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Gangrenous Appendico-ileal knotting causing strangulated small-bowel obstruction and shock in a patient with a virgin abdomen: a case report

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Case Report

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Abstract

Background: Appendico-ileal knotting is a rare cause of closed-loop small-bowel obstruction in which the appendix encircles the ileum and may cause strangulation and bowel ischemia. Preoperative diagnosis is difficult because the clinical presentation is nonspecific.

Case presentation: A 52-year-old Ethiopian man with no prior abdominal surgery presented after 2 days of abdominal pain, distension, bilious vomiting, and obstipation. He was hypotensive, tachycardic, dehydrated, and had generalized peritonitis. Plain abdominal radiography showed features of small-bowel obstruction. Following resuscitation, antibiotics, and vasopressor support, emergency laparotomy was performed for suspected strangulated small-bowel obstruction. Approximately 2 L of hemorrhagic intraperitoneal fluid was found. A 16-cm inflamed appendix tightly encircled the distal ileum, forming an Appendico-ileal knot and causing approximately 1 m of ileal gangrene. The knot was released, appendectomy and ileal resection were performed, and intestinal continuity was restored with an end-to-side ileo-transverse anastomosis. The patient required postoperative intensive care and vasopressor support; shock resolved by postoperative day 2. He was discharged on postoperative day 7 and remained well through postoperative day 30.

Conclusions: Appendico-ileal knotting is a rare cause of closed-loop small-bowel obstruction that may be encountered intraoperatively among unusual causes of strangulation, including in patients with a virgin abdomen. Hemodynamic instability, peritonitis, and suspected bowel ischemia warrant urgent operative assessment; CT should not delay operative source control in an unstable patient.

Introduction

Small-bowel obstruction is a common surgical emergency, commonly caused by postoperative adhesions, hernias, malignancy, and volvulus. Appendico-ileal knotting (AIK) is a rare cause in which the appendix encircles the ileum or its mesentery, producing a closed-loop obstruction. The resulting venous congestion and arterial compromise may rapidly lead to intestinal ischemia, gangrene, and shock[1–3].

The clinical manifestations of AIK overlap with those of more common causes of small-bowel obstruction, and the diagnosis is therefore generally made at laparotomy. This case is notable for the combination of a virgin abdomen, generalized peritonitis, vasopressor-requiring shock, hemorrhagic intraperitoneal fluid, extensive distal ileal gangrene, and individualized reconstruction with end-to-side ileo-transverse anastomosis. We report the clinical presentation, operative findings, management, and short-term outcome of gangrenous AIK in an Ethiopian patient.

This report highlights the importance of early recognition of strangulated bowel obstruction and prompt surgical exploration when clinical deterioration precludes definitive preoperative imaging. This case report was prepared in accordance with the CARE reporting guideline[4].

Case presentation

Patient information

A previously healthy 52-year-old Ethiopian man presented with sudden-onset generalized abdominal pain, progressive abdominal distension, persistent bilious vomiting, and absence of stool and flatus for 2 days. He had no history of abdominal surgery, hernia, chronic medical illness, regular medication use, or recent trauma. He did not smoke or drink alcohol and reported no family history of gastrointestinal disease.

Clinical findings

The patient appeared toxic, dehydrated, and distressed. His pulse rate was 120 beats/min and weak; respiratory rate was 24 breaths/min; blood pressure was 80/50 mmHg; temperature was 36.6°C; and peripheral oxygen saturation was 92% while receiving 2 L/min oxygen by nasal cannula. His body weight was 60 kg.

The patient was clinically dehydrated. Abdominal examination demonstrated marked generalized distension, diffuse tenderness with rebound tenderness, tympany, and hyperactive bowel sounds.

Timeline

Time	Event
0 h	Admission with small-bowel obstruction, generalized peritonitis, and shock
First 2 h	Fluid resuscitation, urinary catheterization, and initiation of vasopressor support
4 h	Emergency exploratory laparotomy
POD 0–2	Intensive-care monitoring and vasopressor support
POD 2	Resolution of shock and initiation of oral intake
POD 7	Discharge
POD 14	First outpatient follow-up
POD 30	Final reported follow-up

Diagnostic assessment

Laboratory evaluation showed leukocytosis, with a white blood cell count of 12,800/mm³ and 79% neutrophils. Hemoglobin was 13 g/dL, hematocrit was 36.3%, platelet count was 186 × 10³/μL, and random blood glucose was 109 mg/dL. Plain abdominal radiography showed multiple air-fluid levels consistent with small-bowel obstruction.

Computed tomography was not performed because persistent hemodynamic instability and clinical evidence of strangulation required urgent operative management. The preoperative diagnosis was

strangulated small-bowel obstruction. Primary small-bowel volvulus was considered among the differential diagnoses.

Following urinary catheterization, the initial urine output was 50 mL. Administration of three litres of normal saline over approximately 2 hours was followed by a urine output of 100 mL over the subsequent 2 hours. Because hypotension persisted despite fluid resuscitation, vasopressor support was initiated and titrated according to hemodynamic response. The overall clinical picture was consistent with shock secondary to strangulated small-bowel obstruction and suspected bowel gangrene.

Therapeutic intervention

After intravenous fluid resuscitation, administration of ceftriaxone 1 g intravenously twice daily and metronidazole 500 mg intravenously three times daily, and initiation of vasopressor support, the patient underwent emergency exploratory laparotomy.

Approximately 2 L of hemorrhagic intraperitoneal fluid was encountered. Exploration revealed a 16-cm inflamed appendix tightly encircling the distal ileum in an anticlockwise direction, forming an appendico-ileal knot.This caused a closed-loop obstruction with approximately 1 m of gangrenous distal ileum beginning about 1 cm proximal to the ileocecal valve (Fig. 1).

The knot was carefully released. The appendix was gangrenous at its tip, while the appendiceal base remained viable; appendectomy was therefore performed. The terminal ileum, ileocecal valve, and cecum were viable and preserved.

After resection of the gangrenous ileum, only a very short distal ileal stump, approximately 1 cm in length, remained adjacent to the ileocecal valve. Because only approximately 1 cm of distal ileum remained proximal to a viable ileocecal valve, a tension-free ileo-ileal anastomosis was not feasible. The distal ileal stump was closed, and the proximal ileal end was anastomosed to the side of the transverse colon using a two-layer hand-sewn technique.

Histopathological examination was not performed because histopathology services were unavailable. No intraoperative complication was documented. The patient was transferred to the intensive-care unit under continued vasopressor support for postoperative management of shock.

Follow-up and outcome

Postoperatively, the patient received intensive-care monitoring, adrenaline vasopressor support, intravenous antibiotics, and supportive care. Serum creatinine after transfer to the intensive-care unit was 1.2 mg/dL.

Hemodynamic status improved, and shock resolved by postoperative day 2, allowing discontinuation of vasopressor support. Oral intake was initiated on postoperative day 2 and was tolerated by postoperative

day 4. No postoperative complication was documented. The patient was discharged in stable condition on postoperative day 7.

At postoperative day 14, he was asymptomatic, tolerated a regular diet, and had normal bowel function. Follow-up through postoperative day 30 showed continued recovery without reported complications.

Discussion

Appendico-ileal knotting is an exceptionally rare form of closed-loop small-bowel obstruction in which the appendix encircles the distal ileum and/or its mesentery, creating a constricting ring. A long, mobile, and inflamed appendix may plausibly facilitate this configuration by providing sufficient length and mobility to wrap around adjacent ileum or mesentery; however, the precise mechanism and causal contribution of these anatomical and inflammatory factors remain uncertain. Once a constricting loop forms, venous congestion and subsequent arterial compromise may result in ischemia, strangulation, and gangrene[1–3]. Because abdominal pain, vomiting, distension, obstipation, and peritonitis are nonspecific, AIK is usually diagnosed intraoperatively.

This patient had a severe presentation, including a virgin abdomen, generalized peritonitis, shock requiring vasopressor support, approximately 2 L of hemorrhagic intraperitoneal fluid, and 1 m of gangrenous distal ileum. The intraoperative finding of a 16-cm appendix tightly encircling the ileum established the diagnosis of AIK. A virgin abdomen lowers the likelihood of postoperative adhesive obstruction but does not exclude mechanical obstruction, closed-loop obstruction, or strangulation.

Cross-sectional imaging can demonstrate the level of obstruction and features of bowel ischemia when the patient is sufficiently stable for imaging. In this case, CT was not performed because persistent hemodynamic instability and clinical signs of strangulation required immediate operative exploration. Plain abdominal radiography confirmed small-bowel obstruction but could not establish the cause[5–7]. In patients with a virgin abdomen, volvulus, internal hernia, congenital bands, inflammatory bands, and other causes of closed-loop obstruction should be considered[8, 9]

The operative strategy was determined by the extensive distal ileal gangrene, the viable ileocecal region, the short distal ileal stump, and the patient's severe physiological compromise. Closure of the short ileal stump and end-to-side ileo-transverse anastomosis allowed restoration of intestinal continuity while avoiding a technically difficult anastomosis to a very short distal ileal segment. This decision was individualized to the intraoperative findings and physiological condition of the patient.

Comparison with prior Ethiopian reports places the present case at the severe end of the reported spectrum. Published Ethiopian cases include a 28-year-old man with a 20-cm gangrenous appendix, 1 m of gangrenous ileum, and ileal resection with ileo-transverse anastomosis; a 32-year-old woman presenting after 24 hours with a viable 15-cm distal ileal loop managed by knot release and appendectomy without bowel resection; and a case series describing patients aged 17 and 54 years, with symptom duration ranging from 2 days to approximately 1 week before worsening, and gangrenous

distal ileum involving about 90 cm in one reported case[2, 10–12]. The present 52-year-old patient presented after 2 days of symptoms and had a 16-cm inflamed appendix with approximately 1 m of gangrenous ileum. Across these reports, appendix length and the extent of ischemic bowel are not uniformly reported, limiting direct quantitative comparison. Nevertheless, the present case is notable for vasopressor-requiring shock, approximately 2 L of hemorrhagic intraperitoneal fluid, extensive distal ileal gangrene, preservation of a viable ileocecal region, and individualized reconstruction with end-to-side ileo-transverse anastomosis. These differences illustrate the variable operative consequences of AIK, ranging from simple knot release and appendectomy when bowel remains viable to intestinal resection and reconstruction when ischemia or gangrene is established.

Limitations include the absence of histopathological examination, which was unavailable, and follow-up limited to 30 postoperative days. Nevertheless, the operative findings clearly established AIK and documented the associated intestinal gangrene.

Conclusions

Appendico-ileal knotting is a rare but life-threatening cause of strangulated small-bowel obstruction. Rather than representing a routine leading diagnosis, AIK may be encountered intraoperatively among unusual causes of closed-loop obstruction, including in patients with a virgin abdomen. Hemodynamic instability, generalized peritonitis, and suspected bowel ischemia are indications for urgent operative assessment. CT can be useful in sufficiently stable patients, but imaging should not delay operative source control when an unstable patient has clinical evidence of strangulation or ischemia.

Patient perspective

At 30-day follow-up, the patient reported return to usual eating and bowel habits and satisfaction with the outcome.

Declarations

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Authors’ contributions

BA selected the case, collected the clinical data, drafted the manuscript, and revised the manuscript. AK collected clinical data, contributed to manuscript review, and conducted the literature review. ZM contributed to drafting and critical review of the manuscript, analyzed the case, and conducted the

literature review. MB contributed to case selection, critical manuscript review, literature review, and manuscript editing. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated and/or analyzed during the current case report are not publicly available to protect patient confidentiality but are available from the corresponding author on reasonable request, subject to institutional and ethical requirements.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Ethics and Consent to Participate declarations

not applicable

Competing interests

The authors declare that they have no competing interests.

References

1. Bhargav P, Tiwari AK, Nargesh SS, Khuman K, Parmar R: Appendico-Ileal Knotting (Appendiceal Tourniquet Syndrome): A Systematic Review and Clinicopathological Classification. *Cureus* 2026, 18(1):e102704.
2. Kassahun B, Afenigus AD: Gangrenous small bowel obstruction resulting from appendico-ileal knotting: a rare case report from Bete Markos Medical and Surgical Center, Ethiopia. *Journal of surgical case reports* 2025, 2025(7):rjaf539.
3. Dereje WM, Zemariam MA, Ferede MT, Worku AT, Wattaro DW, Tsehay EB: Appendico-ileal knotting: a rare cause of small bowel obstruction diagnosis and management in a resource-limited setting; case report. *International journal of surgery case reports* 2025, 131:111393.

4. Riley DS, Barber MS, Kienle GS, Aronson JK, von Schoen-Angerer T, Tugwell P, Kiene H, Helfand M, Altman DG, Sox H *et al*: CARE guidelines for case reports: explanation and elaboration document. *Journal of clinical epidemiology* 2017, 89:218–235.
5. Zins M, Millet I, Taourel P: Adhesive Small Bowel Obstruction: Predictive Radiology to Improve Patient Management. *Radiology* 2020, 296(3):480–492.
6. Ahmad SJS, Drvaric I, Ahmed AR, Jakob D, Kyriazidis IP, Pouwels S, Hajibandeh S, Tang A, Cripps P, Yang W *et al*: From obstruction to ischaemia: a systematic review and meta-analysis on the diagnostic accuracy of CT scans in identifying small and large bowel obstruction, underlying causes and predicting critical complications in adults. *BMJ open* 2025, 15(11):e103887.
7. Long B, Robertson J, Koyfman A: Emergency Medicine Evaluation and Management of Small Bowel Obstruction: Evidence-Based Recommendations. *The Journal of emergency medicine* 2019, 56(2):166–176.
8. Qian Y, Zhu Y, Ping X: Aetiologies and prognosis of small bowel obstruction in virgin abdomen: a retrospective cohort study. *World journal of emergency surgery: WJES* 2026, 21(1).
9. Puchakayala N, Kamaraj B, Vemulaghat KT, Gopu S, Shaik DA, Korlakunta BJOjotACoG, ACG: S4505 Unmasking the Unknown: A Case Series of Bowel Obstruction in the Virgin Abdomen and Its Surgical Imperatives. 2025, 120(10S2):S963.
10. Tessema TT, Obolu MT, Mulisa TG, Tilahun BG, Woldegiorgis ET, Beyene YA: Appendico-Ileal Knotting; Case Series in Ethiopia. *Clinical case reports* 2025, 13(10):e71140.
11. Oljira AM, Tebelu AM, Abdisa MB: Viable appendico-ileal knotting resulting in acute small bowel obstruction: a case report from Ethiopia. *Journal of surgical case reports* 2026, 2026(1):rjaf1109.
12. Bisetegn TM, Mohammed YE, Bedore TM, Achamyeleh YG, Dorsisso TT: Appendico-Ileal Knotting: A Rare, Dangerous, and Often Overlooked Complication of Appendicitis: A Case Report. *Case reports in surgery* 2026, 2026:6658226.

Figures

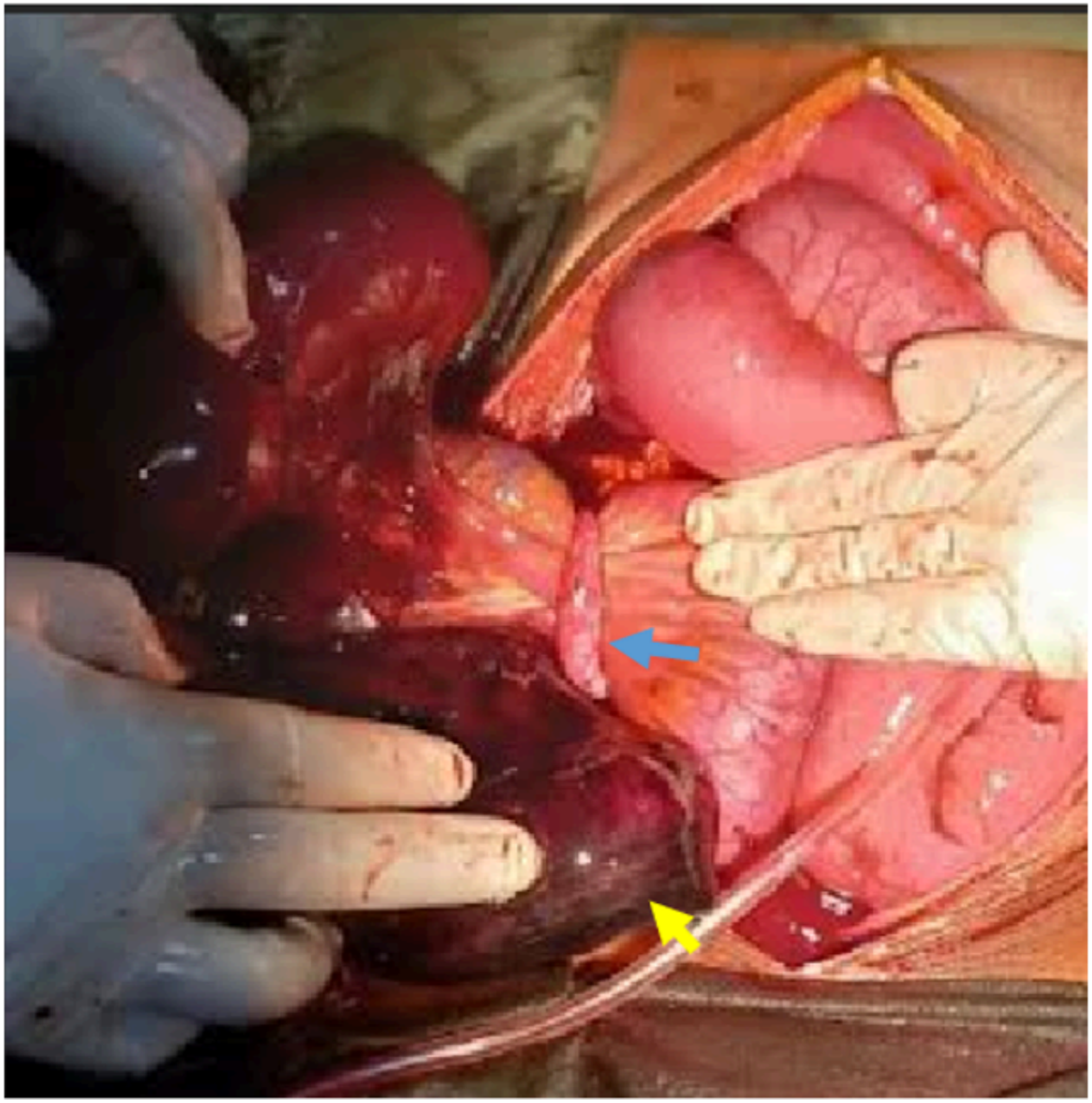


Figure 1

Intraoperative image showing Appendico-ileal knotting (blue arrow) around the ileum, causing gangrenous changes (yellow arrow).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- CAREChecklistJMCRAppendicoIlealKnotting.docx