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Case Report

Ileosigmoid knotting: a rare and life threatening case of acute bowel obstruction

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ABSTRACT

Ileosigmoid knotting is a rare cause of acute intestinal obstruction, and is also known as compound volvulus or double volvulus. It occurs due to wrapping of the ileum or sigmoid colon around the base of the other, causing bowel obstruction. The bowel obstruction rapidly progresses to gangrene of the ileum as well as the sigmoid colon, generalized peritonitis and septic shock. It is a potentially lethal condition with high morbidity and mortality rates. The incidence of ileosigmoid knotting is rare and usually seen in areas where there is a high incidence of the sigmoid volvulus with male preponderance. The primary risk factor for ileosigmoid knotting is a long small bowel mesentery with a freely mobile small bowel and a redundant sigmoid colon on a narrow mesentery. We present the case of a 79-year-old male patient who presented with an acute abdomen at our emergency with signs of peritonism. Emergent surgical exploration was done given acute intestinal obstruction and peritonitis. Intra-operatively, ileosigmoid knotting was present with gangrenous ileum and sigmoid colon. Resection of gangrenous bowel was performed with end ileostomy and Hartmann's procedure for descending colon in view of haemodynamic instability.

Keywords: Ileosigmoid knotting, Compound volvulus, Acute intestinal obstruction, Sigmoid volvulus, Ileostomy

INTRODUCTION

Ileosigmoid knotting is a rare cause of acute intestinal obstruction and is also known as compound volvulus or double volvulus.[1] It occurs due to wrapping of the ileum or sigmoid colon around the base of the other, forming a pseudoknot causing bowel obstruction, which is a double closed loop.[1,2] The bowel obstruction rapidly progresses to gangrene of the ileum as well as the sigmoid colon, generalized peritonitis and septic shock. It is a potentially lethal condition with a mean mortality rate of 35.5 per cent.[3] The incidence of ileosigmoid knotting is rare, but it is usually seen in areas with a high incidence of the sigmoid volvulus with male preponderance.[4] The primary risk factor for ileosigmoid knotting is a long small bowel mesentery with a freely mobile small bowel and a redundant sigmoid colon on a narrow mesentery. Other risk factors are consumption of a high bulk diet, postoperative adhesions, internal herniations, malrotation, late pregnancy and Meckel's diverticulum.[1,5] It is essential to differentiate simple sigmoid volvulus from ileosigmoid knotting, as endoscopic decompression is contraindicated in the latter. The diagnosis of ileosigmoid knotting is difficult preoperatively, with occasional findings of double closed loop obstruction on a plain x-ray abdomen radiograph. Contrast-enhanced computed tomography (CECT) abdomen can help in diagnosing the condition, but the severity of the disease might not always permit a preoperative scan.

CASE REPORT

A 79-year-old male patient arrived at our hospital's emergency room with a one-day history of diffuse

abdominal pain. The pain, which began suddenly and was initially mild, escalated in severity with radiation to the whole abdomen and initially had a colicky nature. It occurred intermittently and was associated with absolute constipation and abdominal distension. He has multiple episodes of bilious vomiting. The patient was a chronic smoker and tobacco chewer. Upon examination, the patient appeared ill, pale, and moderately dehydrated. His pulse rate was 130 beats per minute, his blood pressure was 90/64 mmHg, and his respiratory rate was 30 breaths per minute. Abdominal examination revealed diffuse abdominal distension, tenderness and guarding of the whole abdomen, with positive rebound tenderness suggestive of peritonism. Rectal examination revealed an empty rectum. Laboratory investigations showed a haemoglobin level of 11.4 grams per cent, a white blood cell count of 4800/mm3, deranged renal functions (urea 91 mg/dl, creatinine 2.8 mg/dl), deranged coagulation profile (INR-2.25) with normal serum electrolytes (sodium-139 mEq/l, potassium- 4.5 mEq/l).

On plain abdominal radiography, distended large and small bowel loops were observed in the upper abdomen and left side of the abdomen, with multiple air-fluid levels that strongly indicated the presence of obstruction in the large bowel. The patient has already undergone a CECT abdomen from his native place, which was about 150 kilometres away from our institute, which reported dilated jejunal and ileal loops with a maximum diameter of 4.1cm, suggestive of small bowel obstruction (Figure 1 and 2).

In response to the emergent situation and severity of the disease, after resuscitation, the patient was shifted to the operation theatre and an exploratory laparotomy was performed through a midline incision. On opening the peritoneal cavity, about two litres of haemorrhagic fluid was present with ileosigmoid knotting (volvulus). The whole of the sigmoid colon and the lower part of the descending colon were gangrenous (Figure 3 and 4). The ileum up to the length of about 130 cm from the ileocecal junction was gangrenous, with the rest of the proximal ileum and the whole of the jejunum being oedematous (Figure 5).

The resection of gangrenous large and small bowel was done with end ileostomy and Hartmann's procedure/end colostomy with closure of distal rectal stump depending upon the condition of the patient and hemodynamic instability. The abdomen was closed using the mass closure technique with drains in the pelvis and subhepatic region. In the postoperative period, the patient was shifted to the intensive care unit (ICU) and was extubated after 48 hours. Blood and blood products were given intraoperatively and postoperatively with high-end antibiotics and total parenteral nutrition. The patient was kept nil per oral and on ryle tube suctioning for three days, as ileostomy was functional after three days. Orals were started on the third postoperative day, and the patient was shifted from the ICU on the fourth postoperative day. Seroma was formed over the midline wound, which was managed conservatively. Drains were removed on the sixth postoperative day. Attendants of the patient were trained in stoma care, and the patient was discharged on the tenth postoperative day after removing the sutures.

Figure 1: X-ray abdomen, supine view showing features of intestinal obstruction.

Figure 2: X-ray abdomen, erect view showing multiple air-fluid levels.

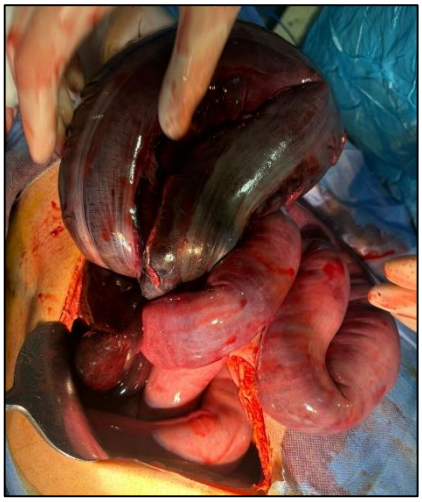

Figure 3: Intra-operative picture showing ileosigmoid knot (white arrow) and gangrenous sigmoid colon (red arrow).

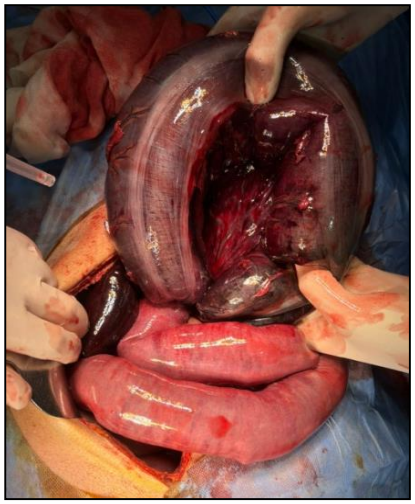

Figure 4: Intra-operative picture showing gangrenous sigmoid colon (white arrow) and gangrenous sigmoid mesocolon (black arrow).

Figure 5: Intra-operative picture showing gangrenous ileal loop (white arrow).

DISCUSSION

Ileosigmoid knotting is a double closed-loop obstruction which is rare and potentially lethal with high mortality. It predominantly occurs in African, Asian and Middle Eastern nations and mostly occurs in the fourth decade of life.[3,6] There are three factors which are responsible for ileosigmoid knotting: a freely mobile small bowel with long small bowel mesentery, a long sigmoid colon with a narrow pedicle (redundant sigmoid), and the ingestion of a high bulk diet in the presence of an empty small bowel.[5,7] The exact mechanism of the formation of a knot is unclear, but ileosigmoid knotting is classified into four subtypes.

Type I is the most common subtype and occurs when the ileum wraps itself around the sigmoid colon. Here, the ileum is the active component, and the sigmoid is the passive component. Wrapping can occur in the clockwise direction (type A) and anticlockwise direction (type B). Type II occurs when the sigmoid colon acts as an active component and wraps around the ileum (opposite of type I). Type III occurs when the ileocecal segment acts as the active component. Type IV is an undetermined type.[3,6,8] Patients with ileosigmoid knotting usually present with complaints of abdominal pain, distension, nausea, vomiting and inability to pass flatus. The patient may have abdominal tenderness, guarding, and rebound tenderness, depending on the severity of the disease.[3]

Diagnosing ileosigmoid knotting preoperatively is difficult due to its infrequent presentation. Most of the time, it is mistakenly diagnosed as simple sigmoid volvulus on abdominal radiography, which may lead to attempts to perform endoscopic decompression. Endoscopic decompression in this condition is contraindicated as it may lead to perforation and injury.[1,9] Abdominal X-ray radiograph shows characteristic double closed bowel obstruction with small bowel loops on the left side of the abdomen and sigmoid colon on the right side, but these are occasional findings. CT scan findings which demonstrate the condition are classic whirl sign due to twisted loops of intestine, medial deviation of the distal descending colon with a pointed appearance in its medial border, signs of bowel ischemia, stretched and elongated superior and inferior mesenteric vessels converging towards sigmoid colon indicates the diagnosis.[10]

Preoperative diagnosis of ileosigmoid knotting is complex, and a high index of suspicion is required as it is often confused with small bowel obstruction or sigmoid volvulus. Clinically, the patient has symptoms of small bowel obstruction with abdominal distension and bilious vomiting, while on x-ray radiography, the patient has features of a distended large bowel suggestive of large bowel obstruction.[11] When the ileosigmoid knot develops, the patient presents with frank obstruction, which progresses rapidly, leading to bowel gangrene, making prompt diagnosis and early intervention of vital importance. Early diagnosis, aggressive fluid resuscitation, hemodynamic stabilization, preoperative antibiotics and immediate surgical exploration are the keys to optimal management of patients with ileosigmoid knotting.[3]

The intra-operative anatomical and pathological findings dictate the surgical procedure.[1] The extent of surgical resection depends upon the intra-operative clinical stability of the patients with diversion, which is preferable in haemodynamically unstable patients. Prolonged attempts at untwisting the knot intra-operatively are not recommended. Also, it may be difficult to untie the knot when the bowel is gangrenous, increasing the risk of potential spillage of toxic contents.

In such conditions, the bowel should be resected after applying bowel clamps. Primary anastomosis is preferred if the bowel is healthy, well vascularized, and nondistended in haemodynamically stable patients with both small bowel and sigmoid colon.[3,6] In our case, the patient was haemodynamically unstable with gangrenous sigmoid and most parts of the ileum; resection of the gangrenous ileum and sigmoid was performed with end ileostomy and Hartmann's procedure (end colostomy).

CONCLUSION

Ileosigmoid knotting is a rare and fatal cause of intestinal obstruction and bowel ischemia. Early diagnosis, prompt fluid resuscitation, preoperative antibiotics and urgent surgical exploration are the keys to optimal management. Patients with this condition have high morbidity and mortality due to unfamiliarity and diagnostic difficulties. A high index of suspicion is required to rule out ileosigmoid knotting from small bowel obstruction and sigmoid volvulus with early surgical intervention before it causes bowel ischemia and gangrene, leading to loss of bowel and high mortality. Computed tomography may aid in early diagnosis. Patients with ileosigmoid knotting usually require surgical intervention, which includes bowel resection with or without primary anastomosis.

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