

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Identification of perforated appendicitis within a right inguinal hernia sac (Amyand's hernia) by emergency abdominal CT scan: A case report

Elham Dadzan, MD*, Mathilde Marie Winkler Wille, MD, PhD

Department of Diagnostics Imaging, North Zealand Hospital, Hillerød, Denmark

ARTICLE INFO

Article history:

Received 5 July 2020

Revised 14 July 2020

Accepted 15 July 2020

Keywords:

Amyand's hernia

Inguinal hernia

Appendicitis

Perforated appendicitis

Gangrenous appendicitis

Computed tomography

ABSTRACT

Amyand's hernia (AH) is a rare condition in which the vermiform appendix is herniated into the inguinal sac regardless of whether the appendix appears normal or is inflamed. Most cases of AH are diagnosed intraoperatively at the time of inguinal hernia repair as its clinical diagnosis is difficult, and the role of computed tomography (CT) and other diagnostic imaging has not been described well in the literature.

We report the case of a 79-year-old female who presented to the emergency department with nonspecific symptoms of nausea, vomiting, and constipation. Her symptoms were nonspecific, and physical examination suggested that she did not have a strangulated hernia or appendicitis, but the emergency CT scan of the abdomen showed a perforated appendix trapped in the sac of a right-sided inguinal hernia.

Complicated appendicitis in an AH is a surgical emergency, and an accurate diagnosis is necessary for proper triage of patients and appropriate management. CT plays a significant role in revealing an unsuspected diagnosis of AH. Radiologists must be aware of this rare presentation of the appendix in an inguinal hernia sac and be familiar with AH subtypes.

© 2020 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license.

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

An inguinal hernia containing the appendix is referred to as Amyand's hernia (AH), which was named after Clausius Amyand, the surgeon who performed the first successful appendectomy of a perforated appendix in an inguinal hernia [1,2]. AH represents only 1% of all inguinal hernias.

An inflamed appendix within AH is even rarer and accounts for 0.07%–0.13% of cases [3,4].

Cases of acute appendicitis in a hernial sac have been reported in patients ranging from 3 weeks to 88 years old.

While inguinal hernias occur more in male patients, acute appendicitis in the sac of an inguinal hernia occurs more frequently in female patients [4,5]. Losanoff and Basson created a scale that categorizes AH into several types: (1) type

* Corresponding author.

E-mail address: Elham_D@hotmail.com (E. Dadzan).

<https://doi.org/10.1016/j.radcr.2020.07.042>

1930-0433/© 2020 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)



Fig. 1 – Axial contrast enhanced CT images of lower abdomen of a 79-year-old female patient, presented with a 3-day history of nausea, vomiting, and constipation reveals Amyand’s hernia (Arrow A) and a large left-sided inguinal hernia containing bowel without signs of strangulation or obstruction (arrow B).

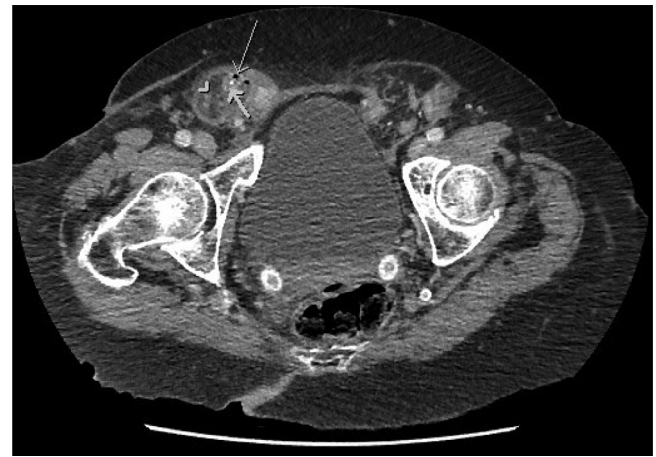


Fig. 2 – Axial contrast enhanced CT images of lower abdomen of a 79-year-old female patient, presented with a 3-day history of nausea, vomiting, and constipation reveals Amyand’s hernia. The image shows dilated appendix (short arrow), which is trapped into the right-sided inguinal hernia surrounded by extra-luminal gas (long arrow) and periappendiceal inflammation (head arrow).

1, the presence of a normal appendix within an inguinal hernia; (2) type 2, acute appendicitis within an inguinal hernia without intra-abdominal sepsis; (3) type 3, acute appendicitis within an inguinal hernia with either an abdominal wall or intra-abdominal sepsis; and (4) type 4, acute appendicitis within an inguinal hernia with any intra-abdominal pathology [6,7].

Clinical case and imaging findings

A 79-year-old female with a past medical history of stroke, atrial fibrillation, and hypertension without any known past abdominal surgery presented with a 3-day history of nausea, vomiting, and constipation. The patient was moderately somnolent and afebrile, and her vital signs were within the normal range. A routine laboratory panel demonstrated a moderately elevated white blood cell count of 19.7×10^9 cells/L (reference range $3.5\text{--}8.8 \times 10^9$ cells/L) and a C-reactive protein of 207 mg/L (reference range <10 mg/L), which suggested an infection. Her abdominal physical exam was notable for diffuse tenderness in the lower abdominal quadrants and bilateral reducible inguinal hernias with mild tenderness on the right side but no rebound tenderness.

The patient immediately underwent an abdominal computed tomography (CT) scan with intravenous contrast to rule out intra-abdominal abscess and obstruction. The CT scan showed an inflamed appendix (Figs. 1–4), which was trapped

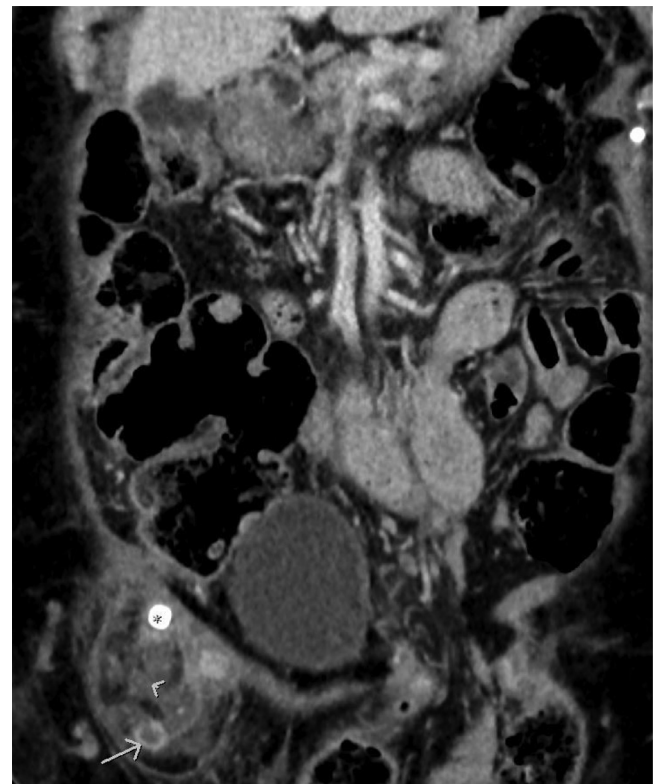


Fig. 3 – Coronal contrast enhanced CT images of abdomen of a 79-year-old female patient, presented with a 3-day history of nausea, vomiting, and constipation reveals type 2 Amyand’s hernia. Dilated appendix (short arrow), which is trapped in right-sided inguinal hernia, an impacted appendicolith (asterisk), diffuse periappendiceal inflammation (head arrow) indicating perforated acute appendicitis. Scanning did not show any intraabdominal abscess or bowel obstruction.

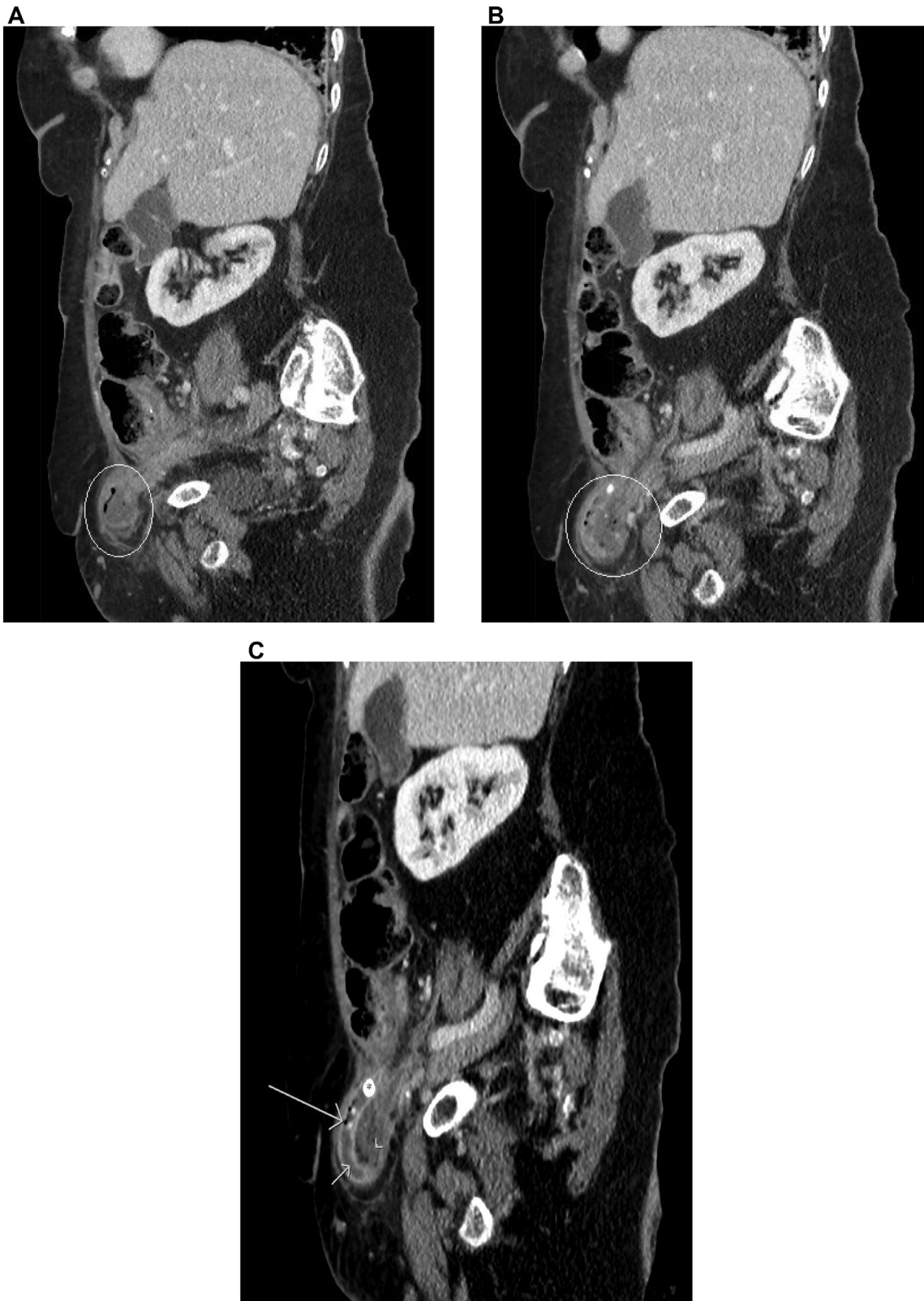


Fig. 4 – (a-c): Sagittal contrast-enhanced CT images of the abdomen of a 79-year-old female patient, presented with a 3-day history of nausea, vomiting, and constipation reveals type 2 Amyand's hernia. Images a to c illustrate developing of appendix as it extends into the right inguinal hernia(circle), dilated appendix (short arrow), which has trapped in a right-sided inguinal hernia, an impacted appendicolith (asterisk), diffuse periappendiceal inflammation (head arrow) as well as extraluminal (long arrow), which indicate perforated acute appendicitis.

in a right-sided inguinal hernia sac. The dilated appendix was surrounded by fluid and extraluminal gas, indicating perforation (Figs. 2–4). All findings suggested AH type 2 according to Losanoff and Basson [6]. Additionally, there was a large left-sided inguinal hernia containing the bowel without signs of strangulation or obstruction (Fig. 1, arrow B). The patient underwent an emergency appendectomy via an inguinal incision, and the intra-operative findings confirmed a gangrenous appendix in the lateral right inguinal hernia surrounded by pus and fecal contamination, as suggested on the preoperative CT scan. The patient made an uneventful recovery and was discharged on postoperative day 5 in stable condition.

Discussion

Traditionally, almost all cases of AH are diagnosed intraoperatively [3]. Despite the increased use of diagnostic imaging, especially CT as a diagnostic tool in patients presenting with acute abdomen, the vast majority of cases are diagnosed still during surgery since most AHs present with either the symptoms of an incarcerated hernia requiring emergency surgery or are found incidentally during an elective hernia procedure. The lack of tenderness over McBurney's point and other distinctive signs and symptoms of acute appendicitis make the preoperative diagnosis of inflamed AH through physical examination difficult [8].

Unlike other bowel-containing inguinal hernias that may cause ileus, AHs usually present without signs of obstruction, and inflammation markers often remain within the normal range [9]. In this case, however, inflammation markers were elevated. The differential diagnosis for AH may include strangulated hernia, Richter's hernia, orchitis, rectocele, inguinal lymphadenitis, epididymitis, and hemorrhagic testicular tumor [9].

The role of CT in AH diagnosis has not been described well in the literature. Vermillion et al. [5] and Ashe et al. [10] previously reported cases in which preoperative CT successfully identified AH.

The incidence of AHs with appendicitis that was correctly and preoperatively diagnosed by CT appears to be increasing [11,12]; however, almost all successful preoperative diagnoses of AHs are made based on scans performed to rule out other pathologies, such as bowel obstruction or strangulation [11].

Our case and previously reported cases in which AH was accurately and preoperatively diagnosed by CT scans demonstrated that CT scans play an important role in revealing an unsuspected diagnosis of AH.

Although AH is a rare condition, radiologists should be aware of this unusual location of the appendix and should be familiar with AH subtypes since these subtypes can determine surgical management.

Any inguinal hernia that contains the bowel is easily detectable with axial CT; however, sagittal and coronal reconstructions may aid the diagnosis and classification of AH [11,12].

A blind-ending tubular structure trapped in an inguinal hernia sac is considered a pathognomonic CT sign of AH. Wall thickening, hyperemia, and peri-appendiceal fat stranding suggest an inflamed appendix regardless of the anatomical location of the appendix [1,13]. Furthermore, the presence of fluid and extraluminal gas suggests perforation.

Conclusion

AH is a rare type of hernia, which is characterized by herniation of vermiform appendix into the inguinal sac; due to unusual location, and lack of signs and symptoms, it is difficult to clinically diagnosed.

A complicated AH with an inflamed appendix is a surgical emergency, and accurate diagnosis and rapid triage of patients for appropriate management will reduce the rate of complications. CT is a valuable diagnostic tool in the preoperative workup for AH, and radiologists must be not only aware of this atypical location of the appendix but should familiarize themselves with its subtypes.

REFERENCES

- [1] Sengul I, Sengul D, Aribas D. An elective detection of an Amyand's hernia with an adhesive caecum to the sac: report of a rare case. *N Am J Med Sci* 2011;3(8):391.
- [2] Constantine S. Computed tomography appearances of Amyand hernia. *J Comput Assist Tomogr* 2009;33(3):359–62.
- [3] Malayeri AA, Siegelman SS. Amyand's hernia. *N Engl J Med* 2011;364(22):2147.
- [4] D'Alia C, Schiavo ML, Tonante A, Taranto F, Gagliano E, Bonanno L, et al. Amyand's hernia: case report and review of the literature. *Hernia* 2003;7(2):89–91.
- [5] Vermillion JM, Abernathy SW, Snyder SK. Laparoscopic reduction of Amyand's hernia. *Hernia* 1999;3(3):159–60.
- [6] Losanoff JE, Basson MD. Amyand hernia: what lies beneath—a proposed classification scheme to determine management. *Am Surg* 2007;73(12):1288–90.
- [7] Singal R, Gupta S. "Amyand's hernia" - pathophysiology, role of investigations and treatment. *Maedica (Buchar)* 2011;6(4):321–7 PMID:22879848PMCID: PMC3391951.
- [8] Ghafouri A, Anbara T, Foroutankia R. A rare case report of appendix and cecum in the sac of left inguinal hernia (left Amyand's hernia). *Med J Islam Repub Iran* 2012;26(2):94.
- [9] Solecki R, Matyja A, Milanowski W. Amyand's hernia: a report of two cases. *Hernia* 2003;7(1):50–1.
- [10] Ash L, Hatem S, Ramirez GA, Veniero J. Amyand's hernia: a case report of prospective CT diagnosis in the emergency department. *Emerg Radiol* 2005;11(4):231–2.
- [11] Ivashchuk G, Cesmebasi A, Sorenson EP, Blaak C, Tubbs SR, Loukas M. Amyand's hernia: a review. *Med Sci Monit* 2014;20:140.
- [12] Cankorkmaz L, Ozer H, Guney C, Atalar MH, Arslan MS, Koyluoglu G. Amyand's hernia in the children: a single center experience. *Surgery* 2010;147(1):140–3.
- [13] Okur MH, Arslan MS, Zeytun H, Otcu S. Amyand's hernia complicated with acute appendicitis: a case report and literature review. *Pediatr Urol Case Rep* 2015;2(4):7–12.