

Complicated Acute Appendicitis in a Horseshoe Appendix: A Case Report

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Case Report

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Abstract

Background

Acute appendicitis is among the most common surgical emergencies, but rare anatomical variants can complicate its diagnosis and management. The horseshoe appendix, classified as a Type D anomaly within the extended Cave-Wallbridge classification, is an exceptionally rare congenital variant characterized by a single lumen with two distinct cecal insertions and is almost always identified intraoperatively.

Case presentation:

We report the case of a 60-year-old woman with type 2 diabetes mellitus who presented with a three-day history of abdominal pain that began in the epigastrium and migrated to the right iliac fossa, accompanied by nausea and reduced appetite. Clinical examination and abdominal ultrasonography were consistent with acute appendicitis. Laparoscopic exploration revealed approximately 200 mL of purulent fluid and an inflammatory plastron involving the appendix, cecum, terminal ileum, and abdominal wall. Further dissection identified a horseshoe appendix with two separate, perforated cecal bases, consistent with a Type D appendiceal duplication. Both bases were ligated with polymer clips, and a complete appendectomy was performed without complications; the patient recovered uneventfully and was discharged in stable condition.

Conclusions

This case underscores the diagnostic and surgical challenges posed by rare appendiceal anomalies and highlights the importance of careful, systematic intraoperative exploration to achieve complete resection and avoid retained appendiceal tissue, particularly in complicated presentations.

Background

Acute appendicitis (AA) is one of the most common abdominal surgical emergencies; however, its presentation may be complicated by anatomical variations of the appendix, which require careful intraoperative identification to ensure appropriate management. Among these, the horseshoe appendix is an exceptionally rare entity. First described by Cave [1] and later modified by Wallbridge to define types A, B, and C [2], the Cave–Wallbridge classification was subsequently extended to include the horseshoe appendix as a Type D variant [3], an uncommon anatomical variant characterized by a single lumen with two distinct cecal insertions, which must be considered in cases of complicated appendicitis.

Although AA is typically managed straightforwardly, anatomical anomalies require careful assessment of the appendix to ensure complete resection, which remains the cornerstone of treatment. Because the

literature on this condition is limited, recognizing these variants is essential to optimize patient outcomes. This report describes a case of horseshoe appendix with complicated appendicitis and emphasizes the importance of intraoperative assessment, diagnostic suspicion, and surgical considerations. This case is reported in accordance with the CARE guidelines, and the completed CARE checklist is provided as an additional file [4].

Case Presentation

A 60-year-old Hispanic woman with a medical history of type 2 diabetes mellitus, treated with metformin 850 mg twice daily, presented to the emergency department with a three-day history of abdominal pain. The pain initially started in the epigastric region and later migrated to the right iliac fossa. It was associated with nausea and decreased appetite.

On physical examination, the patient exhibited signs suggestive of acute appendicitis, including positive McBurney's point tenderness as well as positive Dunphy's and Rovsing's signs. Laboratory findings revealed leukocytosis with neutrophilia, hyperglycemia (341 mg/dL), elevated C-reactive protein levels, and hyperbilirubinemia, predominantly in the indirect fraction.

Abdominal ultrasonography demonstrated a non-compressible, aperistaltic tubular structure in the right lower quadrant with an anteroposterior diameter of 10 mm, consistent with acute appendicitis.

The patient was taken to the operating room for a laparoscopic appendectomy. Intraoperatively, approximately 200 mL of purulent fluid was identified in the right flank. A plastron was observed involving the appendix, cecum, terminal ileum, and abdominal wall (Fig. 1). During the dissection, a well-defined appendiceal base was identified at the usual convergence of the taeniae. However, further exploration and ligation of the mesoappendix revealed a second appendiceal base, consistent with a horseshoe appendix variant. Appendiceal bases were found to be perforated.

Polymer clips were applied to both appendiceal bases, and appendectomy was completed without complications (Figs. 2 and 3). Postoperatively, the patient was admitted to the ward, administered intravenous antibiotic therapy, and recovered uneventfully. The patient was subsequently discharged in stable condition without complications.

Discussion and Conclusions

Acute appendicitis is commonly an indication for emergency abdominal surgery. Its diagnosis is primarily based on clinical presentation and imaging findings and is therefore generally considered straightforward. However, its presentation and intraoperative course may be complicated by underlying anatomical variations that often remain undetected until surgical exploration. Among these, appendiceal duplication is one of the rarest entities described, yet it represents a significant challenge in common surgical emergencies such as appendicitis.

This anomaly is exceedingly rare, with a reported incidence of approximately 0.004%, and only a limited number of cases are associated with acute appendicitis, as described in the literature [3, 5]. The embryological mechanism underlying its occurrence is thought to involve aberrant duplication during early midgut formation. Although several theories have been proposed, there is currently no definitive explanation for its origin [6].

Clinically, this condition presents similarly to typical AA, with symptoms arising once the appendiceal structure becomes inflamed. Common findings include nausea, vomiting, and right lower quadrant abdominal pain, which have also been consistently reported in cases of appendicitis involving the horseshoe appendix. Laboratory and imaging studies, including computed tomography and ultrasound, are generally sufficient to support the diagnosis of AA; however, their ability to detect underlying anatomical variants before surgical intervention remains limited. Consequently, the horseshoe appendix is most often identified intraoperatively. This overlap in clinical presentation reinforces the difficulty of preoperative diagnosis and introduces additional challenges to surgical management. Delayed recognition of this anatomical variant may contribute to disease progression toward more complicated forms, including perforation.

Intraoperative findings remain the cornerstone for the diagnosis of appendiceal duplication. In the setting of inflammation and perforation, anatomical distortion may further complicate the identification of such variants. Therefore, careful and systematic exploration of the cecal region is essential to ensure complete removal of all appendiceal tissue and to avoid retention, which may increase postoperative morbidity. As in the case described here, the treatment of choice is appendectomy, which can be performed via a laparoscopic or open approach [7, 8].

Failure to recognize this anomaly may result in incomplete appendectomy and subsequent complications, underscoring the importance of meticulous surgical exploration. It also reinforces the need for the surgical team to remain vigilant for the possibility of underlying anatomical variants in complicated cases, as recognizing these entities, despite their rarity, may ultimately reduce patient risk and improve outcomes. Maintaining a high index of suspicion is therefore essential, particularly in cases of complicated appendicitis presenting with perforation, as observed in the present case.

The horseshoe appendix is a very rare anatomical variant that is important to recognize, as it may complicate both the presentation and surgical management of acute appendicitis. Given its indistinguishable clinical presentation, it is most often identified during surgery, and its management requires complete resection of the appendiceal structure. This case highlights the importance of maintaining a high index of suspicion and remaining attentive to potential anatomical variations that, although uncommon, may be encountered in clinical practice.

Abbreviations

AA
Acute appendicitis

Declarations

Ethics Approval and Consent to Participate

Ethical approval was obtained from the Comité de Ética de Investigación en Seres Humanos (CEISH), Hospital General del Sur de Quito, Quito, Ecuador (Protocol number: CEISH-HGSQ-2026-045, Version 1, dated July 2, 2026).

Clinical trial number:

Not applicable.

Consent for Publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Competing Interests

The authors declare that they have no competing interests.

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Author Contribution

MS, MM, AG and AB conceptualized the study and performed the surgery. DPP and SS collected clinical data and conducted the literature review. EQ drafted the manuscript and critically reviewed it. All authors read and approved the final manuscript.

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Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Figures



Figure 1

Intraoperative image revealing an inflamed appendiceal segment surrounded by purulent material, consistent with complicated appendicitis and an inflammatory plastron.

Alt text: Inflamed appendix with surrounding pus, consistent with complicated appendicitis.

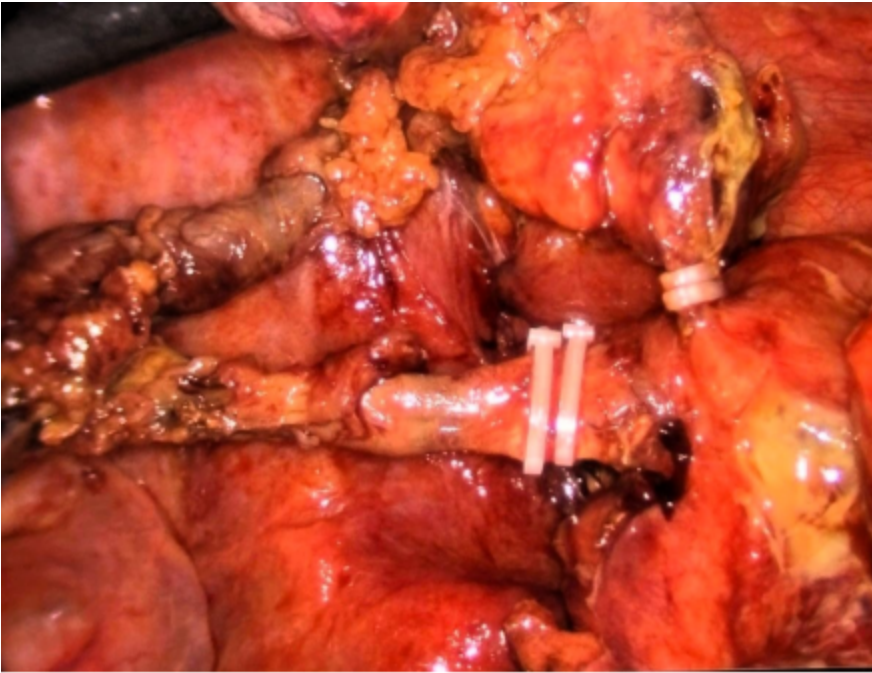


Figure 2

Intraoperative image showing two separate appendiceal bases, each ligated with polymer clips, confirming a horseshoe appendix variant. Inflammatory changes consistent with complicated appendicitis are visible.

Alt text: Intraoperative view showing two appendiceal bases clipped separately, with inflammatory changes indicating complicated appendicitis.

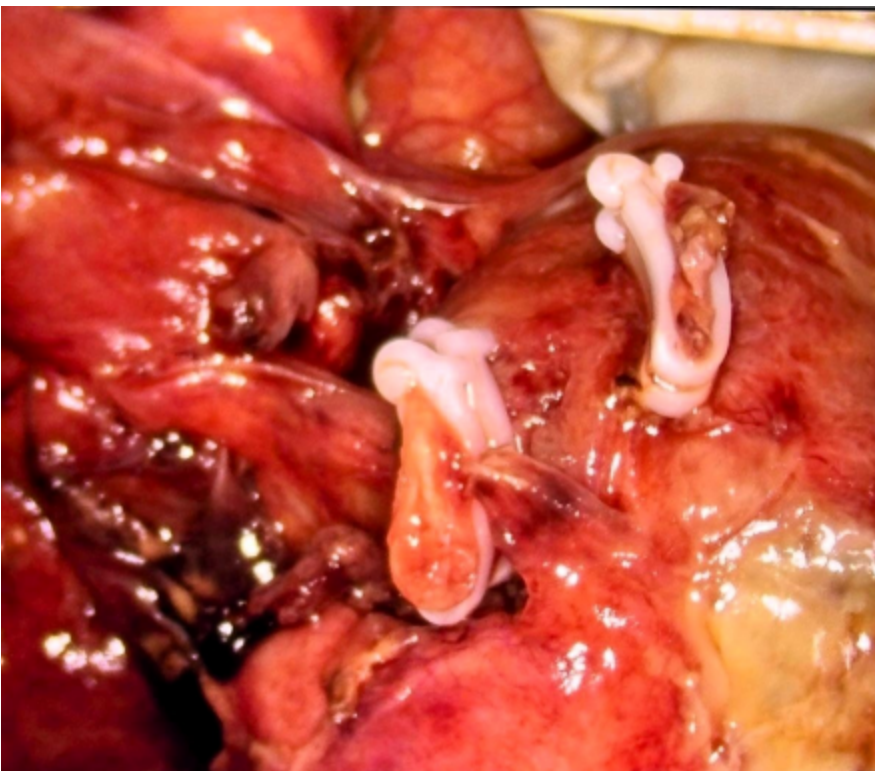


Figure 3

Intraoperative identification of a horseshoe appendix, showing a continuous appendiceal structure with two distinct cecal insertions. Polymer clips mark one of the appendiceal bases.

Alt text: Intraoperative image of a horseshoe appendix with two cecal insertions; one base is marked with surgical clips.