



## Strangulated Internal Hernia Caused by Appendix Adhering to the Pelvic Structures in a Patient with a History of Gynecological Surgery: An Innocent Reason for a Surgical Emergency

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### Abstract

Timely diagnosis and surgical intervention are vital for any surgical situation. Clinical suspicion and a careful evaluation of a patient with non-specific abdominal symptoms are crucial to avoid any delay in treatment. Hereby, we report a case with delayed acute intestinal obstruction, due to a strangulated internal herniation caused by an adhesion of the appendicular tip to an adjacent pelvic tissue secondary to earlier abdominal surgery as a very rare condition, resulting in intestinal resection.

**Keywords:** Internal hernia; Strangulation; Acute abdomen; Appendectomy

### Background

Abdominal hernias may mainly be classified as internal hernias and external or abdominal wall hernias. Internal hernias may develop based on congenital anomalies of the peritoneum and mesentery or secondary to trauma, surgery, inflammation, and circulation disorders.

Internal hernias are rare but would be a life-threatening condition requiring an emergency exploratory laparotomy due to acute intestinal obstruction. And, in case of strangulation of the herniated intestine, segmental resection may become unavoidable. The patient might be misdiagnosed as having obstruction secondary to strictures formed as a result of earlier surgical interventions and pose a critical delay in treatment. Therefore, it is crucial for clinicians to be aware of these phenomena for patients, who had a history of abdominal surgeries, with acute abdominal pain. Hereby, it is expected that there is a tendency to increase the incidence of internal hernias in parallel with increasing abdominal surgical procedures [1].

Currently, the overall incidence of internal abdominal hernias is reported as 0.2% to 0.9% in autopsy series and as 0.5% to 4.1% in patients with intestinal obstruction [2]. In case of strangulation and if it is left untreated the mortality rate can lead to high exceeding 50% [3,4]. On the other hand, very few cases have been reported in the literature in which internal herniation occurred through a ring formed by appendicular pathologies [5-8].

We report a case with delayed acute intestinal obstruction due to adhesion of the appendicular tip to an adjacent pelvic tissue secondary to earlier gynecological surgery. To the best of our knowledge, it will be one of the very first reports with an internal herniation due to a simple adhesion of the appendix without any appendicular pathology.

### Case Presentation

A 60-year-old female patient presented with four days of colicky abdominal pain in the lower right abdominal area associated with vomiting in the last two days. She was first evaluated by the emergency medicine physicians and medically treated with the provisional diagnosis of terminal ileitis. The only abnormal laboratory finding was a slightly increased lactate level in arterial blood gas of 1.9 mMol/L (0.5 to 1.6). Her white blood cell count, platelet count, and C-reactive protein levels were within normal ranges ( $8.60 \times 10^3/\mu\text{L}$  ( $3.98\text{-}10.04 \times 10^3/\mu\text{L}$ ),  $373 \times 10^3/\mu\text{L}$  ( $180\text{-}370 \times 10^3/$

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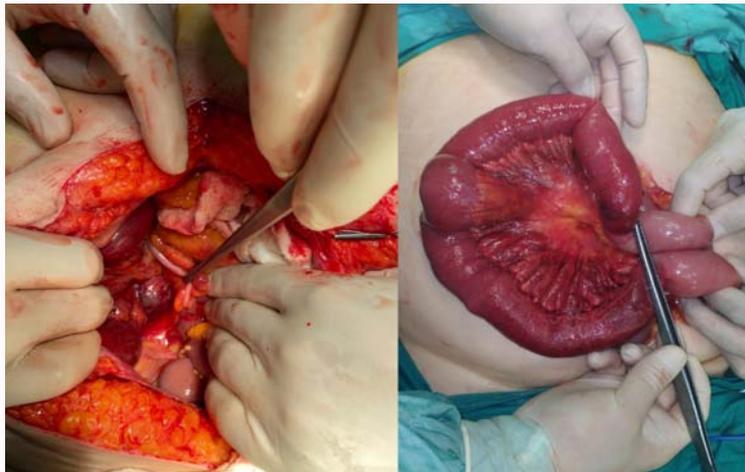
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**Figure 1:** The computerized tomography scan showing a dilated small bowel loop to the level of the caecum, suggestive of small bowel obstruction possibly caused by an internal herniation.



**Figure 2:** The forceps grasping the appendix adhering on its tip to the postoperative fibrous tissue and the internally herniated loop with ischemic and patchy necrotic areas, on the left. The forceps mimic the appendix after appendectomy and releasing the herniated intestine, on the right.

$\mu\text{L}$ ) and 3.9 mg/L (0 to 5), respectively). On the 3<sup>rd</sup> day of admission, the patient was consulted by the surgical team due to the deterioration of her clinical condition. On a surgical physical examination, she was uncomfortable with the abdominal pain. According to her past medical history, she had a total abdominal hysterectomy and bilateral salpingo-oophorectomy for benign fibroids 21 years ago. Her vital signs were within normal limits except supraventricular tachycardia with a heart rate of 125/min. She had a Phannelstein's incision and her bowel sounds had increased. Her abdomen was mildly distended with tenderness and rebound tenderness on the right lower quadrant by palpation, suggestive of an acute abdomen. Digital rectal examination revealed an empty rectum. Nasogastric tube aspirated around 250 mL of bilious fluid.

The erect abdominal X-ray showed non-specific multiple gas-fluid levels within small intestines without any perforation sign. For a radiological re-investigation Computerized Tomography (CT) scan was ordered and revealed a dilated small bowel loop to the level of the

cecum, suggestive of small-bowel obstruction (Figure 1).

Due to provisional diagnosis of complicated small-bowel obstruction, a midline exploratory laparotomy was performed and about 1 L reactive peritoneal fluid without any intestinal contents was evacuated from the abdominal cavity. An intestinal segment, between 130 cm and 200 cm from the ligament of Treitz, formed an internally herniated loop due to the appendix adhering on its tip to the postoperative fibrous tissue on right-sided pelvic structures based on previous gynecologic surgery. The small intestine located at the front of the complete obstruction site was distended and there were ischemic and patchy necrotic areas on the herniated intestinal segment (Figure 2). Firstly, appendectomy was done after releasing its adhering tip from the fibrous tissue on pelvic structures to release herniated intestinal segment. Resection of the strangulated intestinal segment with side-to-side anastomosis by linear cutter staplers was accomplished. The patient was discharged home on the 6<sup>th</sup> postoperative day uneventfully.

## Discussion

Abdominal hernias are classified as internal hernias and external/abdominal wall hernias. In internal hernias, intestinal segments protrude through either a congenital or acquired defect in the peritoneum or mesentery into a compartment within the abdominal cavity. External or abdominal wall hernias involve protrusion of abdominal contents through a defect in the abdominal wall. According to special types of Internal Hernias (IH); Paraduodenal hernias, which form within the paraduodenal fossa as one of the congenital parietal peritoneal fusion anomalies, are the most common type and constitute approximately 53% of all IH [1].

Pericecal hernia is the second most common type (13%) of IH, which occurs due to another congenital anomaly of determination of cecal and pericecal peritoneum. Congenital internal hernias through the Foramen of Winslow represent approximately 8% of all IH. This type of hernias may develop especially in patients with enlarged foramen of Winslow, more than 3 cm long, and the existence of excessively mobile intestinal loops and/or persistence of a mobile ascending colon [9].

The incidence of transmesenteric and transmesocolic hernia currently accounts for 8% but is increasing in frequency as a result of increasing abdominal surgeries involving Roux-en-Y reconstructions such as gastric bypass surgeries for obesity and related diseases or liver transplantation surgeries [10,11]. Besides these acquired reasons, nearly 35% of transmesenteric hernias are caused by congenital mesenteric defects which are located close to the ligament of Treitz or the ileocecal valve and most likely occur in the pediatric group of patients.

Transomental hernias are responsible for 1% to 4% of all IH. Most of them occur through a bare area in the greater omentum. But there may also be internal herniation through a defect in the gastrocolic ligament. It has been suggested that most transomental hernias have a congenital origin, although inflammation, trauma, and circulation disorders may also result in these omental perforations.

Other rare internal hernias are supravescical and pelvic hernias which mostly arise from congenital defects within the peritoneum of pelvic structures.

The appendicular ring is formed by the adhesion of its tip to other adjacent tissues secondary to inflammation of the appendix itself or may result from the peritoneal reaction as in our case [12,13]. It was first described as intestinal obstruction caused by the appendix in 1901 by Hotchkiss [14].

The clinical diagnosis of IH is challenging most of the time. The most important first step for the diagnosis is suspicion for an IH. Therefore, taking a detailed past medical history, especially for previous surgeries, is crucial to avoid any delay for the diagnosis and the treatment. Radiological studies also play an important role. Even the imaging modalities relevant for diagnosing IH include plain radiography, ultrasound, and Computerized Tomography scan (CT); CT has become the first-line imaging technique in these patients in recent years. Barium or iodinated contrast radiological studies have lost their importance because of the availability and capabilities of cross-sectional imaging [1,15].

In terms of surgical treatment for an IH due to appendicular ring, after abdominal exploration, releasing the obstruction by appendectomy then resection of incarcerated intestinal segments,

if it is required, remains the standard of care either by open or laparoscopic approach [5-8].

Laparoscopic exploration and treatment is becoming more common in cases of intestinal obstruction with its advantage over open surgery as less pain, good postoperative outcomes, less morbidity, lower chances of postoperative ileus, and early discharge [15,16]. Even that it may not be convenient for all patients and requires advanced laparoscopic skills [17]. Open surgery remains the best choice in all the cases in which laparoscopic surgery is not able to perform [18].

## Conclusion

An internal herniation caused by an appendicular ring is a very rare condition. To avoid any delay for the right diagnosis and surgical treatment, suspicion and a careful evaluation of the patient are crucial. A CT scan currently is the best radiological diagnostic tool. And the treatment is abdominal exploration, releasing the obstruction by appendectomy and resection of incarcerated bowel segments if required by open surgery or laparoscopic surgery in appropriate patients. Timely diagnosis and surgical intervention are vital and may prevent intestinal loss.

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