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An incarcerated umbilical hernia containing an acute suppurative appendicitis in a significantly comorbid patient

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Abstract

We present a rare case of a comorbid female in her 60's with a long-standing umbilical hernia who presented to the emergency department with acute abdominal pain, three days of constipation and cellulitis of the overlying hernia skin. Imaging confirmed an incarcerated hernia containing the appendix and omental fat. The patient underwent emergency midline incision with appendicectomy and hernia defect repair under combines spinal epidural. Postoperative recovery was uneventful, and she was discharged without complications. This case underscores the rarity of appendiceal involvement in an incarcerated umbilical hernia, highlighting the importance of timely diagnosis and intervention to prevent severe complications such as ischemia, perforation, or peritonitis.

Keywords: Umbilical hernia, appendicitis, general surgery

Introduction

Background

Umbilical hernias are relatively common in the adult population, particularly in women, and account for approximately 10% of all abdominal hernias ^[1]. In most cases, they remain asymptomatic unless complications such as incarceration or strangulation arise. The incarceration of abdominal contents, such as small bowel or omentum, is not unusual ^[1]. However, the presence of the appendix within an incarcerated umbilical hernia is exceedingly rare and only sporadically reported in the literature. When the appendix or small bowel contents are involved, immediate surgical management is critical to avoid further complications ^[2].

The presence of the appendix within an umbilical hernia has been described in case reports but remains a very uncommon finding. This report adds to the limited body of literature on incarcerated umbilical hernias containing the appendix and provides an opportunity to discuss potential mechanisms behind this rare anatomical anomaly as well as appropriate management.

Case Presentation

A female in her 60's presented to the emergency department with a 24-hour history of progressively worsening abdominal pain, nausea, and absence of bowel movements or flatus. She had a known umbilical hernia for over 20 years, which had been increasing in size over the previous week. Her past medical history of note included hypertension, cerebellar ataxia, sleep apnoea, neuralgia, chronic obstructive pulmonary disease, ischaemic heart disease and a laparoscopic oophorectomy.

On physical examination, she was afebrile with stable vital signs. Her abdomen was tender on palpation, particularly around the umbilical region, where a firm, irreducible hernia was palpated. The skin overlying the hernia was red and hot. There were no clinical signs of peritonitis, but the patient exhibited mild abdominal distension.

Investigations

Serum testing showed a white cell count of $10.0 \times 10^9/L$, C-reactive protein levels of 27.3mg/L, and a lactate of 3mmol/L. Plain abdominal radiography demonstrated dilated loops of small bowel suggestive of bowel obstruction, without evidence of free intra-abdominal air or gas patterns indicative of perforation.

To further evaluate the cause of the potential bowel obstruction, a contrast-enhanced

computed tomography (CT) scan of the abdomen and pelvis was performed. The CT scan revealed an incarcerated umbilical hernia containing the appendix and omental fat (Figure 1). The appendix was thickened and inflamed, consistent with acute appendicitis. No free air or intra-abdominal fluid collections were noted, indicating the absence of perforation at the time of imaging.

Treatment

Given the diagnosis of incarcerated hernia, the patient was taken to the operating theatre for emergency surgery. A combined spinal epidural anaesthetic approach was used. A midline incision was performed, which revealed an incarcerated appendix within the umbilical hernia sac along with omental fat (Figures 2 and 3). The appendix was visibly inflamed, but not perforated. The hernia sac was dissected, and an appendectomy was performed. The omental fat was reduced back into the abdominal cavity, and the hernia defect, measuring 2cm x 3cm, was repaired with a primary suture closure, rather than mesh given the contamination risk from the potential concurrent appendicitis. Intraoperatively, there were no other signs of bowel compromise, therefore no additional small bowel resection was undertaken.

Outcome and follow-up

The postoperative course was uneventful. She recovered well and was discharged on postoperative day four. She was reviewed in clinic six weeks post discharge. The wound had fully healed, there was no incisional hernia or recurrence of the umbilical hernia, and she had a normal bowel habit. The histology report revealed acute suppurative appendicitis and peri-appendicitis.

Discussion

This case exemplifies a rare occurrence of an incarcerated umbilical hernia containing the appendix, with concomitant appendicitis. While umbilical hernias are common, the inclusion of the appendix within the hernia sac is an unusual anatomical finding, with the incarceration of this being even more unusual. The precise mechanisms underlying this rare condition are not fully understood but can be attributed to several factors.

- 1. Abnormal Appendiceal Mobility:** In some individuals, the appendix may exhibit increased mobility due to a longer mesoappendix or variations in its fixation.³ This can allow the appendix to migrate from its usual location in the right lower quadrant into other regions of the abdomen, including hernia sacs. A more mobile appendix could explain its unusual presence within the umbilical hernia sac in this patient.
- 2. Developmental Factors:** During embryological development, malrotation of the midgut can result in the appendix being positioned in an abnormal location.⁴ Although there were no signs of obvious developmental anomalies in this patient, this possibility cannot be entirely excluded as a contributing factor.
- 3. Previous Episodes of Appendiceal Prolapse:** It is possible that intermittent prolapse of the appendix into the umbilical hernia sac had occurred over time, with

episodes of spontaneous reduction. This could have allowed the appendix to become gradually incorporated into the hernia sac, with the development of acute appendicitis eventually leading to incarceration.

- 4. Hernial Sac Enlargement and Chronicity:** A long-standing hernia could allow the hernia sac may have expanded and allowed more abdominal contents to prolapse. The hernia being well established could have contributed to the eventual incarceration of the appendix, especially if the hernia defect widened over time^[5]. Chronic intermittent entrapment of the appendix may have predisposed it to eventual incarceration and inflammation, though in our case this is not likely as the hernia neck was short in diameter.

An incarcerated umbilical hernia containing the appendix and omental fat is a rare and important clinical entity with very few reported cases^[6, 8]. The combination of mechanical obstruction, ischemia, and the abnormal position of the appendix likely contributed to the development of appendix inflammation in this patient. It is probable that this then further contributed to the incarceration of the hernia, through reactive inflammation and swelling of the sac contents. Typically, in previously reported cases of incarcerated hernias containing the appendix, a mesh repair was not done and surgeons opted for a simple suture closure of the defect. A similar approach was adopted in our case.

This case bears similarity to an Amyand hernia, where the appendix is incarcerated within an inguinal hernia^[9]. Losanoff and Basson developed a classification system for such cases, along with corresponding surgical management recommendations based on the condition of the appendix and any concomitant abdominal or abdominal wall sepsis^[10]. Although the present case involves an umbilical hernia rather than inguinal, we propose that their criteria may be extrapolated and applied to this scenario. Based on their classification this patient would correspond to either category two or three. Given the cellulitis of the overlying skin to the hernia, we were concerned regarding a potentially developing sepsis and therefore decided this case fit more with category three and consequently, an open surgical approach was selected over a laparoscopic one.

Although an argument could be made for laparoscopic management via the hernia defect, particularly given the absence of pyrexia, markedly abnormal laboratory findings, or visible purulence, the patient's complex medical history influenced our decision. The patient's comorbidities, including significant cardiac and pulmonary disease and limited cervical spine mobility, precluded the use of emergency intubation. Therefore, a combined spinal epidural anaesthesia was employed, further supporting the choice of a midline incision over laparoscopy^[11].

Although there were no overt signs of perforation or severe infection intraoperatively, a suture closure was chosen to mitigate the risk of postoperative infection, adhering to established principles for managing Amyand hernias. This decision underscores the necessity of individualized surgical planning, carefully weighing the potential risks of hernia recurrence or closure failure against the likelihood of infection and its subsequent impact on the healing process.



Fig 1: sagittal and transverse frames of computed tomography of the abdomen and pelvis with red circles indicating the incarcerated appendix visible in the umbilical hernia.



Fig 2: Intra-operative photograph showing a midline laparotomy incision with the umbilical hernia sac containing the incarcerated appendix



Fig 3: Intraoperative photograph showing the inflamed appendix freed from the hernial sac. Note the healthy appearance of the bowel at the base of the appendix.

Take home messages

- Umbilical hernias can contain rare structures, including the appendix, leading to acute appendicitis.
- Prompt imaging, particularly CT, is essential for diagnosis and preoperative planning.
- Classification for Amyand hernias may be used to help determine appropriate surgical course in other unusual abdominal hernias containing the appendix.
- A suture repair of the hernia defect can be useful in mitigating the risk of infection compared with a standard mesh repair.
- In comorbid patients, midline incisions are useful for repair of incarcerated umbilical hernias, rather than intubation and laparoscopy.

Conflict of Interest

Not available

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Not available

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