

Unveiling Amyand's Hernia: Clinical Perspectives and Surgical Approaches

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Abstract:

Amyand's hernia, a rare variant of inguinal hernia characterized by the presence of the appendix within the hernial sac, poses diagnostic and management challenges. This case series presents five cases of Amyand's hernia treated at medical institutions in India between 2020 and 2023. Clinical presentations varied, with cases ranging from incidental findings during hernia repair to acute appendicitis within the hernia sac. Surgical interventions included hernia repair, appendectomy, and management of associated complications. The discussion encompasses clinical characteristics, diagnostic challenges, surgical approaches, and classification systems guiding management decisions. Additionally, emphasis is placed on individualized treatment strategies based on the appendix's inflammatory state, presence of abdominal sepsis, and patient comorbidities. This report aims to enhance awareness and understanding of Amyand's hernia, facilitating improved diagnosis and management in clinical practice.

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Introduction

Hernia is a broad term describing a protrusion of an organ or tissue through an abnormal opening within the anatomic structure holding it. Most of the hernias are related to the abdomen, with approximately 75% occurring in the inguinal region [1]. While hernial sacs can encompass a spectrum of anatomical structures, the appendix is rare. Claudius Amyand documented the first case in 1735, successfully removing an appendix from an 11-year-old boy [2]. The term "Amyand's hernia" gained traction over several decades: first proposed by Creese in 1953, further advocated by Hiatt and Hiatt in 1988, and ultimately established by Hutchinson in 1993 [3]. While Amyand's hernia occurs in 0.19%-1.7% of all hernias, appendicitis within an inguinal hernia is even rarer, estimated at 0.07%-0.13% [4].

This case series report presents five cases of Amyand's hernia treated at Guntur Medical College and Government Medical College, Vizianagaram, in Andhra Pradesh, India between 2020 and 2023. Our

objective is to enhance surgical awareness of this uncommon hernia variant by emphasizing the importance of recognizing its diverse clinical manifestations and implementing appropriate management strategies.

Case 1

A 55-year-old man presented with a right inguinal hernia for one year, initially manifesting as occasional dull pain. Over the past four months, the hernia progressively increased in size and became non-reducible. Examination revealed a single, non-tender, partially reducible, pyriform-shaped swelling in the right groin with a positive cough impulse. The surgical exploration revealed an indirect hernia sac containing an appendix without signs of inflammation, along with omental adhesions within the sac. An appendectomy was performed alongside a Lichtenstein repair using a monofilament knitted polypropylene mesh.

Following treatment with broad-spectrum antibiotics, the patient was discharged three days post-surgery. Subsequent follow-up at one month showed no signs of infection at the surgical site.

Histopathological analysis of the appendix demonstrated significant congestion and prominent lymphoid follicular hyperplasia.

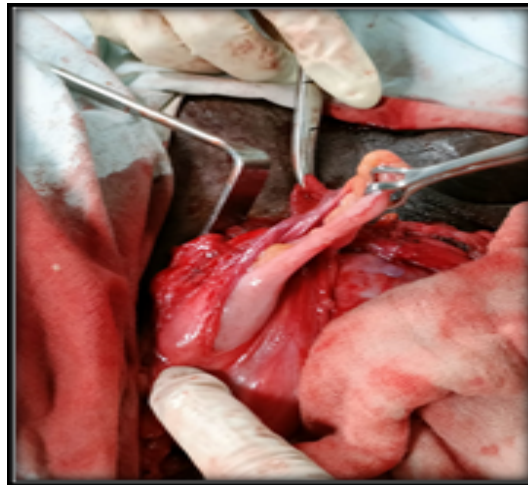


Figure 1: Sac with appendix and omental adhesions

Case 2

A 37-year-old man with an 8-year history of a right-sided, reducible inguinal hernia presented with a 3-day history of fever, increasing right groin pain, and two episodes of vomiting. The previously reducible hernia became irreducible 3 days prior to presentation. Laboratory tests revealed leukocytosis and neutrophilia. Ultrasound examination of the abdomen and right groin confirmed an irreducible hernia containing a blind, non-contracting tubular structure. Surgical exploration identified the cecum

with an inflamed appendix tip adhered to the hernia sac. Adhesiolysis and appendectomy were performed, followed by a modified Bassini's herniorrhaphy. The patient was discharged on postoperative day 8 without complications. He showed no signs of inflammation or recurrence at the 1-month follow-up visit. Pathological analysis of the appendectomy specimen revealed features consistent with acute appendicitis, including congestion, neutrophilic infiltration, and lymphoid hyperplasia.



Figure 2: Sac with inflamed appendix

Case 3

A 64-year-old man with a known right inguinal hernia for 3 years presented with 5 days of progressive, dragging pain in the right groin. He had no fever or vomiting. Examination revealed a partially reducible hernia. Ultrasound confirmed a 5 cm defect with protruding bowel loops extending

into the scrotum. Surgery revealed a "sliding hernia" containing the cecum, ileo-cecal junction, and a normal appendix. These structures were safely returned to the abdomen, the hernia sac was closed, and a Lichtenstein repair was performed. He recovered uneventfully and was discharged home on postoperative day 5. No complications or recurrences were noted at the 1-year follow-up.

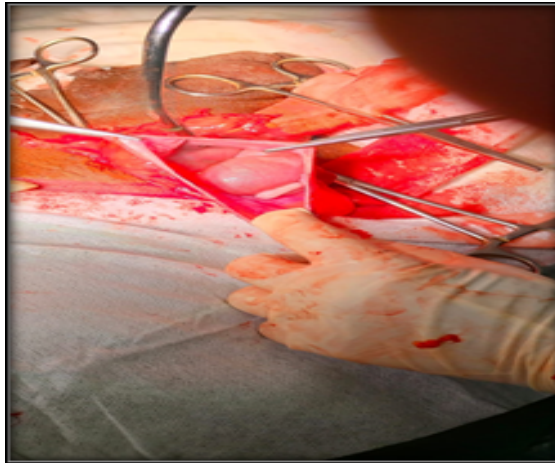


Figure 3: Sliding hernia sac with appendix

Case 4

A 57-year-old man with a progressively enlarging and partially reducible right groin swelling for one year experienced sudden pain in the same area for three days, accompanied by fever, vomiting, and inability to reduce the swelling. Ultrasound revealed a trapped bowel loop with active movement. Elevated inflammatory markers (CRP, white blood cell count with neutrophil predominance) suggested infection. Emergency surgery identified 50ml of bloody fluid, a inflamed appendix with perforated

tip and cecum, and adhesions involving the omentum. An appendectomy, removal of adhesions, and partial omentectomy were performed, followed by a modified Bassini's hernia repair. He developed a surgical site infection on the 4th postoperative day, treated with wound drainage, broad-spectrum antibiotics, and pain management. He recovered well and was discharged on the 15th day with secondary wound closure on the 10th day. No further complications or hernia recurrence were seen at the 6-month follow-up.

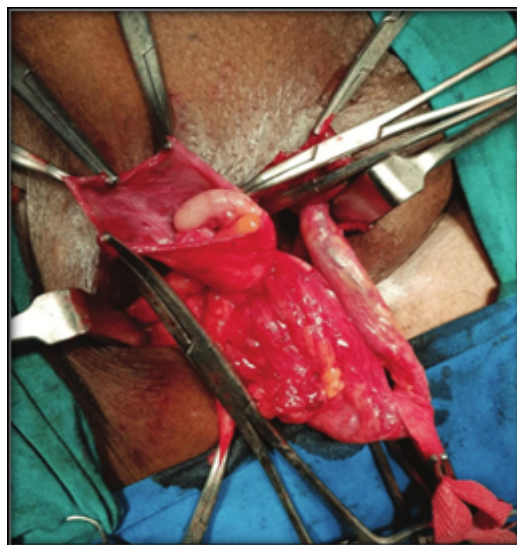


Figure 4: Sac with inflamed appendix and omental adhesions

Case 5

A 60-year-old man with a 6-month history of a right-sided, reducible groin lump developed 3 days of pain in the same area. He had no fever or vomiting. Examination revealed a firm, non-reducible, tender 8x5 cm swelling in the right groin that didn't enlarge

with coughing (negative cough impulse). Both testicles were felt separately. Surgery revealed an inflamed appendix within the hernia sac. An appendectomy and a Lichtenstein hernia repair were performed. The patient recovered well and was discharged home on the 6th day after surgery. Biopsy confirmed acute appendicitis.

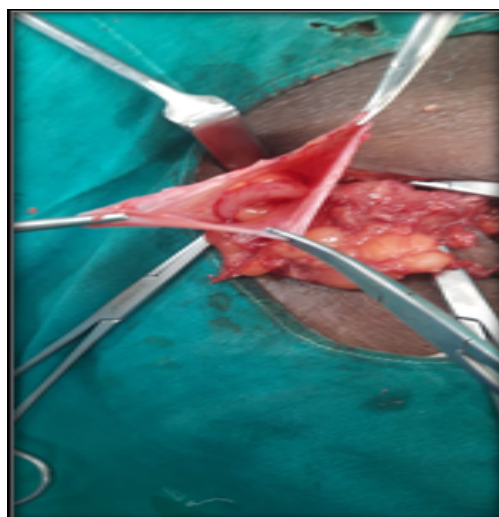


Figure 5: Sac with inflamed appendix

Table 1: Characteristics of the five amyand’s hernia patients

Case No	Age	Sex	Clinical presentation	Imaging	WBC/CRP	Amyand’s hernia type
1	55	Male	Right inguinal hernia with dull pain	Ultrasound	Normal	1
2	37	Male	Inguinal hernia associated with right lower quadrant abdominal pain	Ultrasound	Elevated	2
3	64	Male	Partially reducible right inguinal hernia	Ultrasound	Normal	1
4	57	Male	Right inguinal hernia with right lower abdominal pain	Ultrasound	Elevated	2
5	60	Male	Globular non-reducible firm tender swelling	Ultrasound	Elevated	2

Characteristics of the five amyand’s hernia patients (cont.)

Appendix	Appendectomy	Hernia repair technique	Surgical wound infection	Discharge (days)	Deaths
Normal	Yes	Lichtenstein repair	No	3	No
Inflamed	Yes	Modified Bassini’s repair	No	8	No
Normal	No	Lichtenstein repair	No	5	No
Perforated	Yes	Modified Bassini’s repair	Yes	15	No
Inflamed	Yes	Lichtenstein repair	No	6	No

Discussion

A hernia occurs when a viscus or part of a viscus pushes through the wall of the cavity that normally holds it. The most common type, an inguinal hernia, usually involves intestines or omentum. While less frequent, other hernias can involve the bladder, Meckel's diverticulum (Littre's hernia), or a portion of the intestine (Richter's hernia). Despite being first described in 1735 by Claudius Amyand, Amyand's hernia, involving the appendix within the inguinal sac, remains relatively rare [5,6].

Amyand's hernia, a rare condition, occurs when an inguinal hernia contains either an inflamed or non-inflamed appendix. While approximately 1% of inguinal hernias contain a normal appendix, only 0.1% develop appendicitis within the hernial sac [6].

This rarity often stems from the appendix's usual anatomical position on the right side, coinciding with the higher prevalence of right-sided inguinal hernias. While typically associated with the right side, left-sided Amyand's hernias, albeit rare, have been documented in literature, often linked to conditions like situs inversus, gut malrotation, or a mobile caecum [7,8].

While Amyand's hernia can occur at any age, it's diagnosed three times more often in children due to occasional patent processus vaginalis during their development leading to a higher prevalence of indirect hernias in this age group [9,10]. Interestingly, most reported cases involve premature newborns and young children, with surgery typically performed between 5 days old and 16 months [11].

In contrast, adults tend to develop amyand's hernia later, with a second peak around 70 years old and a higher incidence of direct hernias [12].

The exact mechanisms behind Amyand's hernia formation remain unclear. Acute appendicitis in Amyand's hernia is frequently caused by extraluminal obstruction due to pressure on hernia neck by a narrow deep inguinal ring or from an intraluminal obstruction by a fecolith [13]. The appendix can become trapped within the hernia sac due to the formation of adhesions, scar tissue that develops after inflammation or injury. This entrapment, combined with repeated compression from changes in intra-abdominal pressure and muscle contractions, can restrict blood flow to the appendix and lead to inflammation, potentially progressing to strangulation [14,15]. Translocation

of virulent bacteria through the hernia sac into subcutaneous and surrounding tissues promotes the rapid spread of disease leading to localized ischemia and Fournier's gangrene [15,16].

A simplified classification of Amyand's hernia was defined by Fernando and Leelaratra where they depicted an inguinal hernia containing: (a) a non-inflamed appendix, (b) an inflamed appendix, or (c) a perforated appendix [17]. In 2007, Losanoff and Basson proposed a more comprehensive classification system for Amyand's hernia. Unlike the previous system, theirs focuses not just on the appendix's state but also on the presence or absence of appendicitis and the extent of inflammation. This classification helps guide surgical decision-making, particularly regarding mesh use in adults [18].

Table 2: Losanoff and Basson's Classification of Amyand's hernia

Losanoff and Basson's Classification of Amyand's hernia		
Type	Description	Surgical management
Type 1	Normal appendix within an inguinal hernia	Hernia reduction, mesh repair, appendectomy only in young patients
Type 2	Acute appendicitis within an inguinal hernia, no abdominal sepsis	Appendectomy through hernia, primary repair of hernia, no mesh
Type 3	Acute appendicitis within an inguinal hernia, abdominal wall or peritoneal sepsis	Laparotomy, appendectomy, primary repair of hernia, no mesh
Type 4	Acute appendicitis within an inguinal hernia, related or unrelated abdominal pathology	Manage as type 1 to 3 hernia, investigate or treat second pathology as appropriate

Diagnosing Amyand's hernia before surgery is challenging. Physical exams, lab tests, and even imaging tools often miss it. While CT scans can help, they aren't routinely used for uncomplicated inguinal hernias, leading to missed diagnoses [19]. Ultrasound offers a cheaper and more convenient option, especially for patients in pain [20]. However, its accuracy relies heavily on the operator's skill, making it unreliable [13]. Laparoscopic surgery can combine diagnosis and treatment [21], but a recent review suggests CT remains the most definitive method [22].

There is substantial agreement regarding the surgical treatments for types 3 and 4, which necessitates an appendectomy with a primary hernia repair and refrainment of mesh [16]. Largely, the primary management for Amyand's hernia with a non-inflamed appendix is hernia repair without appendectomy [23]. While the Losanoff and Basson classification helps guide surgical decisions for Amyand's hernia, it's not without limitations. Kose et al. highlight ongoing debate about the best approach for types 1 and 2, especially with the emergence of new, previously unrecognized forms of the condition. One such example involves an appendix tethered to the hernia sac by fibrous bands, making safe removal without appendectomy challenging. This complexity necessitates further refinement of the classification system to encompass

such variations and ensure optimal treatment strategies [24].

Conclusion

Amyand's hernia is a rare presentation of inguinal hernia and diagnosed incidentally during surgery. The management should be individualised according to the appendix's state of inflammation, presence of abdominal sepsis and co-morbidity.

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