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A combined open and laparoscopic technique for the management of De Garengeot's hernia with acute appendicitis: A case report

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ABSTRACT

INTRODUCTION: De Garengeot's hernia is a rare type of femoral hernia which describes the vermiform appendix incarcerated within the hernia sac. In this case report we present our case and review the surgical approaches described in the literature.

PRESENTATION OF CASE: We present the case of an 84-year-old female with a background of Parkinson's Disease who presented to the emergency department with a five day history of a right-sided groin lump with worsening pain, nausea and reduced appetite. Computed tomography of the abdomen and pelvis revealed an inflamed appendix herniating through the right femoral canal. She had a two staged surgical approach involving an open repair of her femoral hernia followed by laparoscopic appendicectomy.

DISCUSSION: Due to its rarity, there is no standard surgical approach to the appendicectomy and femoral hernia repair. Multiple approaches have been described in the literature, however most reports describe a simultaneous femoral hernia repair and appendicectomy. If an additional abdominal incision is required to complete the appendicectomy safely, we advocate the consideration of a hybrid open-laparoscopic approach, particularly in patients such as this with a history of Parkinson's disease.

CONCLUSION: Here we highlight the usefulness of combining an open low inguinal approach followed by a laparoscopic appendicectomy.

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1. Introduction

De Garengeot's hernia is a rare type of femoral hernia which describes the vermiform appendix incarcerated within the hernia sac. First described in 1731 by the Parisian surgeon Rene Jacques Croissant de Garengeot [1], there are fewer than 100 cases reported in the literature since 1960 with a reported incidence of 0.5–5% of femoral hernia [2,3]. The presence of an acutely inflamed appendix in this type of hernia is very rare; with a reported incidence of 0.08–0.13% [4].

Our surgical approach is discussed and compared with the current literature in line with the SCARE criteria [5] and PROCESS guidance [6].

2. Presentation of case

An 83-year-old woman attended the emergency department with a five day history of a right-sided groin lump with worsening pain, nausea and reduced appetite. She had a background of

Parkinson's disease, diverticular disease and renal impairment. On examination she had erythema over her right groin with a palpable, irreducible and tender lump inferior and lateral to the pubic tubercle. Her abdomen was soft and non-tender and she was afebrile and not tachycardic. Her blood results revealed: CRP 127, WCC $11.4 \times 10^9/L$ (neutrophilia), Hb 134 g/L, and eGFR 42. The computed tomography of the abdomen and pelvis (CTAP) with contrast report revealed an inflamed appendix herniating through the right femoral canal (Figs. 1 and 2). The appendix itself was thick walled and distended. There was localised fluid, lymphadenopathy and fat stranding. The caecum and terminal ileum were not distended.

The patient was started on intravenous fluids and antibiotics and underwent same day operative management. The procedure was carried out in two phases under general anaesthetic (performed by CN). The first phase involved a right-sided low approach with a groin incision over the swelling. The hernia sac was dissected out and opened after the lacunar ligament was divided medially. The sac contained necrotic omentum, an inflamed appendix and the fat pad of the terminal ileum. The necrotic omentum was ligated and excised to enable reduction of the appendix and the fat pad into the abdominal cavity. There was no abscess nor perforation of the appendix. The femoral defect was closed with non-absorbable interrupted sutures; absorbable suture was used to close scarpa's fascia and the skin was closed with clips. The second phase involved diagnostic laparoscopy with appendicectomy via a standard three

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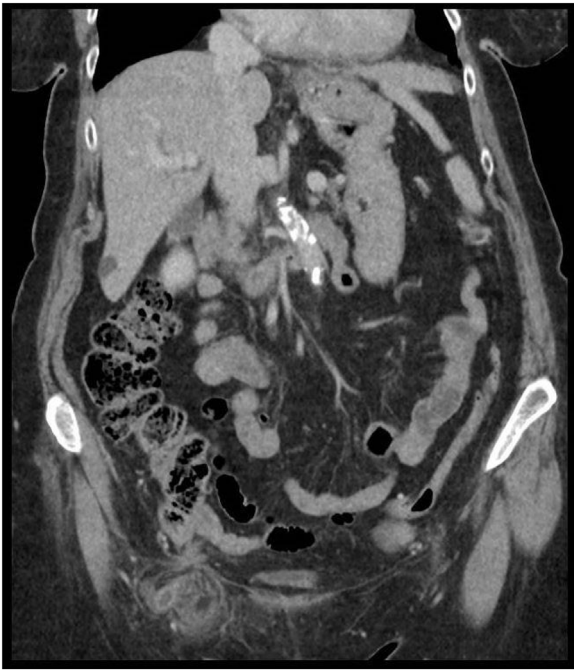


Fig. 1. A coronal section demonstrating the distended, thick-walled appendix herniating through the femoral canal with localised fluid, lymphadenopathy and fat stranding. The caecum and terminal ileum appear normal.



Fig. 2. An axial section demonstrating the right femoral hernia with a distended thick walled structure. The sac lies inferior to the pubic tubercle and anterior-medial to the femoral vein and common femoral artery.

port laparoscopic approach (Fig. 3). The whole procedure took less than 90 min. The patient made a good recovery and she was discharged home on the third postoperative day without complication.

3. Discussion

Hussain et al. suggest that the appendix first migrates through the femoral canal, then becomes incarcerated and subsequently strangulated, whilst others believe an inflamed appendix migrates through [7]. Voitk et al. have highlighted that patients usually have an absence of signs of intra-peritoneal pathology as the femoral canal contains the spread of infection [8]. Such infection may be self-limiting or may result in complications including abscess,



Fig. 3. Laparoscopic view of the reduced appendix. The appendix is turgid, ischaemic with no evidence of gangrene or perforation. The caecal base is clearly visualised as is the repaired femoral defect.

necrosis of the hernia contents, necrotising fasciitis and even death if the diagnosis is delayed [9].

The clinical diagnosis of a de Garengeot hernia is challenging and the surgeon needs to be cognisant of this differential in patients with atypical symptoms. Patients usually present with a tender, erythematous and irreducible lump in the right groin but the final diagnosis is often made during surgery [10]. CT is the most useful imaging modality in atypical presentations and can assist in diagnosis but findings are typically nonspecific and diagnostic for only 44% of patients [10]. However a low-positioned caecum along with a tubular structure within the hernia sac as well as adjacent fat stranding have been reported to have 98% specificity and sensitivity for diagnosis [11]. Whilst ultrasound is frequently used in the diagnosis of groin lumps, it has variable findings which are user-dependent [10].

Due to its rarity, indeterminate imaging studies and often intra-operative diagnosis, there is no standard surgical approach to the appendicectomy and femoral hernia repair. Multiple approaches have been described in the literature.

Appendicectomy via delivery of the entire appendix through the femoral canal or inguinal incision has been widely used with a primary hernia repair [2,3,12–17]. If the appendix is clearly visualised and not inflamed, Sharma suggests repair of the hernia following reduction of the normal appendix is acceptable [18]. There are many combined open intra-abdominal approaches described once an inflamed appendix is encountered during an emergency procedure. Rajan et al. deployed an open exploration via low inguinal approach [4]. Once an inflamed appendix was identified within the sac, the incision was extended laterally with splitting of the abdominal wall layers to access the peritoneum. The appendix was subsequently reduced and a routine appendicectomy was performed. The sac was then transfixated and excised intra-abdominally and the femoral defect repaired using sutures. Hussain (2014) used an oblique incision at the level of the inguinal ligament to access the sac, upon finding a necrotic appendix, a McEvedy approach was then used to enter the peritoneal cavity and a retrograde appendicectomy was performed to prevent peritoneal contamination [7]. The hernia was repaired with sutures. Erdas used an infra-inguinal incision initially but the base of the inflamed appendix was impossible to control and thus a typical open appendicectomy via an incision over McBurney's point was performed [19], with a mesh repair of the femoral defect. Wise & Tanner approached the hernia with a low incision but as the caecum could not be brought down, the inflamed appendix was reduced, the sac excised and hernia repaired with sutures [1]. The appendicectomy was subsequently performed using a grid-iron approach. Linder et al. deployed a low midline incision and as the appendix could not be reduced from the hernia sac, a further groin incision was performed. The appendix

ruptured when it was reduced and it was extracted piecemeal following which a sutured hernia repair was performed.

It is clear that an open approach is widely accepted, whilst a laparoscopic approach is less well used but is gaining acceptance. Beysens et al. were the first to describe a laparoscopic appendicectomy and hernia repair using the totally extraperitoneal technique (TEP) with mesh repair. They were able to perform the laparoscopic appendicectomy first followed by the hernia repair with the peritoneum acting as a barrier between mesh and abdominal contents [20]. A transabdominal preperitoneal procedure (TAPP) for a de Garengeot hernia has also been performed [21,22]. Garcia-Amador et al. performed an initial laparoscopic appendicectomy with a primary sutured repair of the femoral defect [23]. Sibona et al. and Thomas et al. performed an initial laparoscopic reduction of the appendix with appendicectomy, followed by groin exploration and repair with an oblique incision over the femoral swelling [24,25]. Ramsingh et al. completed an open repair of the femoral hernia with mesh plug followed by laparoscopic appendicectomy [26]. Repair by prosthetic mesh whether open or laparoscopically is considered possible with low risk of infection or recurrence, in the absence of appendix perforation or abscess formation [3,11,13,14,18,20].

In this case the pre-operative imaging facilitated diagnosis and surgical planning but the surgeon must be alert for any unpredicted intra-operative findings during the initial approach of any incarcerated or strangulated femoral hernia. There are several surgical approaches described in the literature for the emergency management of de Garengeot's hernia and decisions should be based on anatomical and intra-operative findings as well as the patient's clinical status, comorbidities and available surgical expertise. Whilst an entire laparoscopic approach or initial laparoscopic approach followed by open hernia repair has been suggested, we performed an initial groin incision as the groin lump was tender and irreducible with overlying skin erythema. We believe that the groin exploration preceding the laparoscopic approach may be the correct order of surgery as this allows you to assess the hernia sac contents and avoid additional incisions if the caecal base can be identified and the appendicectomy safely performed through the groin incision. We also hypothesise that an initial laparoscopic approach may increase the potential for appendiceal perforation or leaving the tip of the appendix behind which has implications on decision making related to the hernia repair with or without mesh [3,11,13,14,18,20].

The key to any approach is providing adequate exposure and access to the area to facilitate a safe and effective hernia repair and appendicectomy. If an additional abdominal incision is required to perform the appendicectomy, we advocate the consideration of a hybrid open-laparoscopic approach, particularly in patients such as this with a history of Parkinson's disease. It is well established that laparoscopy has advantages over open surgery with regards to the management of acute appendicitis; offering reduced post-operative pain and wound infection rates, shorter length of stay and more rapid return to normal activities [27].

4. Conclusion

De Garengeot hernia containing an acutely inflamed appendix is a rare surgical emergency, not easy to diagnose and has several surgical treatment options. Here we highlight the usefulness of combining an open low inguinal approach followed by a laparoscopic appendicectomy.

Conflicts of interest

Nil conflicts of interest.

Funding

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Ethical approval

Ethical approval was sought but not required given the nature of the study.

Consent

We can confirm that the patient has indeed given us written/signed consent to publish the case report as well as the images.

Author contribution

Tarak Chouari - Study concept/design, collection of data, interpretation and writing the paper.

Timothy Davies - interpretation and writing the paper.

Karan Rangarajan - collection of data, interpretation and editing the paper.

Christopher Nicolay - (senior author), study concept/design, interpretation, writing and editing the paper.

Registration of research studies

Not required - not a first in man study.

Guarantor

Tarak Chouari.

Christopher Nicolay.

Provenance and peer review

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