

Torsion of Ileum Due To Giant Meckel's Diverticulum – A Case Report

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Abstract

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BACKGROUND: Meckel's diverticulum (MD) is detected in approximately 2% of all individuals and only 2-4% MD patients may develop symptoms. Small intestinal obstruction is a frequent complication in adults.

CASE REPORT: A 48-year-old male was admitted to emergency department for high intestinal obstruction symptoms. The imaging examinations were failed to detect the underlying causes. A median laparotomy revealed small bowel obstruction (SBO) due to a segment of ileum twisted around a giant MD axis.

CONCLUSION: Thus, a giant MD generating torsion of ileum is an unusual complication. Preoperative diagnosis is challenging. Emergency surgery is preferred to make an accurate diagnosis and for treatment.

Introduction

Meckel's diverticulum (MD) is a frequent congenital defect of the gastrointestinal tract, presenting in approximately 2% of whole population. Only 2-4% of this anomaly may become symptomatic [1]. Its location and size are known by "the rule of twos", in which the diverticulum is frequently located 2 feet (60 cm) from the ileocecal valve and does not exceed 2 inches (5 cm) in length [2]. Gastrointestinal bleeding, inflammation, intussusception or SBO are the principle complications of MD [1].

According to previous studies, the complication rate likely increases in the giant MD (diameter \geq 5 cm) cases [3]. In these cases, small bowel obstruction (SBO) because of torsion around the giant diverticulum axis is rare but is the most serious complication [3]. Preoperative imaging diagnosis is always challenging because the diverticulum may resemble a normal bowel loop on

ultrasound and computed tomography (CT) scan [3]. Hence, we report an unusual SBO case causing axial volvulus of a giant MD successfully treated by operation.

Case report

A 48-year-old male patient was hospitalized with increasing abdominal pain, abdominal distension, failure of passage gas and bowel movement for over 24 hours. No abnormal medical and surgical history was detected. The patient reported no nausea and no vomiting experience, along with a normal blood pressure (110/80 mmHg) and heart rate (90 bpm). Abdominal tenderness on palpation with muscular defense and no palpable hernias was detected on physical examination.



Figure 1: Abdominal X-ray findings. Air fluid levels in small bowel (arrow)

Air fluid levels were showed in small bowel at the left upper quadrant and ruled out pneumoperitoneum on abdominal X-ray (Fig. 1). Ultrasound revealed SBO with dilated bowel loop, decreased bowel peristalsis and homogenous free fluid mainly located in pouch of Douglas. On CT, SBO signs were also detected. The most distended loop (52 mm in diameter) proximal to transition point (Fig. 2A) and the thickened small bowel loops (Fig. 2B) were found at the left upper quadrant. Moreover, the whirlpool sign indicated mesenteric volvulus was showed at this area (Fig. 2C). No free gas, and no hernia was found. Blood count revealed that white blood cell count was 18.2 g/l, and percentage of neutrophil was 87.7%.

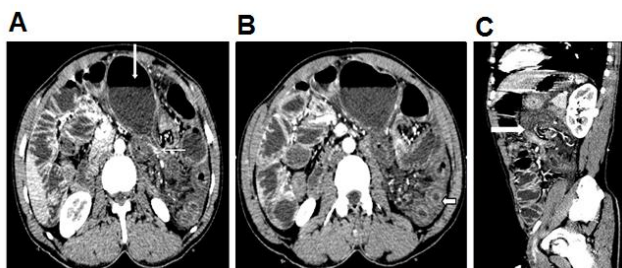


Figure 2: CT findings. A. Axial CT scan reveals the most distended loop (white arrow) proximal to transition point (small arrow). B. Axial CT reveals the thickened small bowel loops (arrow). C. Sagittal CT scan shows the whirlpool sign indicated mesenteric volvulus (arrow)

A median laparotomy was performed due to SBO with mesenteric volvulus. Operatory findings pointed out a 10-cm in length MD from 40 cm of ileocecal junction and 50 cm long of ileum twisted around MD axis. Segmental ileum containing the diverticulum was resected followed by ileo-ileostomy.

Pathologic findings demonstrated inflammation, necrosis and hemorrhage of a MD and necrosis of the small bowel segment. The patient was discharged after 10 days.

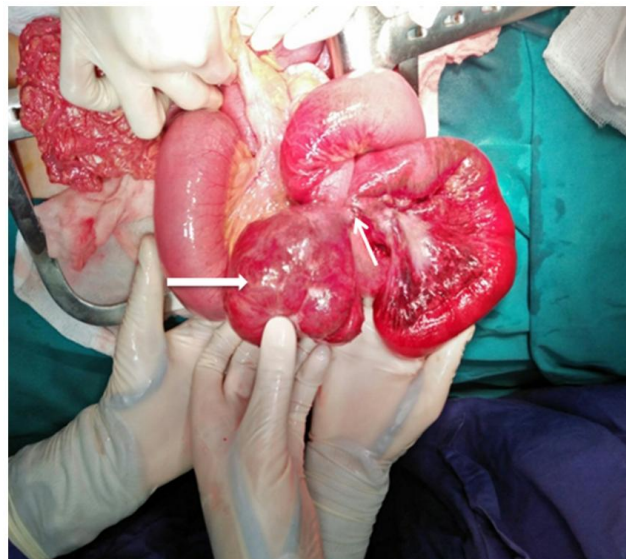


Figure 3: Intra-operative findings. Intra-operative photograph shows a giant MD (white arrow) and the location where the ileal loops twisted around MD axis (small arrow)

Discussion

MD results from the incomplete obliteration in the omphalomesenteric (vitelline) duct. As it is consisted of all layers of the small bowel, MD is considered a true diverticulum [3]. While gastrointestinal bleeding is one of the popular complications in children, intestinal obstruction is more frequently found to be a clinical symptom among adults (3). Based on hypothesis of Halstead *et al*, MD can be divided in two types - unattached and attached diverticulum. The former type is rarer and can cause obstruction due to its mobility. The latter has a fibrous band at its apex attaches to the umbilicus or to other viscera. Inflammation, adhesion or inversion of the mucous membrane of the diverticulum and adjacent bowel may lead a volvulus by twisting of the gut in upon itself at the point where the diverticulum attached. Furthermore, the appearance and the size of MD may increase the complication rate, hence, may change the treatment strategy. Many authors discouraged the resection of a broad-base or of a short length MD without palpable mass in the lumen in case of casually found [4, 5]. In contrast, a long and narrow base diverticulum is prone to diverticulitis and torsion, while intussusception is a frequent complication detected with a short and stumpy base diverticulum [2]. Regarding the size of MD, those which the diameter is ≥ 5 cm may result in SBO [2].

Preoperative diagnosis is difficult in the symptomatic patients without per-rectal bleeding and can be misdiagnosed as acute appendicitis. The clinical symptoms of SBO by reason of volvulus of MD are untypical to the other causes such as hernias, intra-abdominal adhesions or intussusception. Imaging exams can easily diagnose the SBO. Mallo et al. showed that CT scan sensitivity and specificity were 92 and 94% respectively for detecting SBO [6]. However, the potential diagnostic tools such as ultrasound and CT scan have limited value in detecting MD even in symptomatic cases [7]. Ultrasound has a narrow field of view and a limitation due to bowel gas. Besides, it is challenging to make a distinction between small bowel loops and MD on CT by reason of similarity of two structures. Scintigraphy with technetium-99m is a valuable non-invasive diagnostic exam in case of gastrointestinal bleeding [7].

Emergency surgery via laparotomy or laparoscopic is the first-line option to treat SBO due to MD. The principle purpose of this procedure is to remove the diverticulum and to correct the associated pathologies [8]. In cases where the adjacent ileum has inflammatory or ischemia changes, the resection of involved bowel with ileo-ileostomy is favored [9]. According to Cullen *et al.* study, the mortality and morbidity rates of Meckel's diverticulectomy were 2% and 12%, respectively, moreover, the cumulative risk of long-term post-operative complications was 7%. The author also recommended that the casually found MD should be resected regardless of the patient's age [10]. Our unusual case shows a SBO because of the torsion of adjacent ileum around a giant MD axis. The clinical symptoms and the imaging examinations were typical of SBO, however, they failed to demonstrate the etiology which was MD. A median laparotomy was performed to detect the underlying cause and successfully managed the SBO condition.

In conclusion, a segment of ileum twisted around a giant MD axis causing SBO is exceptional. The preoperative diagnosis of etiology in this condition is limited. Hence, MD should be considered in cases with an unrecognized cause of SBO and without surgical history.

Ethical approval

The patient and patient's family were informed about the imaging exams, surgical protocol, surgical complications and the research. All study protocols were approved by a local ethics committee of the Department of radiology, Vietduc hospital.

Informed consent

Informed consents were obtained from department of radiology and digestive surgery department, Vietduc hospital, the patient and patient's family.

References

1. Lee NK, et al. Complications of congenital and developmental abnormalities of the gastrointestinal tract in adolescents and adults: evaluation with multimodality imaging. *Radiographics*. 2010; 30(6):1489-507. <https://doi.org/10.1148/rq.306105504> PMID:21071371
2. Capelão G, et al. Intestinal Obstruction by Giant Meckel's Diverticulum. *GE Portuguese journal of gastroenterology*. 2017; 24(4):183-187. <https://doi.org/10.1159/000452690> PMID:29255748 PMCid:PMC5729947
3. Akbulut S, Yagmur Y. Giant Meckel's diverticulum: An exceptional cause of intestinal obstruction. *World journal of gastrointestinal surgery*. 2014; 6(3):47-50. <https://doi.org/10.4240/wjgs.v6.i3.47> PMID:24672650 PMCid:PMC3964415
4. Robijn J, Sebrechts E, Miserez M. Management of incidentally found Meckel's diverticulum a new approach: resection based on a Risk Score. *Acta Chir Belg*. 2006; 106(4):467-70. <https://doi.org/10.1080/00015458.2006.11679933> PMID:17017710
5. Varcoe RL, et al. Diverticulectomy is inadequate treatment for short Meckel's diverticulum with heterotopic mucosa. *ANZ J Surg*. 2004; 74(10):869-72. <https://doi.org/10.1111/j.1445-1433.2004.03191.x> PMID:15456435
6. Mallo RD, et al. Computed tomography diagnosis of ischemia and complete obstruction in small bowel obstruction: a systematic review. *J Gastrointest Surg*. 2005; 9(5):690-4. <https://doi.org/10.1016/j.gassur.2004.10.006> PMID:15862265
7. Shelat VG, et al. Meckel's diverticulitis causing small bowel obstruction by a novel mechanism. *Clin Pract*. 2011; 1(3):e51. <https://doi.org/10.4081/cp.2011.e51> PMID:24765312 PMCid:PMC3981389
8. Sharma RK, Jain VK. Emergency surgery for Meckel's diverticulum. *World J Emerg Surg*. 2008; 3:27. <https://doi.org/10.1186/1749-7922-3-27> PMID:18700974 PMCid:PMC2533303
9. Mukai M, et al. Does the external appearance of a Meckel's diverticulum assist in choice of the laparoscopic procedure? *Pediatr Surg Int*. 2002; 18(4):231-3. <https://doi.org/10.1007/s003830100663> PMID:12021967
10. Cullen JJ, et al. Surgical management of Meckel's diverticulum. An epidemiologic, population-based study. *Ann Surg*. 1994; 220(4):564-8; discussion 568-9. <https://doi.org/10.1097/0000658-199410000-00014> PMID:7944666 PMCid:PMC1234434