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CASE REPORT

Amyand's Hernia in a Low-Resource Setting: Surgical Challenges and Experience – A Case Report

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Abstract

Background Amyand's hernia is a rare condition in which the appendix is found within the hernia sac, with or without signs of appendicitis. Its management depends on the condition of the appendix and the availability of surgical resources.

Case Presentation We present the case of a 45-year-old sub–Saharan African man, a farmer who presented with a 10-year history of intermittent right inguinoscrotal swelling. Intraoperatively, the appendix was incidentally found within the hernia sac, without signs of inflammation. An appendectomy was performed, followed by primary tissue repair. He had an uneventful postoperative recovery.

Conclusion Amyand's hernia, though uncommon, is a critical differential diagnosis in inguinal hernias. This case highlights the challenges faced by surgeons in resource-limited settings, who must balance evidence-based surgical principles with practical constraints. Our experience emphasizes the importance of meticulous inspection of hernia sac contents before intervention and tailored operative approaches, considering patient-specific factors and available resources, to optimize outcomes.

Keywords Amyand's hernia · Inguinal hernia · Appendectomy · Resource-limited settings

Background

An inguinal hernia is characterized by the protrusion of abdominal contents through a defect in the transversalis fascia at the inguinal canal. This disorder is highly prevalent in the general population [1]. The omentum and intestinal loops are frequently incarcerated within the inguinal canal. Appendicitis, like inguinal hernia, is a prevalent and typically straightforward general surgical procedure [2]. An Amyand's hernia is a rare subtype of hernia characterized by the presence of the appendix, either inflamed or normal, in the inguinal hernia sac. It was named after Claudius Amyand, a French-born English surgeon who successfully performed and recorded an inguinal hernia repair in a 11-year-old patient. The patient was found to have a vermiform appendix in his hernia sac. Since then, the presence of a vermiform appendix in a hernia sac has been deemed an "Amyand's hernia" [3].

The prevalence of Amyand's hernia is between 0.19% and 1.7% among documented hernia cases. It is encountered more frequently in children, a finding attributed to the persistent patency of the processus vaginalis, which predisposes them to hernia formation [4]. It is most often incidentally discovered intraoperatively during a right-sided inguinal hernia surgery or on imaging using either ultrasound or computed tomography (CT). CT allows direct visualization of the appendix inside the inguinal canal and helps make an accurate diagnosis [5].

According to the level of appendix inflammation, Fernando et al. divided Amyand's hernia into three categories: (A) an intact appendix devoid of inflammation, (B) an appendix exhibiting indications of inflammation, and (C) a perforated appendix [6]. Approximately 90% of all cases are Type A. Appendectomy is required for types B and C [6, 7].

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Losanoff et al. also classified it into stages ranging from 1 to 4 [8] (Table 1).

Inguinal hernia is primarily a clinical diagnosis and usually does not require additional paraclinical investigations. While the specific contents of the hernia sac are most often identified intraoperatively, imaging modalities such as ultrasound or computed tomography (CT) can occasionally demonstrate them preoperatively [9]. However, in many low-resource settings, such imaging is either unavailable or not routinely performed, making intraoperative discovery the norm.

The standard repair in high-resource settings is the Lichtenstein mesh technique, which is tension-free and associated with lower recurrence rates and shorter hospital stays [10, 11]. However, in low-resource settings where prosthetic mesh is rarely available, the Bassini hernia repair is frequently employed due to its relative simplicity and lower dependence on material resources [12]. When Amyand's hernia is encountered, surgical management depends on the condition of the appendix. If the appendix is normal (Losanoff type 1), mesh repair is generally safe and preferred to reduce recurrence [6, 8, 13]. If the appendix is inflamed but not perforated (type 2), appendectomy with primary tissue repair is often performed, although some authors have reported safe use of mesh in carefully selected cases [6, 14]. In cases of perforated appendix or peritonitis (types 3–4), prosthetic materials are contraindicated, and tissue-based techniques such as Bassini or Shouldice repair are recommended [6, 8, 15].

In low-resource settings, hernia management is often shaped by limited access to diagnostic tools, mesh materials, and anesthesia services. International guidelines recommend tension-free mesh repair under local anesthesia as the standard approach, but in many low- and middle-income countries (LMICs), commercial mesh is either unavailable or unaffordable. In such cases, tissue-based techniques such as the Bassini or Shouldice repair remain widely practiced, and several studies have demonstrated that low-cost or non-commercial mesh alternatives (sterilized polypropylene mesh) can be safe and effective [16–18]. Delays in accessing elective surgery, often due to financial and infrastructural constraints, increase the risk of emergency presentations, which are associated with higher morbidity and mortality [19]. These realities highlight the importance of context-specific surgical decision-making, particularly in sub-Saharan Africa and other resource-limited regions.

Although Amyand's hernia is rare and most frequently reported from high-resource settings where advanced diagnostic modalities and prosthetic mesh are readily available, only a few cases have been documented in sub-Saharan Africa [20, 21]. This scarcity of reports reflects both its rarity and the diagnostic limitations in resource-limited environments. In such settings, surgical decision-making is strongly influenced by the availability of anesthesia, suture materials, and prosthetic mesh, as well as by the heightened risk of infection. We report the case of 45-year-old sub–Saharan African male patient with Amyand's hernia, discovered incidentally during elective hernia surgery in a secondary-level district hospital in Cameroon. This case highlights not only the clinical presentation but also the context-specific challenges of operative management in low-resource environments, thereby offering lessons that may inform surgical practice in similar settings.

Case Presentation

A 45-year-old sub-Saharan African man, a farmer, presented with a 10-year history of intermittent right inguinoscrotal swelling. The swelling gradually increased in size and caused occasional discomfort during intensive farm work, without significant pain. He denied nausea, vomiting, fever, or bowel habit changes. Past medical history was unremarkable, with no prior abdominal surgery or chronic illness. He had previously been diagnosed with a right inguinoscrotal hernia but declined surgery on several occasions because of financial constraints and minimal symptoms.

On physical examination, a non-tender, mildly reducible right inguinoscrotal swelling was observed, without erythema or skin changes. The abdomen was soft and non-tender on palpation with normoactive bowel sounds and there was no clinical evidence of bowel obstruction or peritonitis.

Table 1 Classification for Amyand's hernia and current management options according to the literature [6, 8]

Classification	Description	Management options
1*A^	Normal appendix in an inguinal hernia	Hernia reduction, mesh repair without appendectomy
2*B^	Acute appendicitis in an inguinal hernia without abdominal sepsis	Appendectomy, primary repair of hernia without mesh
3*C^	Acute appendicitis in an inguinal hernia, with abdominal wall or peritoneal sepsis	Laparotomy, appendectomy, primary repair without mesh
4	Acute appendicitis in an inguinal hernia, with abdominal pathology	Manage as type 1–3, investigate pathology as needed

*Types from 1 to 4 (Losanoff-Basson)

^Types from A to C (Fernando and Ceulemans)

A diagnosis of an uncomplicated right inguinoscrotal hernia was made. The patient was counseled, and informed consent signed for surgery. He was admitted to the surgical ward for elective hernia repair. Despite the absence of an anesthetist, thorough pre-anesthetic counseling regarding risks, benefits, and alternatives was undertaken. Routine preoperative investigations including hemoglobin, fasting blood glucose, HIV serology, bleeding time, and clotting time were all within normal limits, and no further investigations were deemed necessary.

Also, Anesthesia was administered by a theatre nurse trained in procedural sedation, under the direct supervision of the operating surgeon. Atropine 1 mg IV was given 30 min preoperatively as premedication, followed by diazepam 0.3 mg/kg IV 10 min before induction. Antibiotic prophylaxis was ceftriaxone 2 g IV, administered at induction. Induction was then achieved with ketamine 4 mg/kg IV as loading dose, with additional ketamine 1 mg/kg IV boluses administered as maintenance dose intraoperatively as required. The nurse continuously monitored blood pressure using an automated device and clinically observed airway patency and respiratory effort throughout the procedure. Pulse oximetry, ECG, and supplemental oxygen were not available. This protocol represented a locally adapted anesthesia regimen developed for use in resource-limited settings.

A standard right inguinal incision was made to expose the inguinal canal. The hernia sac was identified (Fig. 1) and found to contain bowel loops. In view of the clinically noted mild reducibility, the sac was opened for evaluation. This revealed the appendix, which was macroscopically normal but densely adherent to the inner sac wall (Fig. 2), confirming Amyand's hernia. These adhesions explained the mild reducibility noted clinically and the intraoperative difficulty in achieving safe reduction.

The appendix appeared macroscopically normal, with no signs of inflammation or perforation. However, due to firm adhesion, it could not be safely reduced into the abdominal cavity without risking serosal tearing or trauma to surrounding structures.

After careful consideration, an appendectomy was performed. The incision was extended to allow complete exposure of the appendix and its base. The appendix was meticulously dissected down to its origin at the cecum, ensuring full visualization of the cecal wall and careful preservation of adjacent bowel integrity (Figs. 3 and 4).

This decision was based on the intraoperative difficulty of safe reduction and the potential risk of future complications in a setting where access to emergency surgical care is limited. Due to the unavailability of mesh in this setting and concerns regarding infection risk, the hernia was repaired using primary tissue approximation (Bassini technique). The hernia defect was closed with interrupted non-absorbable sutures (Nylon 2). The patient received intravenous fluids, ceftriaxone and analgesics during hospitalization. After discharge, oral amoxicillin-clavulanate and oral analgesics were prescribed.

Fig. 1 Opened hernia sac

The patient's postoperative recovery was uncomplicated. Early mobilization was encouraged, and oral intake was tolerated within 24 h. He was discharged on postoperative day 5 with detailed wound care instructions and scheduled follow-up. At the three-month review, he had made a complete recovery, with no evidence of hernia recurrence or surgical-site infection. He was advised to avoid strenuous farming activities for at least three additional months.

Discussion

Inguinal hernia repair ranks among the most common surgical procedures worldwide, accounting for 10 to 15% of all surgical procedures, and standing as the second most frequently performed surgery after appendicectomy [13]. Epidemiological studies demonstrate that inguinal hernia primarily affects young males who are typically engaged in strenuous physical labor, such as intensive farming, which

Fig. 2 Dissected hernia showing appendix wholly adhered to the wall of the hernia Sac

Fig. 3 Fully dissected hernia sac showing appendix within the hernia sac

contributes to progressive abdominal wall weakness and inguinal canal dilation [22]. This correlation is exemplified by our patient; a lifelong farmer whose occupational exposure significantly increased his hernia risk.

Amyand's hernia represents a rare clinical entity that typically eludes preoperative detection. While conventional inguinal hernias are readily diagnosable through physical examination—often obviating the need for imaging studies like ultrasonography or computed tomography (CT)—the specific herniated contents usually remain unidentified until surgery [23]. This diagnostic limitation explains why Amyand's hernia is predominantly an intraoperative discovery. Furthermore, even when imaging might aid clinical diagnosis, such modalities frequently remain inaccessible in resource-limited settings, underscoring persistent healthcare disparities in underserved regions. The surgical management of Amyand's hernia is commonly guided by the classification system proposed by Losanoff–Basson and later modified by Fernando et al. which recommends treatment according to the appendiceal status [6, 8]. While inflamed appendices necessitate appendectomy, the management of non-inflamed appendices remains controversial [6, 8]. In our case, the appendix was macroscopically normal but found densely adherent to the hernia sac wall, explaining the mild reducibility noted clinically. Reduction without resection would have risked serosal injury. Moreover, leaving the appendix in situ would have posed risks of future strangulation within the hernia sac or subsequent infection, particularly in a setting where access to timely reoperation is limited. For these reasons, prophylactic appendectomy was performed despite the absence of gross inflammation. This highlights the importance of individualized surgical judgment in low-resource contexts.

Regarding hernia repair, mesh reinforcement is considered the gold standard [24]. However, polypropylene mesh was unavailable in our hospital, and the surgical field was considered clean-contaminated following appendectomy, further discouraging prosthetic use. Mesh prostheses, while the gold standard in high-resource settings, have been associated with elevated infection risks when used in suboptimal surgical environments, such as those with limited sterilization facilities or restricted perioperative infection control [10]. A Bassini tissue repair was therefore performed. While Shouldice repair is often preferred as the more durable tissue technique [25], Bassini repair was selected as the most practical option in this setting, reflecting both resource

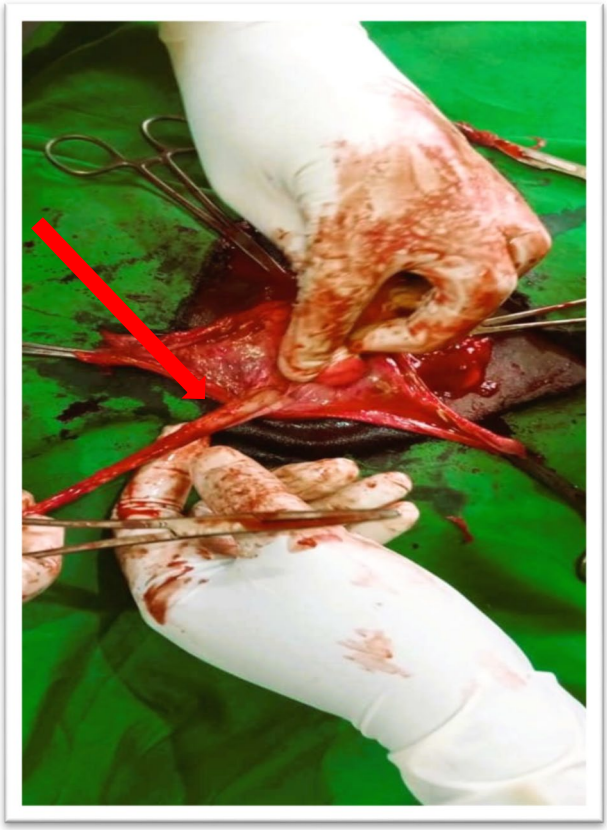

Fig. 4 Fully dissected hernia sac showing base of the appendix within the hernia sac

limitations and surgical experience. This illustrates how evidence from high-resource environments may not always be directly transferrable to low-resource practice.

Anesthesia posed another significant challenge in this case. In the absence of an anesthetist, a locally adapted ketamine-based protocol was employed by a trained nurse under the supervision of the operating surgeon. Ketamine is widely used in resource-limited settings for its safety and minimal requirements for airway support [26]. Monitoring, however, was limited to automated blood pressure measurement and clinical observation of airway patency and respiratory effort, as pulse oximetry, ECG, and supplemental oxygen were unavailable. Although local anesthesia was considered, the large, long-standing hernia and the need to open the sac made general anesthesia with ketamine the most appropriate option despite its risks.

Financial barriers further complicated this case. The patient had declined surgery on multiple previous occasions due to cost, leading to almost a decade of delay. Such postponements increase the cumulative risk of complications, including strangulation, perforation, and appendicitis. Globally, an estimated 5 billion people lack access to timely, safe, and affordable surgical care, with out-of-pocket costs representing a major barrier in low- and middle-income countries [27]. This case therefore also highlights the urgent public health need for healthcare financing reforms, including universal coverage, to reduce delays and prevent avoidable morbidity.

Conclusions

Amyand's hernia is a rare but important differential diagnosis in cases of inguinal hernia. In resource-constrained environments, surgeons often must balance standard surgical principles with the limitations of available resources. Management decisions, including whether to perform appendectomy in the absence of inflammation, should be guided by careful clinical judgment and individualized patient assessment. This case highlights the challenges and necessity of adapting surgical care to local circumstances, while recognizing the need for further research to develop clearer guidelines tailored to low-resource settings.

Limitations

This case report is limited by the lack of preoperative imaging, such as ultrasound or CT scan, due to resource constraints. Being a single case, the findings may not be generalizable to broader populations.

Additionally, the postoperative follow-up period was relatively short, limiting assessment of long-term outcomes. Histopathological examination of the appendix was not performed, which could have provided definitive confirmation of its status. Finally, the management decisions were influenced by the resource-limited setting and local clinical judgment, which may differ from standard guidelines.

Abbreviations *CT*: Computed tomography; *HIV*: Human Immunodeficiency Virus

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Author Contribution CA managed the patient and wrote the first draft of the manuscript, FZLC and SKT critically reviewed and revised drafts of the manuscript. All authors read and approved of the final manuscript.

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Data Availability No datasets were generated or analyzed during the current study. All relevant clinical information is included within the manuscript. Images and patient data are not publicly available due to patient confidentiality but can be provided in anonymized form upon reasonable request and with appropriate ethical approval.

Code Availability Not applicable.

Declarations

Ethical Approval Ethical approval was obtained from the local ethical committee of Touboro Health District. Written informed consent was also obtained from the patient for publication of this case report and any accompanying images.

Consent to Publish Informed consent was obtained in writing from the patient to publish this case report and any accompanying images.

Consent to Participate Written informed consent was also obtained from the patient for publication of this case report and any accompanying images.

Clinical Trial Registration Not applicable.

Competing Interests The authors declare no competing interests.

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