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CASE REPORT PEER REVIEWED | OPEN ACCESS

De Garengeot's hernia: A modified Nyhus tissue-based procedure to approach a rare case of de Garengeot hernia, with a crystal-clear diagnosis on preoperative imaging

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ABSTRACT

Introduction: The presence of the appendix within a femoral hernia, a condition named De Garengeot hernia, is an unusual finding often discovered incidentally during surgery. Patients usually present with a clinical picture undistinguishable from that of an incarcerated groin hernia and few cases have been clearly observed on imaging studies. Case Report: This paper present the case of a De Garengeot hernia diagnosed on a preoperative CT-scan and repaired using a modified Nyhus tissue-based procedure. Conclusion: Clinical experience mainly arises from management decisions taken intra-operatively, and no standard recommendations have yet been formulated. This article further discusses surgical dilemmas in managing this rare entity.

Keywords: De Garengeot hernia, Femoral hernia, Nyhus procedure, Surgical approach

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INTRODUCTION

Abdominal hernias have become a ubiquitous anomaly for general surgeons. Among these can be found a rare variant, a De Garengeot hernia, encompassing for 0.5 to 5% of all femoral hernias [1]. Named after the Parisian surgeon who initially described it in 1731, a De Garengeot hernia is defined as a femoral hernia containing the appendix [2]. It is typically seen in post-menopausal women, with an occurrence ratio of 4:1 to 13:1 in women, which correlates with their higher incidence of femoral hernias and probably associated with body changes during pregnancy [3–5]. Other general contributing factors include older age, smoking, increased intra-abdominal pressure, and connective tissue disorders [3, 5].

In the literature, less than 100 cases have been reported, and were all managed using various surgical approaches, including the McVay, De Oliveira, King's College and McEvedy methods, or even by laparoscopy [1, 6–9]. No standard technique has been recommended for accessing this rare entity, but an inguinal approach is still practiced in the majority of cases [5]. Pre-operative diagnosis is difficult to establish since patients present with a non-specific history and clinical findings in favor of an incarcerated inguinal or femoral hernia [7]. It is also seldom diagnosed on imaging, either because of immediate surgical intervention with no need for preoperative imaging or because patients had a non-visualized appendix. As a result, it is estimated that almost 90% of De Garengeot hernias are diagnosed during surgery [5].

This article report the case of a patient who was diagnosed with a De Garengeot hernia pre-operatively,

and who underwent a repair using a modified Nyhus procedure. This paper further attempts to discuss surgical dilemmas encountered when managing this type of hernia.

CASE REPORT

A 76-year-old female presented to the emergency department with a three-day history of a painful bulging in the right inguinal region. She denied any accompanying symptoms and did not notice any bowel obstruction. Her past medical history was unremarkable. Her past surgical history included a total abdominal hysterectomy, a hallux valgus osteotomy, a left inguinal hernia repair and sigmoidectomy for diverticulitis. She was stable hemodynamically with no fever or tachycardia. Physical examination was only significant for a right subinguinal erythematous swelling. Tenderness was noted at light palpation. No manual reduction technique was intended because the pain had been persistent for three days. The rest of the abdomen was soft and non-tender. Laboratory tests on admission showed a hemoglobin level at 144 g/L, and a white blood cell count of 5.3 $x10^9$/L, with 3.4 neutrophils $x10^9$/L. An abdominal and pelvic computerized tomography (CT) was performed and revealed a right femoral hernia sac, along with a trapped vermiform appendix (Figure 1). The latter seemed normal, with no mural thickening, except for a small round area of high attenuation at its tip. The CT also identified a small fluid collection in the hernia sac and slight infiltration of adjacent soft tissues, but no signs of perforation or abscess. With this clear diagnosis of a De Garengeot hernia on imaging, the patient was brought to the operating room the same day.

Under general anesthesia, a 6-cm long transverse inguinal incision was performed two finger breadths above the pubis. After cutting through the anterior aponeurosis of the rectus abdominis, a deinsertion of the muscle on its lateral aspect was performed. The fascia transversalis was opened from beneath the inferior epigastric vessels. Dissection was carried down deeper, liberating the transversalis fascia from the peritoneum until attaining the surface of the psoas muscle. After iliac vessels were identified, the round ligament was isolated and sectioned, letting us access the femoral sac, which we freed through blunt finger dissection and encircled in a Penrose drain at its neck. Due to the position of the corona mortis close to the internal aspect of the Gimbernat's ligament in this case, it had to be clipped and cut it. A 1-cm long incision in the Gimbernat's ligament left enough space to introduce an index finger and disengage the femoral hernia. The latter was then easily extricated by both gently pulling on the drain and applying pressure on the surrounding skin. The sac was opened after noticing what was thought to be an underlying necrotic appendix (Figure 2). It turned out to be a hematoma at the tip of the appendix, with an otherwise normal body. An appendectomy in routine fashion using simple ligations was accomplished. This was followed by hernia sac excision and its closure using continuous Vicryl sutures. Finally, the femoral ring was closed by placing five 2–0 Prolene sutures from the Cooper's ligament to the iliopubic tract superiorly.

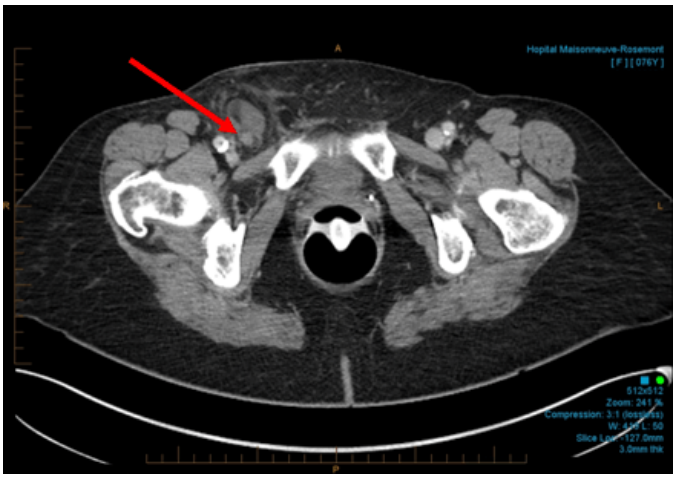

Figure 1: Abdominal computed tomography (CT) scan indicating the presence of a right-sided femoral hernia sac (3.54 x 2.25 cm), containing a tubular structure with a circular high attenuating area posteriorly (0.88 cm-red arrow). Both femoral vein and artery are lateral to the hernia sac.

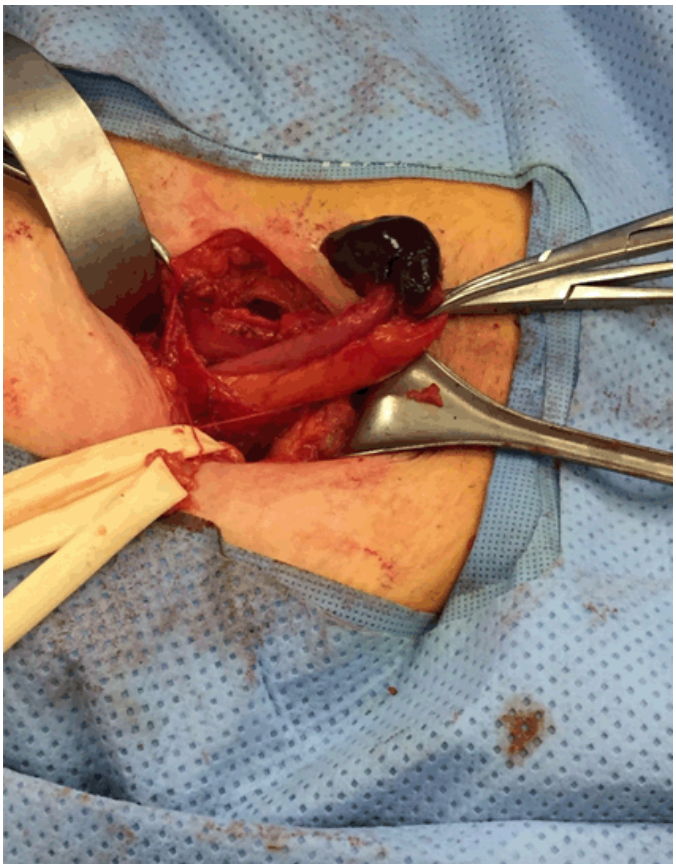

Figure 2: Image showing the intraoperative findings of De Garengeot hernia. Opening the hernia sac revealed a hematoma localized at the tip of the appendix, with an otherwise normal body, correlating with the CT findings.

The surgery was very well tolerated and the patient had a satisfactory post-operative recovery. She was discharged on post-operative day three, without any complication. She was seen at an outpatient follow-up visit one month after surgery, and was seen again five months later without any sign of recurrence.

DISCUSSION

The above described a rare case of a De Garengeot hernia diagnosed pre-operatively. The underlying pathogenesis of this entity remains unclear, but two theories are generally retained either an anatomical variant of the appendix positioned in the pelvis, or the presence of a large cecum with an increased motility, forcing the appendix into the pelvis [10].

Speaking of imaging, it is rarely warranted for hernias overall, but may be considered in certain circumstances. Even though sonographic positive findings have been described for De Garengeot hernias, contrast enhanced CT is the modality of choice. It can define the preoperative diagnosis, and help with surgical planning. Magnetic resonance imaging findings were also reported in literature, but are typically used only when CT is contra-indicated [11–12]. Typical signs include the presence of a tubular structure within the hernia sac, in continuity with a low-lying cecum in the pelvis, and stranding of adjacent fat [11–13]. The finding of a concomitant appendicitis is possible but even rarer, at 0.08% to 0.5% of all femoral hernias [3]. Only five cases of CT detected appendicitiswere reported as of yet, mostly in the form of a fat-stranding surrounding the portion of appendix within the sac [7, 14–17]. Sonographic appearance has also been described twice, as a tubular blind-ending structure casting an acoustic shadow, and showing negative findings for flow on Doppler interrogation [11]. It often remains a chicken-and-egg question as to whether the inflamed appendix migrated within the femoral hernia or whether appendicitis occurred secondarily to the strangulation at the neck of the hernia [7]. However, whether imaging is obtained or not, a surgical intervention is indicated in all suspected incarcerated hernia because of the high strangulation riskof femoral hernias [18]. An untreated De Garengeot hernia may lead to severe complications, such as perforation, abscess, appendico-cutaneous fistula, bowel obstruction, sepsis, and even necrotizing fasciitis [7].

As for surgical management, no standard conduct has been established yet, but surgeons are usually faced with three main dilemmas. The first one concerns the choice of an open versus a laparoscopic repair. In this case, a Nyhus technique was adopted. Described in 1960, this technique leads to a posterior repair by dividing the layers of the abdominal wall to expose the femoral ring from the properitoneal space. It has been used for inguinal hernia repair and is also recommended for incarcerated or strangulated femoral hernias, with a recurrence rate of around 1% [19–21]. Another novel technique, used by Mizumoto and al. (2015), is the King's College approach. It starts with an incision 1 cm above the medial half of the inguinal ligament. Dissection is carried down to the external oblique aponeurosis and creation of a superior and inferior flap. This help differentiation of inguinal and femoral hernia. The abdominal cavity is accessed with a similar approach of the Nyhus technic. It has the same advantage of accessing the abdominal cavity in a single incision, making both femoral and inguinal hernia repair possible, as well as resection of a necrotic segment of bowel if necessary [7]. Finally, Al-Subaie and al. (2015) successfully repaired a De Garengeot hernia using a laparoscopic transabdominal preperitoneal (TAPP) approach, where shorter hospital stay and fast recovery are expected benefits [9]. In a review of 36 patients by Kalles and al. (2013), 48% of them had an inguinal approach, 10% had a low midline laparotomy, 5% were converted from laparoscopic to a standard oblique inguinal incision and 3% had a McEvedy (vertical) incision [5]. In the end, regardless of the chosen procedure, it is important to keep in mind that adequate intra-abdominal access to the base of the appendix may be necessary in order to safely perform an appendectomy. The surgical approached used was well adapted because the intra-peritoneal cavity is easily opened allowing to perform an appendectomy simply. There is a controversy in the literature questioning the necessity of an appendectomy in the presence of a normal appendix [16, 17, 22, 23]. In this patient, even though the body of the appendix seemed healthy, a hematoma at its tip indicated some level of tissue damage and microscopic inflammation could not be ruled out, in which case appendectomy was judged to be a safer and straightforward option. For this reason, other authors suggest systematic appendectomy [24]. Lastly, the use of a prosthetic mesh constitutes another procedural variation. Generally, it is not recommended if signs of inflammation, perforation or abscess formation are observed or cannot be excluded, as prosthetic material increases the risks of infection. Thus, herniorrhaphy becomes the established choice of repair in such cases.

The high incidence of wound infection after femoral hernia repair, up to 29%, also applies to De Garengeot hernias. This stresses the importance of a close post-operative monitoring and outpatient follow-up [25]. The management definitely relies in recognition of a femoral hernia, followed by undelayed surgical management. In this case, a Nyhus technique was adopted. This technique leads to a posterior repair by dividing the layers of the abdominal wall to expose the femoral ring from the properitoneal space.

CONCLUSION

A De Garengeot hernia should be kept in mind when assessing a patient who presents with a right groin pain. Nyhus technique has the same advantage of accessing

the abdominal cavity in a single incision, making both femoral and inguinal hernia repair possible, as well as resection of a necrotic segment of bowel if necessary.

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Author Contributions

Ariane Lacaille-Ranger – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Olina Dagher – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Lucas Sidéris – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Michel Morin – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor of Submission

The corresponding author is the guarantor of submission.

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Consent Statement

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

Conflict of Interest

Authors declare no conflict of interest.

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