



Case Report

Amyand Hernia Repair and Negative Pressure Wound Therapy

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Abstract

Background: An Amyand hernia is an inguinal hernia containing the appendix vermiformis. This rare type of hernia was first described by Claudius Amyand in 1735. **Case Presentation:** A 71-year-old man with a known right inguinal hernia presented at the hospital emergency department with symptoms and signs of incarceration. The right inguinal hernia was swollen, irreducible, hyperthermic, but without erythema. The patient was scheduled for emergency surgery. Intraoperatively an Amyand's hernia with an inflamed and perforated appendix was found. An appendectomy and open hernia repair according to Shouldice were performed. A vacuum suction drain for negative pressure wound therapy was placed. **Conclusion:** Appendicitis within an Amyand's hernia is a rare occurrence. The appearance of the appendix vermiformis influences the type of surgery. This is a rare report of an Amyand's hernia which was treated with appendectomy, Shouldice, and negative pressure wound therapy.

Keywords: Amyand's Hernia; Amyand Hernia; Appendicitis; Inguinal Hernia; Shouldice; Negative Pressure Wound Therapy.

Introduction

An Amyand's hernia is defined as an inguinal hernia containing the appendix vermiformis. In 1735, Claudius Amyand, described the first inguinal hernia in which the inflamed appendix protruded through. He reported about an 11-year-old boy who presented with a right inguinal hernia that had been existed since birth. Intraoperatively he found a right inguinal hernia containing a perforated appendix with faecal fistula. The surgeon performed an appendectomy and hernia repair. He described the appendix during the operation as "contracted, carnosus, duplicated, and changed in its Figure and Substance" [1]. Historically, it was the first description of Amyand's hernia as well as the first successfully documented conducted appendectomy [2]. Of all reported cases of inguinal hernias, Amyand's hernia accounts for approximately

0.19% to 1.7% of inguinal hernias [3]. Inguinal hernias containing an inflamed or perforated appendix are rare and occur at an estimated rate of 0.07-0.13% [4].

Intraoperatively, Amyand's hernia can be divided into four types based on the external appearance according to the classification of Losanoff and Basson [5]. While type 1 describes a normal appendix within an inguinal hernia sac, from type 2 onwards it is an appendicitis, and the extent of the inflammation determines the further classification. According to the type of Amyand's hernia Losanoff and Basson recommend different management of Amyand's hernia. The classification was modified by Singal and Gupta in 2011 [6]. Type 5 which included incisional hernia was added. Type 5 was subdivided into 5a (normal appendix in incisional hernia), 5b (acute appendicitis in incisional hernia), and 5c (acute appendicitis within incisional hernia with abdominal wall or peritoneal sepsis). The revised classification is known as Rikki classification [7] (Table 1).

Classification	Description	Surgical management
Type 1	Normal appendix within 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 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 types 1 to 3 hernia, investigate or treat second pathology as appropriate
Type - 5 a	Normal appendix within an incisional hernia	Appendectomy through hernia, primary repair of hernia including mesh
Type - 5 b	Acute appendicitis within an incisional hernia, no abdominal sepsis	Appendectomy through hernia, primary repair of hernia
Type - 5 c	Acute appendicitis within an incisional hernia, abdominal wall, or peritoneal sepsis or in relation to previous surgery	Manage as type – 4

Table 1: Rikki’s classification of Amyand’s hernias

The exact pathophysiology of an Amyand’s hernia is not fully understood [8]. It is generally assumed that there is a correlation between the appendix becoming trapped in the inguinal canal and the development of inflammation. It has been suggested that the appendix becomes more vulnerable to trauma when the appendix moves into the inguinal canal. Further, the blood supply of the appendix can be reduced which can lead to inflammation and bacterial overgrowth. This mechanism can be strengthened by further compression of the appendix, for example, by a sudden increase in abdominal pressure due to contraction of the abdominal muscles [9].

In this study we present a case of an Amyand’s hernia diagnosed intraoperatively and treated with appendectomy and mesh free open hernia repair according to Shouldice.

Material and Methods

The case report has been reported in accordance with SCARE Guidelines for case report publication [10].

Case Description

The 71-year-old white male patient presented to the emergency department due to severe right groin pain for three days with a previously known right inguinal hernia. The swelling had been known for three weeks and had so far been only cosmetically disturbing. He reported continuously increasing pain in the past three days and an intensity of 8 on the numerical rating scale from 0 to 10 (where 10 stands for the worst pain possible) during

movement. At rest he had just a sensation of pressure. The pain had become unbearable now, and the patient reported that he had “no more strength”. There was no pain in the testicles. Fever was denied, urination was unremarkable. The stool had a normal consistency on the morning of presentation, the three days before the patient was unable to pass stool. There were no known pre-existing conditions other than arterial hypertension, which was treated with common antihypertensive medication. There were no known allergies. On examination, the patient was found to be in pain-reduced general condition and in good nutritional status, as well as alert and communicative. The auricular measured body temperature was 36.6 °C. The abdomen palpated softly and without resistance on deep palpation, regular bowel sounds could be auscultated over all quadrants. A nonreducible, doughy-hard bulge in the right groin was detected. It was hyperthermic, but not reddened. On coughing, the swelling remained unchanged. Discrete and sparse bowel sounds could be auscultated over the swelling. The lymph nodes were not palpable inguinally. No lower leg edema was found. The ECG revealed age-appropriate findings. Laboratory examination of the blood revealed leucocytosis of 23.5 G/L (normal value: 4-10 G/L) and an elevation of C-reactive protein of 180.1 mg/L (normal value < 5mg/l). The hematogram, electrolytes, and renal function parameters were normal. Hb 151 g/l, MCV 87 fl, MCH 29 pg, sodium 133 mmol/l, potassium 4.2 mmol/l, creatinine 115 umol/l, GFR 55 ml/min, glucose 7.9 mmol/L, urea 9.8 mmol/L. An externally obtained sonographic finding three weeks earlier showed a relatively slender hernial

orifice of a large right indirect inguinal hernia with a hernial sac measuring 11 x 8 x 9 cm. Herniation of small bowel structures was noted, but there was no evidence of obstruction or incarceration. Elective scheduled surgical management was recommended. The surgeon in charge was consulted immediately after examination of the patient, the clinical suspect of incarcerated inguinal hernia was confirmed. An indication for emergency surgery was given.

At surgery, the classical right inguinal incision was made. After the incision, an abscess appeared. Already at the pressure the abscess cavity perforated and it drained creamy pus. Extensive irrigation and new washing and covering. Afterward, a direct hernia sac was identified. After preparation of the hernial sac the Amyand's hernia revealed with the inflamed and perforated appendix at the tip of the appendix. The surrounding wall was inflamed (Figure 1). An appendectomy and hernia repair according to Shouldice were performed. The appendix showed a length of 9.8 cm. The abscess cavity was irrigated after further dissection and debridement was performed. The closure of the external aponeurosis was not possible, so the inguinal ligament was shirred. A vacuum suction drain was placed in the subcutaneous tissue for negative pressure wound therapy. The patient received Cefuroxim and Ornidazol during the operation. The antibiotic therapy was continued with Cefuroxim.



Figure 1: Intraoperative findings of the perforated appendix

Histopathological examination revealed acute peri appendicitis with chronic granulating inflammation, macro

phagocytic reaction, foam cell aggregates, fibrinous purulent, and stercoral peritonitis in a transmural wall defect.

The postoperative course was uneventful. On postoperative day 3, a debridement, lavage, and VAC dressing change were carried out under spinal anesthesia. Further VAC dressing changes were performed on postoperative days 7 and 10. The patient was discharged with a vacuum pump on day 11 post-surgery. Regular changes of vacuum pumps took place and secondary wound closure was performed on postoperative day 38 (Figure 2). The follow-up examination 3 months after surgery did not show a reoccurrence of a hernia.



Figure 2: Secondary wound closure was performed on postoperative day 38

Discussion

The clinical presentation of our patient was similar to most cases of the consulted literature [11,12], with an irreducible hernia causing sudden pain in the inguinal and lower abdominal regions. Elevated CRP and leukocytosis were identified through laboratory chemistry, as is frequently observed in other cases. Further the suspected diagnosis of incarcerated or strangulated hernia is usually made preoperatively, and only intraoperatively could Amyand's hernia be diagnosed.

Treatment of this pathology requires specialized management based on the individual needs of each patient. There are many surgical options for the treatment of Amyand's hernias; however, there are also reports of very elderly comorbid patients in whom conservative therapy was sufficient [13,14].

Based on the suspected diagnosis of incarcerated hernia, the surgeon opted for an inguinal incision. A lower midline laparotomy should be preferred when there is a suspicion of pelvic abscess or perforation [15].

The Losanoff-Basson classification or Rikki classification provides a guidance system for surgical therapy. Recommendations are made depending on the appearance of the appendix vermiformis. There is a lot of debate about these recommendations. Overall, most authors agree that an inflamed appendix should be surgically removed [16,17].

The presented patient had an inguinal hernia for the first time in his life. To avoid a recurrence, a hernia repair with mesh is usually recommended.

Due to the intraoperative presence of inflammation of the appendix, we decided against the insertion of a mesh, according to the widespread recommendation in the literature. The insertion of mesh is associated with a higher risk of soft tissue infections, mesh sepsis or recurrent hernia [16,18]. The use of biological nets in contaminated areas is becoming more prevalent, sparking much debate in the literature. Further, there are increasing reports of Amyand's hernias with appendicitis (type 2) that were treated with appendectomy and tension free repair with mesh without postoperative complications [19-21].

Contrary, in the meta-analysis by Atema, et al [22], it was shown that in the repair of potentially contaminated hernias, biological meshes do not represent an advantage over synthetic meshes in terms of postoperative complication rate or hernia recurrence rate. Therefore, it is recommended to avoid the use of mesh in case of acute infections and signs of peritonitis.

In the presence of appendicitis, hernia repair with Bassini or with Shouldice is suggested [6,23]. A meta-analysis showed that the Shouldice method is the best non-mesh method to prevent a recurrent hernia, so this method was chosen for hernia repair [24]. Our surgeon is very experienced with the Shouldice technique, so the surgery was performed without complications. However, the majority of authors chose the Bassini method for hernia repair because most surgeons are more experienced with this technique. According to the literature, the chances of recurrence are lower when the surgeon is more experienced with the technique [12]. In summary, the operative therapy of appendicitis and hernia repair were both performed in accordance with the most accepted opinion from the literature.

Postoperative surgical site infections, wound healing deficits, abscess formation or sepsis are feared complications. The presence of superficial wound infection can lead to an increase in morbidity, while the presence of deep infection may contribute

to the recurrence of hernias [23]. Therefore, infection prevention and postoperative wound care are important components of therapy. Especially in cases of inflamed, perforated, or gangrenous appendix, pre- and postoperative antibiotics is recommended [4]. Therefore, we initiated an antibiotic therapy intra- and postoperatively. Equally important, the VAC therapy performed is a special characteristic of the case described here.

In the literature search we found 9 cases [23,25-29] where a vacuum drainage was left intraoperatively and one case [30] where negative pressure wound therapy was performed. In these cases, Amyand's hernias of type 2 to type 4 were found. With one exception, these patients were treated with antibiotics. No infections or other postoperative complications occurred. There is some evidence that negative pressure wound therapy has a positive effect on wound healing compared to conventional wound treatment (healing by secondary intention) [31,32].

Conclusion

In conclusion, Amyand's hernia is a rare type of inguinal hernia. Treatment of this pathology requires specialized management based on the individual needs of each patient. The choice of appropriate management depends on several factors (age, health status, severity of the symptoms). An experienced surgeon should always be consulted, and all possible options should be discussed. Infection prevention and postoperative wound care is important to reduce morbidity and the recurrence rate. Therefore, an intra- and postoperative antibiotic therapy as well as sufficient wound care like negative pressure wound therapy should be considered in cases of inflamed, perforated, or gangrenous appendix.

Ethical Considerations: The patient was informed and written informed consent was obtained for publication of the present case report.

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Conflict of Interest: All authors declare they have no conflict of interest.

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