

## Amyand's hernia: role of CT for a correct diagnosis

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**SUMMARY: Amyand's hernia: role of CT for a correct diagnosis.**

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*Amyand's hernia consists in the protrusion of the vermiform appendix into an inguinal hernia sac and represents an uncommon condition with a difficult preoperative diagnosis to be recognized with clinical examination and imaging diagnostic tools in order to choose a correct therapeutic approach for the patient. Four types of Amyand's*

*hernias exist. The case of a recurrent type 1 Amyand's hernia is presented. Multi detector computed tomography allowed a correct diagnosis and the subsequent surgical treatment had no complication for the patient. Radiologists and surgeons need to be aware of this pathology and its classification, as well as of the importance of recognizing both the inflamed and normal appendix within the inguinal canal and the abdominal complications. With the availability of multi detector CT scanning, a greater number of type 1 and 2 hernias are able to be preoperatively diagnosed, and type 3 and 4 better characterized in emergency situation, allowing to perform the best surgical treatment and reducing the chances of pathological recurrence.*

KEY WORDS: Amyand's hernia - Computed tomography - CT - Abdomen - Inguinal hernia.

## Introduction

Protrusion of the vermiform appendix into an inguinal hernia sac is known as Amyand's hernia, named after Claudius Amyand, the first surgeon who described and treated it, performed simultaneously the first appendectomy (1).

Amyand's hernia is uncommon, with a reported incidence in literature varying from 0.28 to 1% (2), even if in the pediatric population it is about 3 times more common, probably due to the greater patency of the processus vaginalis (3). It is more common in male patients with a bimodal age distribution,

greater in neonates and in patients aged more than 70 years (1). It is commonly an indirect hernia, although direct Amyand's hernia has been also described, usually right sided, reflecting the usual intra-abdominal position of the involved organ. Some cases of left-sided Amyand hernias have been reported (2), related to mobile cecum condition, intestinal malrotation or *situs inversus* (1).

The case of a 75-year-old man affected by recurrent type 1 Amyand's hernia is reported.

## Case report

A 75-year-old man presented to our department to undergo a total-body computed tomography (CT) after a colonoscopy that pointed out an adenocarcinoma of the left colonic flexure. The patient had a clinical history of proctectomy for a previous rectal cancer, cholecystectomy for gallbladder lithia-

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sis and a right inguinal hernia repair. No other clinical relevant antecedents were known.

CT examination showed, as an incidental finding, a recurrent right inguinal hernia containing a 80 mm tubular structure arising from the caecum, and consequently identified as the appendix, characterized by a slight wall thickening without significant contrast-enhancement or peri-appendicular inflammation signs (Figures 1, 2). The patient was therefore diagnosed with a recurrent type 1 Amyand's hernia and underwent correct surgical treatment with no complication. Laparoscopic left hemicolectomy was performed for the adenocarcinoma of the splenic flexure with no complication.

## Discussion

The appendix within an Amyand's hernia may develop any of the complications associated with this organ, including acute inflammation, peri-appendicular abscess, mucocoele, benign and malignant tumors, these latter rarely described in the literature (3).

An estimated 0.1% of the cases of acute appendicitis occurs in the setting of an Amyand's hernia. The usual appearance is an inguinal swelling, sometimes associated to pain and tenderness, clinically hardly distinguish from an incarcerated or strangulated inguinal hernia, even if the pain tends to be crampy and episodic instead of dull. Moreover, depending on the vermiform appendix's situation (normal, inflamed, perforated, or gangrenous), other

symptoms that may appear are fever, vomiting, gastrointestinal symptoms and bowel obstruction. Peritoneal involvement is rare because the neck of the hernia usually prevents the spread of inflammation. Necrotizing fasciitis as a dangerous and rare complication of Amyand's hernia has also been described (1). A mortality rate between 14 and 30% is reported in the medical literature and closely linked to a peritoneal spread of the septic process (4).

Preoperative diagnosis of Amyand's hernia is not straightforward, and it is generally an incidental finding during surgery (3) or imaging procedures for other reasons, as in our case. On the other side, it is very useful to determine the correct treatment management.

Ultrasonography (US) can be an helpful investigation at lower costs. Usually such diagnosis is made by demonstration of blind-ending tubular structure with thickened walls, in connection to the caecum within the hernia sac (5). However, preoperative diagnosis based on ultrasound alone is heavily dependent upon the technical skill of the operator and, as such, remains a relatively unreliable modality (6).

Successful preoperative diagnosis has recently increased in the literature, particularly because CT is nowadays the most commonly used imaging modality for evaluation of blunt trauma, acute abdomen and complicated hernias with high accuracy value for both diagnostic and interventional CT-guided procedures (7-16). Multi detector CT allows direct visualization of the appendix inside the inguinal canal, a better understanding upon vermiform appendix's inflammation status and associated abdom-

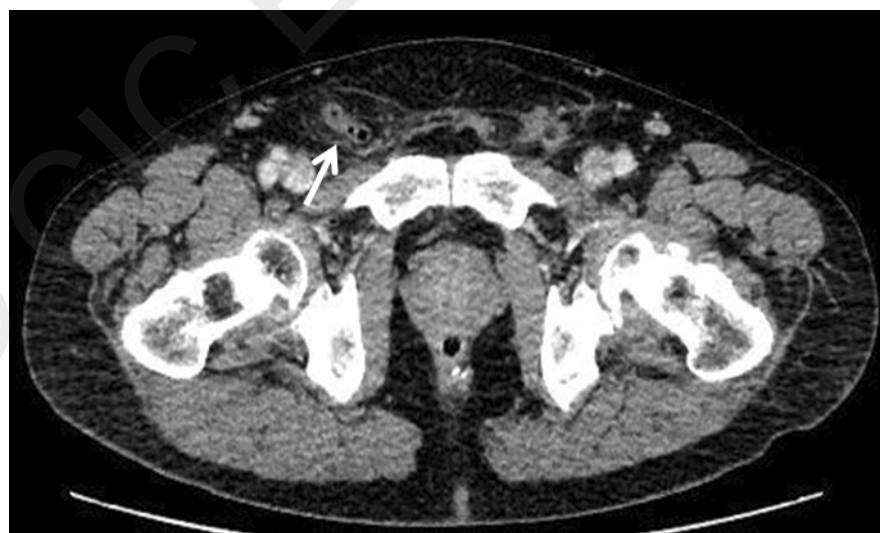


Figure 1 - Transverse CT scan showing the protrusion of the vermiform appendix within a right inguinal hernia sac, classified as type 1 Amyand's hernia (arrow).

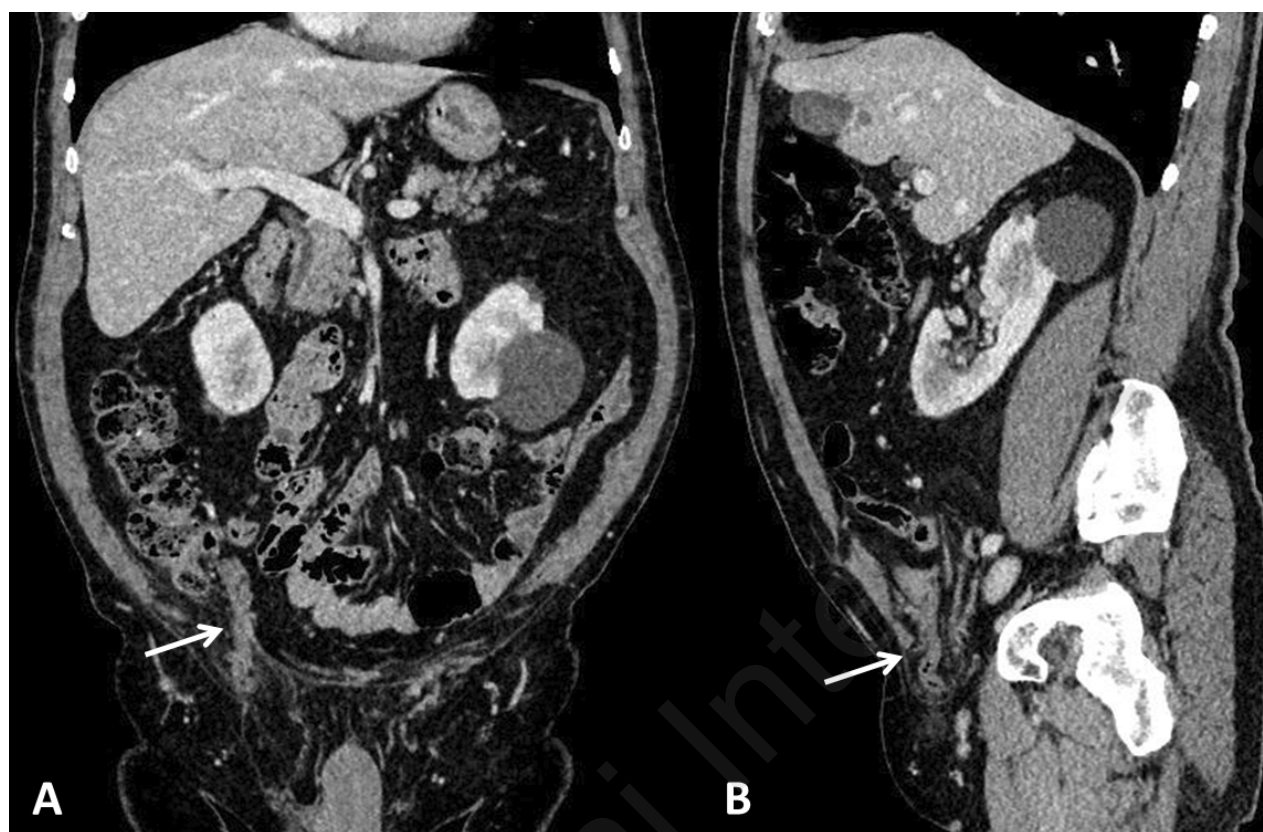


Figure 2 - Multi planar reconstructions on the coronal (A) and sagittal (B) planes allow a more accurate visualization of the appendix inside the inguinal canal (arrows).

inal complication, providing very useful information for the operative design and surgical treatment (6). Actually, based on such parameters, different classification have been proposed for this condition reviewing the existing literature in order to assess the best treatment. Recently Losanoff and Basson developed the existing classification system (which included 3 types of hernia containing a not inflamed appendix, an inflamed appendix or a perforated appendix) into 4 subtypes, adding the situation of complicating intra-abdominal pathology, which can be detected due to the fact that the MDCT is a panoramic examination (17).

The type 1 Amyand hernia may be overlooked on abdominal CT transverse scans, mostly in males because in this population inguinal hernias are common, and the presence of a prominent spermatic cord in some cases may confuse the findings. Moreover, it has been demonstrated that even the size of the appendix is an unreliable parameter for a certain diagnosis as collapsed small bowel loops can be similar in caliber. In order to confirm the presence of an

Amyand's hernia, the sagittal and coronal reformats are particularly useful for identifying the belonging of the identified blind-ending tubular structure to the cecum. Particularly, the value of multi planar reformats was shown in 2007 by Gillion who diagnosed a type 2 hernia, and Maizlin who reported type 1 and type 2 hernia diagnosed using multi slice CT scanning (2). These hernias are treated using elective mesh hernia repair, which may now be performed laparoscopically, with or without appendectomy, depending on the patient age (18, 19).

The diagnosis of type 2 Amyand's hernia is usually obvious, thanks to the signs of inflammation including fat stranding in the inguinal canal and an enlarged, thickened appendix within the hernia (2). The recommended surgical treatment in these cases is represented by appendectomy and hernia repair, usually performed via a groin incision, but mesh repair is not recommended because of the increased risk of infection (18, 19).

The type 3 Amyand's hernia can be more difficult to diagnose as extensive inflammatory changes

and fluid collections may obscure the appendix within the inguinal canal. In these cases, even previous multi detector CT imaging may be invaluable in making the diagnosis. The inflammatory changes may be intra-abdominal or, in the cases of a large hernia or long appendix, may affect the scrotum (2), so the surgical approach often relates to the extent of complications, frequently requiring laparotomy (18).

In the type 4 Amyand's hernia the surgical treatment is mostly depending upon the related or unrelated intra-abdominal findings. Radiological diagnosis is crucial in these cases as further surgery or biopsy can be prevented by the preoperative diagnosis of a second pathology, avoiding additional invasive procedures for the patient (2).

Our case shows the importance of the preoperative CT examination for a correct diagnosis and grading of Amyand's hernia and for the choice of a correct therapeutic approach for the patient.

The main limitation of this case presentation is the lack of crucial information provided by magnetic resonance imaging (MRI) which could show also the peri-appendicular complications with high accu-

racy, due to the possibility of performing fat and background body signal suppression or diffusion imaging, as already demonstrated for other anatomic regions (20).

## Conclusions

"Amyand's hernia" is a rare entity with a difficult preoperative diagnosis. Radiologists need to be aware of this pathology and its classification, as well as of the importance of recognizing both the inflamed and normal appendix within the inguinal canal and the abdominal complications. With the availability of multi detector CT scanning, a greater number of types 1 and 2 hernias are able to be preoperatively diagnosed, and types 3 and 4 better characterized in emergency situation, allowing to perform the best surgical treatment and reducing the chances of pathological recurrence.

## Conflicts of interest

The Authors declare no conflicts of interest.

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