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Ileosigmoid Knotting: A Rare But Lethal Cause of Acute Intestinal Obstruction - A Narrative Review

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Abstract: ***Ileosigmoid knotting (ISK) is a rare and potentially fatal surgical emergency characterized by wrapping of the ileum around the sigmoid colon or vice versa, resulting in a closed-loop obstruction with rapid progression to strangulation and gangrene [1,2]. The condition is predominantly reported from regions with a high incidence of sigmoid volvulus and commonly affects adult males [3,4]. Preoperative diagnosis is challenging due to nonspecific clinical features and overlapping radiological findings with other causes of bowel obstruction [5,6]. Delayed presentation and limited access to advanced imaging further worsen outcomes, particularly in resource-limited settings [7]. Early recognition, aggressive resuscitation, and emergency surgical intervention are critical to reducing morbidity and mortality [2,8]. This review summarizes the epidemiology, etiopathogenesis, clinical presentation, diagnostic challenges, operative management, and outcomes of ileosigmoid knotting, with emphasis on evidence from published case series and reviews.***

Keywords: Acute abdomen; Gangrene; Ileosigmoid knotting; Intestinal obstruction; Volvulus

1. Introduction

Ileosigmoid knotting (ISK), also referred to as compound or double volvulus, is an uncommon but severe cause of acute intestinal obstruction [1,9]. The condition involves twisting of the ileum around the sigmoid colon or, less commonly, the sigmoid colon around the ileum, leading to simultaneous obstruction of both bowel segments [2,3]. This unique mechanism results in rapid vascular compromise and early bowel gangrene, distinguishing ISK from simple volvulus [5].

The earliest descriptions of intestinal knotting date back to the 19th century, with Parker documenting cases in 1845 and Shepherd later popularizing the term “ileosigmoid knot” in 1967 [1,10]. Despite advances in diagnostic imaging and perioperative care, ISK remains associated with high morbidity and mortality due to diagnostic delay and rapid disease progression [2,6].

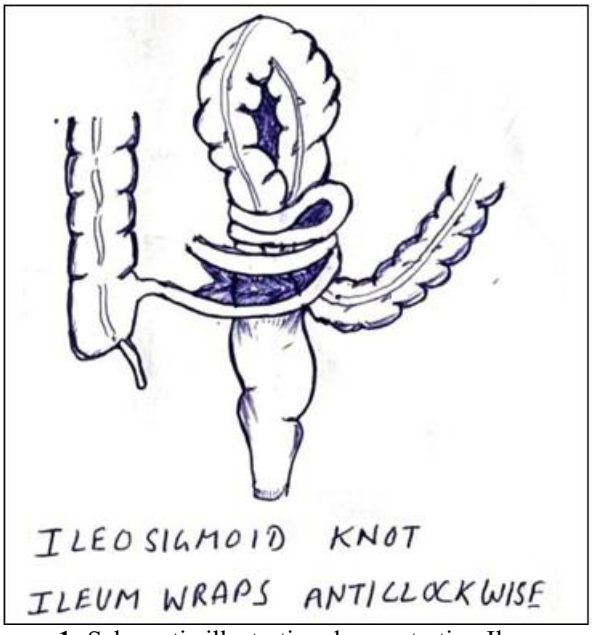

Figure 1: Schematic illustration demonstrating Ileum wraps anticlockwise.

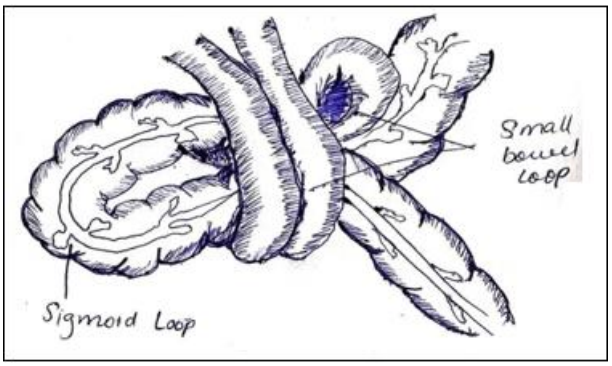

Figure 2: Schematic illustration demonstrating ileum wraps clockwise.

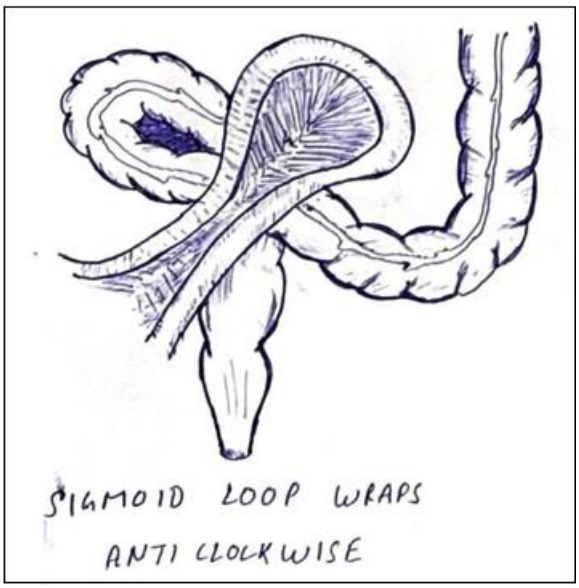

Figure 3: Schematic illustration demonstrating sigmoid loop wraps anticlockwise.

Epidemiology

The true incidence of ileosigmoid knotting is unknown due to its rarity and reliance on case reports and small series [2]. ISK is disproportionately reported from regions known as the "volvulus belt," including Africa, Asia, the Middle East, Eastern Europe, and South America [3,4,11]. In these regions, ISK accounts for approximately 18–50% of cases of sigmoid volvulus, compared with 5–8% in Western countries [3,12].

ISK predominantly affects adult males, with reported male-to-female ratios ranging from 2:1 to 6:1 [4,11]. The peak incidence is observed in the third to fifth decades of life, although cases have been reported in neonates, children, elderly patients, and pregnant women [4,13,14].

Etiology and Predisposing Factors

The etiology of ileosigmoid knotting is multifactorial and remains incompletely understood [2,6]. Several anatomical and functional factors are believed to predispose individuals to ISK:

- A long and mobile sigmoid colon with a narrow mesenteric base [2,3]
- A hypermobile terminal ileum with an elongated mesentery [6,15]
- A capacious abdominal cavity, particularly in thin individuals [5]

Dietary habits also play an important role. Consumption of a bulky meal after prolonged fasting—classically observed during Ramadan—has been implicated due to sudden hyperperistalsis of the ileum in the presence of a relatively empty small bowel [11,16].

Additional contributing factors include postoperative adhesions, Meckel's diverticulum, internal hernias, malrotation, pregnancy, and neurological conditions associated with chronic constipation [6,12,17].

Pathophysiology

Ileosigmoid knotting produces a double-loop closed obstruction, simultaneously affecting both the ileum and sigmoid colon [2,5]. The twisting results in rapid venous congestion, arterial compromise, and subsequent ischemia of the involved bowel segments [6]. Thrombosis of mesenteric vessels accelerates progression to transmural necrosis and gangrene [3].

As ischemia advances, bacterial translocation, endotoxemia, and massive third-space fluid loss occur, predisposing patients to septic shock and multi-organ failure [2,18]. Gangrene rates as high as 78–80% have been reported, significantly higher than in isolated sigmoid volvulus [5,11].

Classification

ISK has been traditionally classified based on the segment initiating the knot [3]:

- Type I: Ileum wraps around the sigmoid colon
- Type II: Sigmoid colon wraps around the ileum
- Type III: Ileocecal segment wraps around the sigmoid colon
- Undetermined type: Direction noted but initiating segment unclear

A prognostic classification proposed by Atamanalp incorporates patient age, comorbidities, presence of shock, and bowel gangrene, correlating strongly with mortality risk [19].

Clinical Presentation

ISK typically presents with sudden onset abdominal pain, rapidly progressive distension, vomiting, and obstipation [1,5]. The pain is often severe and disproportionate to early physical findings [6]. Vomiting may initially be bilious and later feculent as obstruction progresses [2].

On examination, patients frequently exhibit asymmetric abdominal distension, diffuse tenderness, guarding, and signs of peritonitis in advanced cases [3,11]. Tachycardia, hypotension, and fever are common indicators of strangulation and sepsis [7].

Children and elderly patients may present atypically, with delayed diagnosis contributing to higher mortality in these groups [13,20].

Diagnostic Challenges

There are no specific laboratory markers for ileosigmoid knotting [6]. Leukocytosis, metabolic acidosis, and

electrolyte disturbances reflect disease severity rather than diagnosis [2].

Plain abdominal radiographs may show a distended sigmoid colon with multiple small bowel air-fluid levels; however, these findings overlap with sigmoid volvulus and generalized small bowel obstruction [5,11]. Contrast enemas are contraindicated in suspected ISK due to the risk of perforation [12].

Computed tomography (CT) is the most useful imaging modality when available, demonstrating the characteristic "whirl sign," converging mesenteric vessels, and twisted bowel loops [16,21]. Despite this, preoperative diagnosis remains uncommon, and most cases are identified during laparotomy [6,18].

Figure 4: Plain abdominal X-ray showing grossly dilated bowel loops suggestive of acute intestinal obstruction, a typical but non-specific radiological finding in ileosigmoid knotting

Figure 5: CT demonstrating the characteristic "WHIRL SIGN"

Management

Initial management includes aggressive resuscitation with intravenous fluids, correction of electrolyte imbalances, broad-spectrum antibiotics, and nasogastric decompression [2,8]. Once stabilized, emergency laparotomy is mandatory [3].

If both bowel segments are viable, careful untying of the knot may be performed, occasionally combined with sigmoid fixation or resection to prevent recurrence [4, 7]. However, in the presence of gangrene- which is the most common scenario—en bloc resection of the involved ileum and sigmoid colon is recommended [2,6].

Primary anastomosis may be considered in stable patients with healthy bowel ends, while stoma formation is preferred in unstable patients or those with extensive contamination [5,11].

Figure 6: Resected specimen showing gangrenous ileum and sigmoid colon following en bloc resection for ileosigmoid knotting.

Outcomes and Prognosis

The prognosis of ileosigmoid knotting depends on early diagnosis, bowel viability, and patient physiological status at presentation [2,19]. Reported mortality rates range from 6–8% in nongangrenous cases to 20–100% when gangrene and septic shock are present [3, 5, 11].

Advanced age, delayed presentation, shock, extensive bowel necrosis, and comorbid illness are consistently associated with poor outcomes [6, 18]. Mortality remains particularly high in resource-limited settings due to delayed access to care and lack of advanced critical support [7, 22].

Special Populations

1) Children: ISK is extremely rare in children, with diagnosis often delayed due to atypical presentation and limited suspicion [13, 20]. Mortality rates are higher than in adults.
2) Pregnancy: Displacement of bowel by the gravid uterus predisposes to ISK, and diagnostic delay due to avoidance of imaging increases fetal and maternal mortality [14].
3) Elderly: Comorbidities, chronic constipation, and delayed presentation contribute to poor outcomes in elderly patients [6,11].

2. Conclusion

Ileosigmoid knotting is a rare but catastrophic cause of acute intestinal obstruction characterized by rapid progression to bowel ischemia and gangrene. A high index of suspicion is essential in patients presenting with acute abdomen in regions endemic for sigmoid volvulus. Early surgical intervention remains the cornerstone of management, and outcomes depend largely on timely diagnosis and bowel viability. Increased awareness and improved access to diagnostic imaging may help reduce the persistently high mortality associated with this condition.

References

[1] Shepherd JJ. Ninety-two cases of ileosigmoid knotting in Uganda. Br J Surg. 1967;54(6):561–566.
[2] Atamanalp SS, Oren D, Basoglu M, et al. Ileosigmoid knotting: outcome in 63 patients. Dis Colon Rectum. 2004;47(6):906–910.
[3] Alver O, Oren D, Tireli M, Kayabasi B, Akdemir D. Ileosigmoid knotting in Turkey: review of 68 cases. Dis Colon Rectum. 1993;36(12):1139–1147.
[4] Raveenthiran V. The ileosigmoid knot: new observations and changing trends. Dis Colon Rectum. 2001;44(8):1196–1200.
[5] Mallick IH, Winslet MC. Ileosigmoid knotting. Colorectal Dis. 2004;6(4):220–225.
[6] Atamanalp SS. Ileosigmoid knotting: a review of 923 cases. World J Gastroenterol. 2014;20(44):16989–16993.
[7] Argaw DA, Nur WA, Ibrahim MA, et al. Ileosigmoid knotting: a rare cause of acute abdomen with fatal outcome in a resource-limited setting. Int J Surg Case Rep. 2025;XX:XXXX.
[8] Kotisso B, Bekele A. Ilio-sigmoid knotting in Addis Ababa: a three-year comprehensive retrospective analysis. Ethiop Med J. 2006;44(4):377–383.
[9] Parker E. Case of intestinal obstruction from knotting of the intestines. Lancet. 1845;1:XX–XX.
[10] Lee SH, Park YH, Won YS. The ileosigmoid knot: CT findings. AJR Am J Roentgenol. 2000;174(3):685–687.
[11] Vaez-Zadeh K, Dutz W. Ileosigmoid knotting. Ann Surg. 1970;172(6):1027–1033.
[12] Alver O, Oren D, Apaydin B, Yigitbasi R, Ersan Y. Internal herniation concurrent with ileosigmoid knotting or sigmoid volvulus. Surgery. 2005;137(4):372–377.
[13] Atamanalp SS, Polat KY, Balik AA, et al. Ileosigmoid knotting in children: a review of 9 cases. World J Surg. 2007;31(1):31–35.
[14] Wolf B, Youngson GG. A case of ileosigmoid knotting in a child. J Pediatr Surg. 1997;32(10):1514–1515.
[15] Watson RG. Ileosigmoid knot. J R Coll Surg Edinb. 1984;29(2):100–102.
[16] Hirano Y, Hara T, Horichi Y, et al. Ileosigmoid knot: case report and CT findings. Abdom Imaging. 2005;30(6):674–676.
[17] Puthu D, Rajan N, Shenoy GM, Pai SU. The ileosigmoid knot. Dis Colon Rectum. 1991;34(2):161–166.
[18] VerSteeg KR, Whitehead WA. Ileosigmoid knotting. Arch Surg. 1980;115(6):761–763.
[19] Atamanalp SS, Ozturk G, Aydinli B, et al. A new classification for ileosigmoid knotting. Turk J Med Sci. 2009; 39: 541–545.

[20] Chirdan LB, Ameh EA. Sigmoid volvulus and ileosigmoid knotting in children. Pediatr Surg Int. 2001;17(8):636–637.
[21] Young WS, White A, Graves GF. The radiology of ileosigmoid knot. Clin Radiol. 1978;29(2):211–216.
[22] Kedir M, Kotisso B, Messele G. Ileosigmoid knotting in Gondar Teaching Hospital. Ethiop Med J. 1998;36(4):255–260