

# Management of Ileosigmoid Knotting: A Literature Review

Sabri Selçuk Atamanalp<sup>1</sup> , Rıfat Peksöz<sup>1</sup> , Esra Dişçi<sup>1</sup> , Refik Selim Atamanalp<sup>2</sup> , Cansu Tatar Atamanalp<sup>3</sup> 

<sup>1</sup>Department of General Surgery, Ataturk University Faculty of Medicine, Erzurum, Türkiye

<sup>2</sup>Department of Medical Pathology, Prof. Dr. Cemil Taşçıoğlu City Hospital, İstanbul, Türkiye

<sup>3</sup>Department of Pediatrics, Haseki Education and Research Hospital, İstanbul, Türkiye

Received: 2024-07-05

Accepted: 2024-08-06

Published Online: 2024-08-07

## Corresponding Author

Sabri Selçuk Atamanalp, Prof. MD,

Address: Department of General Surgery, Faculty of Medicine, Ataturk University, 25040, Erzurum, Türkiye

E-mail: [ssa@atauni.edu.tr](mailto:ssa@atauni.edu.tr)

© 2024, European Journal of Therapeutics, Gaziantep University School of Medicine.



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

## ABSTRACT

Ileosigmoid knotting (ISK) is a rare double-segment intestinal obstruction form. Urgent surgery is the unique solution in the management of ISK. In surgical treatment, detorsion alone is generally used in patients with viable bowel, while cases with gangrenous bowel require resection. ISK recurrence is uncommon. However, due to the recurrence risk of sigmoid volvulus, the role of recurrence-reducing procedures is unclear. In this review, urgent treatment of ISK as well as the techniques and patient selection criteria of recurrence-reducing management are discussed.

**Keywords:** Ileum, sigmoid colon, ileosigmoid knotting, management, follow up

## INTRODUCTION

In ileosigmoid knotting (ISK), ileum or sigmoid colon twists around the other stricture (Figure 1.a) [1,2]. Abdominal pain, distention, and obstipation are the prominent clinical features of ISK [3,4]. Abdominal plain X-rays generally suspect intestinal obstruction or sigmoid volvulus (SV) by demonstrating multiple intestinal air-fluid levels in addition to ‘coffee-bean sign’ in sigmoid colon, while abdominal computerized tomography or magnetic resonance imaging are highly sensitive by revealing ‘whirl sign’ in both sigmoid colon and terminal ileum mesenteries in addition to X-ray findings [5]. Urgent surgery following resuscitation is essential in the treatment [6]. However, ISK has a relatively poor prognosis particularly in cases with bowel gangrene, perforation, or peritonitis [7,8].

ISK is a very rare disease over the world with less than 1,000 cases reported to date [9,10]. However, it is relatively common

in Turkey, particularly in Eastern Anatolia [11]. Our ISK experience of 58 years (from June 1966 to July 2024) and 81 cases constitutes one of the most comprehensive single-centre ISK series over the world [12]. In this review, we discuss the management and follow-up of ISK based on above-mentioned experience.

## First-Line Management

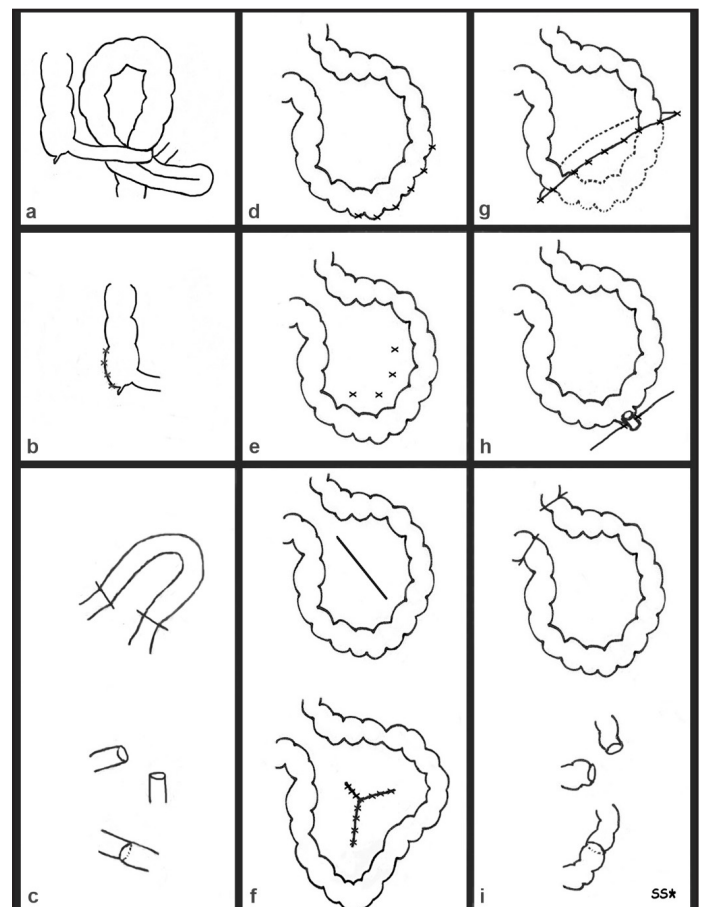
Due to the fluid and electrolyte loss into the obstructive lumens and absorption of the toxic materials from the bowel surfaces, ISK rapidly causes hypovolemic and/or toxic shock [13,14]. In the management, an early and effective resuscitation is essential [15,16]. In the presence or suspicion of complicated colonic volvulus, without considering the bowel viability, urgent surgery is strongly recommended in all patients by actual guidelines [17,18]. Similarly, current reviews and articles support this idea [19,20]. Although endoscopic detorsion is effective in the

management of uncomplicated SV, the unravelling of the knot by endoscopy is very difficult or impossible in ISK, a complicated form of SV. Additionally, endoscopy doesn't demonstrate the viability of the ileum and endoscopy trying may cause missing the ileum gangrene resulting in toxic shock and related death [21,22]. For this reason, surgical treatment is the unique solution [2,12,23,24].

### Management of Viable Bowel

If the bowels are viable, untying the knot may be enough in most cases. Detorsion alone has 1%-5% of mortality and 5%-15% of morbidity [2,6,10,12,14-16,23,24]. In such patients, ISK or SV recurrence is rare and one case has been reported in the actual literature for each [12,25,26]. For this reason, the therapeutic route and patient selection criteria are not clear [2,12,24]. In clinical practice, cecopexy (fixation of the anti-mesenteric edge of the cecum to the parietal peritoneum) (Figure 1.b) may be used in patients with mobile cecum, while no additional procedure including ileectomy (resection of the knotted ileum segment) (Figure 1.c) is necessary for viable ileum [2,11,12,22]. However, dolichosigmoid, an elongated and dilated sigmoid colon, is an anatomic indicator of recurrent SV [27,28]. For this reason, recurrence-reducing procedures such as sigmoidopexy (fixation of the anti-mesenteric edge of the sigmoid colon to the parietal peritoneum) (Figure 1.d), sigmoid mesopexy (fixation of the sigmoid mesentery to the parietal periton by using horseshoe-shaped sutures) (Figure 1.e), sigmoid mesoplasty (efformation of the sigmoid mesentery by cutting it longitudinally and suturing transversely) (Figure 1.f), or sigmoid extraperitonealization

(fixation of the apex of the sigmoid colon to the extra-peritoneal area) (Figure 1.g) may be preferred in selected well-conditioned (American Society of Anesthesiologists – ASA score 1-3) and nonelderly (younger than 70-75 years old) cases with 1%-8% of mortality and 10%-20% of morbidity rates [2,12,24,29-31]. However, the role of percutaneous endoscopic sigmoidopexy (fixation of the apex of the sigmoid colon to the anterior abdominal wall by using stoma kits) (Figure 1.h) is unclear and it may be applied in bad-conditioned (ASA score 4) and elderly (older than 70-75 years old) patients [2,12,24,32,33]. On the other hand, sigmoidectomy (resection of the twisted sigmoid segment to prevent a recurrence) (Figure 1.i) is an alternative option with 1%-10% of mortality and 15%-25% of morbidity rates in above-mentioned ASA score 1-3 and nonelderly individuals [2,12,24,29-31].



**Figure 1.** Schematic diagrams demonstrating ileosigmoid knotting and surgical procedures. **a.** Ileosigmoid knotting. **b.** Cecopexy. **c.** Ileectomy. **d.** Sigmoidopexy. **e.** Sigmoid mesopexy. **f.** Sigmoid mesoplasty. **g.** Sigmoid extraperitonealization. **h.** Tube sigmoidopexy. **i.** Sigmoidectomy.

### Main Points:

- Ileosigmoid knotting is a rare double-segment intestinal obstruction form characterized with rapid progress and poor prognosis.
- In the treatment, early and effective resuscitation followed by urgent surgery is the unique option.
- In surgical treatment, detorsion alone may be used in patients with viable bowel, while cases with gangrenous bowel require primary anastomosis or stoma following resection.
- Recurrence of sigmoid volvulus is rare and the role of recurrence-reducing procedures are controversial.

### Management of Single-Segment Gangrenous Bowel

In patients with ileum or sigmoid colon gangrene, following the resection, primary anastomosis is preferred in above-mentioned well-conditioned and nonelderly cases with 5%-20% of mortality and 10%-30% of morbidity rates, while stoma is life saver in most bad-conditioned and elderly patients with 20%-50% of mortality and 30%-60% of morbidity rates [2,12,24,32,33]. If the sigmoid colon is viable, one of the above-mentioned recurrence-reducing procedures may be added [2,12,24,29-33].

### Management of Double-Segment Gangrenous Bowel

It is clear that both gangrenous segments require resection. Following this procedure, primary anastomosis is preferred in both segments in above-mentioned well-conditioned and nonelderly cases with 10%-30% of mortality and 20%-40% of morbidity rates. Bad-conditioned and elderly patients are treated with one anastomosis and one stoma (preferably ileum anastomosis and sigmoid colon stoma), the mortality and morbidity rates are 30%-60% and 40%-80%, respectively [2,12,24,29-33].

### Ileosigmoid Knotting in Childhood

ISK in childhood is seldom with less than 30 cases reported in the literature [2,12,34,35]. Although the therapeutic principles are similar, if the bowels are viable, short-term procedures including detorsion alone may be preferred in most bad-conditioned children. However, the high recurrence rate in early-onset SV patients may necessitate a recurrence-reducing procedure in well-conditioned group [36]. The inability of a healthy medical anamnesis and clinical examination in addition to the complexity of the clinical features generally retard the diagnosis resulting in a relatively poor prognosis consisting of 15%-60% of mortality and 20%-60% of morbidity rates [2,24,34,35,37].

### Ileosigmoid Knotting in Pregnancy

ISK is rare in pregnancy and puerperium with less than 20 cases reported to date [2,37-39]. The treatment requires a multidisciplinary approach. Surgical treatment principles are similar to that of non-pregnant individuals. Short-term surgery such as detorsion alone is the most preferred option in cases with viable bowel, while recurrence-reducing techniques are generally postponed post-delivery period. However, the prognosis is relatively poor with 15%-25% of maternal and 30%-50% of fetal mortality in addition to 40%-60% of morbidity rates [2,12,37-39].

### Ileosigmoid Knotting in Elderliness

ISK generally affects middle-aged population and about one eighth of the cases are over 80 years old [12,37,40]. Although the basic therapeutic principles are similar, due to the worse prognosis arising from high-rate comorbidities, short-term techniques including detorsion alone are generally preferred. The prognosis is relatively poor with 20%-80% of mortality and 30%-60% of morbidity rates [2,12,37,40].

### Clinical Experience

ISK is relatively common in Eastern Anatolia. As a result, the experience of Ataturk University, which includes 81 patients treated over 58 years (from June 1966 to July 2024) constitutes the third large single-centre ISK series over the world [12]. In 20-case (24.7%) viable-bowel group, detorsion was applied in 15 patients, while additionally sigmoid mesopexy (two patients), sigmoidectomy with primary anastomosis (two cases), and sigmoidectomy with stoma (one patient) were other options with no mortality and 5.0% morbidity. In eight cases (9.9%) with ileum gangrene, the mortality and morbidity rates were similar, 12.5% for each. In this group, following ileectomy (in two patients, additionally right colon resection), primary anastomosis was preferred in seven cases, while one patient treated with stoma. Seven cases (8.6%) had sigmoid colon gangrene with 14.3% of mortality and morbidity rates for each. In this group, following sigmoidectomy, bowel continuity was obtained via stoma in six patients, while one case treated with primary anastomosis. Finally, in 46 patients (56.8%) with double-segment gangrene, both segment resection was followed by ileum primary anastomosis with sigmoid colon stoma in 38 cases (in 11 patients, additionally right colon resection), double-segment stoma in three, ileum stoma with sigmoid colon primary anastomosis in three. In the last group, one patient death during laparotomy, while mortality and morbidity rates were 28.3% for each.

Regarding the special considerations, seven cases were in childhood period. Detorsion alone was used in the management of one patient with viable bowel, while six cases with double-segment gangrene were treated with ileum primary anastomosis and sigmoid colon stoma following double-segment resection (in one patient, additionally partial jejunum resection) with 14.3% mortality and 42.9% morbidity rates. Three of 22 women (13.6%) were pregnant. Following the resections, two cases with double-segment gangrene were treated with ileum primary anastomosis and sigmoid colon stoma, while sigmoid primary anastomosis

was preferred in one patient with sigmoid colon gangrene alone. In this series, maternal and fetal mortality rates were 33.3% for each, while maternal morbidity rate was also 33.3%. Finally, 24 cases (29.6%) were over 60 years old, while the numbers of the patients older than 70, 80 and 90 years were 11, four and one, respectively. As expected, 11 (73.3%) of decedent cases were older than 60 years.

## CONCLUSION

In ileosigmoid knotting (ISK), detorsion alone is generally used in patients with viable bowel, while cases with gangrenous ileum and/or sigmoid colon are treated with primary anastomosis or stoma following resection. In patients treated detorsion alone, ISK or sigmoid volvulus recurrence is rare. For this reason, the role of recurrence-reducing procedures is unclear. However, recurrence-reducing procedures such as sigmoidectomy, sigmoidopexy, sigmoid mesopexy, sigmoid mesoplasty, or extraperitonealization may be used in selected well-conditioned and nonelderly cases.

**Conflict of interest:** No conflict of interest was experienced.

**Funding:** No financial support was received for this study.

**Author Contributions:** Conception: S, S, A - Design: S, S, A - Supervision: S, S, A – Materials: S, S, A - R, P - E, D; Data Collection and/or Processing: S, S, A - R, P - E, D; Analysis and Interpretation: S, S, A; Literature Review: S, S, A; Writing: S, S, A - Critical Review: R, P - E, D - R, S, A - C, T, A

## REFERENCES

- [1] Gupta AK, Ansari MA, Jayant S, Goel S, Bansal LK (2020) Ileosigmoid knotting causing double-lumen acute intestinal obstruction and gangrene-Review and a case report. *J Clin Diagn Res.* 14(10):PE06-11. <https://doi.org/10.7860/JCDR/2020/45118.14130>
- [2] Atamanalp SS, Peksoz R, Disci E (2022) Sigmoid volvulus and ileosigmoid knotting: An update. *Eurasian J Med.* 54(S1):S91-S96. <https://doi.org/10.5152/eurasianjmed.2022.22310>
- [3] Sseruwagi TM, Lewis C (2022) Ileosigmoid knotting: A case series. *Cureus J Med Sci.* 14(11):e32003. <https://doi.org/10.7759/cureus.32003>
- [4] Atamanalp SS (2013) Ileosigmoid knotting: clinical appearance of 73 cases over 45.5 years. *ANZ J Surg.* 83 (1-2):70-73. <https://doi.org/10.1111/j.1445-2197.2012.06146.x>
- [5] Hirano Y, Hara T, Horichi Y, Nozawa H, Nakada K, Oyama K, Hada M, Takagi T, Hirano M, Kitagawa K (2005) Ileosigmoid knot: case report and CT findings. *Abdom Imaging.* 30(6):674-676. <https://doi.org/10.1007/s00261-005-0315-7>
- [6] Ooko PB, Saruni S, Oloo M, Topazian HM, White R (2016) Ileo-sigmoid knotting: a review of 61 cases in Kenya. *Pan Afr Med J.* 23:198. <https://doi.org/10.11604/pamj.2016.23.198.6255>
- [7] Huynh TT, Te J, Orellana F, Joshi M (2016) Ileosigmoid Knotting: A rare but treacherous cause of closed loop obstruction. *Am Surg.* 82(12):E363-E365.
- [8] Mungazi SG, Mutseyekwa B, Sachikonye M (2018) A rare occurrence of viability of both small and large bowel in ileosigmoid knotting: A case report. *Int J Surg Case Rep.* 2018;49:1-3. <https://doi.org/10.1016/j.ijscr.2018.05.024>
- [9] Banerjee C, Mukhopadhyay M, Roy A, Kumar J, Mukherjee S, Rahman QM (2014) The unusual volvulus : A five year retrospective analysis of nine cases. *Indian J Surg.* 76(2):100-104. <https://doi.org/10.1007/s12262-012-0551-3>
- [10] Machado NO (2009) Ileosigmoid knot: a case report and literature review of 280 cases. *Ann Saudi Med.* 29(5):402-406. <https://doi.org/10.4103/0256-4947.55173>
- [11] Atamanalp SS (2018) Ileosigmoid knotting: One of the largest single-center series. *Pak J Med Sci.* 34(3):761-763. <https://doi.org/10.12669/pjms.343.14893>
- [12] Atamanalp SS, Disci E, Peksoz R, Atamanalp RS, Tatar Atamanalp C (2022) Ileosigmoid knotting: A review of 923 cases. *Pak J Med Sci.* 38(3):711-715. <https://doi.org/10.12669/pjms.38.3.5320>
- [13] Kumar R, Kenchappa PKS, Meena K, Singh BK (2019) Ileosigmoid knotting: An unusual cause of acute intestinal obstruction with bowel gangrene. *BMJ Case Rep.* 12(5):e226663. <https://doi.org/10.1136/bcr-2018-226663>
- [14] Mandal A, Chandel V, Baig S (2012) Ileosigmoid knot. *Indian J Surg.* 74(2):136-142. <https://doi.org/10.1007/>

- [s12262-011-0346-y](#)
- [15] Gibney EJ, Mock CN (1993) Ileosigmoid knotting. *Dis Colon Rectum*. 36(9):855-857. <https://doi.org/10.1007/BF02047383>
- [16] Puthu D, Rajan N, Shenoy GM, Pai SU (1991) The ileosigmoid knot. *Dis Colon Rectum*. 34(2):161-166. <https://doi.org/10.1007/BF02049992>
- [17] Naveed M, Jamil LH, Fujii-Lau LL, Al-Haddad M, Buxbaum JL, Fishman DS, Jue TL, Law JK, Lee JK, Qumsey B, Sawhney MS, Thosani N, Storm AC, Calderwood AH, Khashab MA, Wani SB (2020) American Society for Gastrointestinal Endoscopy guideline on the role of endoscopy in the management of acute colonic pseudo-obstruction and colonic volvulus. *Gastrointest Endosc*. 91(2):228-235. <https://doi.org/10.1016/j.gie.2019.09.007>
- [18] Alavi K, Poylin V, Davids JS, Patel SV, Felder S, Valente MA, Paquette IM, Feingold DL (2021) The American Society of Colon and Rectal Surgeons clinical practice guidelines for the management of colonic volvulus and colonic pseudo-obstruction. *Dis Colon Rectum*. 64(9):1046-1057. <https://doi.org/10.1097/DCR.0000000000002159>
- [19] Bauman ZM, Evans CH (2018) Volvulus. *Surg Clin N Am*. 98(5):973-993. <https://doi.org/10.1016/j.suc.2018.06.005>
- [20] Kapadia MR (2017) Volvulus of the small bowel and colon. *Clin Colon Rectal Surg*. 30(1):40-45. <https://doi.org/10.1055/s-0036-1593428>
- [21] Atamanalp SS (2022) Endoscopic decompression of sigmoid volvulus: Review of 748 patients. *J Laparoendosc Adv Surg Tech*. 32(7):763-767. <https://doi.org/10.1089/lap.2021.0613>
- [22] Atamanalp SS (2014) Treatment for ileosigmoid knotting: a single-center experience of 74 patients. *Tech Coloproctol*. 18(3):233-237. <https://doi.org/10.1007/s10151-013-1046-3>
- [23] Sulaiman Shoab S (1997) Management of ileosigmoid knotting. *Br J Surg*. 84(9):1322. <https://doi.org/10.1002/bjs.1800840934>
- [24] Atamanalp SS (2021) Ileosigmoid knotting: An update for Atamanalp classification. *Pak J Med Sci*. 37(3):913-915. <https://doi.org/10.12669/pjms.37.3.3179>
- [25] Nazir S, Munir A, Sulman S, Waleed QM, Muhammad AY (2020) Ileosigmoid knot: A case report. *J Liaquat Uni Med Health Sci*. 19(1):66-68. <https://doi.org/10.22442/jlumhs.201910664>
- [26] Li XG, Zakariah SM, Shi YY (2020) A Case of ileosigmoid knotting in a Ghanaian patient. *Int J General Med*. 13:1265-1269. <https://doi.org/10.2147/IJGM.S279876>
- [27] Korkut E, Atamanalp SS (2022) Factors triggering knot formation in ileosigmoid knotting. *Pak J Med Sci*. 38(6):1714-1716. <https://doi.org/10.12669/pjms.38.6.6133>
- [28] Raahave D (2018) Dolichocolon revisited: An inborn anatomic variant with redundancies causing constipation and volvulus. *World J Gastrointest Endosc*. 10(2):6-12. <https://doi.org/10.4240/wjgs.v10.i2.6>
- [29] Orban YA, Safwat K, Awad JRI, Asjour H, Yassin MA (2023) Sigmoidopexy versus sigmoidectomy for sigmoid volvulus through left iliac incision in high-risk patients. *Egypt J Surg*. 41(1):135-140. [https://doi.org/10.4103/ejs.ejs\\_295\\_21](https://doi.org/10.4103/ejs.ejs_295_21)
- [30] Akhtar M, Khan I (2009) Management of viable sigmoid volvulus by mesosigmoidoplasty. *Gomal J Med Sci*. 7(1):7-9.
- [31] Aharoni M, Zager Y, Khalilieh S, Amiel I, Horesh N, Ram E, Gutman M, Rosin D (2022) Laparoscopic fixation of volvulus by extra-peritonealization: a case series. *Tech Coloproctol*. 26(6):489-493. <https://doi.org/10.1007/s10151-022-02596-y>
- [32] Frank L, Moran A, Beaton C (2016) Use of percutaneous endoscopic colostomy (PEC) to treat sigmoid volvulus: a systematic review. *Endosc Int Open*. 4:e737-e741. <https://doi.org/10.1055/s-0042-105513>
- [33] Farkas N, Kenny R, Conroy M, Harris H, Anele C, Simson J, Levy B (2022) A single centre 20-year retrospective cohort study: Percutaneous endoscopic colostomy. *Colorectal Dis*. 24(11):1390-1396. <https://doi.org/10.1111/codi.16207>
- [34] Ba-Shammakh SA, Rabai NA, Haj-Freej HM, Ghanem WH, Wahsheh MN (2023) Pediatric ileosigmoid knotting: A rare culprit of acute abdominal pain. *Cureus J Med Sci*. 15(7):e42749. <https://doi.org/10.7759/cureus.42749>

- [35] Bedada AG, Sreekumaran MI, Azzie G (2018) Ileosigmoid knotting in a child: Index case in Botswana and review of the literature. South Afr J Child Health. 12(3):88-89. <https://doi.org/10.7196/SAJCH.2018.v12i3.1493>
- [36] Korkut E, Peksoz R, Disci E, Atamanalp SS (2023) Factors affecting recurrence in sigmoid volvulus. Pak J Med Sci. 39(1):150-153. <https://doi.org/10.12669/pjms.39.1.6882>
- [37] Atamanalp SS (2009) Ileosigmoid knotting. Eurasian J Med. 41(2):116-119.
- [38] Atamanalp SS (2012) Ileosigmoid knotting in pregnancy. Turk J Med Sci. 42(4):553-558. <https://doi.org/10.3906/sag-1108-41>
- [39] Maunganidze AJV, Mungazi SG, Siamuchembu M, Mlotshwa M (2016) Ileosigmoid knotting in early pregnancy: A case report. Int J Surg Case Rep. 23:20-22. <https://doi.org/10.1016/j.ijscr.2016.03.022>
- [40] Singh PK, Ali MS, Manohar D, Sethi M (2020) A challenging case of ileosigmoid knotting in an elderly. Cureus J Med Sci. 12(8):e9624. <https://doi.org/10.7759/cureus.9624>

***How to Cite;***

Atamanalp SS, Peksoz R, Disci E, Atamanalp RS, Atamanalp CT (2024) Management of Ileosigmoid Knotting: A Literature Review. Eur J Ther. 30(4):525-530. <https://doi.org/10.58600/eurjther2271>