Case Report

# Laparoscopic repair of Amyand hernia – A case report with review of literature

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## ABSTRACT

Amyand's hernia is a rare condition in which the appendix becomes incarcerated within an inguinal hernia. Although this type of hernia is uncommon, it can lead to serious complications such as strangulation and perforation when the appendix becomes trapped. Incarceration of the appendix is most frequently observed in inguinal and femoral hernias, but it can also occur, though less commonly, in incisional and umbilical hernias. This case report describes an 83-year-old male, who was diagnosed with a right inguinal hernia and underwent laparoscopic hernia repair. Intraoperatively, a right-sided Amyand's hernia was identified. Since the appendix was not inflamed, it was reduced and a mesh plasty was performed to repair the hernia. The patient had an uneventful recovery.

***Key words:*** Appendicitis, Hernia, Incarceration, Inguinal, Laparoscopy, Mesh plasty

Amyand's hernia is a rare surgical finding where the vermiform appendix is incarcerated within an inguinal hernia sac. It often presents with nonspecific symptoms and is typically diagnosed intraoperatively [1]. This case report discusses the laparoscopic management of a right-sided Amyand's hernia in an elderly male, emphasizing the role of intraoperative vigilance and appropriate surgical decision-making.

## CASE REPORT

An 83-year-old male presented to the surgical outpatients department (OPD) with a complaint of swelling in the right groin region, which became more prominent on straining, with occasional discomfort since 20 days. He had no known comorbidities. He had a history of undergoing open surgical repair of an umbilical hernia 2 years back. On examination, the right inguinal swelling was reducible and exhibited a positive expansile cough impulse; suggestive of right inguinal hernia. The horizontal infra-umbilical scar of the previous umbilical hernia surgery was noted. The patient was then planned for elective laparoscopic right inguinal hernia repair under general anaesthesia. Though the totally extraperitoneal (TEP) is the authors' preferred approach, in view of the infraumbilical scar and previous mesh placement and anticipated adhesions due to the same, it was decided to adopt the trans-abdominal pre-peritoneal (TAPP) approach. Intraoperatively, the right-sided indirect inguinal hernia was found to contain the appendix and mesoappendix within the hernia sac, thereby confirming an Amyand's hernia (Type 1).

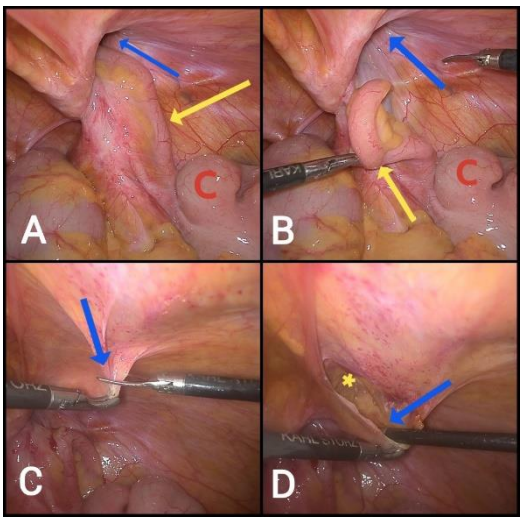


**Fig 1. A) Indirect RIH (blue arrow) with appendix as its content (yellow arrow), red 'C' shows intraabdominal caecum, B) Appendix being reduced, C) Reflection of peritoneal flap during TAPP (blue arrow), D) Development of extraperitoneal space (yellow asterisk) by blunt dissection (blue arrow)**

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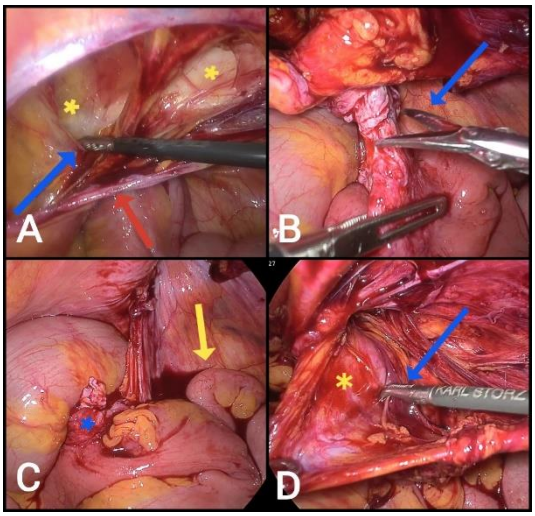


**Fig 2. A) Further development of extraperitoneal space (yellow asterisks) by blunt dissection (blue arrow) anterior to the reflected peritoneal flap (red arrow), B) Division of fibrotic attachment of mesoappendix to indirect ring (blue arrow), C) Fibrotic attachment (blue asterisk) completely divided & appendix reduced to its normal position in right iliac fossa (yellow arrow), D) Right indirect sac (yellow asterisk) being skeletonised (blue arrow)**

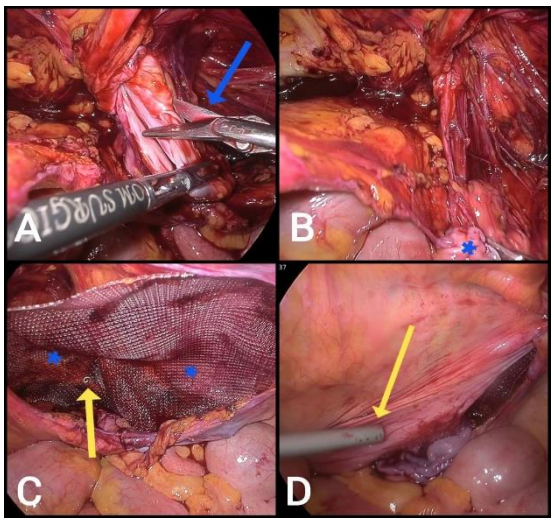


**Fig 3. A) Division of skeletonised right indirect sac (blue arrow), B) Sac completely divided & pushed proximally (blue asterisk), C) Prolene mesh (blue asterisks) placed optimally & tacked to Cooper's ligament (yellow arrow), D) Previously reflected peritoneal flap re-positioned and tacked to parietes so as to extra-peritonealise the mesh (yellow arrow)**

No signs of perforation or abscess were noted (Fig 1A). As the appendix was not inflamed, it was simply reduced (Fig 1B). The peritoneal flap was reflected and extra-peritoneal space developed as part of the hernia repair (Fig 1C, D & 2A). The fibrotic attachment of the meso-appendix to the hernia ring was divided and the appendix was reposited back to the right iliac fossa (Fig 2 B, C). The indirect sac was then skeletonised and divided (Fig 2D & 3A, B). A standard meshplasty was performed, using a 12 X 15 cm Prolene mesh and a Protack hernia tacker (Fig 3C). The peritoneal flap was then repositioned back so as to extra-peritonealise the mesh (Fig 3D). The post-operative course was uneventful. During his post-operative day 10 OPD follow-up visit, all his operative wounds had healed well. At the time of writing this paper, a telephonic interview was conducted with the patient. Twelve months after his surgery, he continues to be asymptomatic.

## DISCUSSION

The condition is named after Claudius Amyand, who, on December 6, 1735, performed the first successful appendectomy on an 11-year-old boy presenting with a right inguinal hernia. During the surgery, Amyand discovered a pin lodged in the appendix, which was surrounded by stones. The appendix was located within the inguinal hernia sac. Consequently, Amyand's hernia (AH) refers to an incarcerated hernia that contains the appendix, which can either be inflamed or normal [2]. It has been documented in individuals aged from 3 weeks to 92 years, frequently diagnosed in children, being three times more likely than in adults, primarily due to the patency of the processus vaginalis in children [2]. A recent systematic review indicated a higher prevalence of AH in men (87.6%) [3].

The incidence of AH is estimated to be around 0.4%-1% of all inguinal hernias [4]. An incarcerated appendix in an inguinal hernia may become inflamed, infected, or perforated. However, in some cases, the appendix remains completely healthy despite being incarcerated, as seen in our case. Appendicitis within an AH hernia constitutes 0.1% of all cases [4]. The occurrence of a perforated appendix within an inguinal hernia is also rare, accounting for 0.1% of appendicitis cases [4]. In females, AH-related appendicitis is often observed in postmenopausal women [4]. The mortality rate of AH hernia ranges from 14% to 30%, primarily due to sepsis spreading through the peritoneum [4]. Amyand's hernia can involve either direct or indirect inguinal hernias. Diagnosing AH before surgery is challenging, and it is often discovered incidentally during surgery.

Patients commonly present with sudden-onset pain in the epigastric or periumbilical area, localized tenderness in the right lower quadrant, and a tender irreducible mass in the inguinal or inguino-scrotal region. The presence of acute appendicitis in AH remains a controversial subject. It is typically caused by extra-luminal obstruction due to pressure at the hernia neck rather than an intraluminal obstruction [5]. The appendix becomes more vulnerable to injury and is eventually trapped by adhesions when it enters the hernia sac. Increased intra-abdominal pressure, such as muscle contractions, can compress the appendix, causing inflammation and potentially disrupting its blood supply, leading to further inflammation and bacterial growth.

Amyand's hernia is most often found on the right side due to the anatomical position of the appendix.

However, left-sided cases have been reported, potentially linked to conditions such as situs inversus, intestinal malrotation, or a mobile cecum [5]. In these cases, an appendectomy is performed if the cecum's base is accessible through the hernial sac. If it is not, an open appendectomy may be performed through a low-midline laparotomy incision. Some suggest performing an appendectomy even in cases of left-sided AH, even if the appendix appears normal, as any future appendicitis could present atypically and delay diagnosis.

Preoperative diagnosis of AH is rare, with most diagnoses made during surgery. Abdominal exams, physical findings, lab results, and imaging studies are not always helpful in differentiating AH from other conditions. When a normal appendix is discovered during surgery, it often does not present with symptoms. However, an inflamed appendix trapped within the inguinal canal can lead to incarcerated hernias, faecal spillage, and sepsis [3]. Common imaging techniques, such as ultrasonography and CT scans, can assist in diagnosing AH. CT is frequently used to evaluate acute abdominal conditions and abdominal hernias.

However, inguinal hernias are typically diagnosed clinically, and imaging is often ordered to exclude other, more serious conditions. The accuracy of ultrasound as a diagnostic tool is heavily dependent on the operator's skill, making it relatively unreliable [4]. The treatment of AH depends on the intraoperative findings. Differential diagnoses can include orchitis, testicular torsion, ovarian inflammation, and bowel inflammation. Laparoscopic appendectomy has become a preferred method of surgery, particularly due to its benefits in reducing the risk of surgical site infections. If the appendix is inflamed, appendectomy is recommended without the use of mesh for hernia repair [5].

Losanoff and Basson's classification system helps guide the surgical treatment of different types of AH. Type 1 consists of a normal appendix within the inguinal hernia. Type 2 refers to acute appendicitis within the hernia sac, but without abdominal sepsis. Type 3 is Acute appendicitis with peritoneal or abdominal wall sepsis. Type 4 is acute appendicitis with other intra-abdominal pathology. This type is related to other findings, which may be incidental to the hernia. According to this system, mesh placement is not recommended in cases of appendicitis (Types 2–4). Patients with any form of appendicitis should undergo an appendectomy, followed by natural tissue repair of the hernia. If appendicitis is not present, the appendix should be reduced back into the abdomen, and mesh can be used to repair the inguinal hernia (Type 1) [6].

To summarise, AH is a rare form of inguinal hernia in which the appendix is incarcerated within the hernia sac. Its diagnosis remains challenging due to its low incidence, vague clinical presentation, and unclear imaging findings. As such, surgery often serves both diagnostic and therapeutic purposes. The appendix may remain healthy or become inflamed in these cases. A review of the literature on reported cases of AH over the last 5 years is summarised (Table 1). A list of named external herniae with interesting rare contents &/or anatomy including AH, is summarised (Table 2).

**Table 1: A review of recent literature on Amyand Hernia over the last 5 years**

| Authors | Pre-operative diagnosis | Time of diagnosis / Condition of appendix | Mode of surgery (open/lap; mesh - Y or N; appendectomy – Y or N) |
|---|---|---|---|
| Hina Khalid et al [6] | Right indirect inguinal hernia | Intraoperative / non inflamed (Type 1) | Open / Y / Y |
| Kasra Hatampour et al [3] | Right indirect inguinal hernia | Intraoperative / Inflamed (Type 2) | Open / Y / N |
| Shu-Yu Wu et al [7] | Right direct inguinal hernia with an incarcerated appendix | Pre-operative (CT scan) / Inflamed (Type 2) | Lap / N / Y |
| Manuel Baldinu et al [8] | Strangulated right inguinal hernia | Intraoperative / Pyogenic inflammation infiltrated the posterior spermatic cord (Type 3) | Open / N / Y |
| Tsalis K et al [9] | Recurrent right inguinal hernia | Pre-operative (CECT) / non inflamed (Type 1) | Lap / Y / N |
| Atsushi Okita [10] | Right incarcerated Indirect inguinal hernia | Intraoperative / Non inflamed (Type 1) | Open / Y / Y |
| Jayateertha Joshi et al [11] | Left irreducible indirect inguinal hernia | Intraoperative / Non inflamed (Type 1) | Open / N / N |
| Khalid Alyahyawi [12] | Incarcerated left sided inguinal hernia | Intraoperative / Non inflamed (Type 1) | Open / Y / N |
| Faranak Olamaeian et al [13] | Right sided inguinal hernia | Intraoperative / Inflamed (Type 2) | Open / Y / Y |

**Table 2: Named abdominal/groin hernias with unusual contents**

| Sr. No | Name of Hernia | Content | Named after | Year of Discovery |
|---|---|---|---|---|
| 1 | **Richter's Hernia** | Only part of the bowel wall involved | Hans Richter, Germany | 1700s |
| 2 | **Maydl's Hernia** | Loop of bowel protruding through multiple defects | Otto Maydl, Austria | 1900 |
| 3 | **Amyand's Hernia** | Typically, inguinal hernia where the appendix is the content, can occur in other locations as well | Claudius Amyand, Britain | 1735 |
| 4 | **Gibbon's Hernia** | Associated with a hydrocele | Edward Gibbon, English historian who suffered from it | 1780s |
| 5 | **Littre Hernia** | Inguinal hernia where Meckel's diverticulum is the content | René Litré, France | 1700 |
| 6 | **De Garengeot hernia** | Femoral hernia where the appendix is the content | René-Jacques De Garengeot, France | 1731 |
| 7 | **Narath Hernia** | Femoral hernia where hernial sac protrudes behind the femoral vessels in the groin, typically occurring in individuals with congenital hip dislocation | Albert Narath, France | 1949 |
| 8 | **Laugier Hernia** | Hernial sac pushes through the lacunar ligament into the thigh | Henrie de Laugier, France | 1833 |
| 9 | **Serafini Hernia** | Femoral hernia in which hernial sac emerges behind femoral vessels | Luigi Serafini, Italy | |
| 10 | **Velpeau Hernia** | Femoral hernia in which hernial sac lies in front of the femoral blood vessels | Alfred Velpeau, France | 1820s |
| 11 | **Cloquets Hernia** | Femoral hernia in which hernial sac protrudes through the pectineal fascia, essentially passing over the pectineus muscle and into the thigh | Jules Germain Cloquet, France | 1820s |
| 12 | **Beclard's Hernia** | Femoral hernia in which hernial sac protrudes through the saphenous opening | Pierre Augustin Beclard, France | 1825 |
| 13 | **Grynfeltt–Lesshaft Hernia** | Occurs in the superior lumbar triangle (lined by the 12th rib, the internal oblique muscle, and the erector spinae muscle) | Franz Grynfeltt & Johann Friedrich Lesshaft Germany | 1854 |
| 14 | **Petit Hernia** | Occurs in the inferior lumbar triangle (lined by the iliac crest, external oblique muscle, and latissimus dorsi muscle) | Jean Louis Petit, France | 1743 |
| 15 | **Spigelian Hernia** | Occurs through the Spigelian fascia, which is a layer of connective tissue located between the muscles of the abdomen, specifically in the area of the semilunar line | Adriaan van den Spieghel, Holland | 1627 |

## CONCLUSION

Amyand's hernia, though rare, should be considered during hernia repair, especially when unusual intraoperative findings are encountered. Laparoscopic approaches allow for effective diagnosis and tailored treatment. In cases where the appendix is normal, reduction and mesh repair yield excellent outcomes.

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