



# De Garengeot's Hernia: Report of a Rare Surgical Emergency and Review of the Literature

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## OPEN ACCESS

### Edited by:

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### Specialty section:

This article was submitted to  
Visceral Surgery,  
a section of the journal  
Frontiers in Surgery

**Received:** 16 January 2018

**Accepted:** 05 February 2018

**Published:** 16 February 2018

### Citation:

Misiakos EP, Paspala A,  
Prodromidou A, Machairas N,  
Domi V, Koliakos N, Karatzas T,  
Zavras N and Machairas A  
(2018) De Garengeot's Hernia:  
Report of a Rare Surgical Emergency  
and Review of the Literature.  
*Front. Surg.* 5:12.  
doi: 10.3389/fsurg.2018.00012

This is a report of a case who was admitted and operated on for a strangulated femoral hernia. The hernia sac contained a gangrenous appendix, which was excised and the hernia was repaired with sutures without complication. De Garengeot's hernia, although very rare, should be included in the differential diagnosis of cases with strangulated hernia and should receive the optimal treatment.

**Keywords:** femoral ring, hernia repair, appendicitis, appendectomy, de Garengeot's hernia

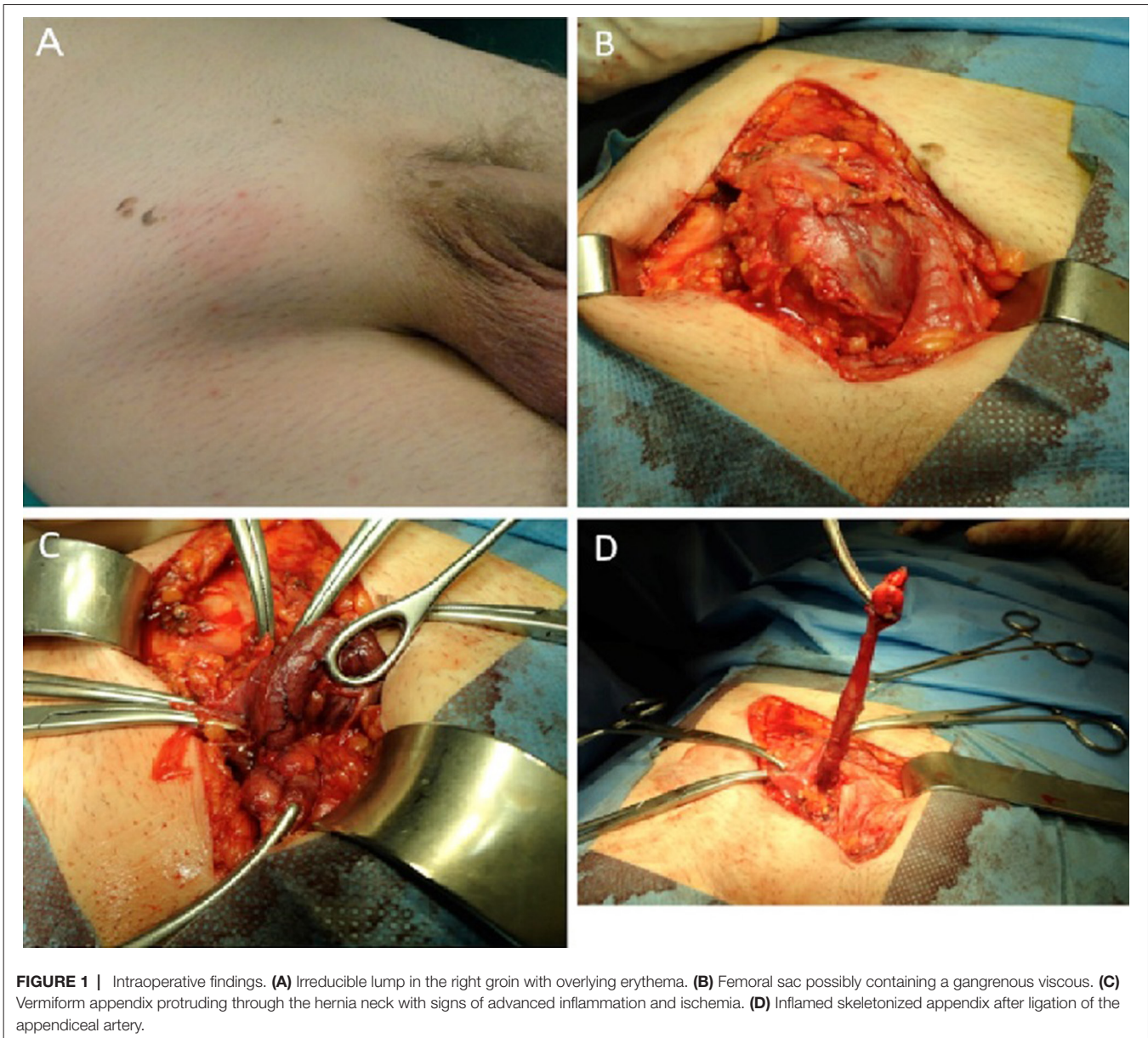
## BACKGROUND

Femoral hernia occurs as the result of protrusion of the sac through the femoral canal medial to the femoral artery and below the inguinal ligament. This type of hernia is more common in women and accounts for only 3% of all the hernias; it has a 15–20% chance of strangulation because of the narrow and rigid femoral neck. (1–3) In only 0.5–5% of the events, the appendix can travel through the femoral hernia. Rene Jacques Croissant de Garengeot, a French surgeon, was the first to describe the presence of the vermiform appendix inside an incarcerated femoral hernia in 1731 (4). Finding de Garengeot's hernia is rare (less than 1% of surgically treated hernias), and it is even rarer to find an acutely inflamed or perforated appendicitis within the hernia sac (roughly 0.08–0.13%) (2).

We herein report a case of de Garengeot's hernia in a middle-aged male patient and present a systematic review of the literature.

## CASE PRESENTATION

A 56 year old male Caucasian patient was admitted to the Emergency Department of our Hospital due to an irreducible lump in his right groin, which he had initially noticed 12 h earlier. At the time of his arrival the patient had no significant abdominal pain during the last 48 h or any change in his bowel movements. Moreover, he had no personal history of hernia or any other pathology. Physical examination revealed a small irreducible palpable lump with overlying skin erythema and local tenderness in the right inguinal region (**Figure 1A**). His abdomen was soft, non-distended, and non-tender with normal bowel sounds on auscultation and no signs of bowel obstruction. A small increase of inflammatory markers was noted in his blood tests (WBC =  $13,910 \times 10^9/L$ ; CRP = 43.8 mg/L). (**Table 1**) Due to gradually increasing pain in the region, the patient was transferred to the operating theater. Initially a right inguinal incision was performed. No inguinal hernia was



found and a lump emerging from the subcutaneous tissue below the inguinal ligament was identified (**Figure 1B**). After identification of the sac, the adjacent tissues were dissected, and the sac was opened. Unexpectedly the sac contained a vermiform appendix (**Figure 1C**) emerging from the femoral canal along with a small quantity of clear fluid (negative for bacteria). The appendix was incarcerated within the sac, inflamed and its blind end exhibited early signs of necrosis (**Figure 1D**). The appendix was resected and the femoral ring was approximated with sutures without use of a mesh. The patient's postoperative course was uneventful; he tolerated oral intake and his bowel movements returned to normal within 24 h. He was discharged on the 3rd postoperative day. Histology of the resected appendix showed inflammatory changes within the appendix consistent with appendicitis and peri-appendicitis.

## DISCUSSION

Femoral hernia cases constitute an uncommon cause of groin lumps, which account for 3–5% of all abdominal hernias. The appendix is reported to be present inside the hernia sac in approximately 1% of the cases (3), and the incidence of appendicitis is even rarer, occurring in 0.08–0.13% of all patients. The clinical preoperative diagnosis of de Garengeot's hernia can be challenging and often encountered randomly during surgery especially in cases where the patients are urgently led to surgery without preoperative imaging examination. Due to the narrow and rigid femoral neck of femoral canal, this type of hernia is much more likely to become incarcerated and strangulated. Sequentially strangulation can result in acute appendicitis or even worse in perforation and abscess formation. The treatment of choice for this type of hernia is emergency surgery.

**TABLE 1 |** Patient characteristics

Total patients	34
Mean age ± SD (years)	71.2 ± 16.2
Gender	
Male	5
Female	29
Diagnosis	
Preoperative (CT or U/S)	25
Intraoperative	9
Primary symptoms	
Pain	26
Nausea/Vomit	5
Fever	3
Intraoperative Findings	
Acute Appendicitis	34
Perforation	7
Surgical Approach	
Open	32
Laparoscopic	2
Mesh placement	
Yes	9
No	25

Appendectomy and primary hernia repair should be performed simultaneously.

After the year 2000, a total of 32 articles, which presented 34 cases of de Garengéot's hernia and histology proven appendicitis have been published (1, 3, 5–34). Thirty-four patients (5 men and 29 women) with a mean age of 71.2 years with this uncommon type of hernia were presented in these studies. In the majority of cases (26/34, 76.4%) patients presented with pain in the groin or generalized pain in the lower abdomen, more frequently right-sided (only one patient had a left-sided hernia) (7). Patients reported abdominal pain, nausea and vomiting in 5 (14.7%) cases (5, 12, 13, 22, 27) and fever (8.8%) in 3 cases (6, 24, 29). Six patients underwent preoperative ultrasound in addition to a CT (13, 17, 18, 21, 30, 32) and fifteen patients had a preoperative CT as the only imaging method (1, 5, 9, 10, 12, 14, 19, 20, 22, 24–26, 29, 34). In 9 cases no imaging studies were performed as physical examination indicated an incarcerated hernia (inguinal versus femoral) and received emergency surgical treatment (3, 6, 7, 11, 23, 27, 28, 33). Seven of them had a perforated appendix (9, 11, 19, 22, 25, 28, 29). The degree of inflammation of the appendix was proven histologically in all 34 cases. Interestingly in one of these studies, Phillips et al. had described a case of a 73-year-old female who apart from appendicitis, his femoral sac included a perforated Meckel's diverticulum (Littre's hernia) (9).

Several surgical approaches for the treatment of de Garengéot's hernia have been described; open (inguinal or midline incision) or laparoscopic appendectomy plus primary repair of the femoral hernia with/without mesh (Lichtenstein or TAPP technique) (3,

5, 8, 17, 20, 22, 26, 27, 30). Most surgical strategies began with an inguinal or an oblique incision over the irreducible lump (26 of the patients). Six patients had a laparotomy with a lower midline incision, because of a high possibility of abscess or perforation (9, 11, 12, 14, 16, 19). Only in 2 published cases the surgical team chose the laparoscopic approach for both appendectomy and hernia repair (one TAPP procedure and one case primary repair). (8, 22) There is currently no formal consensus regarding the optimal approach (open or laparoscopic) for the treatment of femoral hernia. Although it would be preferable not to use a mesh in a patient with well-documented inflammation, successful repair with mesh has been reported. (3, 5, 8, 17, 20, 22, 26, 27, 30) Therefore, the decision on whether to use a mesh or not depends on the surgeon's preference in each individual case.

Herein we described a case of a 56 year old male patient, who was admitted to our center and finally underwent emergency surgery for an irreducible lump in his right groin. Intraoperatively, a de Garengéot's hernia was identified. Pathological examination demonstrated acute appendicitis with transmural necrosis and peri-appendicitis. De Garengéot's hernia should be included in the physician's differential diagnosis in patients with pain and swelling in their right groin. To that end, despite the urgency of this surgical case, surgical teams must perform imaging studies (preferably computerized tomography), which will demonstrate the exact kind of hernia (inguinal or femoral) and the content of the sac (omentum, bowel, appendix etc), with the aim to tailor the optimal surgical approach for each case.

## INFORMED CONSENT

Written informed consent was obtained from the patient for the publication of this case report.

## AUTHOR CONTRIBUTIONS

EM is the chief surgeon of this case and the main author of this case report, APa helped him in this operation and, with VD, contributed in the collection and interpretation of data. NZ is a pediatric Surgeon in our Department and contributed in analyzing the patient's clinical reports and obtained informed consent of the patient. NK and NM are chief resident and postdoctoral fellow, respectively, in our Department and helped in reference collection and selection, and the writing of the paper. APr and TK are surgeons from another Hospital who helped in the collection of literature references and review analysis. AM is the Professor and Chairman in our Department and supervised the writing of this report.

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**Conflict of Interest Statement:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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