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CASE REPORT | ENDOSCOPY

SpyGlass/Cholangioscope-Assisted Colonoscopic Removal of Appendicolith as a Nonsurgical Alternative for Stump Appendicitis Management

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ABSTRACT

An appendicolith is a calcified mass which can obstruct the appendix often leading to recurrent appendicitis. Failure to extract fecalith at the time of appendectomy can lead to recurrent inflammation in the appendiceal stump. We describe a 28-year-old man with stump appendicitis due to a retained fecalith postappendectomy. Our approach, akin to interval appendectomy, combines antibiotics and endoscopic intervention postinfection resolution. This case highlights the feasibility and safety of endoscopic management, offering a nonsurgical alternative to prevent the morbidity associated with revision surgery. Further exploration of nonsurgical modalities is warranted to optimize patient outcomes.

KEYWORDS: appendicolith; fecalith; stump appendicitis; medical management; endoscopy

INTRODUCTION

An appendicolith (fecalith) is a calcified mass formed by accumulation of fecal particles and organic mineral salts which can obstruct the lumen of the appendix, triggering acute inflammation.[1] It has been observed in 10% of patients with appendicitis.[2] Laparoscopic appendectomy, the standard treatment of acute appendicitis, carries a small risk of retained fecalith.[3] This can lead to recurrent inflammation and stump appendicitis, necessitating additional surgery.[4] To avoid such complications, nonsurgical options should be explored. We present a case of stump appendicitis associated with appendicolith where endoscopy was utilized for fecalith extraction.

CASE REPORT

A 28-year-old man with recent appendectomy presented with severe stabbing pain in the periumbilical region radiating to the right lower quadrant and fever. Initial vital signs were notable for fever of 102.6°F, tachycardia in the 130 seconds, and a blood pressure of 108/62 mm Hg. On physical examination, tenderness and guarding in the right lower quadrant was noted, indicative of localized peritonitis. Laboratory tests showed leukocytosis up to 14,000 cells/mm^3 with a left shift (range: 4,500–11,000 cells/mm^3), creatinine of 1 mg/dL (baseline: 0.7 mg/dL), and venous lactate of 2.4 mmol/L (range: 0.6–1.4 mmol/L), suggesting possible sepsis. Computed tomography revealed a 1.3 cm calcification at the base of the cecum, indicating a retained fecalith with phlegmonous changes suggestive of inflammation in the surrounding cecum.

Patient was admitted for concern of cecal colitis. Broad spectrum antibiotics were initiated, leading to clinical improvement. The patient had a recent admission 2 weeks prior with similar symptoms, and at that time, a laparoscopic appendectomy was performed, removing about 3.7 cm of appendiceal tissue, and the patient was discharged without complications.

During the current admission, due to a high suspicion of the retained fecalith being the cause of the recurrence, further evaluation was undertaken. The surgical team suspected that the fecalith was likely a calcified mass, neoplasm, or stool ball in the cecum, necessitating

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confirmation before considering additional resection. Gastroenterology was consulted for a possible colonoscopy-aided biopsy and removal of the mass. The intent of the colonoscopy was to confirm the nature of the mass and, if benign, to manage the fecalith nonsurgically. The patient's consent was obtained beforehand, with a clear explanation of the potential for endoscopic management if feasible. The procedure was performed by an interventional endoscopist experienced in using spyglasses and lithotripsy.

Colonoscopy showed chronic inflammatory changes in the cecum around the appendiceal orifice which were biopsied. A SpyGlass catheter, advanced through the colonoscope, was placed at the entrance of the appendiceal orifice (Figure 1). A large hard stone (~1.5 cm) was observed within the appendiceal remnant (Figure 1). The stone was broken down using an electrohydraulic lithotripter probe in one attempt (Figure 1). Subsequently, a SpyBasket (15 mm in diameter) was introduced through the SpyGlass catheter, and 2 large stone fragments were removed, followed by irrigation and removal of smaller fragments (Figure 1). The total duration of the procedure was 75 minutes. There were no post-procedure complications, and the abdominal examination during and after the procedure showed no guarding or tenderness. On follow-up appointments at 2 weeks, 3 months, and 6 months, the patient made a smooth recovery without any complications or recurrences and expressed satisfaction with the outcome.

DISCUSSION

Appendicitis ranks among the leading causes of acute abdomen.[5] Risk of appendicitis after surgery is low (1 in 50,000) but remains significant.[6] However, diagnosing appendicitis in individuals with prior appendectomy can be challenging, often leading to oversight. Inflammation in the residual appendiceal tissue can stem from fecalith impaction or secondary to ischemia.[7] Incorrect identification of the base of appendix during surgery may lead to partial removal and leave a part of appendix behind, which can be a source of recurrent inflammation.[8] The recommended length of appendiceal stump is therefore <5 mm.[9] In addition, laparoscopic appendectomy carries a small but notable risk of a retained fecalith where a fecalith may drop from the base of the appendix when it is being resected or extracted from the port.[3] The stone can serve as a nidus for abscess formation or obstruct the residual appendix lumen,

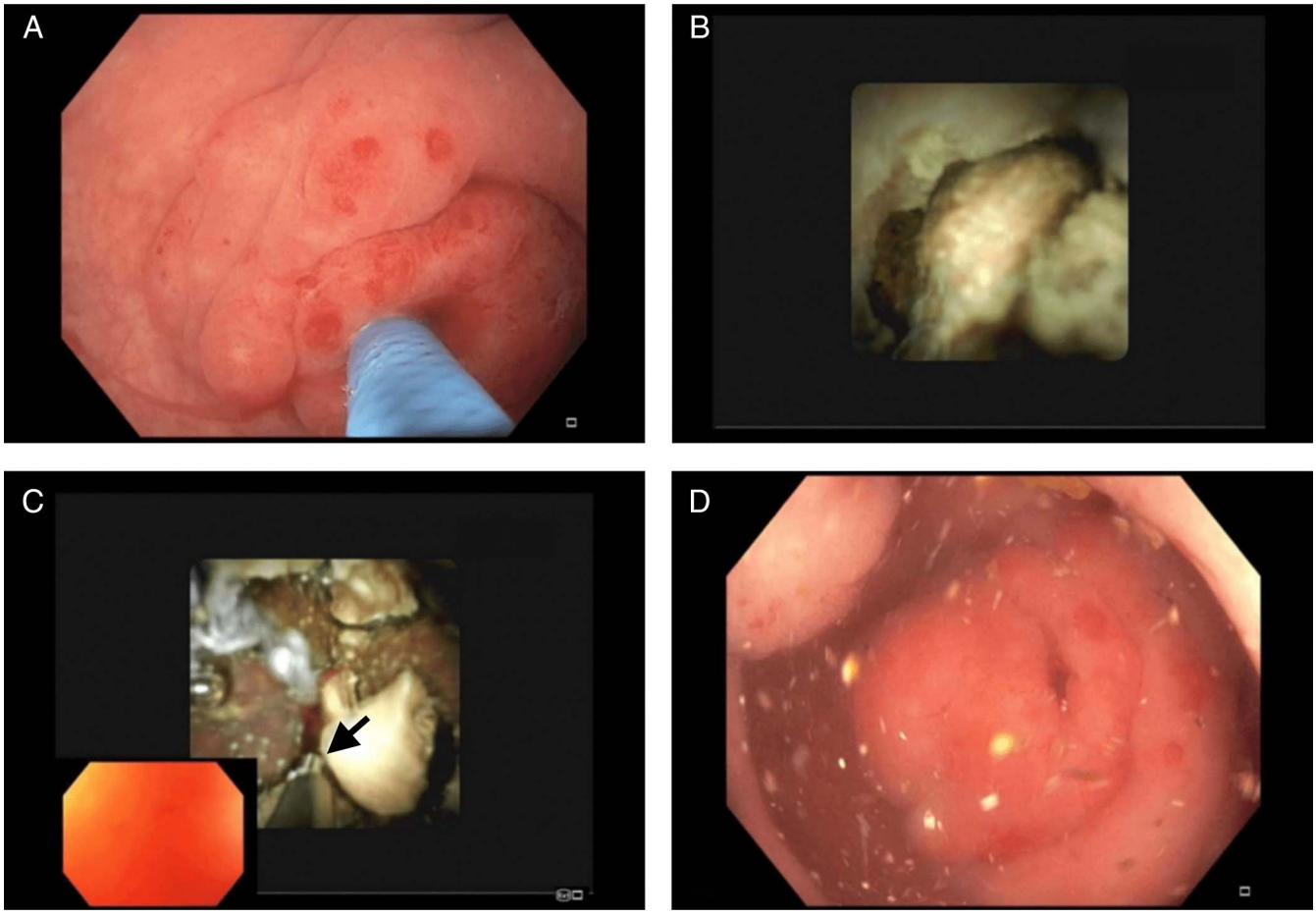

Figure 1. (A) Endoscopic view of SpyGlass catheter at the appendiceal orifice; (B) Fecalith within the appendiceal remnant visualized with SpyGlass camera; (C) SpyGlass camera view of stone fragments broken down by lithotripter probe (arrow) introduced through SpyGlass catheter; (D) Endoscopic view of stone fragments within the cecum.

leading to stump appendicitis, with or without involvement of the surrounding cecum.[4,10,11]

Treatment of stump appendicitis has conventionally been surgical. Appendectomy, however, carries a potential for postoperative complications, such as bleeding, wound infection, and intestinal obstruction, and the overall complication rate has been reported to be 8.2%–31.4%.[12-14] Revision appendectomy may require ileocecectomy or right hemicolectomy depending on inflammation extent, raising concerns about prolonged operative duration, increased blood loss, and postoperative hospitalization.[15] Our case illustrates a recurrence of appendicitis due to a fecalith despite a short stump length. Initial surgical intervention likely failed to extract the fecalith. Imaging was helpful in localizing the extent of inflammation and the location of fecalith. We adopted a strategy akin to interval appendectomy, allowing acute infection to subside with antibiotics. Once sepsis resolved, the fecalith was removed endoscopically, thereby removing nidus for further episodes.

Recent studies highlight the effectiveness of endoscopic methods for treating appendicitis.[16,17] Endoscopic Retrograde Appendicitis Therapy (ERAT) is a nonsurgical option for managing acute uncomplicated cases.[16] This procedure involves accessing the appendiceal orifice by a colonoscope, and fluoroscopy aided guidewire insertion into the lumen. Over the guidewire, a standard catheter is inserted to relieve obstruction. Endoscopic retrograde appendicography is then performed to identify any blockages or abnormalities, which are treated by inserting a plastic stent into the appendix, typically removed after 7–14 days or earlier if it passes naturally.[18] A recent pilot randomized controlled trial in China comparing ERAT to open and laparoscopic appendectomy showed promising results.[17] Our method follows ERAT principles but uses the SpyGlass Direct Visualization system, eliminating the need for fluoroscopy. We employed electrohydraulic lithotripsy to break down stones and a SpyBasket for extraction. Prior antibiotic use prevents pus formation, thus obviating stent placement. Fecalith extraction by endoscopy, though not as widely studied as ERAT, has shown success in isolated cases.[2,19] However, no documented cases have reported using the SpyGlass Direct Visualization System. Combining ERAT with fecalith extraction in one procedure is possible but depends on the stone quality and on the endoscopist's technique.[20]

We advocate for nonsurgical management of fecaliths with endoscopy once acute infection resolves. However, large-scale studies are needed to validate this approach and analyze long-term outcomes. The ability to perform this procedure is center dependent and requires a risk/benefit interdisciplinary discussion. By sharing our approach, we aim to contribute to existing literature and promote the exploration of nonsurgical options.

DISCLOSURES

Author contributions: A. Sudan: design of the work, drafting the work, literature review, manuscript editing and finalization, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved; D. Julka: acquisition of the data, literature review, editing and revision of manuscript, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved; SA Patel: conceptualization, design and interpretation of the work, reviewing it critically, editing and revision of manuscript, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. A. Sudan is the article guarantor.

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REFERENCES

1. Kaya B, Eris C. Different clinical presentation of appendicolithiasis. The report of three cases and review of the literature. *Clin Med Insights Pathol.* 2011;4:1–4.
2. Kim DJ, Park SW, Choi SH, et al. A case of endoscopic removal of a giant appendicolith combined with stump appendicitis. *Clin Endosc.* 2014;47(1):112–4.
3. Kim YS, Kong JC, Williams E, Warrier SK. Retained fecalith following laparoscopic appendectomy. *Clin Case Rep.* 2021;9(3):1651–4.
4. Ansari FA, Bilal MI, Gondal MUR, Latif M, Iqbal N. Delayed presentation of a retained fecalith. *Cureus.* 2021;13(6):e15919.
5. Dahabreh IJ, Adam GP, Halladay CW, et al. *Diagnosis of Right Lower Quadrant Pain and Suspected Acute Appendicitis.* Agency for Healthcare Research and Quality (US) (http://www.ncbi.nlm.nih.gov/books/NBK355441/) (2015). Accessed April 6, 2024.
6. Hendahewa R, Shekhar A, Ratnayake S. The dilemma of stump appendicitis: A case report and literature review. *Int J Surg Case Rep.* 2015;14:101–3.
7. Dikicier E, Altintoprak F, Ozdemir K, et al. Stump appendicitis: A retrospective review of 3130 consecutive appendectomy cases. *World J Emerg Surg.* 2018;13(1):22.
8. Keller CA, Dudley RM, Huycke EM, Chow RB, Ali A. Stump appendicitis. *Radiol Case Rep.* 2022;17(7):2534–6.
9. Mangi AA, Berger DL. Stump appendicitis. *Am Surg.* 2000;66(8):739–41.
10. Bašković M. Retained appendicolith in children: A case report and literature review. *Central Eur J Paediatr.* 2022;18(1):44–9.
11. Awe JaA, Soliman AM, Gourdie RW. Stump appendicitis: An uncompleted surgery, a rare but important entity with potential problems. *Case Rep Surg.* 2013;2013:972596.
12. Ahmed HO, Muhedin R, Boujan A, et al. A five-year longitudinal observational study in morbidity and mortality of negative appendectomy in Sulaimani teaching Hospital/Kurdistan Region/Iraq. *Sci Rep.* 2020;10(1):2028.
13. National Surgical Research Collaborative; Bhangu A. Multicentre observational study of performance variation in provision and outcome of emergency appendicectomy. *Br J Surg.* 2013;100(9):1240–52.
14. Bhangu A, Søreide K, Di Saverio S, Assarsson JH, Drake FT. Acute appendicitis: Modern understanding of pathogenesis, diagnosis, and management. *Lancet (London, England)* 2015;386(10000):1278–87.

15. Waki Y, Hotchi M, Utsunomiya D, Inoue T, Obatake M. Preoperative predictors of extended resection in patients with complicated acute appendicitis undergoing surgery. *J Med Invest*. 2021;68(3.4):334–41.
16. Liu BR, Kong LJ, Ullah S, et al. Endoscopic retrograde appendicitis therapy (ERAT) vs appendectomy for acute uncomplicated appendicitis: A prospective multicenter randomized clinical trial. *J Dig Dis*. 2022; 23(11):636–41.
17. Shen Z, Sun P, Jiang M, et al. Endoscopic retrograde appendicitis therapy versus laparoscopic appendectomy versus open appendectomy for acute appendicitis: A pilot study. *BMC Gastroenterol*. 2022;22(1): 63.
18. Liu BR, Song JT, Han FY, Li H, Yin JB. Endoscopic retrograde appendicitis therapy: A pilot minimally invasive technique (with videos). *Gastrointest Endosc*. 2012;76(4):862–6.
19. Hsu C. Colonoscopic removal of a giant appendiceal faecolith without appendectomy for acute appendicitis: A video vignette. *Colorectal Dis*. 2018;20(11):1056.
20. Song MY, Liu ZH, Zhao LX, Liu BR. Endoscopic retrograde appendicitis therapy for treating a giant hard appendicolith embedded in the appendiceal orifice: A case report. *Asian J Surg*. 2021;44(2):488–9.