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## A case report of appendicitis within an Amyand's hernia: A surprising finding in diagnostic laparoscopy

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## ABSTRACT

**INTRODUCTION:** Amyand hernia is a rare type of hernia in which the appendix is located inside the hernia sac. Its diagnosis is very difficult in the Pre-operative period and it is usually presented as an intraoperative finding.

**PRESENTATION OF CASE:** A 21-year-old male who presented to our emergency department with peri-umbilical pain associated with nausea and vomiting. On examination he had a tenderness in the inguinal canal. He underwent diagnostic laparoscopy. Operative finding was amyand hernia with inflamed appendix in hernia sac. Laparoscopic appendectomy and tissue repair was performed for him.

**DISCUSSION:** There are several preoperative diagnostic modalities for amyand hernia including abdominal CT scan and ultrasound. Diagnostic laparoscopy can be used as one of the diagnostic modalities for this type of hernia. Amyand hernia treatment includes appendectomy and inguinal hernia repair, which can vary depending on the severity of inflammation of the inguinal area.

**CONCLUSION:** based on our study another diagnostic modality in case of clinical suspicion of amyand hernia is diagnostic laparoscopy which is useful approach in all forms of incarcerated hernias to assess contents and avoid unnecessary laparotomy.

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## 1. Introduction

In 1735 Claudius Amyand was the first surgeon who described and performed the first case of appendectomy through the same herniotomy incision [1]. Amyand's hernia is a rare type of an inguinal hernia (less than 1% of inguinal hernias), which occurs when the appendix is located and/or incarcerated within the hernia sac [2]. It is commonly presented in children and male patients [3]. Amyand's hernia is most commonly presented as an indirect hernia, but rare cases of direct hernia have also been reported [4]. Appendicitis in this condition has an incidence of 0.07–0.13 %, regardless of the stage of presentation [5]. The literature review reports a perforated appendix in 0.1 %, with mortality from 15 up to 30 %, due to severe abdominal sepsis [6]. Although the pre-operative clinical diagnosis is practically impossible, cases have been reported via trans-abdominal ultrasound or computed tomography [7]. Based on the Surgical Case Report, 2018 (SCARE) guidelines, here we present a case of acute appendicitis in amyand hernia which proved via diagnostic laparoscopy [8].

## 2. Case presentation

A 21-year-old male presented to our emergency department with the complaints of peri-umbilical pain, migrating to the right lower quadrant which started two days ago. The pain was mild to moderate in intensity and associated with nausea, vomiting. The patient had a history of similar pain in the last few months. The past medical history was not significant and the patient had no history of associated co-morbidity. The family history and drug history were unremarkable. Initial assessment demonstrated that the patient was febrile (38 °C) with blood pressure of 120/80 mmHg and pulse rate was 88 beats per minute. On examination, right lower quadrant and inguinal canal tenderness were found. There was no evidence of abdominal distension. Laboratory findings included elevated inflammation markers: White Blood Cells count:  $13 \times 10^3$  g/L and granulocytes of 88 % and C-reactive protein level of 8 mg/dl. Renal function tests and electrolytes was normal. Plain abdominal radiography was unremarkable. Urgent computed tomography of the abdomen and pelvic demonstrated a tubular blind-ended structure originated from the cecum wall and extends to the hernia sac which made suspicion of inguinal hernia (Fig. 1). The patient underwent a diagnostic laparoscopy and operative finding was an inflamed appendix in the right inguinal canal suggesting amyand

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Fig. 1. A tubular blind-ended structure in inguinal canal.

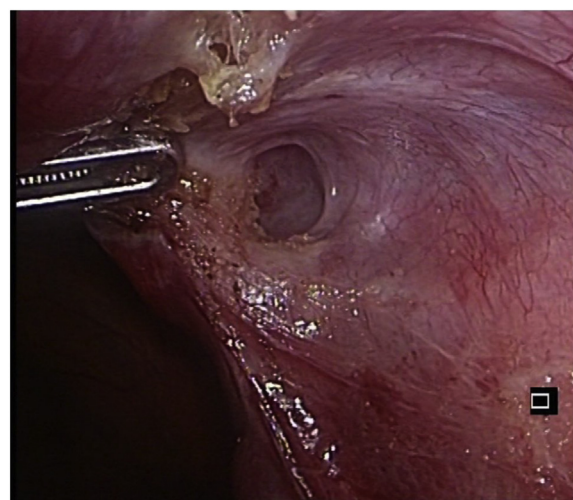


Fig. 3. Inguinal hernia sac.

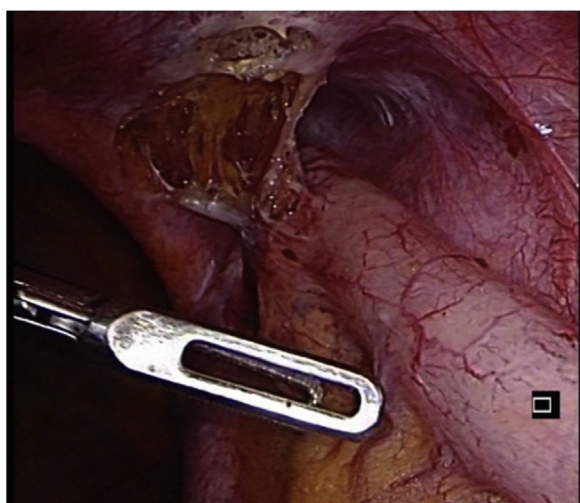


Fig. 2. Appendix in inguinal canal.

hernia (Fig. 2–3). Laparoscopic appendectomy was performed. Due to severe inflammation and congestion of parietal peritoneum at site of inguinal canal following the extraction of appendix from umbilical canal, an open tissue repair of inguinal floor in Bassini manner, was performed by attending surgeon. The patient underwent antibiotic treatment and routine surgical wound care. No immediate postoperative complications were seen, so the patient was discharged after a 48 h and returned for the follow-up at the days ten as well as one month after with no complication. Histopathology revealed acute appendicitis.

**3. Discussion**

Amyand's hernia is a rare type of inguinal hernia that is most frequently reported in men, and almost exclusively on the right side, however, the situs inversus, intestinal malrotation, a very loose cecum or a large appendix could cause an exception where the appendix is on the left side [2]. Most cases of amyand hernia are asymptomatic and preoperative diagnosis is not possible, although limited studies have reported the role of abdominal ultrasound and computed tomography (CT) [9]. A tubular blind-ended

**Table 1**

Losanoff and Basson classification of Amyand Hernia.

Classification	Description	Management
Type 1	Normal appendix in an inguinal hernia	Hernia reduction, mesh placement
Type 2	Acute appendicitis in an inguinal hernia with no abdominal sepsis	Appendectomy, primary no prosthetic hernia repair
Type 3	Acute appendicitis in an inguinal hernia with abdominal and abdominal wall sepsis	Laparotomy, appendectomy, and primary no prosthetic hernia repair
Type 4	Acute appendicitis in an inguinal hernia with abdominal concomitant pathology	Same as type 3 plus management of concomitant disease

structure originated from the cecum wall which extends to the hernia sac is suggestive for amyand hernia in the computed tomography [7]. Most diagnoses are made accidentally during surgery. In the current case, the CT scan also showed the same findings. In cases of incarceration and strangulation, it will lead to acute appendicitis, abscess, perforation, epididymitis and orchitis [10]. The pathophysiology of appendicitis in this condition could be due to impaired blood flow following to the spasm of the abdominal wall muscles and edema of the inguinal canal area [3]. In 2007, Amyand hernia was classified according to a Losanoff and Basson study (Table 1) [6].

International studies suggest standard treatment of amyand hernia to return the contents of the hernia sac to the abdomen and repair the hernia with tension free repair [5]. If an appendectomy is performed, a clean surgery is combined with a clean-contaminated surgery, increasing the infection rate and possible infection of prosthetic material [1]. In these cases, in addition to appendectomy, one of the tissue repair methods should be considered according to the surgeon's experience [4]. Based on the classification, our patient was type 2 amyand and due to inflammation of the appendix and appendectomy, tissue repair was performed by basini method to prevent infection. Of note; abdominal and pelvic CT scans and ultrasound can be helpful in preoperative diagnosis. Diagnostic laparoscopy can be one of the diagnostic modalities for amyand hernia, both in diagnosing and determining the severity of inflammation in the inguinal canal area. In 1999 Vermillion et al, described laparoscopic appendectomy for a preoperatively diagnosed Amyand hernia and they showed that laparoscopic approach has also been used to facilitate mesh repair by allowing reduc-

tion of appendix without opening of the hernial sac [4]. In another Amyand's hernia, with minimized risk of surgical site infection (SSI), fair recovery and cosmesis. The severity of inflammation of the appendix in the inguinal canal determines the treatment. Therefore, laparoscopy can be helpful in diagnosing and determining the best treatment option

#### 4. Conclusion

Although amyand hernia is a very rare form of hernia, its clinical manifestations are hernia and acute appendicitis, which are the most common diseases in general surgery. Clinical diagnosis is not possible before surgery, although CT scans and ultrasounds may be helpful. According to our study diagnostic laparoscopy could be used in case of clinical suspicion of amyand hernia, although more extensive studies are needed to determine the best preoperative diagnostic modality.

#### Conflicts of interest

There is no conflicts of interest.

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#### Ethical approval

This is a case report paper.

#### Consent

Informed consent was obtained from the patient for 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.

#### Author contribution

All authors had same contribution on this work

#### Registration of research studies

1. Name of the registry:
2. Unique identifying number or registration ID:
3. Hyperlink to your specific registration (must be publicly accessible and will be checked):

#### Guarantor

Corresponding author is Dr. javad zebarjadi bagherpour and accept full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish

#### Provenance and peer review

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