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Case report

Internal hernia with incarceration of the cecum through a loop created by an elongated fallopian tube

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ABSTRACT

We describe a case of a 61-year-old female who presented to the emergency department with a 2-week history of severe right and left lower abdominal quadrant abdominal pain that radiated to the back and was accompanied by nausea and vomiting. An initial computed tomography scan with contrast demonstrated unusual loops of small bowel in the left paracentral pelvis. Follow-up computed tomography scans revealed worsening dilation of the cecum. Exploratory laparotomy was indicated and revealed a mobile right mesenteric stalk, which had migrated to the left lower abdominal quadrant and become incarcerated within a loop formed by a 25 cm long left fallopian tube. The distal end of the fallopian tube was firmly adherent to the parietal peritoneum of the left lower quadrant. A right hemicolectomy and a left salpingo-oophorectomy were performed. This case appears to be the first to document the internal herniation of a mobile cecum and right mesenteric stalk through a highly unusual loop created by an elongated left fallopian tube.

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Introduction

Internal abdominal hernias result from the protrusion of an abdominal viscus through a peritoneal or mesenteric aperture

within the confines of the peritoneal cavity. The aperture may be normal, such as a foramen, fossa, or recess, or abnormal such as a defect acquired as the result of surgery or by congenital origin [1–4]. Internal abdominal hernias are an infrequent cause of all intestinal obstruction (approximately 1 of 100 cases) and acute intestinal obstruction (between 1–4 of 100

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cases); however, when left untreated with associated intestinal strangulation they are reported to have an overall mortality rate exceeding 50% [1,3].

For herniation to occur, the viscus must be mobile. This prerequisite largely precludes involvement of the cecum, which is normally fixated to the lateral wall, and the ascending colon, which is normally retroperitoneal. Mobile cecum, however, is a condition characterized by the presence of a freely moveable cecum and ascending colon within the abdominal cavity [5,6]. It results from the failure of the right colonic mesentery to fuse with the lateral peritoneum during embryogenesis. The condition is often asymptomatic; however, the mobility can lead to kinking or torsion of the cecum or ascending colon with associated stasis, obstruction, or volvulus [5–8]. The mobility may also provide the rare opportunity for the cecum and/or ascending colon to be involved in internal herniation [9–13].

Here, we describe a truly unique case involving the internal herniation of a mobile cecum and right mesenteric stalk in the lower left abdominal quadrant through an abnormal aperture created by an elongated fallopian tube. To the best of our knowledge, this is the first report detailing an internal hernia caused by a fallopian tube without any congenital or surgical etiology. While highly unusual, this case helps underscore the importance of recognizing the diagnostic features of internal hernias.

Case report

A 61-year-old female was admitted to the emergency room with 2-weeks of severe abdominal pain, nausea, and vomiting. The patient had a history of intermittent constipation, benign endometriosis, a left ovarian cyst, and cholecystectomy. She had no history of abnormal Pap smears or STDs, and she began menarche at age 12. In addition, the patient had over a 10-year history of intermittent constipation, bowel obstruction, and cholecystectomy. An initial computed tomography (CT) scan with contrast demonstrated unusual loops of small bowel in the left paracentral pelvis (Fig. 1). All other abdominal organs were present and were found to be normal. A follow-up CT scan 48 hours later (Figs. 2 and 4) revealed significant dilation of the cecum (Fig. 2). Due to the unusual nature of the pathology and the difficulty in establishing a diagnosis, 2 additional CT scans were performed on day 4 (Fig. 3) and day 8 (Fig. 5), respectively. Collectively, these demonstrated a swirling pattern of the small bowel with thickening walls as well as stable but severe stool retention in the large bowel. The preliminary differential diagnosis was determined to be a volvulus or an internal hernia. Surgery was recommended.

Exploratory laparotomy demonstrated a large amount of dilated small bowel. The right colon was noted to be on an extensively long mesenteric stalk and was found to have migrated to the left lower abdominal quadrant where the cecum and mesenteric stalk were incarcerated within a loop created by an elongated left fallopian tube. The fallopian tube extended out of the true pelvis and traversed along the left parietal peritoneal wall. The left fallopian tube was 25 cm,



Fig. 1 – IV contrast-enhanced CT image, coronal projection, on the initial day of hospital admittance. The fallopian tube loop (arrows) with herniating mesenteric vessels (asterisk) located centrally within the loop are visible.

Representative computed tomography (CT) images collected during 4 separate exams of a 61-year-old woman diagnosed with an internal hernia of the cecum through a loop created by an elongated fallopian tube. Multiple exams and images were required to reach a diagnosis and therefore the images presented are intended to give an overall impression of the pathology rather than depict a chronological sequence of change in the pathology. IV = intravenous.

attached to the uterus at its proximal end, and adhered to the parietal peritoneum of the left lower abdominal quadrant at its distal end. The incarcerated cecum was viable but a right hemicolectomy was performed to eliminate risk of recurring herniation and/or future volvulus. An ileocolonic anastomosis was performed. Additionally, a left salpingo-oophorectomy was performed to eliminate the risk of incarceration of other intestinal regions.

The specimens were sent to pathology. The resected right colon, appendix, terminal ileum, left fallopian tube, and ovary were serially sectioned and found to be histologically normal. The postoperative period was uneventful. Follow-up was conducted at 8 months and the patient reported no signs or symptoms of recurrence.

Discussion

The patient presented in this report is a 61-year-old female who was diagnosed with an internal hernia of the cecum, with



Fig. 2 – IV contrast-enhanced CT image, coronal projection, on day 3 displaying distended fluid-filled cecum (C) along with fallopian tube loop (arrows) with herniating mesenteric vessels (asterisk) located centrally within the loop.



Fig. 3 – IV and bowel contrast-enhanced CT image, coronal projection, on day 4 displaying the superior margin (black arrow) and inferior margin (white arrow) of the fallopian tube loop with herniating mesenteric vessels (asterisk) located centrally within the loop.

the herniation occurring through a highly unusual aperture created by an elongated and looped left fallopian tube. Two anomalous features appear to have combined in an extraordinary way to enable this unlikely event. First, failed fusion of the cecum to the posterior abdominal wall produced a mobile cecum capable of migrating into the left lower abdominal quadrant. Second, an abnormally long left fallopian tube looped upon itself and migrated out of the true pelvis and into the abdominal cavity. Its loop created an abnormal orifice through which a segment of bowel, in this case the mobile cecum with attached mesenteric stalk, could pass and become incarcerated. Adhesion of the distal end of the fallopian tube to the parietal peritoneum served to anchor the tube with its associated loop in place.

While mobile cecum is estimated to occur in 10%-20% of the population [5,14], internal herniation of a mobile cecum is rare. Internal abdominal hernias in general have a reported incidence rate of less than 1% [1,3,15]. When involved in herniation, the mobile cecum primarily herniates through the foramen of Winslow, an uncommon subtype of internal hernia (frequency rate of 8% among all internal hernias) [1,2,16].

It is extremely rare for the fallopian tube to interact with and strangulate the bowel. One case reported strangulation of the small bowel by a fallopian tube; however, this involved an ectopic congenital anomaly [17]. Three other case reports demonstrated that hysterectomy without salpingectomy can give the fallopian tube the opportunity to coil upon itself and strangulate the bowel [18–20]. These cases differ from the case



Fig. 4 – IV contrast-enhanced CT image, axial projection, on day 3 displaying the medial and lateral margins (arrows) of the fallopian tube loop surrounding herniating vessels and bowel (asterisk).



Fig. 5 – IV and bowel contrast-enhanced CT image, axial projection, on day 8 displaying mesenteric vessels (asterisk) herniating through the medial and lateral margins of the fallopian tube loop (arrows).

described here in that the patient we describe had not undergone a hysterectomy and the proximal end of her left and right fallopian tubes were attached to the uterus in a normal manner.

Although the etiology of this case remains unclear, we speculate that the extended length of the fallopian tube allowed it to make an untightened loop, which created a passageway for the mobile cecum and mesenteric stalk. Periodic distention of the cecum within this loop could have led to a progressive stretching of the fallopian tube. This would explain the patient's history of recurrent intermittent constipation and bowel obstruction. We speculate that early on the cecum could be spontaneously reduced from the loop but with time adhesions developed between the mesenteric stalk and fallopian tube, eventually resulting in incarceration of the cecum and mesenteric stalk.

The unusual length of the patient's left fallopian tube is perplexing. The average length of a fallopian tube in 60-year-old women is less than 10 cm [21] whereas the length left fallopian tube in this patient was 25 cm. The elongation of the fallopian tube runs counter to the progressive atrophy typically seen in fallopian tubes in postmenopausal women [22,23]. Significantly, these unusual features were restricted to the left fallopian tube—the right appeared normal. Furthermore, physical exam 18 years earlier revealed the patient's uterine adnexa to be unremarkable. This observation helps rule out an embryonic explanation for the unusual length and position of the left fallopian tube.

On physical exam, diagnosing internal hernias, including those involving the cecum, is exceptionally difficult. Symptoms are nonspecific and may include vague epigastric pain, intermittent colicky periumbilical pain, tenderness, abnormal bowel sounds, nausea, vomiting (especially after a large meal), and recurrent intestinal obstruction [2,3]. Often, patients have undergone extensive diagnostic workup resulting in negative findings of gastroesophageal reflux, gastritis, biliary colic, inflammatory intestinal diseases, or external hernia [4,24]. The diagnosis is often complicated by the fact that early on internal hernias may be small and easily reducible. Once the hernia has been reduced, radiologic studies typically are negative and the patient may be mislabeled as psychoneurotic [24]. The inability to recognize internal hernias early can lead to a situation where the patient experiencing incarceration, strangulation, or volvulus by the time the hernia is clinically present. In these cases, abdominal imaging plays a key role in the diagnosis, with CT most often serving as the fine-line imaging technique [2,3].

This appears to be the first documented case of an intact but elongated fallopian tube strangulating a mobile right mesenteric stalk. The mechanisms underlying the initial elongation of the fallopian tube, its eventual looping, and ultimately the incarceration of the right mesenteric stalk with attached cecum remain unknown. The events appear to have developed over the course of 15 years.

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