The Journal of Emergency Medicine, Vol. 57, No. 2, pp. 232–234, 2019
© 2019 Elsevier Inc. All rights reserved.
0736-4679/$ - see front matter

https://doi.org/10.1016/j.jemermed.2019.03.044

Clinical Communications: Adult

RECURRENT APPENDICITIS CAUSED BY A RETAINED APPENDICEAL TIP: A CASE REPORT

Timothy J. Boardman, MD and Nicholas J. Musisca, MD, FACEP

Department of Emergency Medicine, Warren Alpert Medical School of Brown University, Providence, Rhode Island
Corresponding Address: Nicholas J. Musisca, MD, FACEP, Department of Emergency Medicine, Warren Alpert Medical School of Brown University, 55 Claverick St, 1st fl, Providence, RI 02903

☐ **Abstract—Background: Acute appendicitis is one of the most common surgical emergencies, and it is treated definitively with appendectomy. Recurrent appendicitis is a rare entity, being reported after approximately 1 in 50,000 appendectomies. It is typically caused by inflammation of the appendiceal stump. Inflammation of a retained appendiceal tip is a unique entity that can also cause recurrent appendicitis and presents similarly to primary appendicitis. Case Report: We present a case of a 50-year-old man who had undergone laparoscopic appendectomy 1 year earlier and who subsequently presented with a chief complaint of right lower quadrant abdominal pain. The diagnosis of recurrent appendicitis caused by a retained appendiceal tip was made after a computed tomography scan. The patient underwent successful laparoscopic removal of the retained appendiceal fragment. Why Should an Emergency Physician be Aware of This?: The etiology of recurrent appendicitis is separate from the stump appendicitis that has been well described in the literature. Retained tip appendicitis poses a diagnostic dilemma because it is uncommon and, if missed, can lead to complications, such as perforation and severe sepsis. Recurrent appendicitis must be in the differential diagnosis for patients who are post-appendectomy and who present with right lower quadrant abdominal pain.** © 2019 Elsevier Inc. All rights reserved.

☐ **Keywords—abdominal infection; appendiceal tip; appendicitis; recurrent; remnant; surgery**

Reprints are not available from the authors.

INTRODUCTION

Appendectomy is one of the most commonly performed emergent surgical procedures and is considered to be the definitive treatment for source control for acute appendicitis (1). Recurrent, or stump, appendicitis is a rare entity that has been previously described in the literature. Recurrent appendicitis is uncommon and therefore it remains a challenging diagnosis to make and it can be overlooked in the differential diagnosis. This report describes a case of recurrent appendicitis presenting as a retained appendiceal tip in a patient who had undergone a previous laparoscopic appendectomy 1 year earlier. Few cases of retained tip appendicitis have been reported, and none of these appear in the emergency medicine literature.

CASE REPORT

A 50-year-old man presented to the emergency department in the late afternoon complaining of abrupt-onset abdominal pain that had started 3 h before presentation. The pain was localized to the right lower quadrant of his abdomen and radiated around to his back. The pain was described as being 10 out of 10 in severity, sharp, constant, exacerbated by movement, and improved by remaining still. The patient had nausea but denied vomiting. He also denied symptoms such as diarrhea, hematochezia, melena, shortness of breath, fever,

Received: 17 November 2018; Final submission received: 6 March 2019;
Accepted: 30 March 2019

hematuria, or dysuria. The patient reported similar symptoms 1 year ago. At that time, he was diagnosed with appendicitis and had an uncomplicated recovery after a successful laparoscopic appendectomy. Since that procedure, he had experienced occasional right lower quadrant abdominal pain that was less severe than the current episode. He has had no other surgical procedures and his only other medical history included hypertension for which he took lisinopril.

The patient's vital signs were blood pressure 126/72 mm Hg, a pulse of 92 beats/min, a respiratory rate of 18 breaths/min, a temperature 37.6°C (99.7°F), and oxygen saturation 98% on room air. The physical examination revealed a middle-aged male who was uncomfortable appearing, lying on his side. On auscultation of his heart, he had tachycardia with regular rhythm. Despite this finding, his extremities were well perfused with 2+ and symmetric radial pulses and did not appear to have clinical signs of shock. His lungs were clear to auscultation bilaterally and there was no tenderness to the chest wall. The abdomen was nondistended and normal bowel sounds were appreciated upon auscultation. Palpation revealed localized peritonitis of the right lower quadrant with tenderness, guarding, and rebound tenderness. Provocative testing was positive for the Rovsing sign on palpation of the left lower quadrant and obturator sign on flexion and rotation of the right hip.

Laboratory results revealed a white blood cell count of 10.3×10^9 cells/L and a differential showed a left shift with 91.2% segmented neutrophils. His complete blood cell count and basic metabolic profile were otherwise normal. The severity of the patient's pain and the findings of localized peritonitis on the abdominal examination led us to perform a computed tomography scan of the abdomen and pelvis with intravenous contrast. The imaging revealed a 1.9-cm, blind-ending structure adjacent to previously placed surgical clips with surrounding soft tissue stranding and contents of high density (Figure 1).

Figure 1. Computed tomography scan of a 1.9 cm structure in the right lower quadrant with surrounding soft tissue stranding. The structure has high-density contents representing an appendicolith.

These findings were thought to represent appendicitis of an appendiceal remnant that contained an appendicolith. The general surgery service was consulted for further management and admission.

The patient was subsequently administered intravenous piperacillin-tazobactam and admitted to their service for a laparoscopy that was performed the following day to remove the remnant. A 2-cm inflamed remnant appendix was found to be adherent to the abdominal wall. There was no connection between the remnant and cecum. The cecum and previous staple line were intact without signs of inflammation. The appendix remnant was removed and was found to contain a soft appendicolith. After examination of the remnant piece, it was determined to be a residual tip of the appendix that had not been removed during the first appendectomy. The patient tolerated the procedure well and was discharged from the hospital on postoperative day 1 with oral amoxicillin-clavulanate for 4 days.

DISCUSSION

The appendix is located at the base of the cecum and has the anatomy of a true diverticulum with an open connection into the cecum. The appendix receives its blood supply from the appendiceal artery, which is the terminal branch of the ileocecal artery. This artery transverses through the mesoappendix and ends at the tip of the appendix. While the base of the appendix is static, the tip may orient itself in several known positions such as retrocecal, subcecal, preileal, postileal, and pelvic (2).

Appendicitis is an inflammation of the appendix that is thought to be caused by obstruction of the appendiceal opening. This blockage can be caused by fecaliths, lymphoid hyperplasia, infection, or tumor. As the inflammation progresses, the appendix becomes dilated, which can lead to ischemia, perforation, abscess formation, and progression to severe sepsis. The initial dilation of the appendix causes a visceral pain reaction often felt initially in the periumbilical area, with subsequent localization to the right lower quadrant once the parietal peritoneum becomes inflamed. Depending on the orientation of the appendiceal tip, pain can also be felt in the back or left lower quadrant (1,2).

Appendicitis is one of the most common surgical emergencies, and appendectomy is the most common emergent surgical procedure worldwide (1). The incidence of appendicitis is roughly 233 in 100,000 people, and it most commonly occurs in the second and third decades of life. Males have a higher incidence than females (8.6% and 6.7%, respectively), with a rate ratio of 1.4:1 (3).

An appendectomy is now typically performed laparoscopically, although laparotomy may be required in severe instances, particularly with perforation. During the

procedure, the appendix is mobilized, the blood supply is ligated, and the appendix is removed. After removal, an appendiceal stump remains where the base of the appendix was located. This stump is either simply ligated and left in place or then inverted into the cecum (4). Removal of the appendix typically represents definitive treatment. However, in rare cases of acute appendicitis, recurrent inflammation of the appendiceal stump can occur. The incidence of stump appendicitis is reportedly 1 in 50,000 appendectomies (5). Approximately 60 cases have been reported in the literature (6). It is thought that this recurrence is a result of misidentification of the appendiceal base during the initial appendectomy, thereby causing the surgeon to leave a longer than desired appendiceal stump behind (7).

This case represents recurrent appendicitis caused by a residual appendiceal tip without involvement of the appendiceal stump or cecum. To date, there have been only 2 reported cases in the literature of recurrent appendicitis caused by a residual appendiceal tip. One case reported recurrence 10 years after the initial appendectomy and the second 3 months postoperatively (8,9). In our case and in both previously reported cases, the appendiceal remnant was adhered to a nearby structure and had remained viable by developing a new blood supply. Under normal circumstances, an appendiceal remnant without a blood supply would degrade and would not be a focus of infection or inflammation in the future (9).

Recurrent appendicitis is a rare, challenging diagnosis to make. The clinical level of suspicion for appendicitis is much lower in a patient with a previous appendectomy and therefore creates potential for delay in treatment or misdiagnosis. The clinical course for recurrent appendicitis is similar to that of classic appendicitis and if undiagnosed can lead to perforation, abscess formation, and sepsis (10). The evaluation should include laboratory testing and computed tomography with intravenous contrast, magnetic resonance imaging, or ultrasonography. Surgical intervention is the definitive treatment because complete resection of the appendix remnant is required (1,10).

WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?

Recurrent appendicitis is a rare entity, yet it should be included in the differential diagnosis for patients who have had a previous appendectomy and who present with right lower quadrant abdominal pain. In this case, other differential diagnoses were considered, including chronic postsurgical pain, epiploic appendagitis, right-sided diverticulitis, small bowel obstruction, iliopsoas abscess, atypical cholecystitis, cystitis, and nephrolithiasis. In the era of conscientious radiographic imaging, one could have considered delaying or foregoing computed tomography in lieu of other testing, such as ultrasonography, urinalysis, or relying on laboratory testing alone. Furthermore, small community centers may not have 24-h radiology readings available and therefore the onus is on the emergency provider to make a preliminary read. Having this diagnosis on the differential can increase suspicion when looking for the cause of a patient's presenting symptoms. Misdiagnosis or a delay in diagnosis of recurrent appendicitis can lead to poor patient outcomes. Stump appendicitis has been previously described in the literature and is thought to be underreported. This case of residual tip appendicitis is even less common, but also merits important clinical consideration.

REFERENCES

1. Wagner M, Tubre DJ, Asensio JA. Evolution and current trends in the management of acute appendicitis. Surg Clin North Am 2018; 98:1005–23.
2. Schumpelick V, Dreuw B, Ophoff K, Prescher A. Appendix and cecum. Embryology, anatomy, and surgical applications. Surg Clin North Am 2000;80:295–318.
3. Addiss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis and appendectomy in the United States. Am J Epidemiol 1990;132:910–25.
4. Watkins BP, Kothari SN, Landercasper J. Stump appendicitis: case report and review. Surg Laparosc Endosc Percutan Tech 2004;14: 167–71.
5. 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.
6. Essenmacher AC, Nash E, Walker SK, Pitcher GJ, Buresh CT, Sato TS. Stump appendicitis. Clin Pract Cases Emerg Med 2018; 2:211–4.
7. Rios RE, Villanueva KM, Stirparo JJ, Kane KE. Recurrent (stump) appendicitis: a case series. Am J Emerg Med 2015;33:480.e1–2.
8. O'Leary DP, Myers E, Coyle J, Wilson I. Case report of recurrent acute appendicitis in a residual tip. Cases J 2010;3:14.
9. Parthsarathi R, Jankar SV, Chittawadgi B, et al. Laparoscopic management of symptomatic residual appendicular tip: a rare case report. J Minim Access Surg 2017;13:154–6.
10. Dikicier E, Altintoprak F, Ozdemir K, et al. Stump appendicitis: a retrospective review of 3130 consecutive appendectomy cases. World J Emerg Surg 2018;13:22.