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A Gut Feeling: An Extremely Rare Case of Missed Appendicitis

Case Report

A 63-year-old male presented to the ED twice in two days with severe abdominal pain. At the first visit, the patient was seen in the ED with initial complaint of acute onset right lower quadrant pain. The pain woke him up from sleep and was described as sharp, 10/10, constant, and worsened by any movement. The patient denied any other associated symptoms, including fevers, vomiting, appetite change, or urinary symptoms. On exam, the patient was afebrile, heart rate of 76, blood pressure of 132/77, and normal respiratory rate and oxygen saturation. He was noted to be grunting due to pain, diffusely tender to palpation in the abdomen but worse in the right lower quadrant, and had a positive obturator sign. He also had a partially reducible, non-tender umbilical hernia.

The patient’s past medical history was significant for atrial fibrillation on Warfarin, obesity, diabetes mellitus, and peptic ulcer disease.

Laboratory findings were unremarkable, including a normal white blood cell count, liver function tests, lipase, and urinalysis.

A CT abdomen and pelvis with IV contrast was performed to rule out appendicitis. Unfortunately, the radiologist was unable to visualize the appendix; however, he commented that there were no secondary signs of appendicitis. The radiologist also noted an incidental finding of a bowel containing umbilical hernia without evidence of strangulation or bowel obstruction (Figure 1). The patient was discharged home after a five-hour observation period in stable condition.

The patient returned to the ED approximately 25 hours after discharge with acutely worsening abdominal pain now primarily focused in the periumbilical region. Further history was limited as the patient was moaning in pain and appeared to be in extremis. The patient was now tachycardic to 103, but otherwise vital signs were within the normal range. On exam, the patient was now noted to have a moderately tender, firm umbilical hernia with overlying skin erythema.

Acute Care Surgery was immediately consulted for concerns of a strangulated umbilical hernia. They were at the bedside within minutes and elected to take the patient to the operating room urgently following Warfarin reversal with fresh frozen plasma.

In the operating room, the hernia sac was opened and found to contain a perforated appendix with abscess formation. The patient was found to have a very long appendix with the tip lying within the umbilical hernia sac.
surrounded by thickened omentum (Figure 2). The patient next underwent an open appendectomy with umbilical hernia repair without the use of mesh. The incision was left open to heal by secondary intention. Intraoperative wound cultures were obtained and enterococcus raffinosus and streptococcus anginosus were isolated.

The patient had a relatively uneventful post-operative course. The patient was discharged five days later with a wound vacuum assisted closure (VAC) in place and given a 10-day course of ciprofloxacin and flagyl. In the following several weeks, the patient was reportedly doing well, but wound VAC remained in place to promote wound healing.

**DISCUSSION**

The presence of an appendix within a hernia sac is a relatively rare phenomenon. This was described first by Jacques Croissant de Garengeot in 1731 after discovering a vermiform appendix located within a femoral hernia.\(^1\) Claudius Amyand four years later described the first known instance of an appendix within an inguinal hernia sac on an 11-year-old boy.\(^2\) Appendices located within a femoral hernia or an inguinal hernia sac are now more commonly referred to by their eponyms, de Garengeot and Amyand’s hernias, respectively. The presence of acute appendicitis within an inguinal hernia is reported to be as low as 0.08%.\(^3\) The presence of appendicitis within a umbilical hernia is even rarer. To the best of our knowledge, there have been less than a handful of case reports in adults describing the presence of appendicitis within an umbilical or paraumbilical hernia sac. It was first described by Doig\(^4\) in 1970, later by Al-Qahtani\(^5\) in 2003, and most recently by Agarwal\(^6\) in 2013. All were single-patient case reports. There is only one reported occurrence in the English literature in a child, described in 2008 by Atabek,\(^7\) in which he found an acute appendicitis within an umbilical hernia sac in a 25-day-old infant.

The finding of appendicitis within a hernia sac is almost always found in the operating room. Patients usually present with acute onset abdominal pain with exam findings highly suspicious for a strangulated hernia.

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**Figure 1.** A & B, Arrows illustrating sagital and axial views of appendix entering umbilical hernia sac.

**Figure 2.** Limited midline laparotomy revealing umbilical hernia sac containing the perforated tip of the appendix. A, Perforation at the tip of the appendix with inflamed mesoappendix within the hernia sac. B, Body of appendix. C, Base of the appendix, joining the cecum.
Hernias are often tender, firm, and may have overlying skin changes. However, if imaging is obtained, there will not be radiologic evidence of a bowel obstruction. Now with the increased use of high resolution CT scanners, it is possible to diagnose appendicitis within a hernia sac prior to the operating room. The first CT radiographic evidence of appendicitis within an umbilical hernia was described by Arnaiz\(^8\) in 2006. Unfortunately, this was not the case for our patient whose appendix was not identified on CT from the day prior. Park et al.\(^9\) reports the overall sensitivity of CT for diagnosis of acute appendicitis is 96.4%, meaning nearly 4% of acute appendicitis will be missed with CT alone. This highlights not only the importance of a thorough history and physical, but also the importance of providing strict and detailed return precautions for our patients being considered for discharge. Retrospective analysis of the CT on our patient did in fact reveal malrotation, colon isolated to the left hemi-abdomen, and the appendix entering the umbilical hernia with a very small amount of free fluid (Figure 1). It has been hypothesized that external compression of the appendix by the hernia leads to ischemia and subsequent appendicitis. Despite the initial delay in diagnosis, our patient is recovering well.

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