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# Laparoscopic Management of Amyand's Hernia in an Adult Male Patient: A Case Report

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Amyand's hernia is a hernia where the appendix is within the inguinal hernial sac. It is often diagnosed by chance due its indeterminate clinical presentation. This case reports a 50-year-old Filipino male who presented with direct and rebound tenderness on the lower abdomen in the presence of a right inguinal bulge. CT scan showed an appendix coursing inferiorly into the pelvis, herniating through a 2 cm defect of the anterior abdominal muscle into the right inguinal region along with mesenteric fat. Laparoscopy confirmed acute appendicitis within an inguinal hernia (Amyand's hernia Type 2). Diagnostic laparoscopy, appendectomy and primary repair of the right inguinal ring were performed. The patient had an unremarkable post-operative course and was discharged after 2 days. He was advised to undergo IPOM to prevent hernia recurrence. Laparoscopic management can be a safe option for cases of Amyand's hernia.

**Key words**: Appendix, appendicitis, surgical mesh, Amyand's hernia, inguinal

Amyand's hernia is diagnosed when the vermiform appendix is located within the inguinal canal. A definitive preoperative diagnosis is a clinical challenge because of its indistinct clinical signs and symptoms and a lack of clear radiological features. Conclusive diagnosis is primarily dependent on the intraoperative findings. This type of hernia is named after Claudius Amyand, who performed the first successful appendectomy on an 11-year-old boy presenting with a right inguinal hernia. Ventral abdominal and inguinal hernias typically contain omentum. Only rarely is the appendix discovered within the herniated region. The incidence of a normal appendix found inside an inguinal hernia sac is about 1%; however, only 0.1% of these cases have appendicitis worldwide.[1] In a review, Michalinos, et al reported that the incidence of an inflamed appendix inside an inguinal hernia is rare at 0.07%-0.13%.[2]

The purpose of this report is to bring Amyand's hernia to the general awareness of surgeons as it may present with unanticipated intraoperative findings. This study also aims to provide insight into the management of this rare disease entity. This case report was exempted from review by the Research Ethics Board of the same hospital. Patient confidentiality and adherence to ethical principles were ensured during its conduct.

## The Case

Presented here is the case of a 50-year-old male who complained of right lower quadrant pain associated with a bulging mass on the right inguinal area. A day prior to admission, the patient complained of right lower quadrant and hypogastric pain. Physical examination revealed an irreducible right inguinal area bulge which had been present 1 week prior. There was direct and rebound tenderness on the right lower quadrant and hypogastric area. Laboratory tests revealed leukocytosis (18,000 cells/μL). The initial consideration was a strangulated inguinal hernia. A CT scan of the whole abdomen done showed a dilated appendix with a maximum diameter of 1.5 cm at its distal end. Peri-appendiceal and peri-cecal fluid and fat stranding with haziness of its wall were noted. Intraluminal appendicoliths were seen, each measuring 1 cm at its base and 0.4 cm at its distal segment (Figure 1. A). The appendix was seen to originate from the retro-inferior cecal region, just inferior to the ileocecal area, coursing inferiorly into the pelvis and

then anteriorly herniating through a 2 cm defect in the anterior abdominal muscle into the right inguinal region (Figure 1.C). Mesenteric fat was noted to herniate with the appendix.

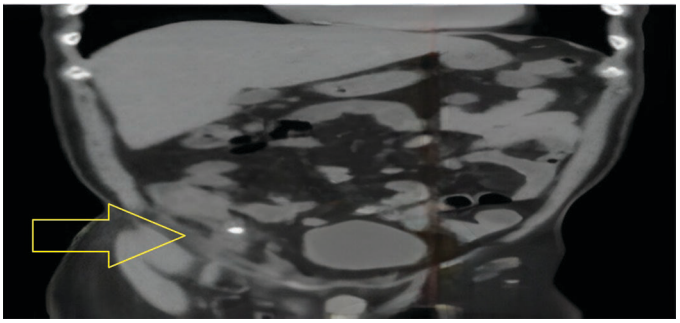

**Figure 1A**

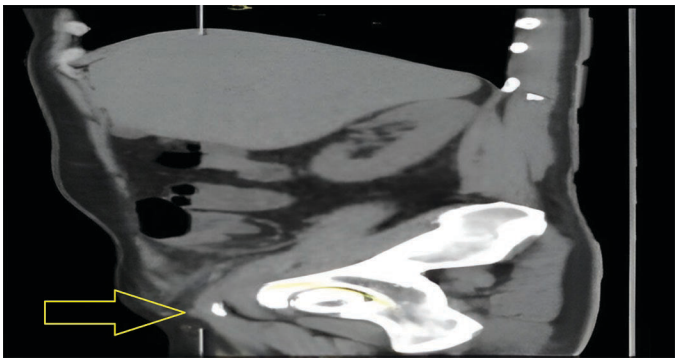

**Figure 1B**

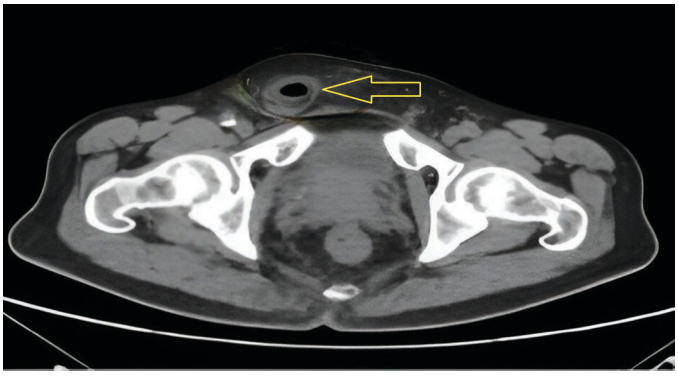

**Figure 1C**

**Figure 1**. Abdominal CT scan of the case. A. Coronal View, B. Sagittal view, C. Axial view. Hernia indicated by the yellow circle.

The patient underwent laparoscopy. An inflamed appendix was observed within the right inguinal ring (Figure 2.A). Laparoscopic lysis of adhesions was performed and the appendix was extracted from the inguinal ring. Laparoscopic appendectomy was then performed. The hernial sac showed no residual contents. The hernia orifice is also closed by direct simple continuous suturing using Stratafix (Ethicon, Johnson & Johnson), size O. The operative finding was a 12 cm x 2.5 cm gangrenous appendix inserted at the right internal ring with adhesions noted on the hernial sac and along the body of the appendix. The appendix was unruptured and had a good base. There was one appendicolith within, 1 cm mid-appendix (Figure 3).

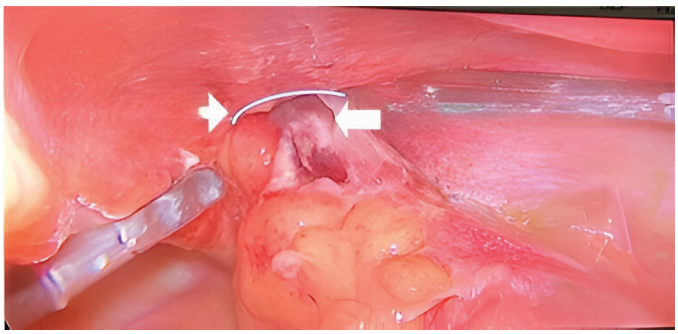

**Figure 2A**

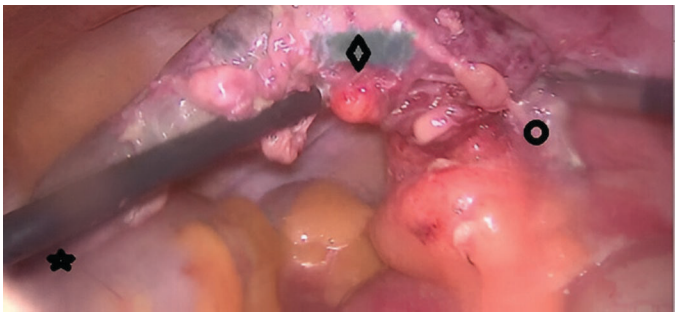

**Figure 2B**

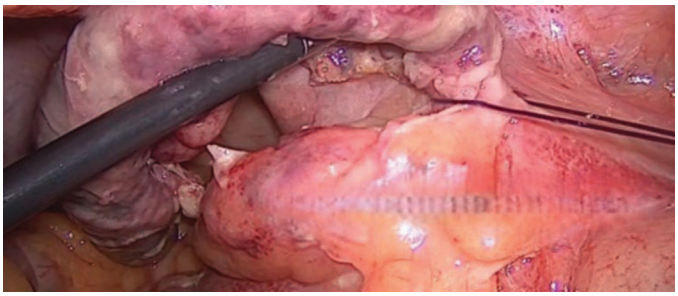

**Figure 2C**

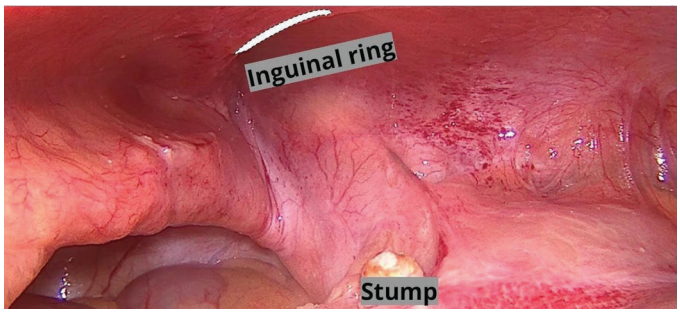


Figure 2D

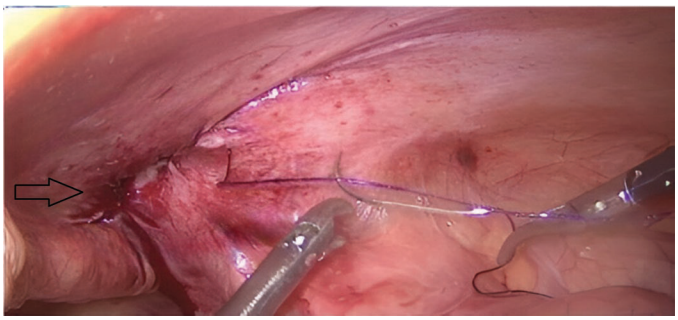

Figure 2E

**Figure 2**. Laparoscopic appendectomy. A. Laparoscopic view of the Amyand hernia demonstrating the inflamed appendix (white arrows) within the inguinal ring (white line). B Laparoscopic view of the appendix after delivery from the hernial sac. (diamond-body of the appendix, star-tip of the appendix, circle-base of the appendix). C. Ligation of the appendix. D. Appendiceal stump after removal of the appendix. E. Closure of internal ring.

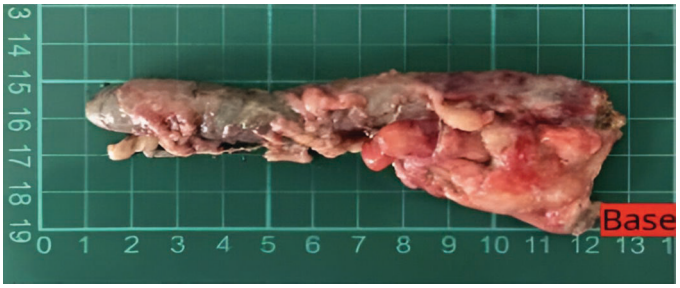


**Figure 3.** Appendix specimen.

Histopathology showed gangrenous appendicitis. Elective laparoscopic Intraperitoneal Onlay Mesh (IPOM) was initially planned after three months to prevent hernia recurrence. Unfortunately, the patient was lost to follow-up and returned only to the attending surgeon after one year and seven months. The patient subsequently underwent laparoscopic IPOM. Intraoperatively, there was closure of the internal ring (Figure 4.A). A 20 cm x 15 cm synthetic mesh (ProGrip, Medtronic) was placed to cover the previous hernia defect. Laparoscopic hernia tackers (ProTack, 5mm, Covidien) were used for mesh fixation around the possible hernia sites (Figure 4.B). No adverse events occurred postoperatively.

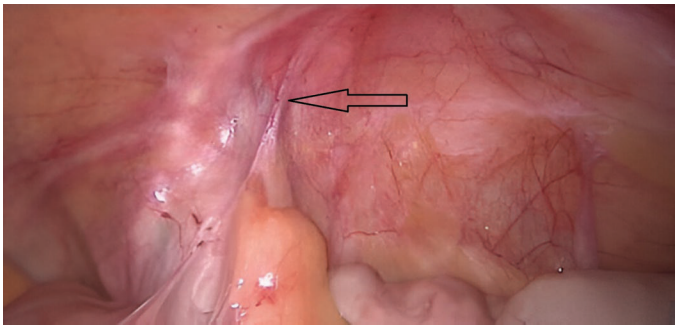

Figure 4A

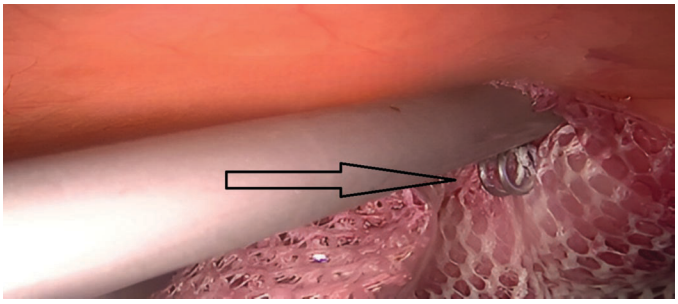

Figure 4B

**Figure 4**. A. Intraoperative findings during laparoscopic IPOM showing closure of internal ring with adhesions (hollow arrow). B. Placement of composite mesh, (laparoscopic hernia tacker indicated by the hollow arrow)

## Discussion

The pathophysiology of Amyand's hernia is unclear. There is no clear causal relationship between appendicitis and Amyand's hernias. Singal[3] proposed that this is usually caused by extraluminal obstruction due to pressure on the hernia neck rather than intraluminal obstruction of the appendix. Thus, herniation of the appendix makes it more vulnerable to adherence to the hernia sac via compression. Ranganathan, et al[4] proposed that this may

be due to the congenital laxity of the right colon. It has also been suggested that it may be the result of an intact vaginal process and a fibrous connection between the appendix and the testis.[2]

Diagnosing Amyand's hernia can be problematic because of its low incidence and ambiguous clinical presentation. Ultrasonography and CT imaging have been touted as the imaging modalities to consider. In patients with complicated hernias, ultrasound could be a useful tool to assess the appendix, hernial sac and the character of any inflammatory soft tissue.[5] According to Constantine, however, CT scan of the abdomen, unlike ultrasound, is more sensitive and specific as it allows a clearer visualization of the appendix inside the inguinal canal.[6] CT scans of the abdomen are not routinely performed for inguinal hernias since these are generally diagnosed clinically.[7,8] They are more often requested to evaluate potential intra-abdominal complications. Assuming the condition was under consideration, a CT scan would be critical to the accurate pre-operative diagnosis and the classification of Amyand's hernias.[9] It would not only be helpful to rule out potential abdominal complications but also direct decision-making to either conservative or surgical treatment. It has been suggested that a CT scan of the acute abdomen and pelvis may reveal a previously unsuspected diagnoses and lead to earlier treatment.[10]

In 1999, Vermillion, et al reported the first laparoscopic appendectomy for the treatment of Amyand's hernia with appendicitis.[11] Researches supported the use of laparoscopic surgery, both diagnostically and therapeutically, especially for those patients in whom diagnosis of Amyand's hernia was unclear. Laparoscopy allows for visualization of the entire abdomen, a decrease in post-operative pain, and earlier hospital discharge.

According to Losanoff and Basson, the status of the appendix in the hernia sac determines the type of hernia repair required.[12] They established a classification of Amyand's hernia into 4 types (Table 1). Management of Amyand's hernia should be individualized according to the appendix's inflammation stage, presence of abdominal sepsis and co-morbidity. Mortality from Amyand's hernia has been reported to range from 14–30% and is associated with peritoneal spread of sepsis.[13] Immediate intervention is warranted in these cases.

**Table 1.** Pathological classification of Amyand's hernia after Losanoff and Basson.[12]

| Type of Hernia | Salient Feature |
|---|---|
| 1 | Normal appendix |
| 2 | Acute appendicitis localized in the sac |
| 3 | Acute appendicitis, peritonitis |
| 4 | Acute appendicitis, other abdominal pathology |

When encountering an inflamed or gangrenous appendix in Amyand's hernia, the method of repair, especially with regard to the use of mesh, is of great importance. The growing utility of laparoscopy has led to the use of this technology for this condition. The technique brings with it the advantages of a more rapid approach, better outcomes and superior cosmetic results.[14] Laparoscopic repairs could be carried out via (IPOM), transabdominal preperitoneal repair (TAPP) or totally extraperitoneal (TEP) repair.[14] Several authors[1,15,16] favored a non-mesh repair because they felt the use of prosthetic material in the presence of peritonitis or a gangrenous appendix could increase the risk of wound infection and appendiceal stump fistula. Akaishi, et al[17] repaired an Amyard hernia via a two-stage procedure, an initial laparoscopic appendectomy followed by elective preperitoneal inguinal hernioplasty a month later with a Kugel patch. Han, et al proposed a laparoscopic treatment strategy for Amyand's hernias based on the condition of the appendix (Figure 5).[14]

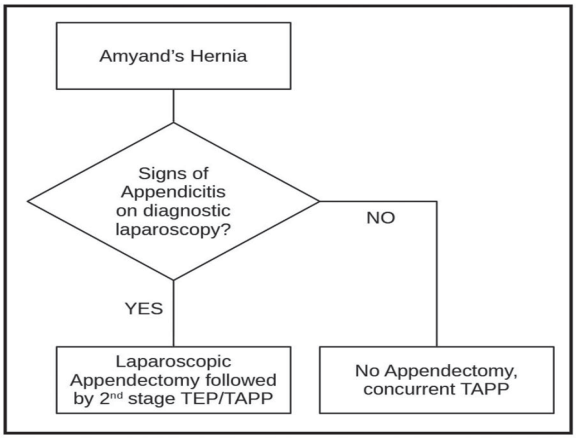


**Figure 5**. Total laparoscopic treatment strategy for Amyand's hernia after Han, et al.[14] (TEP-total extraperitoneal hernioplasty, TAPP-transabdominal preperitoneal hernioplasty)

## Conclusions

Amyand's hernia is a rare disease and its diagnosis is a challenge due to its often variable ambiguous presentation. Pre-operatively, the appendix is rarely discovered within the herniated region; the diagnosis is usually made intraoperatively. A CT scan of the whole abdomen is helpful to diagnose the condition and plan operative management. Laparoscopy can be used for the visual assessment of the entire abdomen, followed by the laparoscopic reduction of the appendix and appendectomy. The manner of repair and its timing will depending on the condition of the appendix and the presence of other abdominal pathologies.

## Additional Information

The case report was performed in accordance with ethical practices and was approved by the Research Committee of the Department of Surgery of Capitol Medical Center. The study was exempted from review by the Research Ethics Board of the hospital.

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