



## **Amyand's Hernia: A Rare Occurrence. Report of Two Cases and Literature Review**

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### **Authors' contributions**

*The work was carried out in collaboration among all authors. Authors MSB and SLL designed the study, wrote the protocol and first draft of the manuscript. Authors CV, SGN and ARS managed the literature searches. Author MV managed writing-reviewing and supervision. All authors read and approved the final manuscript.*

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**Case Study**

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### **ABSTRACT**

A variety of hernias have been encountered for the past centuries. One rare type of hernia is Amyand's hernia which was originally described by Claudius Amyand (1685-1740) in 1736, a surgeon in St. George's Hospital, London, England, United Kingdom. It is a condition where the vermiform appendix is trapped within the hernial sac; mostly an incidental finding intraoperatively. We present two cases of right Amyand's hernia, where both patients presented with right reducible inguinal hernia without signs of incarceration or strangulation. They incidentally diagnosed with Amyand's hernia intraoperatively. Both patients were treated with hernia reduction and mesh repair without appendectomy. Preoperative diagnosis of Amyand's hernia remains challenging. Management of this type of hernia should be tailored to each patient individually according to their clinical presentation.

**Keywords:** *Hernia; abdominal hernia; amyand's hernia; hernia management.*

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## 1. INTRODUCTION

An Amyand's hernia is defined as the presence of vermiform appendix within the hernial sac, accounting for about 1% of inguinal hernias. Commonly seen in young male patients due to patent processus vaginalis, the incidence of Amyand's hernia occurs in ages from as young as 3 weeks to as old as 92 years [1]. There is not a straightforward clinical presentation of this type of hernia; signs and symptoms may mimic incarcerated inguinal hernia. Hence, preoperative diagnosis of Amyand's hernia remains challenging, it is essentially an intraoperative finding. The trapped appendix may become inflamed, incarcerated, strangulated and perforated. Appendicitis in this condition consists of 0.1% of all appendicitis [2,3].

To date, there is a lack of study for the correct management of the disease due to its rarity. Current management is based on the universalized Losanoff and Basson classification, but more trials are needed to ascertain its effectiveness in patient's outcome. The necessity for prophylactic appendectomy and insertion of mesh intraoperatively is still under debate.

We report two cases of type I Amyand's hernia which were discovered incidentally intraoperative and both appendices were not inflamed. They were both treated with hernia reduction and mesh repair.

## 2. CASE PRESENTATION

### 2.1 Case 1

A 74 years old Chinese gentleman with underlying benign prostatic hyperplasia was seen in our clinic complaining of right inguinal swelling for 2 months duration with on and off pain which has not increased in size. He denied any changes in bowel habit, constitutional symptoms, nor rectal bleeding.

His physical examination showed a soft and non-tender abdomen with a right reducible inguinal swelling measuring 5x4 cm. Bowel sounds were heard over the inguinal swelling with a positive cough impulse.

Patient underwent ultrasound of the abdomen which revealed a swelling seen at the right

inguinal region with normal vascularity omentum seen within its sac. (Fig. 1, Fig 2.)

We subsequently proceeded with an open right inguinal hernioplasty under spinal anaesthesia. Intraoperatively a horizontal incision made over the right internal ring following skin crease.

A right indirect inguinal hernia was found with content of an uninflamed appendix; an Amyand's hernia (Fig. 3) Surgery was completed with the sac content and appendix reduced into abdomen. The distal sac was laid open, whilst proximal sac ligated and resected. A mesh size 11x6cm inserted, and anchored using Prolene 2/0. Patient was discharged well on post-operative day one.

On follow up in clinic two months post-surgery, patient was well with wound well healed and no signs of recurrence.

### 2.2 Case 2

A 31-year-old Malay gentleman with no underlying disease presented with 3 months history of right inguinal painless swelling, which was not increasing in size. There were no other lumps and bumps noticed. He denied chronic cough, change in bowel habit, passing hematochezia, any constitutional symptoms and family history of malignancy. He was a construction worker for 5 years, there was a history of lifting heavy objects.

On examination, his abdomen was not distended, soft, not tender, bowel sounds were active. There was a right reducible inguinoscrotal swelling with positive cough impulse, bilateral testes were palpable. An abdominal x-ray was done showing no signs of intestinal obstruction.

We proceeded with open right hernioplasty under general anaesthesia. Intraoperative findings noted there were uninflamed appendix with 50cm of viable pink small bowel in the hernial sac. The herniated contents were reduced into the abdomen and mesh repair was applied. Patient was discharged the next day.

Post-operation two months patient was reviewed in our clinic, he appeared well, and wound was well healed.



Fig. 1, Fig 2. Ultrasound abdomen findings of omentum in hernia sac



Fig. 3. Hernial sac with content of uninflamed appendix; an Amyand's hernia

### 3. DISCUSSION

A hernia is defined as a protrusion of a viscus, or part of a viscus, through the wall of its containing cavity. Abdominal wall hernias are a common problem and prevalence of this condition has been estimated as approximately 2% for all ages [4]. Inguinal hernias are hernias that occur in the inguinal region of the abdominal wall. This accounts for 75% of abdominal wall hernias, with a lifetime risk of 27% in men and 3% in women [5].

There are two types of inguinal hernia namely indirect inguinal hernia and direct inguinal hernia. An indirect inguinal hernia occurs when the inguinal canal does not close completely. With time, this opening can enlarge and organs in the abdomen can protrude into the canal. A direct inguinal hernia on the other hand occurs when the weakness is in the floor of the inguinal canal through the Hesselbach triangle rather than its opening. Direct and indirect hernias cause similar symptoms and look nearly the same on physical examination [6].

Amyand's hernia is a very rare type of hernia. In simple term, it is an inguinal hernia with a sac content of an appendix. According to literature search the incidence of Amyand's hernia reported varies between 0.19-1.7% [1]. It usually occurs on the right owing to the normal anatomical position of the appendix, and the right inguinal hernia is more prevalent versus the left inguinal hernia, as with our patients [7]. Occasionally, the Amyand's hernia may occur on the left side. The predisposing factors of left Amyand's hernia include caecal hypermobility, situs inversus or embryologic malrotation [8].

The presentation of Amyand's hernia would often be confused with incarcerated or strangulated hernia, or it can also present as painless reducible inguinal swelling. Radiological investigations are usually not performed to diagnose a hernia as it is essentially a clinical diagnosis, unless intraabdominal pathology is suspected [3]. An Amyand's hernia can be coincidentally diagnosed preoperatively by means of ultrasonography or computed tomography. Ultrasound will reveal an incompressible tubular structure with increased vascularity in hernia sac, whereas the latter will provide a more precise visualization of appendix within inguinal canal [9]. Routine use of ultrasound or computed tomography to diagnose Amyand's hernia is not recommended as it is a waste of resources and may subject patients to unnecessary irradiation if CT scan is used. As

such, Amyand's hernia is almost exclusively an intraoperative finding. Perioperatively, it is critical that an accurate surgical plan should be deduced for the successful outcome of a patient. Therefore, a surgeon should be well-versed with different presentations of this hernia as clinical management of it varies from one patient to another [10].

Amyand's hernia can be a simple inguinal hernia with uninflamed appendix. However, there were cases reported whereby the appendix could be inflamed with or without peritoneal sepsis. Currently universally accepted treatment algorithm is based on the Losanoff and Basson classification system as described in (Table 1) [11].

The system highlights that the management of Amyand's hernia is practically according to the condition of appendix. Both our patients presented with type I Amyand's hernia, we proceeded with hernioplasty without appendectomy. Generally, the management of type III and IV Amyand's hernia are well-accepted, which prompts for appendectomy and hernia repair without mesh. Controversies still exist for the surgical management of both type I and II Amyand's hernia, mainly prophylactic appendectomy in type I and application of mesh repair in type II. The following Table demonstrates the literatures for or against prophylactic appendectomy (Table 2).

**Table 1. Classification of Amyand's hernias after Losanoff and Basson**

Classification	Description	Surgical management
Type I	Normal appendix in inguinal hernia	Hernia reduction, mesh repair; appendectomy in young patients
Type II	Acute appendicitis within an inguinal hernia and no abdominal sepsis	Appendectomy through hernia; primary repair of hernia; no mesh
Type III	Acute appendicitis within an inguinal hernia or the abdominal wall, or peritoneal sepsis	Laparotomy; appendectomy; primary repair of hernia; no mesh
Type IV	Acute appendicitis within an inguinal hernia with related or unrelated abdominal pathology	Manage as hernias type I-III; investigate or treat second pathology as appropriate

**Table 2. Literature comparing prophylactic appendectomy in Amyand's hernia cases**

Literatures	Prophylactic appendectomy	No appendectomy
Michalinos A, Moris D, and Vernadakis S [2, 12]	√	
Kose E, Sisik A, Hasbahceci M [13]	√	
Okur MH, Karaçay S, Uygun I, et al [14]		√
Cigsar EB, Karadag CA, Dokucu AI [15]		√

Some advocate for prophylactic appendectomy in all cases (especially young patients) to prevent appendicitis post manipulation or in the future and re-herniation [2,13]. In a literature by Michalinos, Moris and Vernadakis, prophylactic appendectomy is advised especially in patients with immunosuppressed state [12]. Some are against the idea as it is believed that prophylactic appendectomy may add unnecessary risk of infection to the otherwise clean surgery. Furthermore, there is possibility of recurrence in prophylactic appendectomy as the incision extended for surgical manipulation and dissection of appendiceal base may lead to weakening of anatomical structures around the defect [16]. Moreover, unnecessary appendectomy should be avoided because there is possibility of future use of vermiform appendix in operation (i.e Malone, Mitrofanoff stoma formation, urinary diversion or urethral patching) [15].

According to Losanoff and Basson, in patients with appendicitis or perforated appendix (type II) a prosthetic mesh is typically contraindicated due to the risk of wound and mesh infection. However, there are several literatures that advocate the use of mesh repair in type II Amyand's hernia [17,18]. Supporters believe that there is no absolute contraindication for use of prosthetic mesh in septic environment provided the inguinal area is adequately irrigated with antibiotics intraoperatively; a drain is placed under the aponeurosis, and the procedure is followed by a post-operative course of antibiotics [19].

#### 4. CONCLUSION

In conclusion, Amyand's hernia which is a very rare type of hernia poses difficulty in diagnosis and treatment. The final management of this type of hernia should be tailored to patient's clinical findings intraoperatively. Perioperative decision is critical in predicting a patient's outcome.

#### CONSENT

As per international or university standard, patients' written consent has been collected and preserved by the authors.

#### ETHICAL APPROVAL

It is not applicable.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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