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## Appendiceal perforation, necrotizing groin infection and spermatic cord necrosis in a case of Amyand's hernia

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## ABSTRACT

**INTRODUCTION:** Inguinal hernias containing the appendix are described as Amyand's hernias. The surgical approach to these types of hernias is dependent on the type present and associated intra-operative findings.

**PRESENTATION OF CASE:** We present a case of complicated type IV Amyand's hernia, which was managed though combined abdominal and inguinal approach. Though the patient had a prolonged post-operative course due to pulmonary embolism, he progressed to full recovery.

**DISCUSSION:** The different grades of Amyand's hernia are repaired in varying ways, including laparoscopic and open approaches with or without mesh. The type of repair must be tailored to the patient and disease process.

**CONCLUSION:** Primary repair of a perforated Amyand's hernia provides adequate strength with decreased risk of infection due to synthetic material.

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## 1. Introduction

The first report of an appendix discovered in a hernia sac was made by de Garengoet in 1735 who identified an appendix within a femoral hernia. This was followed by the discovery of a perforated appendix in the inguinal hernia sac of an 11-year old boy by Claudius Amyand in 1735. Inguinal hernias containing an appendix are now referred to as Amyand's hernias whether the appendix is normal, inflamed or perforated [1]. It is estimated that they occur in about 0.4–1% of all hernias [2]. Appendicitis within the hernia sac is even rarer at less than 0.1% [3]. We present a case of Amyand's hernia with appendiceal perforation, a large inguinal abscess, necrosis of the spermatic cord and associated cecal adenoma.

## 2. Presentation of case

The patient is an 85 year old male who presented to an outside hospital with a 5-day history of right lower quadrant pain, right groin swelling and fevers. Past medical history was significant for hypertension, hyperlipidemia and chronic obstructive pulmonary disease. He had previously undergone an open prostatectomy for prostate cancer. On arrival at our institution, he was tachycardic, but afebrile. His abdomen was significantly distended with a tender,

fluctuant and erythematous mass in the right groin extending to the right lower quadrant abdominal wall. Laboratory studies were remarkable for a white blood cell count (WBC) of 10,800 cells/mm<sup>3</sup> and an initial lactic acid of 3.5 mmol/L. Contrast CT revealed a heterogeneous soft tissue mass with prominent tubular fluid collection within the right inguinal canal. This collection had the appearance of bowel with surrounding inflammatory changes concerning for ischemia [Fig. 1].

The clinical picture was concerning for sepsis and bowel ischemia so he was taken to the operating room for exploration. The initial approach was through a lower midline incision as the potential need for possible bowel resection was anticipated. There was mucinous fluid around the cecum and terminal ileum with an inflammatory mass within a hernia that was unable to be reduced. A right curvilinear incision was therefore made over the inguinal region. This immediately yielded a significant amount of purulent fluid. The residual cavity contained extensive necrotic debris and considerable inflammation involving the cord structures. The tissue planes were difficult to discern. After meticulous dissection it was possible to identify herniated contents which included portions of the terminal ileum, cecum, and a perforated appendix. The necrotic spermatic cord was debrided. The individual layers of the inguinal floor could not be separately identified due to the severe inflammation. Repair of the inguinal floor was therefore accomplished with interrupted Prolene sutures in 2 layers. Due to involvement of the cecum and presence of mucin, a right hemicolectomy was performed and bowel continuity restored via an ileo-transverse colonic anastomosis.

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**Fig. 1.** CT demonstrating a heterogeneous fluid collection within the right inguinal canal (blue arrow).

Final pathology revealed multiple hyperplastic polyps of the appendix with one that had ruptured as well as transmural inflammation and appendiceal perforation. There was evidence of mucin with associated mucinous epithelial cells in the surrounding inflammatory mass. Additionally, the specimen contained a tubular adenoma of the caecum and 13 reactive lymph nodes. His postoperative course was complicated by prolonged ileus and pulmonary embolism (PE) despite prophylactic anticoagulation. His bowel function gradually returned and he was discharged to a skilled nursing facility on postoperative day 30.

### 3. Discussion

Amyand hernias represent close to 1% of all inguinal hernias [2]. They are more common in children (over 1%), while they represent only 0.4–0.6% of all inguinal hernias in adults [4]. Most Amyand hernias occur on the right side, but there are fewer reported cases on the left side due to a very redundant cecum or very long appendix [5]. Amyand's hernias have also been described in pregnancy, recurrent hernias and in a cadaveric specimen [6,7]. Wu and Yu reported a case of appendiceal adenocarcinoma in an Amyand hernia [8]. A case of endometriosis of the appendix in an Amyand hernia has also been documented [9]. Mortality is currently estimated at 5.5% [2].

Clinical presentation is variable depending on severity of the inguinal incarceration and the degree of inflammation of the appendix. Often when appendicitis is present there are additional gastrointestinal complaints such as poor appetite, nausea and vomiting. If the appendix is inflamed and incarcerated in the hernia sac the pain may be cramping and episodic rather than the typical dull ache typically expected from an incarcerated hernia. There are rare reports of necrotizing soft tissue infection of the groin and the lower abdomen [11–13]. Diagnosis is most frequently made intra-operatively [14]. The differential diagnosis includes inguinal adenitis, strangulated small bowel or omentum, acute epididymo-orchitis and hydrocele, necrotizing fasciitis, partially descended testis and testicular tumor with hemorrhage [10].

To put management guidelines in perspective, Loosanoff and Basson in 2008, proposed a classification of Amyand's hernias with their suggested treatment guidelines [15]. In type 1, the appendix is normal and reduction of the hernia and repair without appendectomy is recommended. In children or very young patients whose risk for subsequent appendicitis is higher, appendectomy may be considered [4]. If mesh is used there is a significant risk of infection since performing the appendectomy changes the classification of

a clean case to one that is clean contaminated. There are, however reports of appendectomy with successful mesh repair with no infectious complications [16]. In type 2, there is appendicitis localized to the hernia sac, so reduction of the hernia, appendectomy and non-mesh repair of the inguinal floor are recommended due to the significant risk of mesh infection [16]. The use of biologic mesh may also be considered in such cases but there are insufficient cases reported to recommend its use as a standard option. In type 3, appendicitis is present with peritonitis beyond the hernia sac and appendectomy via laparotomy with non-mesh repair of the inguinal floor is advised. For type 4 Amyand hernias, there is concomitant pathology such as diverticulitis, tumors or mucocele of the appendix itself or in the adjacent gastrointestinal tract. Removal of the appendix with definitive management and further work up of the associated condition is warranted. It has been proposed that appendectomy be performed in left sided Amyand's hernias regardless of the presence or absence of appendicitis due to the likelihood of future atypical presentation [5].

The role of biologic mesh in cases of acute or perforated appendicitis as well as laparoscopic intervention in an acute incarcerated case has not yet been defined. Sahu reported successful laparoscopic repair of elective Amyand hernias in which following the release of adhesions the appendix was found to be essentially normal and appendectomy was not performed. MacArthur argues that a laparoscopic transabdominal preperitoneal (TAPP) approach affords evaluation of the status of incarcerated contents and allows appendectomy to be performed without breaching the hernia sac. Consequently, this would limit the risk of infection of any prosthetic mesh placed [16]. Others have reported total laparoscopic appendectomy and pre-peritoneal mesh placement for appendicitis, as well as laparoscopic appendectomy but with open inguinal mesh repair both with acceptable results [17,18].

Our patient had a type IV Amyand's hernia with acute perforation of the appendix, necrotizing infection with a large abscess of the inguinal region, necrosis of the spermatic cord and peritoneal contamination. He had additional abdominopelvic pathology with polyps of the appendix and an adenoma of the cecum. Perforation with gross spillage precluded the use of mesh to repair his hernia defect. His risk of hernia recurrence is expected to be much higher than that of a mesh or even standard tissue repair because no planes were discernible during the repair. Overall, the outcome in his case was favorable given the complexity of his presentation and pre-existing medical conditions. Although the patient did have a prolonged hospital course complicated by PE, he suffered no long-term adverse effects from the hospitalization.

### 4. Conclusion

Amyand's hernias are rare, but should be considered in the differential diagnosis of patients with incarcerated inguinal hernias particularly on the right side. Presentation of incarcerated Amyand's hernias is similar to that of other inguinal hernias, with a bulging painful mass in the groin. The diagnosis is rarely established prior to operation, therefore physicians must have a high index of suspicion for such pathology in an incarcerated inguinal hernia. There is a role for laparoscopic treatment particularly in the absence of appendicitis. The guidelines by Loosanoff and Basson may be useful in planning treatment but ultimately the procedure should be tailored to fit the individual patient based on the findings within the hernia sac and the status of the inguinal floor. Consideration should be given to the likelihood of appendicitis in the future, the risk of mesh infection, as well as the consequences of recurrence of the hernia and the ability of the patient to tolerate a subsequent major operation. The final pathology should be carefully reviewed to determine the need for further work up and adjunctive procedures.

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Eric Ebaugh, DO–case review and review of literature, writing of paper.

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**Guarantor**

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