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Ingested foreign body mimicking acute appendicitis

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ABSTRACT

INTRODUCTION: The incidence of acute appendicitis is approximately 250,000 cases per year in the United States with a lifetime risk of 7% (Gupta & Dupuy, 1997). However, despite strongly associated clinical signs, diagnostic accuracy based on history and physical exam alone is only 70% (Jess et al., 1981). This is in large part due to the multitude of mimics found in the differential diagnosis of appendicitis. As a result highly sensitive imaging such as computed tomography scan has become standard of care.

PRESENTATION OF CASE: We present a case of an otherwise healthy 20 year old male presenting to the emergency department with acute onset of right lower quadrant pain and leukocytosis consistent with a diagnosis of appendicitis. Ultrasonography was grossly negative as was a computed tomography scan. Given the peritoneal nature of the patient's abdominal exam, general surgery was consulted. The patient was taken for exploratory laparoscopy where a long, thin, metallic foreign body was found to have perforated the small intestine.

DISCUSSION: Discussion includes a literature review of computed tomography negative appendicitis, as well as the frequency of foreign body mimicking appendicitis. This case demonstrates the importance of the clinical exam even in the face of negative highly sensitive imaging modalities.

CONCLUSION: In conclusion, there are several mimics of acute appendicitis and we present an unusual case of a foreign body mimicking this disorder in a young person. Highly sensitive imaging coupled with history and physical examination remains the standard of care for diagnosing appendicitis; however, clinical acumen must be utilized to formulate a broad differential.

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1. Introduction

The acute abdomen is generally described as a sudden onset of severe abdominal pain with associated findings of tenderness, guarding, and abdominal muscle rigidity on physical exam. The pathology of the acute abdomen encompasses inflammatory, infectious, vascular, mechanical, traumatic, and neoplastic etiologies. The reason we, as medical providers are so concerned with the acute abdomen is that there is classically several etiologies that require emergent surgical intervention [3]. The most common surgical etiology of the acute abdomen is acute appendicitis with an incidence of approximately 250,000 cases occurring annually in the United States [4] and a lifetime incidence of 7% [1]. Common things being common, when presented with acute right lower quadrant pain, it is only natural that the work up often focuses on ruling in or out the diagnosis of appendicitis. However, the differential diagnosis for appendicitis is broad and includes gastroenteritis, infectious

colitis, constipation, Crohn's disease, renal colic and many more. In the female patient this differential must be broadened further to include ovarian torsion, ectopic pregnancy, tubovarian abscess, pelvic inflammatory disease, ovarian cysts, and endometriosis. Historically, it was taught that the presentation of right lower quadrant pain with associated rebound tenderness, fever, and anorexia was grounds for surgical consultation. However, the broad differential, poor specificity of physical exam alone [2], and availability of highly sensitive diagnostic imaging, has made computed tomography, and to a lesser extent ultrasound, standard of care in the workup of these patients. The diagnostic sensitivity and specificity of today's computed tomography scanners is 98.5% and 98% respectively [5].

Among the known etiologies that mimic appendicitis, foreign body perforation of the small bowel or cecum is exceedingly rare. While the exact incidence of foreign body ingestion is impossible to determine due to its often innocuous nature and benign course, perforation occurs less than 1% of the time [6]. The work reported herein is in line with the SCARE criteria [13].

2. Case description

We present a case of a 20-year old male with no past medical or surgical history who presented to the emergency department

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Fig. 1. Surgical resected specimen with visualized penetrating foreign body.



Fig. 2. Surgical specimen of foreign body perforation.

with sudden onset of sharp, nonradiating right lower quadrant pain beginning four hours prior to arrival. He denied any preceding periumbilical pain, nausea, vomiting, or fever and review of systems was otherwise unremarkable. Physical exam revealed a nontoxic appearing, thin, Caucasian male in no acute distress. Vital signs were normal without tachycardia or fever. Abdominal exam was positive for right lower quadrant tenderness with guarding, rebound tenderness, positive Rovsing's and Psoas sign. Normal bowel sounds were present and no masses were palpated. Genitourinary exam was unremarkable as was the remainder of the physical exam. Blood work was remarkable for a leukocytosis and left shift. Ultrasonography of the right lower quadrant showed minimal ascites and a non-visualized appendix. A follow up computed tomography scan with IV and oral contrast showed a normal caliber Appendix with no evidence of gastrointestinal obstruction, hernia or ascites.

The patient was observed in the emergency department for serial abdominal exams due to persistent RLQ pain and rebound tenderness. As symptoms had not abated, general surgery was consulted for suspected computed tomography negative acute appendicitis. The surgery service evaluated the patient, agreed with the assessment and decided to perform an exploratory laparoscopy.

The patient was taken to the operating room for laparoscopy and a long, thin, metallic foreign body was found to have perforated the small intestine in the right lower quadrant (Figs. 1 and 2). His operation was converted from laparoscopic to open and a small portion of his bowel was resected along with his appendix. He recovered

well post operatively was discharged home two days later. Upon learning of the findings in the operating suite, the patient mentioned he had eaten grilled hamburgers two days prior to the onset of his pain. Given the nature of the foreign body, we suspect a wire brush used to clean the grill surface was the source. Having been inadvertently consumed it became lodged in and ultimately perforated the small intestine causing the right lower quadrant pain consistent with acute appendicitis.

3. Discussion

From the time we enter the clinical years of our medical training, the signs and symptoms of appendicitis are familiar. Buzzwords like Psoas, Obturator, Rovsing's, and McBurney's point are heard any time a patient presents with right lower quadrant pain. Despite this, diagnostic accuracy of acute appendicitis based on history and physical is only 70% [2]. This is largely due to an extensive list of similar etiologies as discussed. One of the less common, but well described mimics is that of foreign body perforation. A retrospective review in 1998 described 256 cases of ingested foreign bodies causing appendicitis [7] and even a cursory literature review reveals multiple case reports describing a wide variety of foreign-body induced appendicitis including, but not limited to; tongue studs, bone marrow, and more commonly needles [8–10]. What stands out in the majority of these cases is that diagnosis was made prior to surgery through the use of various imaging modalities [11]. Furthermore, as demonstrated in our case, it is not adequate to rely on pneumoperitoneum to identify perforation as this may not be present [11]. What makes our case unusual is the complete absence of findings on imaging even when the object was found to be metallic.

While comprehensive data on “missed” appendicitis following a visualized normal Appendix on computed tomography scan is not readily available, sensitivity and specificity of multidetector imaging for appendicitis is 98.5% and 98% respectively [5]. This correlates with a study by Nikolaidis et al. in the American Journal of Roentgenology from 2004 who found a 2% incidence of appendicitis in patients with concerning clinical findings and a nonvisualized Appendix with no inflammatory changes on CT scan. In this study the authors cite a paucity of visceral fat as the underlying cause of the missed diagnosis on CT [12]. However, thin young adults and children are certainly at risk for developing acute appendicitis and many will have a paucity of visceral fat around the bowel and appendix. This needs to be taken into account when evaluating a patient with a non-visualized appendix.

4. Conclusion

This case highlights a basic principle of both surgery and emergency medicine, which bears repeating. The acute abdomen with peritoneal features, regardless of imaging or laboratory findings warrants a surgical consult, as it is a clinical diagnosis primarily, while labs and imaging are adjuncts to the physical exam. As our imaging modalities become more sensitive, it is easy for the clinician to question their physical exam findings. Fortunately for this patient, the disposition was correct despite the wrong diagnosis. In retrospect “peritonitis of uncertain etiology” may have been a more appropriate and accurate diagnosis given the evidence that had been collected at the time of admission.

Conflicts of interest

No conflict of interest for this research.

Sources of funding

No sources for funding for this research.

Ethical approval

This study is exempt from ethical approval at our institution.

Consent

Written 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.

Author contribution

Jeremy Reeves MD, FACS Trauma/Critical Care Surgeon: writing the paper, data analysis.

Michael Wade MD. Emergency Medical Physician: study concept and design, data analysis.

John Edwards MD. Emergency Medical Physician: writing the paper, data collection, study concept.

Guarantor

Guarantor: Jeremy Reeves, MD, FACS.

References

- [1] H. Gupta, D.E. Dupuy, Advances in imaging of the acute abdomen, *Surg. Clin. North Am.* 77 (6) (1997) 1245–1263.
- [2] P. Jess, et al., Acute appendicitis: prospective trial concerning diagnostic accuracy and complications, *Am. J. Surg.* 141 (2) (1981) 232–234.
- [3] Z.S. Cope, William, *Cope's Early Diagnosis of the Acute Abdomen*, 22nd ed., Oxford University Press, New York, 2010.
- [4] D.G. Addiss, et al., The epidemiology of appendicitis and appendectomy in the United States, *Am. J. Epidemiol.* 132 (5) (1990) 910–925.
- [5] P.J. Pickhardt, et al., Diagnostic performance of multidetector computed tomography for suspected acute appendicitis, *Ann. Intern. Med.* 154 (12) (2011) 789–796, W-291.
- [6] N.G. Velitchkov, et al., Ingested foreign bodies of the gastrointestinal tract: retrospective analysis of 542 cases, *World J. Surg.* 20 (8) (1996) 1001–1005.
- [7] P.J. Klingler, et al., Ingested foreign bodies within the appendix: a 100-year review of the literature, *Dig. Dis.* 16 (5) (1998) 308–314.
- [8] K. Renner, et al., Needle perforation of the appendix, *Dig. Surg.* 17 (4) (2000) 413–414.
- [9] C.D. Fischer, A. Mukherjee, Appendicitis due to tongue stud ingestion: a case study and review of management plans, *S. D. J. Med.* 57 (1) (2004) 19–22.
- [10] N. Antonacci, et al., A bizarre foreign body in the appendix: a case report, *World J. Gastrointest. Surg.* 5 (6) (2013) 195–198.
- [11] A. Pinero Madrona, et al., Intestinal perforation by foreign bodies, *Eur. J. Surg.* 166 (4) (2000) 307–309.
- [12] P. Nikolaidis, et al., The nonvisualized appendix: incidence of acute appendicitis when secondary inflammatory changes are absent, *Am. J. Roentgenol.* 183 (4) (2004) 889–892.
- [13] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, D.P. Orgill, for the SCARE Group, The SCARE statement: consensus-based surgical case report guidelines, *Int. J. Surg.* (2016).

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