



Case series

Benefits of conservative management of a retained appendicolith after laparoscopic appendectomy: A case series

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ABSTRACT

Introduction: Acute appendicitis is a disease with multifactorial etiology and frequently includes lumen obstruction. Appendicoliths can pose a challenge during the appendectomy procedure if not identified.

Methods: This is a prospective case series at our academic institution involving two medically free patients with intra-abdominal abscess formation secondary to an overlooked appendicolith who were treated conservatively with a follow up period of one year for each patient.

Results: Complications of a retained appendicolith are serious and include intra-abdominal abscess, perihepatic abscess, and delayed wound healing through fistula formation, most surgeons would undergo surgical removal with preoperative localization of the appendicolith using different modalities. In contrast, conservative management is an emerging approach to managing such conditions. The conservative approach involves percutaneous retrieval and the IR-guided draining of an intra-abdominal collection. In our cases, percutaneous drainage and intravenous antibiotics were a successful treatment, with no abscess recurrence in over a year.

Conclusion: We suggest that patients with appendicoliths presenting with appendicitis should undergo appendicolith removal to prevent the risk of recurrent abscess formation. We also consider that the conservative management of patients with appendicoliths presenting with recurrent abdominal pain and abscesses after appendectomy is a better and safer approach than the surgical removal of a dropped appendicolith, as the risks of the surgical procedure complications can be avoided.

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1. Introduction

Acute appendicitis is a disease with multifactorial etiology and frequently includes lumen obstruction. Appendicoliths can pose a challenge during the appendectomy procedure if not identified. We report two cases of intra-abdominal abscess formation secondary to an overlooked appendicolith that was successfully managed using a conservative approach.

The work has been reported in line with the SCARE and PROCESS criteria and cites the following paper [13,14].

2. Methods

This is a prospective case series at our academic institution involving two patients, participants information was obtained from their charts after informed consents, they were followed up in a one-year period for each (2018–2020), participants were selected according to their presentation, both of them were medically free and diagnosed with retained appendicolith and treated conservatively.

3. Case reports

3.1. Patient #1

A 15-year-old man with no significant medical history presented to the emergency department with a [3–]days history of abdominal pain, which started in the periumbilical area and then migrated to the right lower quadrant associated with fever and diarrhea. He had voluntary guarding with tenderness in the lower abdomen and positive rebound

Abbreviation: OR, operating room.

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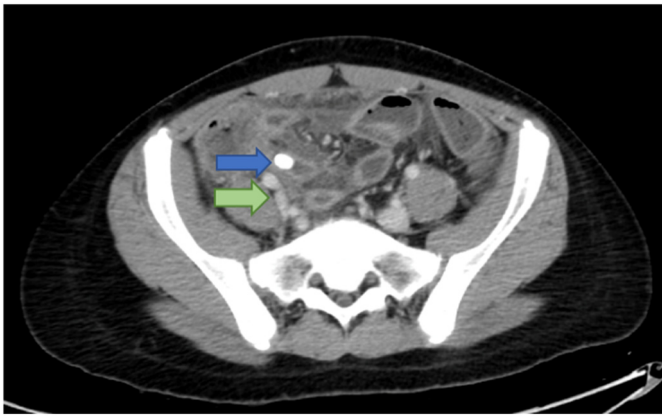


Fig. 1. CT scan upon first presentation showing signs of acute appendicitis with wall enhancement and the presence of intraluminal appendicolith near the base with small loculated fluid collections.

tenderness over McBurney's point on physical examination. Blood tests revealed an elevated white blood cell (WBC) count ($15.300 \times 10^9/L$). An abdominal CT scan showed signs of acute appendicitis with wall enhancement and the presence of intraluminal appendicolith near the base with small loculated fluid collections (Fig. 1), the patient was taken to the operating room (OR) for laparoscopic appendectomy. Diagnostic laparoscopy revealed acute perforated appendicitis with generalized intraperitoneal pus, appendectomy was done using Echelon Flex stapler black 60 load by an acute Care and trauma surgeon, early postoperatively Piperacillin/Tazobactam 4.5 mg was initiated. On the fifth postoperative day the patient complained of abdominal pain and diarrhea, the laboratory findings revealed an elevated WBC count ($16.500 \times 10^9/L$). Abdominal CT showed a 4.6 cm pelvic collection with a retained appendicolith inside (Fig. 2). The patient was diagnosed with postoperative pelvic collection secondary to a missed appendicolith. Ultrasound-guided interventional radiology (IR) was performed to drain the collection on the sixth postoperative day, with 120 ml pus content. Three days later, the drain was removed. One month follow up appointment in the clinic was unremarkable. With The follow-up CT scan results showing no residual pelvic collections. His follow-up visits at six months and one year after the drainage presented no recurrence.

3.2. Patient #2

A medically free 26-year-old man presented to the emergency department with a 4-days history of abdominal pain. The pain started in the right lower quadrant, progressively worsening, associated with fever, nausea, and vomiting. He had tenderness in the right lower quadrant and negative rebound tenderness over McBurney's point on physical examination. Blood tests revealed a WBC count of $12.400 (\times 10^9/L)$. Abdominal CT scan revealed signs of acute appendicitis with multiple scattered intraluminal appendicoliths (Fig. 3) he was brought

to the OR for laparoscopic appendectomy that was performed by an acute care and trauma surgeon. Diagnostic laparoscopy revealed an inflamed retroperitoneal appendix with perforation of the mid appendix, a small amount of pus spillage, and a severely adherent appendix to the posterior aspect of the cecum, appendectomy was performed using EndoLoop x1 followed by Endo-scissors. There for, antibiotics was initiated. Ceftriaxone 2 g IV and Metronidazole 500 mg IV were administered. Post-operative course was unremarkable and the patient was discharged two days after. On the 14th day after surgery, patient presented to the emergency department complaining of abdominal pain associated with fever and diarrhea. The laboratory findings showed an elevated WBC count ($14.200 \times 10^9/L$). Abdominal CT showed an extensive collection, measuring 7 cm, with the presence of free appendicoliths at the postsurgical site (Fig. 4). The patient was diagnosed with a postoperative pelvic abscess secondary to a missed appendicolith. CT-guided IR was performed to drain the collection on day 16 after appendectomy with 300 ml pus output. Five days after, the drain was removed. Likewise, patient presented no recurrence in his follow-up one month and then one year after the drainage procedure.

4. Discussion

Appendicolith is a definite obstructive factor to cause acute appendix inflammation in almost one-third of patients with acute appendicitis. In 18% of patients with perforated appendicitis [1], CT is the modality of choice in assessing patients with suspected retained appendicolith, which usually presents as a round focal area of calcification [2] A study reported that 16 patients surgically and pathologically diagnosed with appendicoliths underwent multidetector computed tomography (MDCT), and the soft-tissue window setting had a sensitivity of 31.3%. Furthermore, the bone-window setting increased the sensitivity to up to 62.5% [3].

Careful dissection and double ligation of the appendiceal base and using retrieval bags to retrieve the excised appendix had shown fewer chances of spillage [1]. An appendicolith may be retained postoperatively as a dropped appendicolith due to different factors. A previously perforated appendix, non-recognition during surgery, or the inability to remove it was considered the most recognized factors [4]. Moreover, dropped appendicoliths have been reported mostly after laparoscopy in comparison to open appendectomy [1]. They are often localized in the pelvis, including the para-cecal region and Morison's pouch [5]. However, Abdullah and Singh reported an appendicolith located around the liver, causing perihepatic abscesses [6,7].

Signs and symptoms of a retained appendicolith depend on its location and how it acts. Pressure symptoms and potentially infectious and irritative materials lead to different signs and symptoms [1]. However, complications of a retained appendicolith are serious and include intra-abdominal abscess, perihepatic abscess, and delayed wound healing through fistula formation [1,6]. There are even rarer complications: Toukan et al. reported a case of recurrent right lower lobe pneumonia associated with a liver abscess in a 15-year-old male secondary



Fig. 2. postoperative abdominal CT scan showing a 4.6 cm pelvic collection with a retained appendicolith inside.

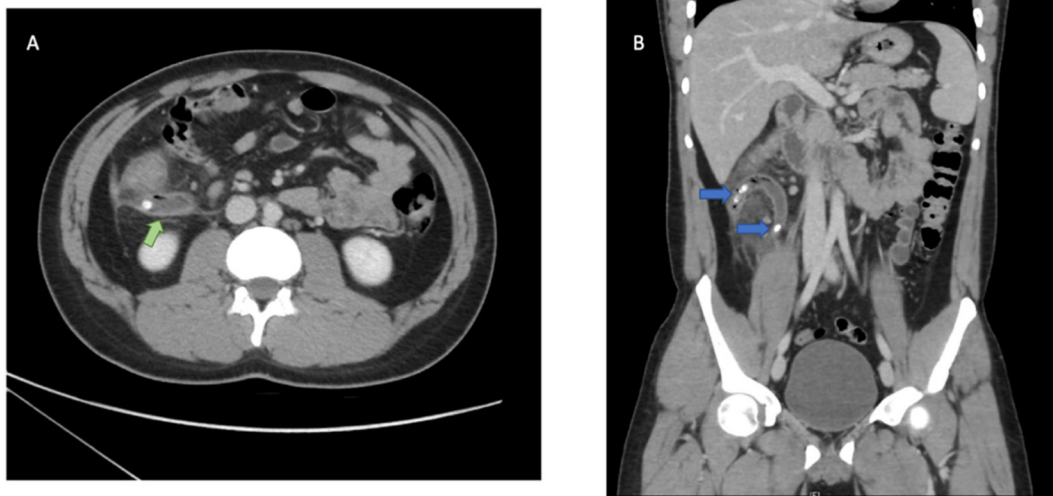


Fig. 3. Abdominal CT scan revealed signs of acute appendicitis with multiple scattered intraluminal appendicoliths.

to retained appendicolith after appendectomy [8]. The time of symptom presentation in patients with appendicolith after appendectomy varies. The most common timing is either before discharge, as in one of our cases, or within a few weeks. However, Gamble and Saxe reported a case of liver abscess with the presence of a fecalith in the right lobe of the liver nine years after laparoscopic appendectomy [9]. We believe that such reports highlight the variability in the time of presentation as well as signs and symptoms in patients with missed appendicolith. Conversely, the lack of reporting uncomplicated retained appendicolith leads to underdetermination of the true incidence of such conditions [1].

The most significant complication that was found in the literature after retained appendicolith was abscess formation, different modalities was found in managing this compared to ours, based on multiple published case reports, laparoscopic guided drainage and appendicolith removal was one of them [11] additionally, options were found included primary surgery, catheter drainage, secondary surgery post failure of catheter drainage and conservative management [12].

Furthermore, most surgeons would undergo surgical removal with preoperative localization of the appendicolith using different modalities

[1]. In contrast, conservative management is an emerging approach to managing such conditions. The conservative approach involves percutaneous retrieval, reported in managing a retained appendicolith [2] and the IR-guided draining of an intra-abdominal collection [10]. In our cases, percutaneous drainage and intravenous antibiotics were a successful treatment, with no abscess recurrence in over a year. Despite the different approaches, we believe that antibiotics should be considered in all management modalities.

5. Conclusion

We suggest that patients with appendicoliths presenting with appendicitis should undergo appendicolith removal to prevent the risk of recurrent abscess formation. We also consider that the conservative management of patients with appendicoliths presenting with recurrent abdominal pain and abscesses after appendectomy is a better and safer approach than the surgical removal of a dropped appendicolith, as the risks of the surgical procedure complications can be avoided, further studies showed be done focusing on the conservative managements more at their long term side effects.

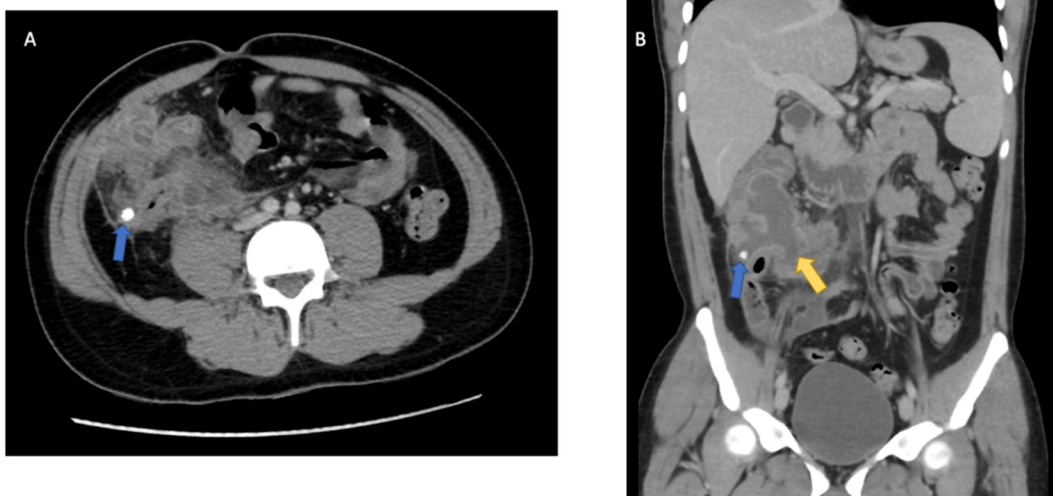


Fig. 4. Abdominal CT showing an extensive collection, measuring 7 cm, with the presence of free appendicoliths at the postsurgical site.

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CRediT authorship contribution statement

Abdullah Albdah: Writing – review & editing. **Nadia Aljomah:** Writing – review & editing. **Mishary Bin Shalhoub:** Writing – review & editing. **Abdelrahman Zekry:** Writing – review & editing. **Nehal Beyari:** Writing – review & editing. **Fouad Bahgat:** Writing – review & editing. **Norah AlSubaie:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Declaration of competing interest

None.

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Obtained consent

Consent was obtained from both patients by the primary treating physician.

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