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A Case of Strangulated Appendix within Incarcerated Umbilical Port Site Hernia: Managing the Unexpected Appendiceal Hernia

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Background	The authors present the case of a 52-year-old obese woman with incarcerated incisional port-site hernia (PSH), found to contain strangulated appendix. The patient underwent concomitant hernia repair and open appendectomy.
Summary	The patient presented with incarcerated incisional hernia from a supraumbilical laparoscopic port site and was taken for operative exploration, demonstrating appendiceal hernia. Given the lack of field contamination and small size of the hernia defect, treatment included appendectomy and concomitant suture repair of the hernia. This suggests that early recognition of appendiceal hernia allows for management with appendectomy and herniorrhaphy. However, more advanced pathology, including any complication, may include more complex treatment and should be ultimately left to the discretion of the operating surgeon.
Conclusion	The incarcerated hernia containing the appendix has been described in a variety of hernia subtypes, locations, and clinical presentations. The incidence of appendiceal and of PSHs are quite rare individually. This represents the first report of an appendix incarcerated within an incisional, supraumbilical PSH. Surgical treatment should be pursued when suspicion is high to prevent the development of complications and a more morbid surgical procedure.
Keywords	Appendix; hernia; herniorrhaphy; Amyand hernia

DISCLOSURE STATEMENT:
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Case Description

The authors present a morbidly obese 52-year-old woman who was evaluated in the emergency department for acute onset abdominal pain. The patient's past surgical history included several caesarean sections and a laparoscopic cholecystectomy done many years prior at an outside institution. She began experiencing periumbilical abdominal pain four days prior to admission, and the pain was progressive and constant in nature. She also noted a tender, palpable bulge just superior to her umbilicus. She began having multiple episodes of diarrhea on the day of presentation, and she denied any prior obstructive symptoms. CT (Figure 1) of the abdomen and pelvis was obtained by the emergency department and was initially read as a small omental fat-containing hernia with soft tissue swelling and a 4.2 x 3.8 cm fluid collection but no free air, all of which may represent strangulation. Of note, the finalized report of the CT had an addendum stating "tiny tubular structure entering the hernia sac may represent the appendix, which is normal in caliber."

A surgical consultation was obtained. On examination, the patient had an incarcerated incisional hernia underlying the supraumbilical port-site from prior laparoscopic cholecystectomy. The patient had severe tenderness of the hernia without diffuse peritoneal signs or overlying skin changes suggestive of strangulation or ischemia. She was admitted to the surgical service with plans for urgent operative repair of incarcerated incisional hernia.

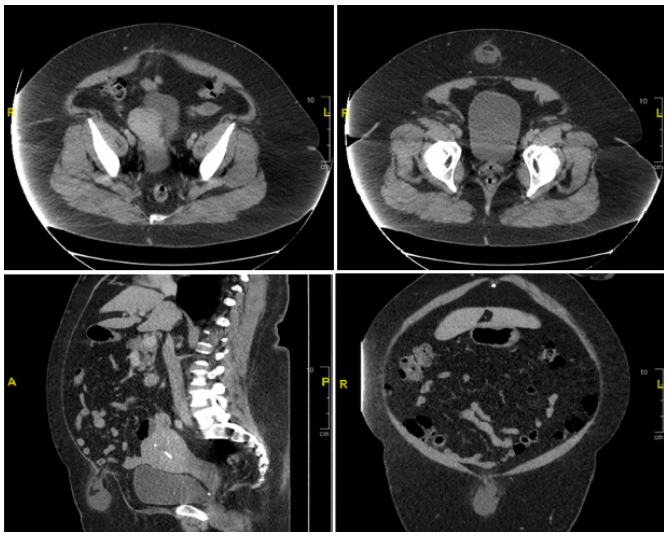

Figure 1. Preoperative computed tomography (CT) of the abdomen and pelvis (a-d): CT demonstrated proximity of cecum (a, cecum with *) to incarcerated port site hernia (arrows) with fluid collection and soft tissue swelling consistent with strangulation (b-d). A tiny tubular structure was seen within the hernia sac (b-c), which represented the appendix, and was normal in caliber.

The patient was taken to the operating room for planned exploration and hernia repair. After appropriate preoperative antibiotics, the patient was placed under general anesthesia. A curvilinear supraumbilical incision was made overlying the scar from her prior laparoscopic cholecystectomy port site. Careful dissection was completed circumferentially until the hernia sac was isolated and the fascial edges appreciated. On entry into the hernia sac, there was a rush of reactive serous fluid, and on evaluation of the contents of the hernia, the authors identified the appendix. A pinhole fascial defect (<1 cm) was palpated, and the appendiceal base was strangulated within the defect. The hernia defect was enlarged slightly in order to identify the appendiceal base at the cecum, and then a routine appendectomy was performed by ligating the mesoappendix and appendiceal base. The hernia sac was excised, and the fascial defect was repaired with interrupted, figure-of-eight permanent sutures.

The patient was stable throughout the case and observed on the general surgical floor overnight. Her diet was advanced, and she was discharged home the next day without issue. She has since been seen in the office for postoperative follow-up and has recovered well from surgery without complication. Gross examination of the appendix revealed a normal appearing, 7 cm appendix with diameter of 0.5 cm. The surface of the appendix and periappendiceal fat demonstrated congestion, erythema, and fibrin exudate consistent with strangulation. No perforation, fecalith, or tumor mass was identified.

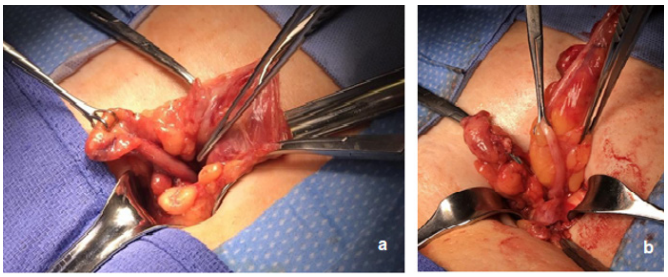

Figure 2. A) Appendix identified within hernia sac. B) Further dissection down to healthy base of appendix.

Discussion

Amyand hernia, or the appendix incarcerated within an inguinal hernia, was first described in 1735 by Claudius Amyand.[1,2,3] There are also case reports of appendix incarceration within incisional hernias,[4-7] femoral hernias (De Garengeot hernia),[8,9] and within a right lower quadrant port site.[4,10] The incidence of appendiceal hernia is an uncommon occurrence, and the development of compli-

cations, including inflammation, perforation, abscess, or fistula formation is even more rare (<0.1 percent).[5,11] Due to the variety of locations and range of complications that have been described in appendiceal hernias, the patient presentation may differ significantly from classic appendicitis. Additionally, presenting signs and symptoms may vary significantly between affected patients. Thus, a high index of suspicion is required for appropriate diagnosis and timely surgical management.

This paper represents the first report of an appendix incarcerated within a midline incisional port site hernia, treated prior to the development of complications. The risk of developing a port-site hernia after cholecystectomy range from 0.3 to 5.4 percent.[12-14] Several risk factors have been associated with the development of a PSH, including an increased body mass index, trocar diameter and design, older age, and longer duration of surgery.[12] Location of the port is also a contributory factor, with the most common site being at the umbilicus or midline, due to the weakness of the linea alba.[15] While this patient was obese, further evaluation of other risk factors related to her initial surgery was inconclusive given that her cholecystectomy had been performed at an outside institution. Other pertinent contributing factors include the proximity of the cecum and appendix to the fascial defect (Figure 1) and length of the appendix. While the pathology measurement of the appendix was 7 cm in length, it can be seen to stretch to a much longer length in Figure 2. Port site hernia should remain on the surgeons' radar for potentially avoidable complication following laparoscopic surgery and can be avoided with appropriate closure of fascial defects and risk factor modification.

Concomitant primary repair of the PSH was possible in this case, given the lack of field contamination and the small size of the hernia defect (<1 cm). Considering the patient's risk factors for recurrence, if the fascial defect had been larger, then repair with ultra-lightweight mesh reinforcement may have been considered. However, we should note there is conflicting literature regarding the use of mesh repair in repair of clean-contaminated hernias.[16,17] If there had been any concern for contamination of the wound, then the authors would have considered leaving the skin open to heal by secondary intention or loose closure of the wound with staples.

A similar patient presenting with an incarcerated incisional PSH thought to contain simply preperitoneal or omental fat may have been discharged with plans for elective hernia repair. This type of delay in management of an appendiceal hernia may ultimately result in a more advanced pathology, including ischemia, perforation, abscess or fistula formation, for which the surgical management may involve a significantly more morbid procedure. This scenario would need to be approached similarly to emergent management of strangulated bowel, and definitive management of the hernia would be left to the discretion of the operating surgeon. This patient was able to undergo a definitive surgical operation with a short hospital stay and no adverse events.

Conclusion

The appendix can become incarcerated with a variety of different hernias and locations and may be difficult to diagnose preoperatively. This represents the first report of an appendix incarcerated within a midline port site treated prior to the development of complications. Early recognition of appendiceal hernia allows for management with appendectomy and herniorrhaphy with minimal morbidity to the patient.

Lessons Learned

An incarcerated hernia containing the appendix is a rare type of hernia, and the presentation can differ significantly from classic appendicitis that may increase incidence of late presentation and delay in diagnosis or treatment. Preoperative diagnosis of this rare type of hernia may be missed by physical exam and imaging like abdominal CT scan. PSH is also extremely rare and should be a remain high on the surgeon's radar of potential complications after laparoscopic surgery. Surgical management should be the preferred treatment of incarcerated appendiceal hernia and should be performed as soon as diagnosis is suspected in order to prevent development of significant complications.

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