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## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

# A complicated case of amyand's hernia involving a perforated appendix and its management using minimally invasive laparoscopic surgery: A case report



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## ARTICLE INFO

### Article history:

Received 4 October 2016  
Received in revised form 26 October 2016  
Accepted 7 November 2016  
Available online 10 November 2016

### Keywords:

Amyand's hernia  
Appendix complication  
Inguinal hernia  
Laparoscopic surgery  
Minimally invasive surgery  
Perforated appendix

## ABSTRACT

**INTRODUCTION:** Amyand's hernia is a rare condition of inguinal hernia in which the appendix is incarcerated within the hernia sac through the internal ring. Complications include acute appendicitis and perforated appendicitis, which are rare in incidence, accounting for about 0.1% of cases.<sup>1</sup> These complications prove a diagnostic challenge due to their vague clinical presentation and atypical laboratory and radiological findings. Until recently, open appendectomy was the mainstay of treatment. Laparoscopic surgery offers a less invasive approach to confirming a diagnosis and serving as a therapeutic tool in equivocal cases.

**CASE PRESENTATION:** We report a case of a previously healthy 20-year-old male presenting with atypical signs and symptoms, as well as blood investigation results, and radiological findings of a perforated appendix within an Amyand's hernia. The patient was successfully managed using a minimally invasive laparoscopic appendectomy approach.

**DISCUSSION:** Until recently, open appendectomy was considered the mainstay in the management of complicated Amyand's hernia. Laparoscopic surgery provides a new avenue for dealing with diagnostic uncertainty with advantages including faster recovery time, reduced hospital stay, and better quality of life.

**CONCLUSION:** This case report highlights the concealing effects of an Amyand's hernia on a perforated appendix, the considerations required when an equivocal diagnosis present and the safe use of the minimally invasive laparoscopic surgery in the treatment of this rare condition.

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## Introduction

It is estimated that 1% of all hernias contain the appendix or parts of it [1]. Accordingly, incarceration of the appendix within an inguinal hernia is termed Amyand's hernia. A risk of inflammation, infection, or perforation is associated with an Amyand's hernia [2–4]. The incidence of appendicitis within an inguinal hernia is rare at 0.1% and that of a perforated appendix is even rarer at 0.01% [1,5].

These rare complicated cases demonstrate diagnostic challenges due to their concealed clinical signs and symptoms and misleading radiological diagnostic features. Until recently, open appendectomy was the mainstay of treatment [1,6]. Laparoscopic surgery offers a less invasive approach to confirming a diagnosis and serving as a therapeutic tool in equivocal cases.

Our case report demonstrates the masking effects of an Amyand's hernia on the signs and symptoms of a perforated

appendix and provides a new insight in its management using a minimally invasive laparoscopic approach.

## 2. Case presentation

A previously healthy 20-year-old male self-referred to the emergency department with a 1-day history of severe lower abdominal pain. He described his pain as sudden onset, initially in the lower central abdomen and later shifting to the right iliac fossa (RIF). Moreover, he confirmed no previous history of similar episodes and had no significant past medical or surgical history.

On examination, his vital signs were all within the normal limits. Additionally, his abdominal examination revealed tenderness in the RIF, with rebound tenderness and guarding. Bowel sounds were audible, hernia orifices were intact, and scrotal examination was clinically unremarkable.

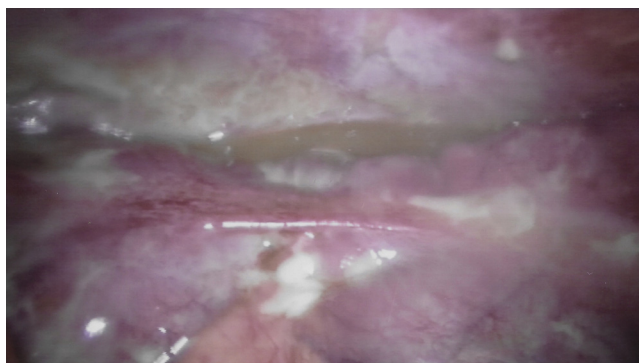
Blood investigation on admission including full blood count, urea and electrolytes, liver function test, amylase and C-reactive protein (CRP) were all within the normal limits. Ultrasound of the abdomen and the pelvis reported few small prominent lymph nodes in the small bowel mesentery in the right lower abdomen, but no pericecal collections or inflammatory mass identified.

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**Fig. 1.** On accessing the abdomen, an amalgamated mass of omentum and small bowel was identified in the right iliac fossa.



**Fig. 2.** Localised pus collection in the right paracolic gutter with pyogenic membrane on the caecum and the abdominal wall visualised.

Accordingly, a decision was made at the time to continue with conservative management including nil by mouth, intravenous (IV) fluid and analgesia.

Overnight, the patient complained of increasing abdominal pain in addition to a drop in his blood pressure (99 over 35 mm Hg), which responded to the administration of 500 ml IV bolus of Hartmann's solution. Repeat blood investigation demonstrated significant elevation of white blood cells ( $15.4 \times 10^9/L$ ) and inflammatory marker CRP (149 mg/L). Due to both clinical and laboratory deterioration in patient's condition, a decision was made with the patient's consent to perform an exploratory laparoscopic surgery with a potential appendectomy.

On accessing the abdomen, the entire intraperitoneum was visualised. An amalgamated mass of small bowel and omentum in the RIF was identified with a pyogenic membrane. The bowel was slightly released from the mass by irrigation and careful blunt dissection. Subsequently, the omentum was released in which it revealed a herniating appendix into the right internal ring. Following delicate retraction of the appendix through the hernial defect, a gangrenous appendix with a perforated tip was demonstrated (Figs. 1–5). Appropriately, appendectomy and irrigation washout of the abdomen with normal saline was performed. Finally, a Robinsion drain was placed in situ.

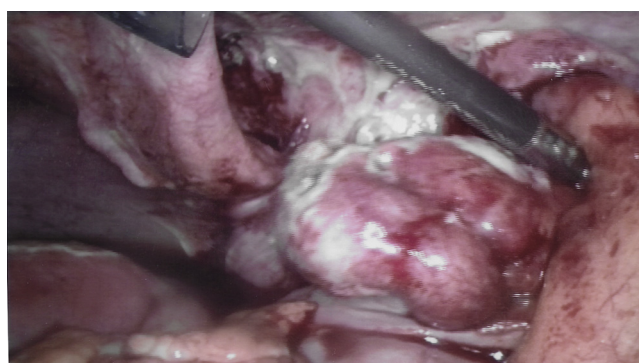
The patient made an excellent clinical recovery and was discharged home on day-3 postoperatively to continue a four-day course of oral antibiotics. An elective hernioplasty at a later date was planned.

### 3. Discussion

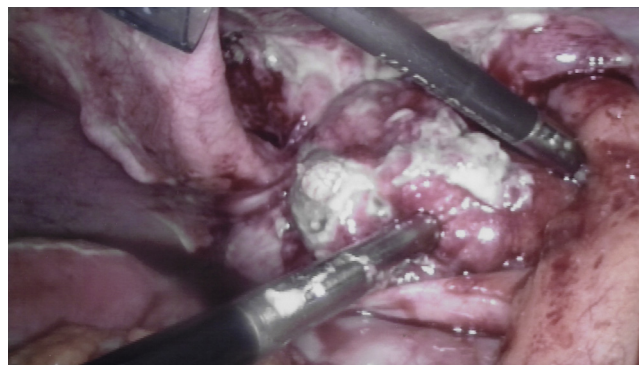
Amyand's hernia and its associated complications represent a diagnostic challenge; thus they are usually incidentally discovered



**Fig. 3.** Upon retraction of the appendix from the right internal ring, a gangrenous and perforated tip is demonstrated with a faecolith and a defect in the internal ring.



**Fig. 4.** Careful blunt dissection separating the small bowel from the appendix and caecum, demonstrating a gangrenous perforated appendix.



**Fig. 5.** The appendix and omentum were retracted from the internal ring with congestion and inflammation at the interior border of the ring.

intra-operatively [1,5,6–8]. The clinical history, physical examination, laboratory, and radiological findings are generally misleading [8–10]. Important considerations are required in equivocal cases. Specifically, a high index of suspicion of Amyand's hernia involving a perforated appendix needs to be considered when pain is disproportionately worse compared to the clinical presentation.

A relationship between the incarceration of the appendix in the inguinal canal and the development of inflammation has been suggested [8,11]. Accordingly, the contributing pathogenesis is thought to be secondary to increased vulnerability of the appendix to trauma and reduced blood supply, subsequently by generalised inflammation and bacterial growth [1,8,12,13]. Late diagnosis of complicated cases may lead to severe consequences if intervention is delayed [1,4,8]; whereas, early intervention and optimal postoperative care demonstrate good prognosis as in our case.

Computed tomography (CT) is the radiological investigation of choice in the assessment of acute abdomen and abdominal hernias [14]. Nevertheless, strict justifications for requesting this imaging modality are necessary as it is associated with a high radiation dose. Consequently, CT scan requests are less likely to be approved in vague clinical presentations such as in Amyand's hernia. This proved to be the case, even when complicated as in our patient. Whereas, ultrasound may be a useful imaging modality given its ease of access, safety, and low cost [15], it remains a relatively unreliable modality [1], as was shown in our case.

The inflammatory status of the appendix determines the surgical approach and the type of hernia repair. Traditionally, surgeons opted for hernia repair using Bassini, Darn or Shouldice techniques when the appendix was inflamed. These endogenous repair techniques are favored over the use of synthetic meshes, as they avoid the associated risks related to prosthesis mesh infection. When the appendix is found healthy and incidentally within the hernia sac, many authors recommend against prophylactic appendectomy along with the hernia repair. This is because appendectomy increases the risk of infection to an otherwise clean procedure [1,5,6,8]. Thus, a reduction of the appendix and mesh hernioplasty is generally advocated in case of a non-inflamed appendix; while appendectomy followed by endogenous hernia repair is generally recommended in case of an inflamed appendix. The use of laparoscopic surgery for both diagnostic and therapeutic purposes in Amyand's hernia has recently become a new trend [5,8,16,17]. Indeed, similar notions have been applied using laparoscopic technique in the management of Amyand's hernia. This technique allows for visualisation of the entire abdomen and concurrent repair of the pathology when feasible. Moreover, laparoscopy proved to be effective in emergency situations as our case demonstrated, when justification for radiological investigation proved difficult while intervention was warranted. Laparoscopic surgery has several advantages over open surgery including a decrease in post-operative pain, reduced hospital stay, and quicker return to daily activities. Furthermore, laparoscopy reduces surgical manipulation to achieve visualization of the entire appendix and its base, thereby avoiding enlarging the hernia defect or distending the neck of the hernia sac, thus reducing the possibility of hernia recurrence by weakening the anatomic structures around the defect [1,5,8]. To date, all described Amyand's hernia cases using laparoscopy as a therapeutic tool were performed on either a healthy or inflamed appendix [6,8,17–19]. To the best of our knowledge based on our literature search, we are the first to report the use of laparoscopic surgery in the management of an Amyand's hernia involving a perforated appendix.

Appropriately, through a minimally invasive laparoscopic technique, we identified a gangrenous, perforated appendix herniating through the right internal ring. This proved to have contained the leakage and pus that was beginning to spill into the abdominal cavity. Our case demonstrated that laparoscopic management of Amyand's hernia involving a perforated appendix is feasible. Moreover, we took all of the preventative measures to reduce potential septic complications [1,5,19]. These precautions included: (1) performing thorough abdominal and pelvic washouts, (2) administering IV antibiotics, (3) placing a drain intra-abdominally, and (4) deferring the hernia repair to a later date at which time inflammation and infection risks were significantly reduced.

#### 4. Conclusion

A significant morbidity is associated with an Amyand's hernia involving a perforated appendix, as the hernia conceals the typical clinical presentation. A high index of suspicion for this condition is required and an early decision for intervention is needed when

an equivocal case presents taking into consideration that a further delay in the decision of laparoscopic exploration would mandate an open exploration due to generalised peritonitis. Laparoscopic surgery is frequently diagnostic as well as therapeutic.

#### Conflicts of interest

Nothing to declare.

#### Funding

Nothing to declare.

#### Consent

Written informed consent was obtained from the patient for the publication of this case report and accompanying images. A copy of the written consent is available for review by the editor-in-chief of this journal on request.

#### Ethical approval

None required.

#### Author contribution

Dr. Wisam Al-Ramli: Surgical Intern. Responsible for literature review, writing and manuscript preparation.

Dr. Yahya Khodear: Surgical Registrar. Performed the laparoscopic surgery. Responsible for manuscript review.

Mr Muiyiwa Aremu: Consultant Surgeon. Responsible for manuscript review.

#### Guarantor

Dr Wisam Al-Ramli.

Dr Yahya Khodear.

Mr Muiyiwa Aremu.

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