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A Case of Laparoscopic Conversion to Open Surgery for Adult Acute Appendicitis with Abdominal Wall Fibrosis

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Case Report

Keywords:

Posted Date: November 26th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11708779/v1

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Additional Declarations: No competing interests reported.

Abstract

Acute appendicitis is a common surgical emergency, which usually requires surgical treatment, but there are a few cases due to their own factors make the operation more difficult. This case report discusses a rare case of acute appendicitis in adults with abdominal cocoon syndrome that required a transition from laparoscopic exploration to open surgery. A 51-year-old male presented to the emergency department with abdominal pain for 24 hours. History, physical examination, laboratory examination and imaging examination were consistent with acute appendicitis. The patient was to undergo laparoscopic appendectomy. However, during laparoscopic exploration, dense intra-abdominal adhesions consistent with abdominal cocoon syndrome were found, limiting access to the surgical field and laparoscopic manipulation. Due to the inability to safely proceed with laparoscopic surgery, the procedure was converted to open appendectomy. The open surgery successfully removed the appendix, and the patient was monitored for postoperative complications. On the tenth day after surgery, the patient was discharged after wound healing and recovery. This case highlights the challenges posed by abdominal cocoon syndrome in laparoscopic appendectomy. In such situations, conversion to open surgery is the correct choice as it can reduce collateral damage and operative time. Further research is needed to better understand the impact of abdominal cocoon syndrome on surgical intervention.

Background

Acute appendicitis is one of the most common acute abdominal conditions encountered in clinical practice; in recent years, its incidence has shown an increasing trend. The primary symptoms include right lower quadrant pain, nausea, vomiting, and fever [1]. In recent years, with the continuous advancement of minimally invasive techniques and the promotion of the Enhanced Recovery After Surgery (ERAS) concept, laparoscopic surgery has been widely adopted for the treatment of acute appendicitis due to its advantages such as minimal invasiveness, rapid recovery, and reduced postoperative pain. However, for patients with acute appendicitis complicated by abdominal cocoon syndrome, laparoscopic surgery presents significant challenges, often necessitating the conversion to open surgery. Abdominal cocoon syndrome is an extremely rare abdominal disorder characterized by the formation of a tough fibrous membrane within the peritoneal cavity that envelops the intra-abdominal organs together, leading to severe intra-abdominal adhesions or even the formation of an "abdominal cocoon." This condition disrupts the normal anatomical structure and function of the abdominal cavity, not only impairing the surgical field of view but also increasing the difficulty and risk associated with surgical procedures, and may readily lead to complications such as intraoperative hemorrhage or injury to adjacent organs [2–3]. Therefore, when performing laparoscopic surgery, it is imperative to conduct a thorough assessment of the patient's specific condition, develop a scientifically sound surgical plan, implement individualized treatment strategies, and, when necessary, decisively convert to open surgery to ensure both surgical safety and therapeutic efficacy. This report describes a case of adult acute appendicitis complicated by abdominal cocoon syndrome, in which the patient required conversion to open surgery due to severe intra-abdominal adhesions, thereby increasing the surgical difficulty and

associated risks. This study examines the clinical characteristics, diagnostic approaches, treatment strategies, as well as the necessity and efficacy of conversion to open surgery in cases of acute appendicitis complicated by abdominal fibrosis, based on a detailed review of medical history, analysis of clinical manifestations, imaging findings, intraoperative observations, and postoperative follow-up data, aiming to provide clinicians with valuable reference guidance when managing similar cases.

Case Data

The patient is a 51-year-old male who was admitted to the hospital on August 23,2024, due to abdominal pain lasting for 24 hours; he has no history of abdominal surgery but does have a history of pulmonary tuberculosis during childhood.

Physical examination: T 36.5°C, P 65 beats/min, R 18 breaths/min, BP 121/85 mmHg; abdomen is flat, with no visible gastrointestinal structures or peristaltic waves; abdomen is soft; right lower quadrant demonstrates tenderness but no rebound tenderness; bowel sounds are normal; liver and spleen are not palpable below the costal margin; Murphy's sign is negative; percussion of both kidneys yields no tenderness (-).

Laboratory and auxiliary examinations: Complete blood count (CBC): White blood cell count: 14.27 × 10^9/L; neutrophil percentage: 87.3%; lymphocyte count: 0.2 × 10^9/L. Appendectomy CT scan: Appendiceal fecalith, acute appendicitis with surrounding exudation. 2. Right renal calculus; right renal cyst; 3. Prostatic calcification. Chest X-ray: Both costophrenic angles appear slightly flattened; a small amount of pleural effusion or pleural thickening is suspected.

Preliminary diagnosis: □ Acute appendicitis; □ Appendiceal fecalith; □ Right renal calculus; □ Right renal cyst; □ Prostatic calcification; □ Pleural effusion

Therapeutic process

The patient was admitted with acute appendicitis and underwent immediate emergency surgery. A incision approximately 1.2 cm long was made in the suprapubic region; the skin, subcutaneous tissue, anterior rectus sheath, and peritoneum were sequentially dissected to establish the access pathway for laparoscopic surgery. The laparoscope was inserted, and the abdominal cavity was explored, revealing severe intra-abdominal adhesions—extensive adhesions between the subperitoneal organs and the peritoneum, as well as between the intestinal loops—with no discernible anatomical gaps (see Figure 1). The surgical team promptly evaluated the risks associated with proceeding with laparoscopic surgery; performing the procedure under these conditions might lead to serious complications such as intraoperative hemorrhage or injury to adjacent organs, thereby increasing surgical difficulty and risk. To avoid secondary trauma, the decision was made to convert to an open surgical approach. The surgical team immediately communicated the current surgical status to the family, providing a detailed explanation of the necessity and potential risks associated with the conversion to open surgery; the family fully understood the rationale and consented to the open procedure. Subsequently, an incision

approximately 10 cm long was made at the right rectus abdominis muscle site, followed by sequential dissection of the skin, subcutaneous tissue, anterior rectus sheath, and peritoneum. Careful dissection of the peritoneum revealed extensive adhesions between the subperitoneal organs and the peritoneum, as well as between the intestinal loops, with virtually no intervening space. Further exploration identified that the small intestine was encased within a grayish-white, tough, and thick fibrous membrane (see Figure 2), which had altered the normal intra-abdominal anatomy and rendered the appendix inaccessible. Using blunt dissection techniques, the adherent tissues were carefully separated to gradually expose the surgical field, separating the adherent intestinal loops from the fibrous membrane. Sharp dissection instruments, such as scissors and electrocoagulators, were then employed to meticulously transect the adherent fibrous membrane (see Figure 3), while electrocoagulation was used to achieve hemostasis. Perform a mobilization procedure along the contour of the right lower colon and the colonic band to locate the appendix; clamp the appendiceal artery and vein using vascular clamps or titanium clips; then meticulously separate the adhesions between the appendix and surrounding tissues with scissors and electrocautery. Upon successful separation of the appendiceal artery and vein and confirmation that there is no bleeding, grasp the root of the appendix with forceps and completely mobilize it from the surrounding tissues using scissors. Apply electrocautery to achieve thorough hemostasis, then transect the appendix along its root with sterile scissors, and apply gauze to the incision site to prevent blood and exudate from entering the abdominal cavity. Place the resected appendix into a sterile specimen bag and promptly transport it for pathological examination. Following appendectomy, irrigate the abdominal cavity multiple times with normal saline to ensure complete cleanliness, after which close the abdominal cavity.Postoperative pathology: Acute cellulitis of the appendix. The patient was transferred to the ward in stable condition postoperatively; on the first postoperative day, the patient began ambulating with an abdominal binder; on the second postoperative day, the patient consumed a small amount of water and gradually resumed oral intake; on the tenth postoperative day, the patient recovered fully and was discharged from the hospital; the surgical incision healed well, with no complications such as infection observed.

Discussion

In 1978, Singaporean scholars Foo et al [4] first reported and named "abdominal cocoon syndrome" in the British Journal of Surgery. The clinical manifestations of abdominal cocoon syndrome include non-specific symptoms such as abdominal pain, abdominal distension, nausea, and vomiting, often accompanied by chronic abdominal pain or intestinal obstruction [5]. Due to the rarity of abdominal cocoon syndrome, preoperative diagnosis is relatively challenging and often relies on imaging studies such as CT or MRI; however, the specificity of these imaging modalities is limited. Consequently, definitive diagnosis of abdominal cocoon syndrome typically requires direct intra-abdominal visualization during surgery. The presence of abdominal cocoon syndrome significantly restricts the surgical field and operative space available for laparoscopic procedures, thereby complicating the operation. Additionally, abdominal cocoon syndrome can lead to increased intra-abdominal pressure [6], further increasing the difficulty of the surgical intervention. Therefore, when performing laparoscopic

surgery, it is imperative to thoroughly assess the patient's specific condition, develop a scientifically sound surgical plan, implement individualized treatment strategies, and, if necessary, decisively convert to an open surgery to ensure both surgical safety and therapeutic efficacy.

Open conversion from laparoscopic surgery represents one of the rescue strategies for laparoscopic procedures. Although conversion from laparoscopic appendectomy to open surgery is not common, it remains necessary in certain clinical scenarios [7]. The necessity of such conversion primarily stems from the following aspects: (1) Ensuring surgical safety: Peritoneal adhesions resulting from abdominal conditions can significantly increase surgical risks, potentially leading to intraoperative hemorrhage or injury to adjacent organs. Open conversion allows surgeons to operate under a more expansive visual field, thereby reducing surgical risks and ensuring patient safety; (2) Enhancing surgical outcomes: When performing laparoscopic surgery on cases with severe peritoneal adhesions, the operative difficulty and associated risks substantially increase, often compromising surgical efficacy. Open conversion enables more thorough dissection of intra-abdominal adhesions, thereby guaranteeing optimal surgical outcomes and reducing postoperative complications; (3) Shortening operative duration: During laparoscopic procedures, repeated maneuvers and prolonged exposure due to severe adhesions can prolong operative time and elevate the risk of intraoperative complications. In contrast, open conversion allows for completion of the procedure within a shorter timeframe, reduces operative exposure time, and improves overall surgical efficiency. In this case, during the laparoscopic procedure, severe intra-abdominal adhesions were identified, significantly increasing the operative difficulty and risk; consequently, an open conversion was performed, ultimately leading to successful completion of the surgery. During the open surgery, the surgical field was adequately exposed, revealing extensive intra-abdominal adhesions, with the appendix encased in a tough fibrous membrane and surrounding tissues exhibiting edema and hyperemia. After meticulous dissection of the adhesions, the appendix was successfully resected, followed by thorough abdominal lavage and exploration. The patient recovered well postoperatively without any severe complications.

Conclusions

Acute appendicitis complicated by abdominal fibrosis is a rare clinical scenario, where abdominal fibrosis is typically diagnosed only during surgery in patients undergoing procedures for conditions such as acute abdomen or intestinal obstruction [8]. The diagnosis and management of this condition present significant challenges, requiring multidisciplinary collaboration and individualized treatment plans. In such cases, thorough preoperative evaluation and flexible intraoperative management are crucial for ensuring surgical safety. This case report highlights the clinical features, diagnostic approaches, therapeutic strategies, and the necessity of conversion to open surgery in patients with acute appendicitis complicated by abdominal fibrosis, providing valuable reference for clinicians managing similar cases.

Declarations

Funding This study was supported by the Guangdong Provincial Key Laboratory of Digestive Cancer Research(No.2021B1212040006),the “735 Program” Project of Clinical Medical Research of the Sevench Afiliated Hospital of Sun Yat-sen University(No. ZSQY2025735),and related insticutional research support.

Ethics statement The experimental protocol was approved by the Research Ethics Committee of Seventh Affiliated Hospital, Sun Yat-sen University, China, and written informed consent was obtained from all subjects.written informed consent for publication was obtained from the patient or their legal guardian.

Informed Consent Statement Participants provided written informed consent.Written informed consent was obtained from the patient for publication of this case report and any accompanying images. a copy of the completed consent form would be available on request for review by the Editor-in-Chief of this journal.

Data Availability Statement The datasets generated or analyzed in this study are available in the National Health and Nutrition Examination Survey repository.

Acknowledgments We thank all the authors for their contributions to this article.

Conflict of interest To the best of our knowledge, the named authors have no conflict of interest, financial or otherwise.

Generative AI statement The authors declare that no generative AI has been used in the creation of this manuscript.

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Figures

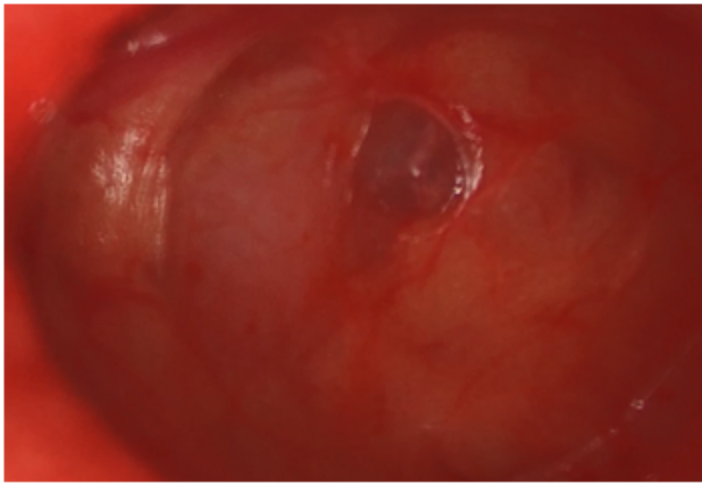


Figure 1

Figure 1

Primary port with no discernible anatomical gaps

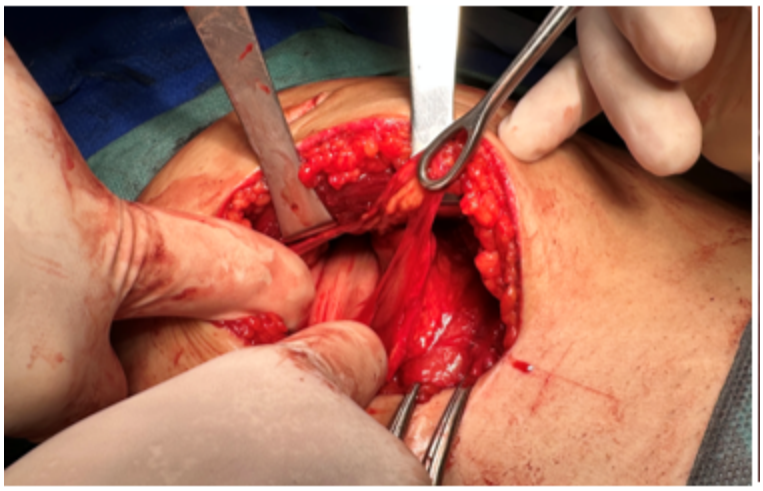


Figure 2

Figure 2

Small intestine was encased within a grayish-white, tough, and thick fibrous membrane

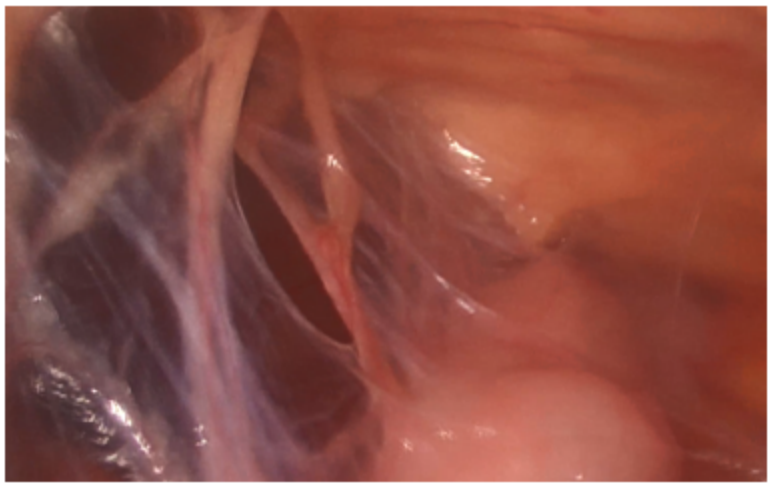


Figure 3

Figure 3

Adherent fibrous membrane