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COMPUTED TOMOGRAPHY FEATURES OF SMALL BOWEL OBSTRUCTION DUE TO MESODIVERTICULAR BAND

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Meckel's diverticulum is the most common congenital anomaly of the small intestine. Common complications related to a Meckel's diverticulum include hemorrhage, intestinal obstruction, and inflammation. Small bowel obstruction due to mesodiverticular band of Meckel's diverticulum is a rare complication. Herein, we report a case of small bowel obstruction occurring due to mesodiverticular band of a Meckel's diverticulum. The important aspect of our case is clear demonstration of the mesodiverticular band adjacent to the Meckel's diverticulum on pre-operative computed tomography (CT).

Key-word: Intestines, stenosis or obstruction.

Meckel's diverticulum is the most common congenital abnormality of the gastrointestinal tract, affecting 2% of the general population (1-3). Most of the Meckel's diverticula are discovered incidentally during the surgical procedures performed for other reasons. Although it generally remains silent, life threatening complications may arise, making it an important structure for having a detailed knowledge of its anatomical and pathophysiological properties. Only 4% of patients with Meckel's diverticulum develop complications that include bleeding, perforation, inflammation, or obstruction. On the other hand, a mesodiverticular band accompanying the Meckel's diverticulum is an extremely rare congenital malformation (4). Radiological feature of such an anomaly has not been reported previously. In this paper, we report a case of adult intestinal obstruction due to a mesodiverticular band of Meckel's diverticulum and describe its CT features.

Case report

A 36-year-old man admitted to the emergency department with an approximately 12 hours history of persistent abdominal pain about the umbilicus, accompanied by nausea and vomiting; no flatus had been passed. On examination his temperature was 36.3 C and pulse 84. Examination of the abdomen revealed some distension and generalized tenderness, most pronounced in the epigastric region, but no rigidity. Laboratory studies were all within normal limits.

Erect radiograph of the abdomen showed multiple air-fluid levels situated in the central abdomen. Ultrasonography (USG) of the abdomen revealed hyperperistaltic dilated small bowel loops with a small amount of free fluid in the abdomen.

The patient previously (2 times during the last 5 years) admitted to the emergency unit with the same complaints that did not require any surgical operation. The patient reported that the pain he endured in the last incident was more severe. The patient was referred to the CT unit to investigate the etiology of the ileus.

CT examination showed dilated jejunal and proximal ileal segments that were measured up to 4.5 cm with air-fluid levels. In addition, a diverticular formation of 4 cm in size at the anti-mesenteric side was recognized (Fig. 1). A linear structure (Fig. 2) adjacent to this diverticulum was noted that caused knotting of the ileum approximately 60-80 cm from the ileocecal valve which corresponds to the transition zone of the obstruction (Fig. 3). There were no findings suggestive of Meckel's diverticulitis on CT examination.

On laparoscopy, the distal part of the ileum was found to be markedly compressed by a linear fibrous structure, the mesodiverticular band, within an area 70 cm proximal to the end of the ileum. Ileal loops were dilated at the superior part of the mechanical obstruction. Obstruction was caused by trapping of a bowel loop by this mesodiverticular band (Fig. 4). After separating the mesodiverticular band from the mesentery, the ileal loop was released from the diverticulum. Resection of the Meckel's diverticulum and then functional end-to-end ileoileal anastomosis of the bowel were performed. Histological examination showed a Meckel's diverticulum with no pathological changes.

Discussion

Intestinal obstruction due to Meckel's diverticulum is an infrequent cause, but is the most common presentation in adult, being the second most common in children (4, 5). Various mechanisms of small intestinal obstruction from Meckel's diverticulum include diverticular intussusception, which is the most common mechanism, volvulus from persistent attachment to the umbilicus, Littre's hernias, foreign body impaction, diverticulitis, and adhesions or neoplasms (6-9).

Other very rare cause of obstruction from Meckel's diverticulum include, as in our case, by trapping of a bowel loop by a mesodiverticular band. Mesodiverticular band embryology was described in detail by Johann Meckel in 1808. As the embryonic yolk sac enlarges, it develops a connection to the primitive gut via the vitelline duct (10). Typically, this duct obliterates in the embryo by the fifth to ninth week during the progression and rotation of the foregut and hindgut. As this occurs, the yolk sac also begins to atrophy (11). In 0.3% to 2.5% of the population, this vitelline duct persists to become a Meckel's Diverticulum (1, 11). The yolk sac is supplied by 2 vitelline arteries, one of which degenerates as the yolk sac atrophies, while the remaining artery develops into the superior mesenteric artery (11). When one of the vitelline arteries fails to degenerate, it develops into a peritoneum covered fibrous band or a mesodiverticular band (11).

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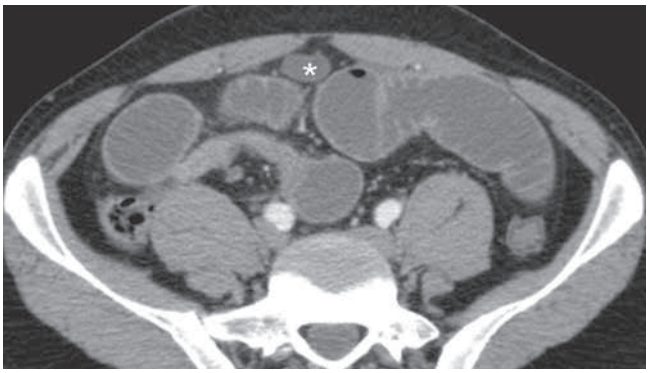

Fig. 1. — Axial post-contrast CT showing the Meckel's diverticula (asterisk).

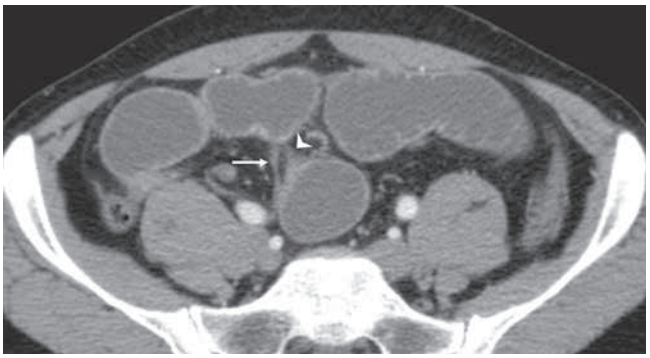

Fig. 2. — Axial post-contrast CT reveals the mesodiverticular band (white arrow) as a linear fibrotic structure adjacent to the Meckel's diverticula (white arrowhead).

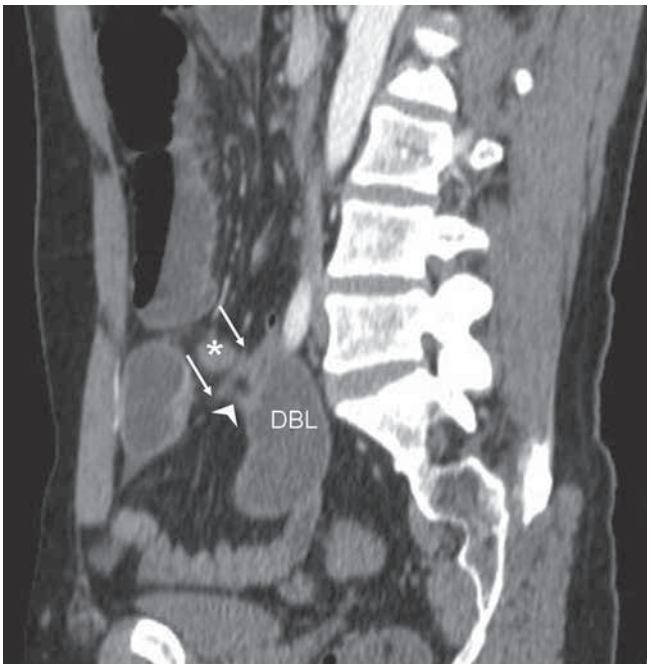

Fig. 3. — Parasagittal reconstructed post-contrast CT image depicts the mesodiverticular band (between white arrows) trapping the small bowel. Note the dilated bowel loops before and collapsed bowel loops (asterisk) after the compression. The Meckel's diverticulum (white arrowhead) is just adjacent to the mesodiverticular band.

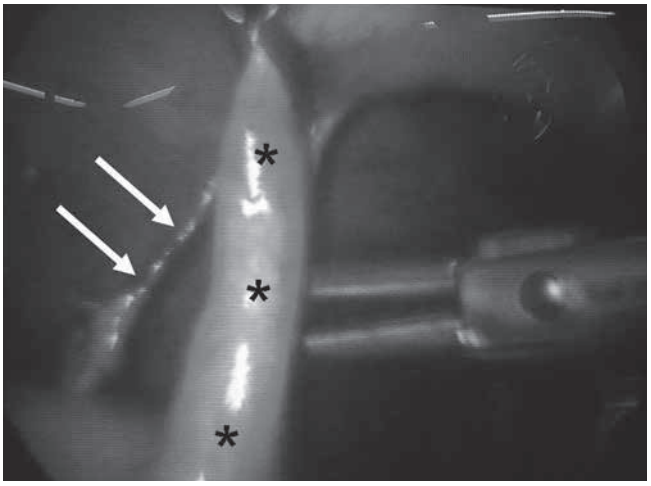

Fig. 4. — Laparoscopic view of the Meckel's diverticulum (asterisk) and mesodiverticular band (white arrows).

On CT, Meckel's diverticulum is difficult to distinguish from normal small bowel in uncomplicated cases. However, a blind-ending fluid or gas-filled structure in continuity with small bowel may be revealed. Abdominal CT is used for complicated cases such as intussusceptions. CT can help to confirm the presence of intussusception and distinguish between lead point and non-lead point intussusceptions (12-14).

In our case the problem was intestinal obstruction caused by a mesodiverticular band adjacent to the Meckel's diverticula. The mesodiverticular band also caused compression to the Meckel's diverticulum, but there were no radiological or histopathological signs of diverticulitis. The Meckel's diverticulum itself did not exert any trapping to the transition zone; rather the linear fibrotic band (mesodiverticular band) was the cause of obstruction. Based on our literature review, the complicated mesodiverticular band as reported in our case is the first one shown clearly by a pre-operative CT study and one of the few that have been determined surgically.

Surgical treatment for Meckel's diverticulum and mesodiverticular band may be by open or laparoscopic procedures (15). Surgical treatment options include simple diverticulectomy or ileal resection. Associated bands should be removed. Laparoscopic resection of MD is feasible and ideal, especially when performed in specialized centers; techniques including intra-abdominal wedge resection or extracorporeal or intra-corporeal bowel segment resection have been reported (3). Results of surgical excision are generally excellent.

In conclusion trapping of a bowel loop by a mesodiverticular band as in our case is very rare cause of intestinal obstruction. The important aspect of our case is clear demonstration of the mesodiverticular band

adjacent to the Meckel's diverticulum on pre-operative CT.

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