There was no recent history of trauma, urinary symptoms, or persistent altered bowel habits. On examination, the patient was febrile (temperature- 101 °F) and mildly dehydrated. Pain score was 5 on the numerical rating scale. His pulse rate was 130 per minute, blood pressure 110/67 mmHg, respiratory rate 26 per minute, and peripheral oxygen saturation 98 % in room air. There was no pallor or icterus. There was localized tenderness over the left iliac fossa. No other features of generalized peritonitis were noted. Per rectal examination revealed soft stools with no masses. An X-ray of the abdomen was performed which showed dilated small bowel loops with multiple fluid levels in the absence of gas under the diaphragm (Fig. 1).

An ultrasound study was performed according to local protocols which further confirmed small bowel obstruction. There was no free fluid or abdominal masses. White cell count was elevated (25,000/mm^3) with a neutrophil predominance. C-reactive protein was raised to 120 mg/L. Chest X-ray, serum electrolytes, amylase, liver enzymes, renal function tests, and urine full report were all normal. Serum lactate was 1.1 mmol/L. The patient was kept nil by mouth, a nasogastric tube inserted and catheterized. Intravenous morphine 3 mg was administered for pain relief and intravenous antibiotics and Hartmann infusion as maintenance was commenced. As Computed tomography (CT) facility was not available in our center and persistent symptomatology in a virgin abdomen, an emergency exploratory laparotomy was performed by a general surgeon under general anaesthesia after informed, written consent of the patient. The peritoneal cavity was opened via a midline incision. There were dilated small bowel loops with a small amount of free fluid. The bowel was healthy. The appendix was normal and there were no intraperitoneal masses. On further examination, an approximately 25 cm long, 2 cm wide MD was found 45 cm proximal to the ileocaecal junction. It was gangrenous due to torsion at the base (Fig. 2a). A band of tissue connecting the tip of the diverticulum and mesentery had simultaneously led to obstruction of the ileum (Fig. 2b). There was no malrotation of the bowel. Gangrenous MD was resected with a part of the adjacent small bowel (Fig. 2c).

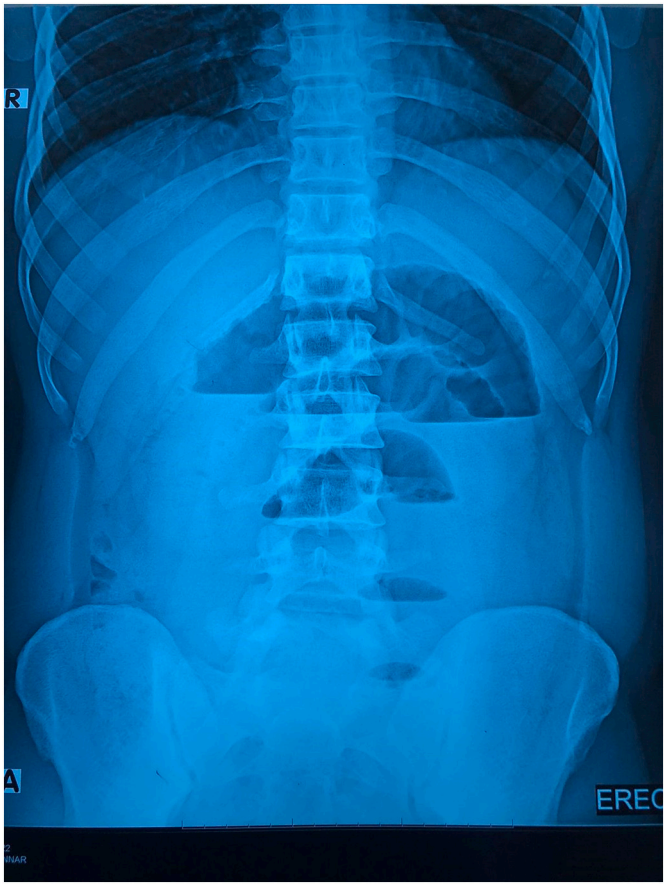

Fig. 1. Erect X-ray abdomen depicting features of small bowel obstruction with dilated bowel loops and multiple fluid levels.

Subsequently, small bowel decompression was carried out and end-to-end ileal anastomosis was performed. The patient was extubated at the end of the surgery and sent to the ward for postoperative care. He was discharged home on day 05 following an uncomplicated postoperative stay. Histology confirmed a giant MD diverticulum consisting of ectopic specialized gastric mucosa and exocrine and endocrine pancreatic tissue with no evidence of malignancy. There was significant acute inflammation extending into the serosal surface with partial necrosis. The resected small bowel was within normal histology (Fig. 3).

He was regularly followed up in the surgical clinic and was without any related complications by one year.

3. Discussion

A diverticulum in the gastrointestinal tract denotes an outpouching of the lumen. A ‘true’ diverticulum contains all three layers of the intestinal wall. MD is a true diverticulum. The quoted prevalence varies between authors; however recent statistics claim it to be 0.3 % to 2.9 % [9], with a preponderance towards males [10]. The majority with MD remain asymptomatic. The symptoms are seen in 4–6 % of the patients [11]. Interestingly, significantly higher proportions of up to 71 % are reported in the literature [12,13]. Intestinal obstruction remains the commonest complication among adults [14–16]. Cited causes predisposing to obstruction include ileal compression by the presence of a mesodiverticular band, recurrent diverticulitis leading to band formation, enteroliths formed inside the diverticulum, infarction following volvulus of the small bowel, intussusception or incarceration of an associated hernia (Littre's Hernia) and internal herniation of small bowel [4,17]. An extensive description of the causality and related mechanisms had been put forth 120 years back by Halstead [18].

It is proposed that the complications are correlated with the size of MDs, the latter being categorized as ‘Giant’ when they are more than 5 cm in length [16]. Giant MDs is a relatively rare entity. When the MD is long with a narrow base, torsion and diverticulitis are commonly associated complications akin to our patient [19–22]. Intussusception, necrosis, small bowel obstruction and perforation of the ileum are all reported with Giant MDs [10,19,23–27]. Despite the abundance of reported cases, the prevalence of Giant MD is not yet known albeit the majority if not all, being symptomatic on presentation [27]. In addition to the size, tissue components contained within the MDs are also associated with complications. Ectopic gastric mucosa is found in the majority of symptomatic MDs representing up to 71 % of the cases. Gastrointestinal haemorrhage has been a common association with gastric ectopic tissue. A relatively lesser number of MDs with symptoms contained ectopic pancreatic tissue (0 to 12 %) [9]. Taking into consideration the comparatively infrequent prevalence of ectopic tissue in asymptomatic MDs, it is believed that the presence of ectopic tissue which is best confirmed histologically, correlates with complications [9]. This being said, prophylactic resection of MDs based on the presence of ectopic tissue by intraoperative rapid frozen sections when the MD is ruled out as the aetiology for initial clinical presentation would lead to weakened diverticular wall and risk of subsequent perforation and leaks.

Left-sided abdominal pain and localized tenderness on initial presentation were quite unusual in our patient. Possible differential diagnoses were excluded and ultimately the symptomatology was

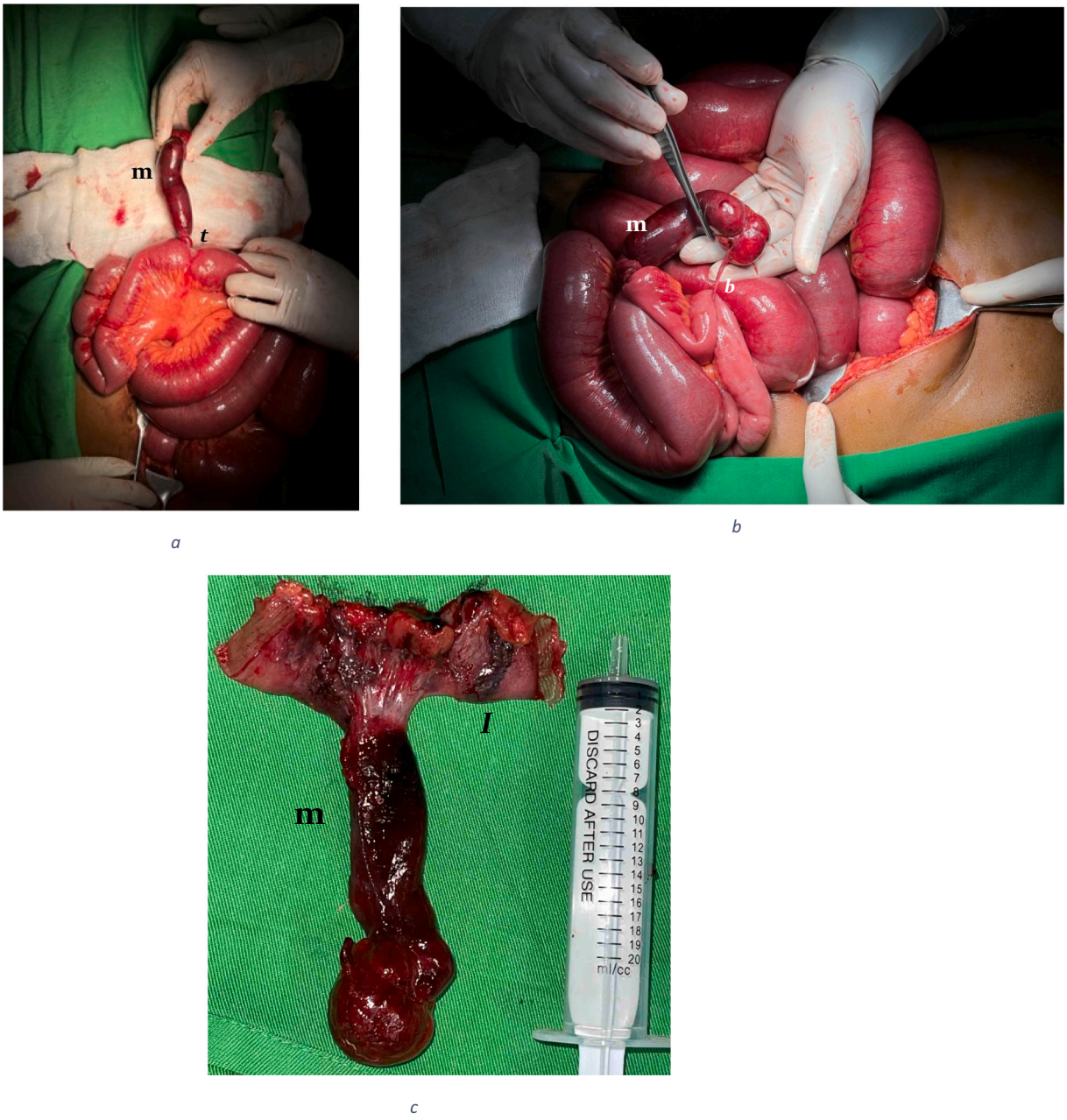

Fig. 2. a, A Giant, torsed (t) gangrenous MD (m); b, a mesodiverticular (b) leading to ileal obstruction; c, 25 cm MD (m) with a narrow base and segmentally resected ileum (I).

attributed to the torsed, gangrenous MD. In case malrotated bowel is found with an underlying MD, it is always a necessity to exclude situs inversus by excluding dextrocardia [28]. More importantly, there are reported cases of MDs located in the rectosigmoid colon and tumours of MD adherent to the sigmoid colon, requiring vigilance in such atypical presentations of symptomatic MDs [29,30].

The diagnosis of MD preoperatively is a challenge on its own. The symptomatology is largely nonspecific. X-ray, ultrasound, and CT studies might yield complications of MD such as small bowel obstruction, enteroliths, and intussusception; however, all these lack sensitivity and specificity [2,6,31]. In comparison to more conventional barium studies, multidetector CT and CT enterography and enteroclysis yield a higher detection rate. Digital substraction angiography, positron emission tomography CT scan, and Scintigraphy using ^{99m}Tc-pertechnetate are all relatively new imaging modes with varying degrees of detection rates [32]. In cases of acute abdomen due to small bowel obstruction, the use of barium studies is obsolete in our practice while ultrasound might not yield useful information due to gaseous distension of the bowel. Immediate unavailability of CT and more sophisticated imaging modalities in low-resource settings (such as our center) is similarly a confounding factor in the preoperative diagnosis of MDs.

All symptomatic MDs should be resected. Laparotomy and laparoscopic had both been adopted with success. Diverticulectomy, segmental or wedge resection are documented surgical approaches in cases of small bowel obstruction with MDs [33]. In complicated intestinal obstruction, complicated diverticulitis with inflamed or perforated base, and when there is a tumour, wedge, or segmental resection is recommended [34]. Provided the base is healthy, wedge resection offers the benefits of avoidance of dissection of the mesentery, bowel anastomosis, and ultimately lengthy surgical times and subsequent complications related to the anastomosis over segmental resection. Given the relative operative unfamiliarity of complicated MDs in the background of intestinal

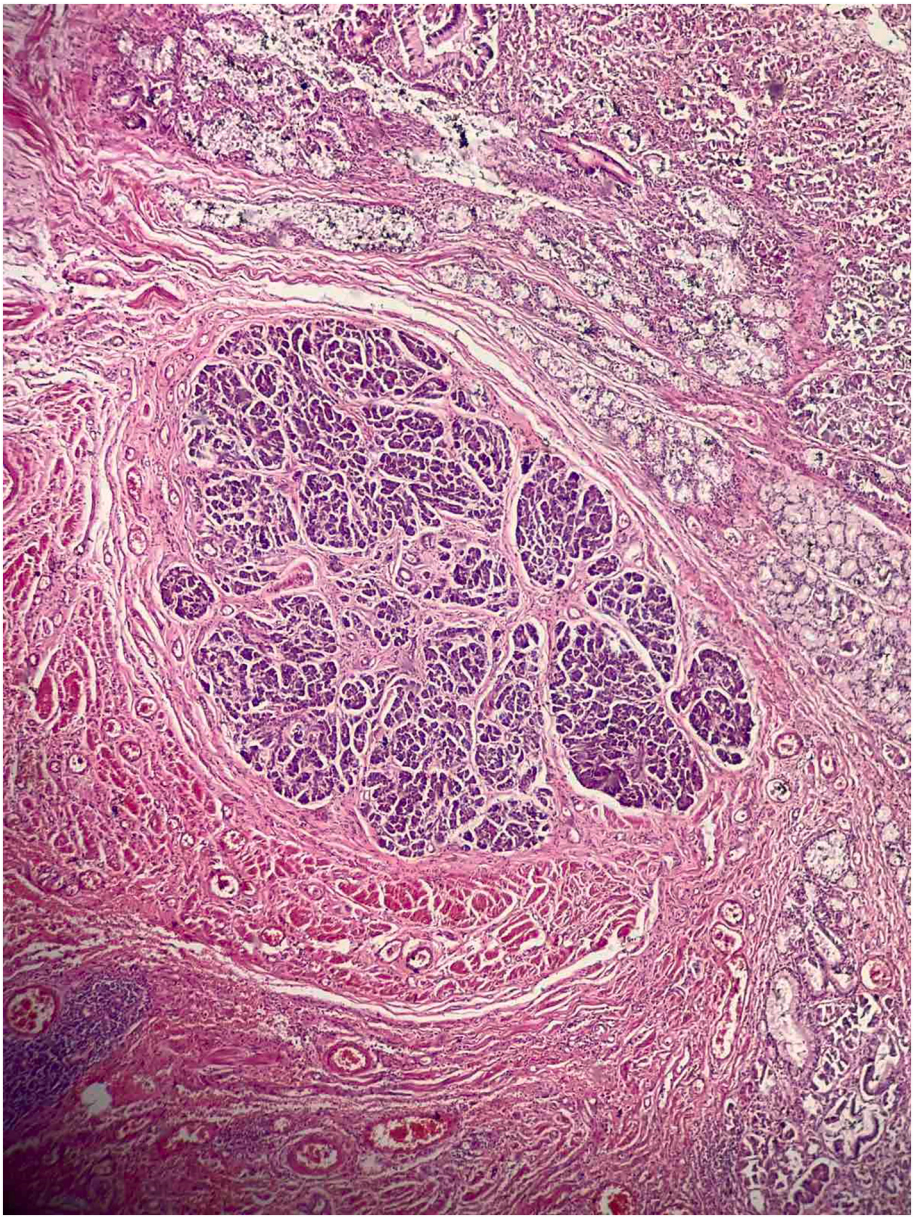

Fig. 3. Gangrenous Meckel's diverticulum with ectopic gastric and pancreatic tissue, Diverticulitis present (H & E staining ×40).

obstruction prompted our surgical team to proceed with segmental resection of the ileum and end-to-end anastomosis. Nonetheless, post-operative measures and close monitoring for any anastomotic leak were carried out. Surgical removal of asymptomatic MDs is a topic still debated upon [33]. In cases the decision is made to leave an asymptomatic MD alone, it is nonetheless prudent to have an institutional protocol to follow up such patients and have heightened vigilance in cases of related symptomatology and low threshold for operative interventions.

4. Conclusion

Giant MDs have been associated with an increased risk of complications such as diverticulitis, torsion, intussusception, and small bowel obstruction. Operative interventions remain the mainstay of therapy in symptomatic MDs. In the background of low diagnostic yield of more ubiquitously available imaging modalities, a high degree of clinical suspicion is required specially when more common differential diagnoses are excluded, for early identification and definitive therapy of MDs. With more and more complicated cases of Giant MDs being reported throughout the world, it is a necessity to analyze and publish comprehensive data pertaining to Giant MDs.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Ethical approval

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

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Clinical management of the patient, concept, consent- BM, DC.

literature review, drafting of the initial and final manuscript, approval of the final manuscript- All authors.

Declaration of competing interest

None declared.

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