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Case report

Hidden appendix: A case report and literature review of perforated acute appendicitis masquerading as acute cholecystitis

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ABSTRACT

Introduction: Acute appendicitis of the subhepatic appendix is uncommon, and a preoperative diagnosis is difficult without a thorough understanding of the various anatomical locations. Cross-sectional imaging is indispensable for prompt diagnosis and subsequent treatment. Surgery is the standard treatment for perforated appendicitis in the subhepatic region. In this study, we present a case of subhepatic appendicitis with an unusual presentation.

Case presentation: A 28-year-old man presented to our emergency department with a 3-day history of diffuse right abdominal discomfort, diarrhea, fever, and vomiting. Physical examination revealed rebound soreness and guarding in the right upper and lower quadrants. Laboratory tests revealed high levels of C-reactive protein and serum bilirubin and neutrophilic leukocytosis. Abdominal computed tomography revealed an undescended cecum and a subhepatic appendix with an intraluminal appendicolith, fat stranding, and peri-appendiceal fluid. The patient underwent open exploration and appendicectomy, during which the subhepatic perforated appendix was excised. The patient's recovery was uneventful.

Discussion: Atypical presentations may indicate an unusual anatomical placement of the appendix. Preoperative diagnosis using cross-sectional computed tomography imaging and a thorough understanding of these situations frequently result in early diagnosis and expeditious surgical care.

Conclusion: Surgical crises resulting from aberrant anatomical variations of the appendix constitute a distinct diagnostic challenge. A strong index of suspicion for this uncommon presentation permits early surgical intervention and prevents delay-induced morbidity/mortality.

1. Introduction

Since ancient times, acute abdomen has been one of the most common presentations of appendiceal surgical emergencies. A literature review on the various locations of the appendix may shed light on its diverse clinical appearances. Although the retrocecal position of the appendix (74 %) is well-established, the pelvic, subcecal, preileal, and postileal locations do occur, albeit at lower rates of 21 %, 1.5 %, 1 %, and 0.4 %, respectively [1]. Subhepatic, lateral pouch, mesocolic, left-sided [2], intraherniary [3], and lumbar [4] appendix locations are uncommon. Although these abnormal placements may not pose surgical difficulty, they induce diagnostic delays because they frequently resemble other conditions with acute abdominal presentations [5,6]. This case presents the perplexity resulting from such abnormal locations, such as the subhepatic appendix, which likely results from malrotation of the midgut, namely, an undescended cecum. Knowledge of such anatomic variants and their pathologies are of major importance to the surgeon, as they may explain the varying presentations and sites of abdominal pain, such as in the present case, where the patient presented with relentless pain. The patient was initially treated at a peripheral clinic for acute cholecystitis. This case of acute appendicitis in a patient with an undescended cecum was managed in the emergency room by open surgery, although laparoscopic surgery is the standard of care owing to its delayed nature. This paper presents a review of the literature in accordance with the SCARE 2020 criteria [7]. The main aim of this case report is to highlight the rarity and confusing nature of this case of acute abdomen, which requires urgent intervention without unnecessary delay in diagnosis.

Abbreviations: USG, ultrasonogram; CT, computed tomography.

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2. Presentation of case

A 28-year-old Indian man presented to our emergency clinic with diffuse pain in the right upper quadrant with an acute onset 3 days prior. He had a history of high-grade fever, diarrhea (11 bouts), and vomiting (one episode). The patient's medical history was unremarkable. His family history was insignificant except for a maternal history of midgut malrotation. He had smoked cigarettes and consumed alcohol for five years. The patient was employed as a driver, unmarried, and had a low socioeconomic status. On examination, the patient was dehydrated, icteric, and had a heart rate of 110 beats/min. The patient experienced pain in the right hypochondrium, lumbar, and iliac fossa, and guarding with rebound tenderness was present. Routine tests revealed leukocytosis (19×10^9/L), an increased C-reactive protein level (205 mg/L), and normal serum lipase concentration. Total serum bilirubin (4.3 mg/dL), and conjugated bilirubin (2.4 mg/dL) were considerably high in the liver function tests. Initial imaging investigations revealed normal radiographs and the abdominal ultrasonogram (USG) was inconclusive with no visible appendix. Abdominal and pelvic computed tomography (CT) revealed a dilated appendix (12 mm in diameter) in a subhepatic location with a 10.6 mm appendicolith and an undescended cecum. The cecum and surrounding hepatic flexure were thickened. A few extraluminal air pockets were observed around the apex of the appendix posterior to the cecum, along with significant peri-appendiceal fat strands and peri-appendiceal free fluid, all of which were suggestive of perforation (Fig. 1A, B). After understanding the severity of his medical condition and consenting to surgery, the patient was admitted to the operating room by an experienced general surgeon for an emergency midline laparotomy under general anesthesia. Given the atypical nature of the presentation, laparoscopy would have been the standard of care, but owing to delayed presentation and discovery of the cecum in the right hypochondrium with thick pus flakes and extensive inflammation involving the adjacent gallbladder, omentum, and lateral peritoneal wall, an open surgery was performed (Fig. 2). After incising the lateral reflection and mobilizing the cecum into the midline wound, the adhesions were removed with blunt and sharp dissection (Fig. 3). The appendix was transfixed, sectioned (Fig. 4A, B), and sent for histological analysis. A subhepatic drain was placed after peritoneal lavage and aspiration of clear fluid. In accordance with the institution's antibiotic policy, the patient received an intravenous injection of piperacillin-tazobactam (4.5 g) and metronidazole (500 mg) three times daily for

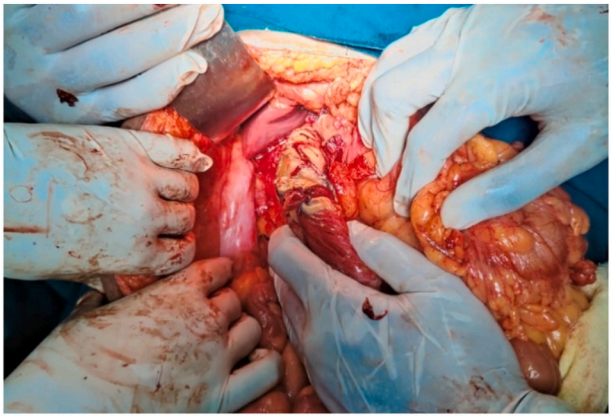

Fig. 2. Dense adhesion of the cecum to the liver is seen after incising the lateral peritoneum reflection.

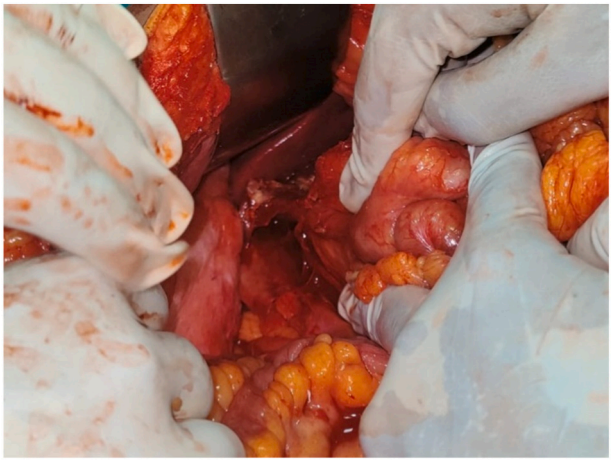

Fig. 3. The cecum is delivered into the midline wound with retrocecal subhepatic appendix in situ.

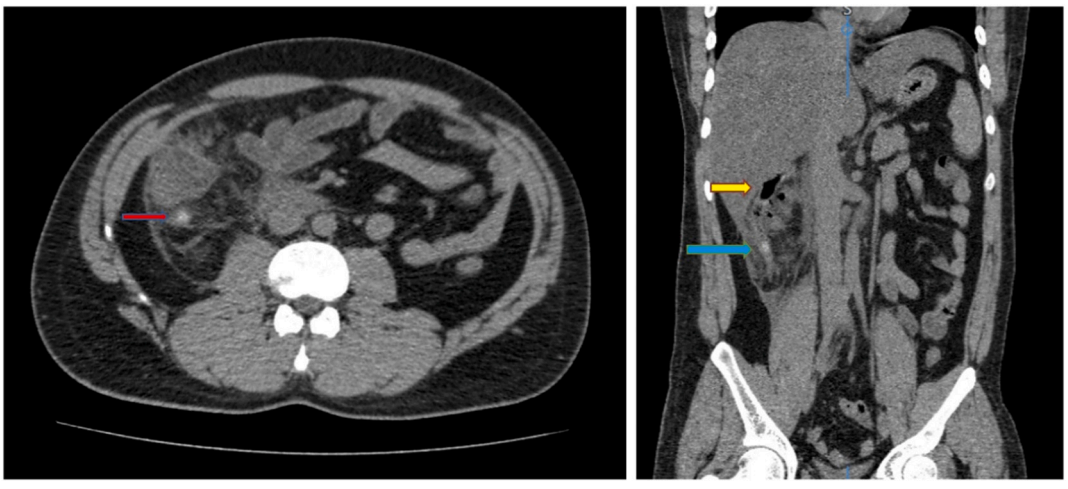

Fig. 1. A, B: Computed tomography scans of the abdomen. The transverse view demonstrates a dilated subhepatic retrocecal appendix with appendicolith (red arrow); coronal view shows the dilated appendix (blue arrow) with surrounding inflammation close to the liver with few air pockets (yellow arrow) showing a perforated appendix.

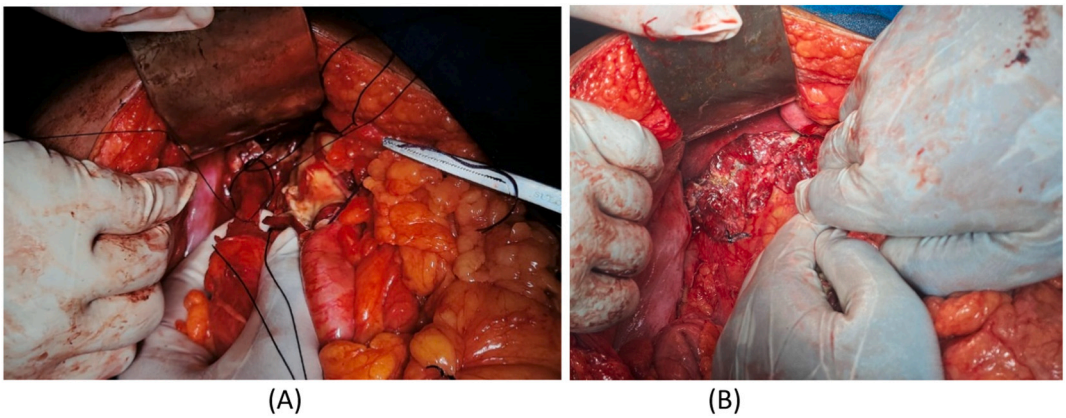

Fig. 4. A, B: Appendix being transfixed; appendix in the subhepatic space prior to removal.

5 days. The patient was discharged on the fifth postoperative day without any complications. Histopathological analysis revealed the presence of acute suppurative appendicitis with perforation (Fig. 5). The patient adhered to the advice provided, and was asymptomatic on the 30-day follow-up.

3. Discussion

The subhepatic area is an unusual location for the appendix. Acute appendicitis is the most prevalent cause of acute abdomen in both children and adults; subhepatic acute appendicitis is a rare illness with an incidence of 0.08 % in acute appendicitis or 0.09 per 100,000 population per year in adults [8]. The first case of sub-hepatic acute appendicitis was documented in 1863 and reviewed by King in 1955 [9]. The subhepatic position of the appendix is due to malrotation of the midgut, which is caused by non-rotation or incomplete rotation of the intestinal loop around the axis of the superior mesenteric artery between the 5th and 10th week of intrauterine development. The incidence of midgut malrotation is between 0.03 and 0.5 % in live births [10]. According to our literature study, the probable cause of an undescended subhepatic cecum is either a Ladd's band [11] or a retroperitoneal terminal ileum [12], neither of which was present in our patient. In the medical literature, the diagnosis and treatment of acute appendicitis in a properly positioned appendix are well established, with only 50 % exhibiting the traditional presentation [13]. Approximately one-third of patients with acute appendicitis report abdominal discomfort in an unexpected region owing to different anatomical positions of the appendix [14]. The aberrant position of the appendix in the upper right quadrant may mimic other hepatobiliary or gastric diseases, including acute cholecystitis, liver abscess, acute pancreatitis, and intestinal perforation/obstruction. This can lead to delayed treatment and consequences, including sepsis, suppuration, and perforation, as well as prolonged postoperative morbidity [15]. The severe hyperbilirubinemia in our patient indicated perforation in the setting of acute appendicitis, as previously reported [16,17], but could have been wrongly attributed to biliary disease in the absence of imaging. A subjective and operator-dependent USG, which is the initial imaging modality of choice for acute abdomen in rural India, may or may not be useful for visualizing the retrocecal appendix and subhepatic appendix. A CT scan identifies the aberrant location of acute appendicitis with a high degree of sensitivity, specificity, and precision. When CT is unclear, diagnostic laparoscopy is an indispensable [8] technique for confirming the diagnosis and proceeding with appendicectomy for such uncommon appendices. USG was inconclusive in our case, and a CT scan confirmed the diagnosis. After confirmation, appendicectomy was the treatment of choice for acute appendicitis. Laparoscopic appendicectomy is the preferred [18] method over open appendicectomy in all instances, let alone in a rare anatomical position. Nonetheless, in our case, conditions necessitated open exploratory appendicectomy. Perforation of the subhepatic appendix and peritonitis prompted our patient to undergo exploratory laparotomy. Given that the death rate following perforation in acute appendicitis is 5.10 per 1000 [19], primary care clinicians should be mindful of these anatomical abnormalities.

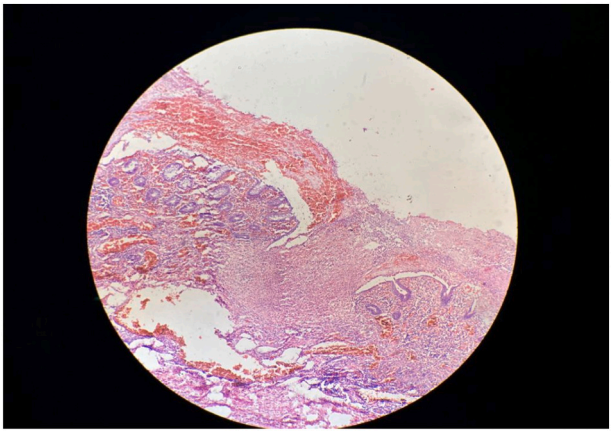

Fig. 5. Photomicrograph slice of the perforated acute appendicitis (hematoxylin and eosin-stained, original magnification × 4).

4. Conclusion

Surgical crises resulting from aberrant anatomical variants of the appendix constitute a unique diagnostic challenge, and may result in high mortality and morbidity rates. This risk can be mitigated by maintaining a high index of suspicion for appendicitis in such uncommon presentations and administering appropriate treatment. Even though laparoscopic appendicectomy has been established as the standard of care for such cases, a tailored approach to the patient's clinical presentation should be taken expeditiously and cautiously.

Consent

Written and informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editor in chief of this journal on request.

Provenance and peer review

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Ethical approval

Ethical approval has been exempted by our institution because this is a case report and no new studies or new techniques were carried out.

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CRediT authorship contribution statement

E Ashwini: Operated on the patient, drafting the manuscript, literature research.
M Varun: Operated on the patient, drafting the manuscript, literature research.
PS Saravanan: Revising the manuscript.
Sunil Julian: Operated on the patient, drafting the manuscript, literature research.
P Sandeep: Operated on the patient, drafting the manuscript, literature research.

Declaration of competing interest

All the authors certify that there is no conflict of interest regarding the material discussed in the manuscript.

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