

Amyand's Hernia with Necrotic Appendiceal Tip Successfully Managed by Appendectomy and Lichtenstein Mesh Repair: A Case Report and Literature Review

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ABSTRACT

Amyand's hernia is an uncommon variant of inguinal hernia characterized by the presence of the vermiform appendix within the hernia sac. It accounts for approximately 1% of all inguinal hernias, whereas acute appendicitis occurring inside the hernia sac is reported in only 0.08–0.13% of cases. Because of its rarity, preoperative diagnosis is challenging, and there is still controversy regarding the optimal surgical management, particularly concerning the use of prosthetic mesh in the presence of appendiceal inflammation. [1].

KEYWORDS: Amyand's hernia; Inguinal hernia; Appendicitis; Appendectomy; Surgical mesh.

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INTRODUCTION

Groin hernia repair is among the most frequently performed procedures in general surgery, with more than 20 million operations performed worldwide every year. Indirect inguinal hernias constitute the most common subtype, and their contents usually include omentum or small bowel. Less frequently, unusual organs such as the urinary bladder, Meckel's diverticulum, ovary, sigmoid colon, or vermiform appendix may be encountered within the hernia sac. The presence of the appendix inside an inguinal hernia defines Amyand's hernia, an uncommon surgical entity first described in 1735 by Claudius Amyand, who successfully performed the first documented appendectomy in an 11-year-old boy presenting with a perforated appendix inside an inguinal hernia. This historical report established one of the earliest descriptions of appendiceal disease requiring operative treatment [1,3].

Amyand's hernia accounts for approximately 1% of all inguinal hernias; however, acute appendicitis occurring within the hernia sac is exceedingly uncommon, with an estimated incidence ranging from 0.08% to 0.13%. Owing to its rarity, most surgeons encounter only one or two cases throughout their careers. Consequently, diagnosis is usually established intraoperatively rather than preoperatively, despite significant advances in cross-sectional imaging [1,3,4].

The pathophysiology of Amyand's hernia remains incompletely understood. Several mechanisms have been proposed, including repeated external compression of the incarcerated appendix, vascular compromise due to increased intraluminal pressure, adhesions between the appendix and the hernia sac, and progressive ischemia leading to bacterial overgrowth and acute appendicitis. In many patients, the appendix remains macroscopically normal, whereas others develop inflammation ranging from simple congestion to gangrene or perforation [1,3].

Clinically, Amyand's hernia frequently mimics an incarcerated or strangulated inguinal hernia. Patients generally present with painful, irreducible inguinal swelling, making preoperative differentiation difficult. Fever, nausea, leukocytosis, and signs of intestinal obstruction may or may not be present. Imaging modalities such as ultrasonography and computed tomography have improved diagnostic accuracy, although most diagnoses continue to be established during surgery [3,4].

One of the most debated aspects of Amyand's hernia concerns its surgical management. While appendectomy is universally accepted in cases of inflamed or necrotic appendix, the use of prosthetic mesh remains controversial because of concerns regarding mesh infection. The classification proposed by Losanoff and Basson provides a practical framework for surgical decision-making by categorizing patients according

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to the inflammatory status of the appendix and the presence of abdominal sepsis [5,6].

We present the case of an elderly patient with an incarcerated right Amyand's hernia containing an appendix with distal necrosis who was successfully treated by open appendectomy followed by Lichtenstein tension-free mesh repair. This report discusses the diagnostic challenges, surgical strategy, and current evidence regarding the selective use of prosthetic mesh in this rare clinical entity.

CASE PRESENTATION

A 75-year-old male presented to the Emergency Department of the General Surgery Service at Hospital General de Zona No. 21, Instituto Mexicano del Seguro Social, Leon, Guanajato, Mexico, with acute onset of severe right inguinal pain. The patient reported a seven-year history of a reducible, painless right inguinal hernia that had never required emergency medical attention or surgical intervention.

His past medical history was significant for type 2 diabetes mellitus under medical treatment, unspecified cardiac arrhythmia requiring permanent pacemaker implantation, and previous umbilical hernia repair performed eight years earlier. He also reported a history of tobacco and alcohol consumption. No history of drug allergies or previous blood transfusions was documented.

Three days before admission, the patient experienced sudden intense pain localized to the right inguinal region without associated nausea, vomiting, abdominal distension, fever, or bowel habit alterations. He initially sought medical evaluation by a private physician, where manual reduction of the incarcerated hernia was attempted unsuccessfully. Because of persistent pain and irreducibility, he was referred to our institution for specialized surgical management.

On admission, physical examination revealed an irreducible right inguinal mass associated with marked tenderness to palpation. Local inflammatory changes were evident, although generalized peritoneal irritation was absent. Vital signs were stable, and no signs of systemic sepsis were observed.

Initial laboratory studies demonstrated leukocytosis ($18.8 \times 10^9/L$) with marked neutrophilia (94%), suggesting an acute inflammatory process. Hemoglobin concentration was 15.2 g/dL, hematocrit 40%, platelet count $199 \times 10^9/L$, serum glucose 170 mg/dL, blood urea nitrogen 38 mg/dL, serum urea 81 mg/dL, creatinine 1.78 mg/dL, prothrombin time 12.9 seconds, and an international normalized ratio (INR) of 1.13. These findings were compatible with localized inflammation without coagulation abnormalities.

Preoperative ultrasonography of the right inguinal region demonstrated an incarcerated indirect inguinal hernia measuring approximately 37 mm in diameter. The hernia sac contained small bowel loops and preperitoneal fat without reduction during the Valsalva maneuver. Although the appendix was not identified preoperatively, the imaging

findings confirmed the diagnosis of incarcerated inguinal hernia requiring emergency surgical exploration.



Figure 1

The patient underwent emergency surgery through an open inguinal approach on August 21, 2021. Intraoperatively, an indirect inguinal hernia was identified. The hernia sac contained preperitoneal fat and the vermiform appendix measuring approximately 12 cm in length. The distal appendiceal tip exhibited ischemic necrosis, whereas the appendiceal base remained viable without perforation or generalized contamination of the operative field. These findings established the diagnosis of Amyand's hernia with localized appendiceal necrosis.



Figure 2

An open appendectomy was performed. The appendiceal stump was managed using a modified tobacco-pouch (Pouchet) technique. Considering the absence of perforation, purulent contamination, or diffuse peritonitis, a standard Lichtenstein tension-free inguinal hernioplasty using polypropylene mesh was subsequently completed. The surgical procedure was uneventful, and adequate hemostasis was achieved before wound closure.

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Broad-spectrum intravenous antibiotics were administered during the postoperative period. The patient showed progressive clinical improvement, remaining afebrile, tolerating oral intake, passing flatus, and ambulating without complications. Follow-up laboratory studies performed before discharge demonstrated normalization of inflammatory markers, including a leukocyte count of $8.4 \times 10^9/L$ with 56% neutrophils, hemoglobin of 14.7 g/dL, and hematocrit of 37%. The patient was discharged home on postoperative day three in good clinical condition with outpatient follow-up.

DISCUSSION

Amyand's hernia is an uncommon clinical entity defined by the presence of the vermiform appendix within an inguinal hernia sac. The condition was first described in 1735 by Claudius Amyand, Sergeant Surgeon to King George II of England, who successfully performed the first recorded appendectomy in an 11-year-old boy presenting with a perforated appendix inside an inguinal hernia. Since then, fewer than 1% of inguinal hernias have been reported to contain the appendix, while acute appendicitis occurring within the hernia sac remains exceptionally rare, with an estimated incidence ranging from 0.08% to 0.13% [1,3].

Although inguinal hernia repair is one of the most commonly performed procedures in general surgery, Amyand's hernia remains an unexpected intraoperative finding in most patients. Its rarity explains the absence of randomized clinical trials and the fact that current recommendations are based primarily on case reports, case series, and expert opinion [2,4].

The exact pathophysiological mechanism responsible for appendiceal inflammation in Amyand's hernia has not been completely elucidated. Several hypotheses have been proposed. The most widely accepted mechanism suggests that repeated compression of the appendix at the internal inguinal ring compromises venous drainage, producing progressive edema, ischemia, bacterial proliferation, and ultimately acute appendicitis. Other authors have suggested that adhesions between the appendix and the hernia sac predispose to vascular compromise and chronic inflammation. Unlike conventional acute appendicitis, luminal obstruction by an appendicolith appears to play a less prominent role [1,3].

Our patient presented with several classical characteristics described in the literature. He was an elderly male with a long-standing right inguinal hernia that suddenly became incarcerated and painful. Similar demographic characteristics have been consistently reported, with most patients being men over 50 years of age because of the higher prevalence of indirect inguinal hernias. The right-sided predominance is explained by the normal anatomical location of the cecum and appendix [2,4].

Preoperative diagnosis remains difficult because the clinical presentation closely resembles that of an incarcerated or

strangulated inguinal hernia. Symptoms such as localized pain, irreducibility, and leukocytosis are nonspecific. In our patient, ultrasonography demonstrated an incarcerated inguinal hernia but failed to identify the appendix within the sac. This finding is consistent with previous reports, in which most diagnoses are established during surgery despite advances in imaging techniques [3,4].

Computed tomography has emerged as the imaging modality with the highest diagnostic accuracy. Several studies have demonstrated that multidetector CT allows visualization of the appendix inside the hernia sac, assessment of appendiceal inflammation, and identification of associated complications such as perforation or abscess formation. Nevertheless, CT is not routinely performed in patients requiring urgent surgical treatment for incarcerated hernias because imaging should not delay operative management [3,4].

One of the most influential contributions to the management of Amyand's hernia is the classification proposed by Losanoff and Basson, which remains the most widely accepted therapeutic guide. Type I includes a normal appendix within the hernia sac and is generally managed with reduction of the appendix and mesh hernioplasty without appendectomy in adult patients. Type II corresponds to acute appendicitis confined to the hernia sac without abdominal sepsis and is treated with appendectomy through the hernia incision followed by primary tissue repair. Type III includes perforated appendicitis with abdominal wall or peritoneal sepsis and requires laparotomy, appendectomy, and non-mesh hernia repair. Type IV encompasses Amyand's hernia associated with additional intra-abdominal pathology requiring individualized treatment [5,6].

The present case shares characteristics of Losanoff Type II because the appendix showed localized distal necrosis without perforation or generalized peritoneal contamination. However, unlike the original recommendation of tissue repair without prosthetic material, polypropylene mesh was used because contamination was minimal, the appendiceal base was healthy, and meticulous surgical technique allowed adequate control of the operative field. The patient developed no postoperative wound infection or mesh-related complications, supporting the growing body of evidence suggesting that mesh implantation may be safe in carefully selected patients with localized inflammation [2,4,7].

The use of prosthetic mesh remains one of the most controversial aspects of Amyand's hernia management. Traditionally, synthetic mesh has been avoided whenever appendectomy is performed because of concerns regarding prosthetic infection. Nevertheless, recent systematic reviews and accumulated case reports indicate that when inflammation is localized, there is no perforation, and adequate antibiotic therapy is administered, mesh repair can be safely performed with low rates of surgical site infection and hernia recurrence. This evolving concept has challenged

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the traditional dogma of avoiding mesh in all contaminated procedures [1,2,4,7].

Our decision to perform a Lichtenstein tension-free repair was based on several intraoperative findings. The inflammatory process was limited to the appendiceal tip, there was no purulent contamination, no perforation, and the appendiceal base remained viable. These factors significantly reduced the theoretical risk of mesh infection while preserving the well-established benefits of prosthetic hernia repair, including lower recurrence rates compared with tissue-based techniques [1,2].

Another important aspect concerns the role of laparoscopy. Although laparoscopic transabdominal preperitoneal (TAPP) and totally extraperitoneal (TEP) approaches have been increasingly reported, open surgery remains the preferred technique in emergency presentations involving incarcerated hernias because it provides rapid access to the hernia sac and facilitates appendectomy through the same incision. In our patient, the open approach allowed prompt diagnosis and definitive treatment without the need for additional abdominal incisions [2,8].

The postoperative course observed in this case was favorable. The patient recovered without infectious complications, tolerated oral intake within the first postoperative days, and was discharged on postoperative day three. Laboratory parameters normalized rapidly, supporting adequate control of the inflammatory process and reinforcing the safety of the selected surgical strategy.

Despite its favorable outcome, this report has several limitations. As with all case reports, conclusions regarding optimal management cannot be generalized. Furthermore, long-term follow-up is necessary to determine the true incidence of mesh infection or hernia recurrence. Nevertheless, detailed reports of rare conditions such as Amyand's hernia continue to contribute valuable information that complements existing evidence and assists surgeons in clinical decision-making [1,2,4].

CONCLUSION

In conclusion, our case supports the growing evidence that individualized treatment remains the cornerstone of Amyand's hernia management. Careful intraoperative assessment of appendiceal inflammation and contamination should guide the decision regarding appendectomy and prosthetic mesh implantation. In selected patients with localized appendiceal necrosis and absence of diffuse infection, Lichtenstein mesh repair appears to be a safe and effective therapeutic option [1,2,4,7].

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