Amyand's Hernia in Children: Intraoperative Finding, A Rare Case Report From dr. Azhar Zahir Naval Hospital, Manokwari, West Papua

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Abstract.
Amyand's hernia is a rare type of inguinal hernia in which the vermiform appendix is found within the hernia sac. Preoperative diagnosis is challenging because its clinical presentation often resembles an incarcerated inguinal hernia, making intraoperative diagnosis common. A 1-year-old boy presented with an irreducible right inguinal swelling that had been present since infancy and became non-reducible one week before admission. Physical examination revealed an irreducible right inguinal mass, while laboratory findings were unremarkable. No preoperative imaging was performed, and the patient underwent emergency herniotomy. Intraoperative exploration revealed the cecum and an edematous, hyperemic vermiform appendix within the hernia sac, consistent with Amyand's hernia complicated by acute appendicitis. Appendectomy followed by primary hernia repair without mesh was performed. The postoperative course was uneventful, and the patient was discharged on the third postoperative day without complications. Amyand's hernia remains a rare and difficult preoperative diagnosis in pediatric patients. Intraoperative recognition is essential for appropriate surgical management. This case supports the use of appendectomy and primary hernia repair without mesh for Type 2 Amyand's hernia, resulting in an excellent postoperative outcome.

Keywords: *Amyand's Hernia; Acute Appendicitis; Inguinal Hernia; Pediatric Surgery and Appendectomy.*

I. INTRODUCTION

Inguinal hernia is a condition characterized by the protrusion of abdominal organs through the inguinal canal, with the small intestine being the most commonly encountered content, although other less frequently observed organs such as the cecum, vermiform appendix, sigmoid colon, or ureter may also be present [1]. Amyand's hernia is a very rare type of inguinal hernia in which the vermiform appendix is found within the hernia sac, first described by a French surgeon, Claudius Amyand, in 1735 at Saint George's Hospital in London [2]–[4]. In pediatric populations, this entity remains exceedingly rare, with reported incidence estimates ranging from approximately 0.19% to 1.7% of inguinal hernias, underscoring its status as a diagnostically challenging and uncommon clinical entity in children [4]. The incidence of Amyand's hernia is less than 1% of all inguinal hernias, with fewer than 0.08% associated with acute appendicitis (2-4), and the prevalence with a perforated appendix is approximately 0.1% (5). The prevalence of acute appendicitis within Amyand's hernia is exceedingly rare, with reports indicating an incidence around 0.07% to 0.13% of all appendicitis cases, highlighting the diagnostic and therapeutic challenges posed by this entity [5]. This condition is more commonly observed in males and is most prevalent in pediatric populations [2], [6].

The pathogenesis of Amyand's hernia, particularly in relation to acute appendicitis, is not yet fully understood. The pediatric predilection is commonly explained by a persistent processus vaginalis (patent peritoneal-vaginal canal), which predisposes the appendix to be incarcerated within an inguinal sac during development and ongoing growth [4], [7]. Some studies suggest that fibrous bands may form between the vermiform appendix and the testis, acting as a "guide" for the appendix to pass through a patent processus vaginalis, thereby resulting in herniation [2], [8]. Other studies indicate that Amyand's hernia may develop due to microtrauma, adhesions, and recurrent inflammation caused by the movement of the appendix into the hernia sac [8]. Sudden increases in intra-abdominal pressure and abdominal muscle contractions may compress the appendix, leading to further inflammation, which may result in compromised blood supply and ischemia, contributing to inflammation and excessive bacterial growth [9].

In most cases, the diagnosis of Amyand's hernia is made intraoperatively, although preoperative diagnosis is possible in some cases [10]. Clinically, Amyand's hernia often presents as a tender, irreducible inguinal swelling, and a preoperative diagnosis is frequently elusive; many cases are first recognized intraoperatively when the hernial sac is opened and the appendix is identified within the sac [7], [11], [12]. Physical examination, laboratory investigations, and imaging modalities such as contrast-enhanced computed tomography (CT) or ultrasonography can sometimes aid in establishing the diagnosis, but their role is typically adjunctive rather than diagnostic in most pediatric cases, with intraoperative confirmation remaining the gold standard in many instances [5], [11], [12].

The optimal management strategy for Amyand's hernia remains controversial and should be tailored to the individual patient's condition. Losanoff and Basson classified Amyand's hernia into four types based on the clinical status of the appendix and the appropriate surgical management [10], with subsequent pediatric-focused adaptations proposed to address unique considerations in children [12]. When the appendix is inflamed, appendectomy through the hernial sac with herniotomy is commonly performed, whereas the management of a non-inflamed appendix within the sac varies and is guided by established classification schemes that seek to standardize decision-making in these rare cases [11], [12]. The use of mesh in contaminated surgical fields may increase the risk of postoperative infection, so in cases associated with appendicitis, appendectomy without mesh repair is recommended. In cases of Type 1 Amyand's hernia, laparoscopic surgery is a suitable option to minimize the risk of postoperative infection and reduce excessive manipulation at the base of the cecum, thereby lowering the risk of recurrence [10]. In recent years, there has been increasing recognition of laparoscopic approaches for Amyand's hernia, particularly in select cases, underscoring a shift toward minimally invasive strategies in appropriate settings [5], [12].

The present report contributes to this body of literature by detailing an intraoperative finding of Amyand's hernia in a pediatric patient, illustrating the practical application of established concepts (definition, diagnostic challenges, and management frameworks) in the context of a real-world case. By synthesizing the experiences reported in pediatric and adult cases, this introduction reinforces the relevance of recognizing Amyand's hernia during surgery for a suspected inguinal hernia, and it emphasizes how available evidence supports intraoperative decision-making, the potential role of imaging as an adjunct, and the value of classification-driven strategies to optimize outcomes for children facing this rare entity [4], [7], [11], [12]. In this case, we report an incidental intraoperative finding of Amyand's hernia, along with a detailed literature review emphasizing the surgical management of this rare condition.

II. CASE REPORT

A 1-year-old male from Manokwari, West Papua, Indonesia, was brought to the emergency department by his parents with a chief complaint of a right inguinal bulge. According to the parents, the swelling had first been noticed when the patient was approximately 3 months old. The mass typically appeared during physical activity and became more prominent when the child cried or strained, while it spontaneously reduced during periods of rest. One week prior to hospital admission, the inguinal swelling became irreducible and remained persistently visible. In addition, the patient experienced difficulty with defecation for two days before presentation. There were no associated symptoms of pain, fever, nausea, vomiting, abdominal distension, urinary complaints, or changes in appetite. The patient had no previous history of abdominal surgery or other significant medical conditions.

On physical examination, the patient appeared in good general condition with stable vital signs. A palpable, irreducible mass was identified in the right inguinal region without overlying skin discoloration or signs of local inflammation. The abdomen was soft without generalized tenderness or peritoneal irritation. Routine laboratory investigations, including complete blood count and basic biochemical tests, were within normal limits, showing no evidence of systemic infection or metabolic abnormalities. No radiological imaging, including ultrasonography, was performed because the clinical findings were considered sufficient to establish the diagnosis of an irreducible right lateral inguinal hernia requiring urgent surgical intervention.

The patient subsequently underwent herniotomy under general anesthesia. During exploration of the hernia sac, the cecum and vermiform appendix were unexpectedly identified as hernia contents.

Intraoperative examination revealed that the appendix was edematous and hyperemic, consistent with acute inflammation, although no evidence of perforation, abscess formation, or generalized contamination was observed (Figure 1). Based on these findings, an appendectomy was performed to remove the inflamed appendix, followed by standard hernia repair with high ligation of the hernia sac (Figure 2). The operative findings established the diagnosis of Amyand's hernia associated with acute appendicitis.

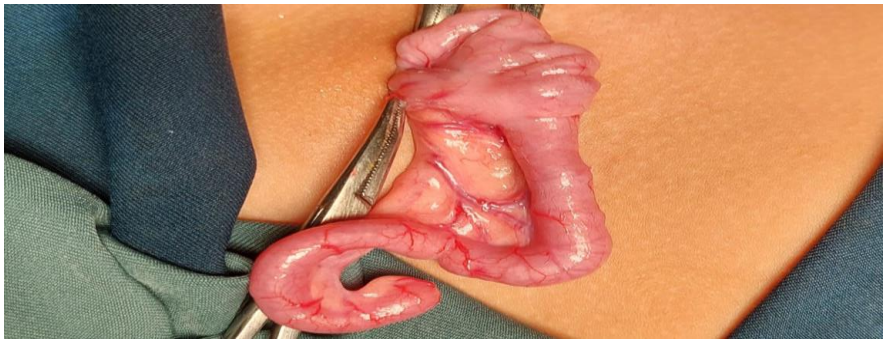

Fig. 1. Inflamed Appendix Vermiformis (Acute Appendicitis) inside The Hernia Sac

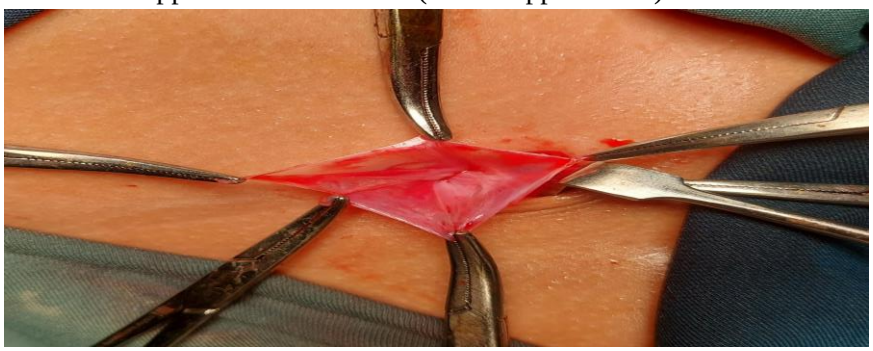

Fig. 2. Hernia Sac

The postoperative course was uneventful. The patient received routine postoperative monitoring and supportive care during a two-day hospital stay. Recovery progressed without evidence of wound infection, fever, bowel dysfunction, or other surgical complications. The patient tolerated oral intake well, and no significant complaints related to the operative site were reported. He was discharged home in stable condition on the third postoperative day with recommendations for routine outpatient follow-up. This case highlights the rare occurrence of Amyand's hernia in the pediatric population and emphasizes that the diagnosis is frequently established intraoperatively because its clinical presentation often resembles that of an incarcerated or irreducible inguinal hernia. Early surgical management resulted in a favorable outcome without postoperative complications.

III. DISCUSSION

Amyand's hernia is a rare entity, accounting for less than 1% of all inguinal hernias, while the presence of acute appendicitis within the hernia sac occurs in fewer than 0.08% of cases.2,3 It is more frequently reported in pediatric patients, particularly males, and predominantly occurs on the right side because of the normal anatomical position of the cecum and vermiform appendix.9,10 The pathogenesis of Amyand's hernia complicated by acute appendicitis remains controversial. Several mechanisms have been proposed, including increased intra-abdominal pressure during abdominal muscle contraction, which may compress the appendix within the hernia sac, as well as extraluminal obstruction caused by constriction at the hernia neck, leading to impaired blood supply, inflammation, and eventually appendicitis [10], [13]. In the present case, a 1-year-old boy presented with an irreducible right inguinal hernia, and intraoperative exploration unexpectedly revealed an inflamed vermiform appendix within the hernia sac, confirming the diagnosis of Amyand's hernia.

Preoperative diagnosis of Amyand's hernia remains difficult because its clinical presentation is usually indistinguishable from that of an incarcerated or strangulated inguinal hernia.9,11 Most patients present with a reducible or irreducible inguinal swelling, while abdominal pain, nausea, vomiting, scrotal

pain, or lower abdominal discomfort may or may not be present [2], [13]. Consequently, the diagnosis is often established incidentally during surgery, as occurred in our patient. Although ultrasonography and computed tomography (CT) are not routinely indicated in uncomplicated inguinal hernias, they may facilitate preoperative diagnosis by demonstrating the appendix within the hernia sac [3], [13]. Ultrasonography may reveal a blind-ending tubular structure with increased vascularity and wall thickening, whereas CT provides superior anatomical detail, including appendiceal enlargement, periappendiceal fat stranding, fluid collection, and cecal wall thickening suggestive of acute appendicitis [14]–[16]. In the present case, no preoperative imaging was performed because the clinical findings were sufficient to indicate urgent surgical exploration.

The surgical management of Amyand's hernia remains controversial and should be individualized according to the condition of the appendix and the degree of contamination. Losanoff and Basson proposed a widely accepted classification that categorizes Amyand's hernia into four types based on intraoperative findings and recommends the appropriate surgical management for each type [10].

Table 1. Losanoff and Basson Classification of Amyand's Hernia

Classification	Description	Surgical Management
Type 1	Normal appendix with an inguinal hernia	Hernia reduction, mesh repair, appendectomy in young patients
Type 2	Acute appendicitis within an inguinal hernia, no abdominal sepsis	Appendectomy through hernia, primary endogenous 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

According to this classification, Type 1 consists of a normal appendix within an inguinal hernia and is generally managed with hernia reduction and mesh repair, with appendectomy considered mainly in young patients. Type 2 involves acute appendicitis confined to the hernia sac without abdominal sepsis and is treated with appendectomy through the hernia sac followed by primary tissue repair without mesh. Type 3 includes appendicitis associated with abdominal wall or peritoneal sepsis, requiring laparotomy, appendectomy, and primary hernia repair without mesh. Type 4 is characterized by Amyand's hernia associated with other intra-abdominal pathology, with treatment tailored according to both the hernia type and the associated disease [17], [18].

The role of mesh repair in Amyand's hernia complicated by appendicitis remains a matter of debate. Most authors discourage mesh implantation in contaminated operative fields because prosthetic materials may increase the risk of surgical site infection and chronic mesh-related complications [10]. Nevertheless, several reports have demonstrated satisfactory outcomes with selective mesh use in carefully chosen patients with minimal inflammation and no gross contamination. A patient with Amyand's hernia complicated by appendicitis who underwent appendectomy without mesh repair and experienced an uneventful recovery without postoperative infection [19]. Similarly, a case reported by Youssef et al. described successful appendectomy and mesh repair in a patient with only mild-to-moderate appendiceal inflammation, while Favorable outcomes after appendectomy and mesh placement in selected cases with minimal inflammatory changes [20].14,15 These reports suggest that although mesh repair may be feasible in highly selected patients, the decision should be individualized based on the extent of inflammation and the degree of contamination encountered intraoperatively.

In the present case, the appendix appeared edematous and hyperemic without perforation or evidence of abdominal sepsis, corresponding to Type 2 Amyand's hernia according to the Losanoff and Basson classification. Therefore, appendectomy followed by primary herniotomy without mesh was performed, consistent with current recommendations. The patient had an uncomplicated postoperative course, received analgesic and antibiotic therapy with metamizole and cefotaxime, and was discharged on the third postoperative day without evidence of surgical site infection or other complications.

This case highlights the diagnostic challenge of Amyand's hernia, which is frequently identified only during surgery despite careful clinical evaluation. Furthermore, it emphasizes the importance of intraoperative assessment in guiding surgical decision-making according to the Losanoff and Basson classification. Our report adds to the limited literature on pediatric Amyand's hernia and supports appendectomy with primary hernia repair without mesh as an effective management strategy for Type 2 Amyand's hernia, resulting in a favorable postoperative outcome.

IV. CONCLUSION

Amyand's hernia is a rare form of inguinal hernia in which the vermiform appendix is found within the hernia sac, and its preoperative diagnosis remains challenging because the clinical presentation often mimics an incarcerated inguinal hernia. Consequently, the diagnosis is frequently established intraoperatively. This case demonstrates that prompt surgical exploration allows definitive diagnosis and appropriate treatment. In patients with Type 2 Amyand's hernia, appendectomy followed by primary hernia repair without mesh is an appropriate management strategy and can result in a favorable postoperative outcome. Increased awareness of this uncommon condition and adherence to established surgical classifications may facilitate optimal intraoperative decision-making and improve patient outcomes.

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