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ORIGINAL ARTICLE

The Unusual Volvulus : A Five Year Retrospective Analysis of Nine Cases

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Abstract The ileosigmoid knot is a rare surgical emergency. It is an unusual type of bowel obstruction in which the ileum usually wraps around the base of the sigmoid colon and forms a pseudoknot. It is usually associated with difficult preoperative diagnosis and poor surgical outcome. To analyze the clinical presentations, operative findings, management, postoperative complications and outcome of patients with ileosigmoid knotting. A retrospective analysis of nine cases of ileosigmoid knotting over a 6-year period from July 2005 to May 2011. Ileosigmoid knotting was common in males in the fifth decade. Mean duration of symptoms prior to admission was 42.67 h. Both the ileum and the sigmoid colon were gangrenous in all the patients. Mortality was 22.22 %. The mean duration of hospital stay was 13.67 days. To conclude, ileosigmoid knotting, though a rare cause of intestinal obstruction, carries a significant risk of mortality. In our study, ileostomy along with colorectal anastomosis seemed to be a better and safer alternative than primary repair in the management of ileosigmoid knotting. Awareness of this condition among surgeons will help to reduce the morbidity and mortality associated with this unusual form of intestinal obstruction.

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Introduction

Ileosigmoid knotting (sometimes referred to as double or compound volvulus) is an unusual form of intestinal obstruction found mainly in parts of the world where sigmoid volvulus is common [1]. Unfamiliarity with this condition can have disastrous consequences at surgery [2]. Owing to its rarity, personal experience with this condition is often limited to a few cases with majority of the studies being retrospective reviews of hospital records [3].

Methods

This is a retrospective study of nine cases of ileosigmoid knotting over a 6-year period between July 2005 and May 2011. Details of the patients were analyzed. All the patients on admission underwent physical examination and abdominal radiography. All of them were resuscitated with fluid infusion and nasogastric suction. Antibiotics were immediately started. After resuscitation, emergency midline laparotomy was done.

Results

The mean age was 49.11 years (range 40–60 years) and the male-to-female ratio was 8:1. The clinical features are summarized in (Table 1). The majority of the patients were Muslim males in their fifth decade, and among them, in

Table 1 Clinical presentations

S. No	Age (Years)	Sex	Religion	Clinical features	Vomiting	Mean duration of symptoms	Previous surgery	Vitals (mm Hg)
1	60	F	Hindu	Pain, distention, constipation	Yes	48 h	No	110/72
2	65	M	Muslim	Pain, distention, constipation	Once	48 h	Yes	106/76
3	40	M	Hindu	Pain, constipation	Nil	36 h	No	72/50
4	46	M	Hindu	Pain, distention, constipation	Yes	48 h	No	74/50
5	55	M	Muslim	Pain, distention, constipation	Yes	24 h	No	110/80
6	47	M	Muslim	Pain, constipation	Yes	48 h	No	106/70
7	45	M	Muslim	Pain, distention, constipation	Yes	60 h	No	70/50
8	42	M	Muslim	Pain, distention, constipation	Yes	48 h	Yes	140/98
9	45	M	Muslim	Pain, constipation	Yes	24 h	No	114/76

two cases it was just after the holy month of Ramzan. The female patient in our series also had a history of regular fasting twice a week. History of previous laparotomy was present in two patients. Most of the patients presented with the classical triad of abdominal pain, distension, and constipation. The pain was colicky and sudden in onset, centered around the umbilicus. Vomiting was a common feature. The mean duration of symptoms prior to presentation was 42.67 h (range 24–60 h). This was the first episode of pain in the majority of the patients. Two patients had previous attacks of similar colicky pain which later subsided.

Three patients presented with features of shock. Erect X-ray of the chest and abdomen showed features of sigmoid volvulus in three patients. On laparotomy hemorrhagic exudate was found in all the patients. Both the ileum and the sigmoid colon were gangrenous in all the patients (Figs. 1 and 2), and in three patients the jejunum was also involved. In one patient who had a previous history of peptic perforation repair, Meckel's diverticulum was also found on laparotomy. The surgery done and the final outcome is given in Table 2. Primary anastomosis at both sites (Fig. 3) was done in four patients, and ileostomy along with colorectal anastomosis was done in five patients.

Mortality in our series was 22.22 %. Two patients expired who were both in the primary anastomosis group, but it was not found to be clinically significant (p=0.906). Anastomotic leak of the colorectal anastomosis occurred in one patient in the primary anastomosis group as was evident on relaparotomy of the patient. Wound infection occurred in three patients—two in the ileostomy group and one in the primary anastomosis group. Ileostomy closure in all the five patients was done 6 months after the primary operation. There were no complications after ileostomy closure. Mean duration of hospital stay was 13.67 days.

Fig. 1 Ileosigmoid knotting with gangrene of sigmoid colon & ileum

Fig. 2 Gangrenous ileum after resection of sigmoid colon

Table 2 Operative findings and outcome

S. No.	X-ray	Extent of gangrenous bowel	(Gangrenous Ilieum from jejunum)	Surgery done	Mortality	Morbidity
1	Dilated bowel loops	Ileum and sigmoid	6 cm	Ileostomy and colorectal anastomosis	Survived	None
2	Sigmoid volvulus	Jejunum, ileum, and sigmoid	1 ft	Primary anastomosis at both sites	Survived	None
3	Dilated bowel loops	Jejunum, ileum and sigmoid	3 ft	Primary anastomosis at both sites	Survived	Wound infection
4	Dilated bowel loops	Ileum and sigmoid	200 cm	Primary anastomosis at both sites	Died	Anastomotic leak
5	Sigmoid volvulus	Ileum and sigmoid	100 cm	Ileostomy and colorectal anastomosis	Survived	Wound infection
6	Sigmoid volvulus	Ileum and sigmoid	2 ft	Ileostomy and colorectal anastomosis	Survived	None
7	Dilated bowel loops	Jejunum, ileum, and sigmoid	50 cm	Primary anastomosis at both sites	Died	septicemia
8	Dilated bowel loops	Ileum and sigmoid	15 cm	Ileostomy and colorectal anastomosis	survived	Wound infection
9	Dilated bowel loops	Ileum and sigmoid	10 cm	Ileostomy and colorectal anastomosis	survived	None

Discussion

An ileosigmoid knot (ISK) occurs when a loop of small bowel descends into the left paracolic gutter to encircle the sigmoid colon in a clockwise or anticlockwise direction [4, 5] or vice versa causing a double-loop obstruction. Kallio [6] recorded the first case in 1932, but the name was popularized by Sheperd [7] in 1967.

ISK generally occurs in areas with a high incidence of sigmoid volvulus. ISK is more common in African, Asian, Eastern, and northern European and South American countries, and also in Turkey [3, 7–9]. ISK is common in adult males and the peak incidence is in the 3rd to 5th decades. ISK is also common in the late pregnancy period in females [9]. The obvious variation of frequency of intestinal knot formation in different geographical areas implicates genetic, dietary, or habitual factors in the pathogenesis of this disease. According to Vaez-Zadeh et al. [10], the virtual disappearance of knot formation in some countries (Finland and Russia) and the absence of the disease in the higher socioeconomic classes speak against a genetic predisposition.

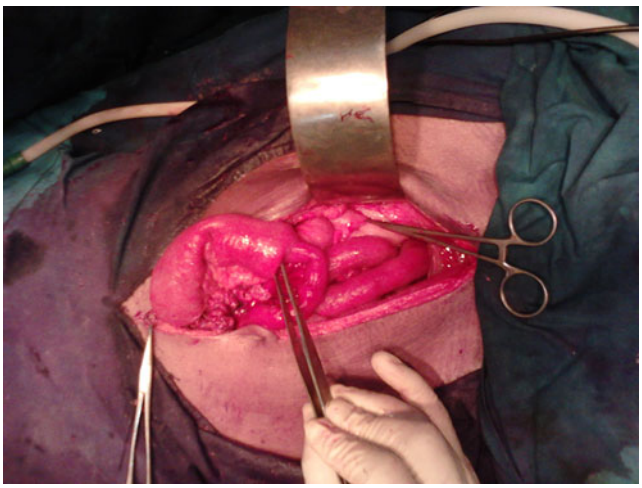

Fig. 3 After resection of gangrenous segments, before anastomosis

Three factors are responsible for the ileosigmoid knot: a long small bowel mesentery and freely mobile small bowel, a long sigmoid colon on a narrow pedicle, and finally the ingestion of a high-bulk diet in the presence of an empty small bowel [2, 7, 8, 11]. When a semifluid bulky meal progresses into the proximal jejunum, it increases the mobility of the intestine and the heavier segments of the proximal jejunum fall into the left lower quadrant. The empty loops of the ileum and distal jejunum twist in a clockwise rotation around the base of a narrow sigmoid colon. Further peristalsis forms an ileosigmoid knot with two closed loop obstructions—one in the small bowel and the other in the sigmoid colon [11]. This has been suggested by studies carried out on Bagandans in Uganda who eat once a day and Muslims who eat a single daily meal during the Ramzan fast [7, 8, 11]. Certain chemicals like 5-hydroxy tryptamine (in certain bananas) leading to hypermotility of the ileum have been incriminated [5, 7]. Finally, some conditions including postoperative adhesions, internal herniations, Meckel's diverticulum, and malrotations may be rare predisposing factors for ISK [9]. In our study, two patients had a history of previous laparotomy. Among them, in one who had a history of peptic perforation repair, Meckel's diverticulum was also found at laparotomy. In two patients it occurred during Ramzan fasting and another patient had a history of regular fasting.

The symptoms and signs include abdominal pain and tenderness, asymmetrical abdominal distension, nausea and vomiting, constipation, and an empty rectum. Preoperative diagnosis of the condition is difficult. Plain abdominal X-ray may show dilated sigmoid colon in the right side of the abdomen and multiple small intestinal air fluid levels in the left side [9]. CT scan can reveal the findings of a sigmoid volvulus including the characteristic "whirl sign" created by the twisted intestine and mesocolon [12]. CT scan can also reveal signs of bowel ischemia caused by strangulation, such as pneumatosis. However, the findings of an

ileosigmoid knot are not easily detected because the ileal twist is higher in the abdomen than the location of the sigmoid volvulus. Compared with a radiograph of the abdomen, CT scan can detect medial deviation of the distal descending colon with a pointed appearance of its medial border—a distinct feature of the ileosigmoid knot [12]. No patient in our series underwent preoperative C T scan. Three patients had X-ray suggestive of large gut volvulus. All patients had X-ray features suggestive of intestinal obstruction. So in our series, correct preoperative diagnosis could not be made in any of the patients though a diagnosis of sigmoid volvulus was made in three patients.

ISK is classified into four types: Types I, II, III, and undetermined. In Type I, the ileum revolves around the sigmoid colon (type A when clockwise and type B when anticlockwise); in Type II, the sigmoid colon revolves around the ileum; in Type III, the ileocecal segment revolves around the sigmoid colon; and in the undetermined type, it is impossible to determine the revolved segment [8, 9, 11]. The most common type of ISK reported is type I (53.9–57.5 %) [11]. In 2009, using some preoperative and operative criteria that are correlated with mortality, a new classification was described for surgically treated ISK [13]. In the new classification, the patients with ISK are classified as follows: Class 1, patients with no risk factors (advanced age, associated disease); Class 2, those with no shock or bowel gangrene but other risk factors mentioned above; Class 3, those with shock; Class 4, those with ileum or sigmoid colon gangrene; Class 5, those with both shock and ileum or sigmoid colon gangrene; Class 6, those with both ileum and sigmoid colon gangrene [9, 13]. In this series, all the patients were of the Class 6 type.

Initial management of patients with ISK consists of rapid and prompt resuscitation to correct fluid, electrolyte, and acid–base imbalance followed by a laparotomy [9]. At laparotomy, untwisting the knot after deflating the loops is only possible in the early cases, especially when both loops are viable [4, 5]. When the gut is gangrenous and friable, en bloc resection of the gangrenous loops with the knot is recommended [4, 5, 7]. If ileal resection extends to less than 3 inches from the ileocecal junction, the distal stump of ileum is closed and end-to-side anastomosis of the proximal small bowel to ascending colon is performed [7]. Resection of the sigmoid colon is often advised in all instances, even when viable. Recurrent volvulus or repeat knotting due to redundancy of the loop may cause gangrene after surgery [11]. The continuity of large bowel can be established by end-to-end anastomosis, but if the condition of the bowel or general condition of the patient does not permit primary colonic anastomosis, a colostomy with distal mucous fistula is recommended [5].

Although primary anastomosis is recommended in literature, we found better results with ileostomy and colorectal anastomosis. ISK has a grave prognosis. The mean mortality rate is 6.8–8 % in nongangrenous and 20–100 % in gangrenous cases [9]. In our study the mortality rate was 22.22 %.

To conclude, ileosigmoid knotting, though a rare cause of intestinal obstruction, carries a significant risk of mortality. Clinical features resemble that of both small and large bowel obstructions. Awareness of this condition among surgeons will help to reduce the morbidity and mortality associated with this unusual form of intestinal obstruction.

References

1. Gibney EJ, Mock CN (1993) Ileosigmoid knotting. Dis Colon Rectum 36(9):855–857
2. Puthu D, Rajan N, Shenoy GM, Pai SU (1991) The ileosigmoid knot. Dis Colon Rectum 34(2):161–166
3. Raveenthiran V (2001) The ileosigmoid knot. New observations and changing trends. Dis Colon Rectum 44(8):1196–1200
4. Watson RK (1984) Ileosigmoid knot. J ROY Coll Surg Edinburgh 29:100–102
5. Dorai CRT (1988) Ileosigmoid knot—case report. Sing Med J 29:413–415
6. Kallio KE (1932) Intestinal knot formation. Acta Chirugica Scandinavica 70(Suppl):211–276
7. Shepherd JJ (1967) Ninety-two cases of ileosigmoid knotting in Uganda. Br J Surg 54:561–566
8. Alver O, Oren D, Tireli M, Kayabasi B, Akdemir D (1993) Ileosigmoid knotting in Turkey. Review of 68 cases. Dis Colon Rectum 36:1139–1147
9. Atamanalp SS (2009) Ileosigmoid knotting. Eurasian J Med 41:116–119
10. Vaez-Zadeh K, Dutz W (1970) Ileosigmoid knotting. Ann Surg 172(6):1027–1033
11. Machado NO (2009) Ileosigmoid knot: A case report and literature review of 280 cases. Ann Saudi Med 29(5):402–406
12. Lee SH, Park YH, Won YS (2000) The Ileosigmoid knot. CT findings. Am J Roetgenol 174:685–687
13. Atamanalp SS, Ozturk G, Aydinli B, Yildirgan MI, Basoglu M, Oren D et al (2009) A new classification for ileosigmoid knotting. Turk J Med Sci 39(4):541–544