



Case report

Necrotizing fasciitis of the back originating from a perforated appendicitis: A case report

Eric Bergeron^{*}, Lionel Bure

Department of Surgery, Charles-LeMoine Hospital, Greenfield Park, Canada



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ABSTRACT

Introduction: Acute appendicitis is a frequent surgical emergency. Necrotizing fasciitis is an uncommon issue in patients with appendicitis. Infection may find its way through susceptible areas.

Case presentation: A case of necrotizing fasciitis in the lumbar region secondary to appendicitis is presented. This case occurred after a perforated appendicitis through the lumbar triangle of Jean-Louis Petit.

Discussion: Necrotizing fasciitis arising from an appendicitis may occur in unusual site. The lumbar triangle of Jean-Louis Petit represents an extremely unpredictable pathway.

Conclusion: Necrotizing fasciitis of the abdominal wall may be caused by a complicated appendicitis. Appendicitis may occur within the inferior lumbar triangle, offering a path to an unexpected site of severe infection.

1. Introduction

Acute appendicitis is a frequent surgical emergency and is usually managed by appendectomy with low morbidity and mortality [1]. Perforation of appendix with abscess formation or peritonitis occurs in about 15 % of patients [2]. Severe complications may occur if diagnosis and management are delayed. However, necrotizing fasciitis is a very uncommon issue in patients with appendicitis [3,4]. A case of necrotizing fasciitis in the lumbar region secondary to appendicitis is presented. This case occurred after a perforated appendicitis through the lumbar triangle of Jean-Louis Petit. This case is reported in accordance with SCARE guidelines [5].

2. Case presentation

A 67-year-old female presented at the emergency room mainly complaining of right lumbar pain. She denied nausea, vomiting, loss of appetite or change in bowel habits. She reported no abdominal pain or fever. She never had abdominal or spine intervention. Back pain was something new and no precipitating factor was identified. She was feeling numbness in the right thigh. She consulted at a walk-in clinic three weeks before with chills and light lumbar tenderness for which she was prescribed ciprofloxacin, without further investigation, except for urinalysis that turned negative. Symptoms rapidly resolved at this time.

Upon presentation, the patient was walking with right limp. She was

not confused. Temperature was 38.9. Blood pressure was 105/65. Pulse rate was 110. There was no abdominal distension, mass, or tenderness. There was redness on the right flank and on the right lumbar region (Fig. 1). On palpation, subcutaneous crepitus was felt. White cell count was $26.4 \times 10^9/L$ (Normal: 3.8–10.7) with 87 % polymorphonuclear cells. Hemoglobin was 97 g/L (Normal: 118–149). CRP was >350 mg/L (Normal: <5.0). An abdominal CT scan showed air in the soft tissues of the postero-inferior and lateral areas along the fascial planes (Fig. 2). This was in communication with a retroperitoneal collection besides the iliopsoas muscle measuring 10 cm × 6.2 cm × 3.5 cm (Figs. 3 and 4). The appendix was proximally normal but distally enlarged at 12 mm and entered the collection with an evident perforation (Fig. 3).

The patient was prompted to the operating room. She was placed in a left lateral position. The incision was planned from the right lumbar region, passing over the iliac crest, and continuing on the right iliac fossa (Fig. 1), to allow access to the back and the abdominal cavity. Exploration started firstly in the back. There was evidence of necrotizing fasciitis with foul smelling and brownish discharge. Necrotic tissues involved the deep planes in the back. The incision was extended towards the front at the right iliac fossa. The peritoneal cavity was open. There was no fasciitis or muscle involvement past the iliac crest. Upon opening the peritoneal cavity, there was no pus or free fluid. The cecum was stuck posterolaterally. By finger dissection, the cecum was liberated, and pus was expressed. The appendix was normal proximally but clearly perforated distally. Pus was aspirated, as it was coming from a hole just

^{*} Corresponding author at: Charles-LeMoine Hospital, 3120, boul. Taschereau, Greenfield Park, Quebec J4V 2H1, Canada.

E-mail address: eric.bergeron.med@sss.gouv.qc.ca (E. Bergeron).

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Fig. 1. On the left, cellulitis extending from the flank to the back is demonstrated. The inferior drawing delineates the iliac bone. The superior drawing is the planned incision. On the right, the patient is placed in left lateral recumbent position for operation.

over the iliac crest, corresponding to the lumbar triangle of Jean-Louis Petit. This space was thoroughly washed out. Appendectomy was completed and a drain was left into the space. The anterior part of the incision was closed but the posterior part was left open. The patient did not have hemodynamic instability and did not receive inotropic medication.

The patient was put on intravenous piperacillin-tazobactam. She was brought to the operating room on second and fourth days after initial intervention for further debridement. The wound was left open thereafter. Cultures grew *Streptococcus anginosus*, *Actinomyces dentocolens*, and *Bacteroides thetaiomicon*. So, this is a type I necrotizing fasciitis according to Lacerotto [6]. Antibiotics were continued for a total of 4 weeks intravenously. Two days after the third intervention, a negative pressure wound therapy was initiated. Globally, the patient recovered well but slowly. She was discharged home 33 days after admission without complications. Three months later, the patient is well but still has numbness in the right thigh. The wound healed satisfactorily (Fig. 6).

3. Discussion

The incidence of necrotizing fasciitis has risen recently associated with an increased prevalence of patients with comorbidities [7]. Mortality remains high owing to its fulminant progression [3]. The involvement of the abdominal wall is usually the result of minor skin trauma or infection, or secondary to postoperative complications [7]. Abdominal causes include appendicitis, colocutaneous fistula, incarcerated hernia, and perforation of hollow viscus [8]. Hence, any intra-abdominal process may be involved but remains unusual.

Appendicitis is one of the most frequent surgical emergencies with 15 % of the cases complicated with peritonitis or abscess [2]. Appendix may lie in unusual locations such as in hernias. The most frequent presence of herniated appendix is within an inguinal hernia, called Amyand's hernia. Amyand's hernia occurs in about 1 % of all inguinal hernia cases and is inflamed in about 0.13 % [9]. The incidence of acute appendicitis presenting in an inguinal hernia is <0.1 % [9]. Femoral hernias represent 2–4 % of all inguinal hernias [10]. Appendix may lie

within a femoral hernia in 0.5–5 % of cases and is called de Garengeot's hernia [10,11]. Appendicitis in these unusual locations presents with very atypical presentation [9,11] and perforation leads to a dramatic increase in the mortality rate (15–30 %), due to severe and rapidly progressing sepsis [9,12].

Lumbar hernias represent <1.5 % of all abdominal hernias, mainly traumatic or after surgery [13]. They may contain retroperitoneal fat, kidney, colon or less commonly small bowel, omentum, ovary, spleen or appendix [13]. They may occur through a congenital area of least resistance [14] called the triangle of Jean-Louis Petit which is bordered by iliac crest (Fig. 4), posterior border of external oblique and the anterior border of latissimus dorsi (Fig. 5) [13]. More than just the area of weakness in the triangle of Jean-Louis Petit, the present case had an actual hernia which allowed a direct path for the infection to expand through the posterior wall [14,15].

Similar to other reported cases [8,16–19], this patient with appendicitis presented with non-specific or atypical symptoms and had even potentially been cooled off with initial antibiotics. Early diagnosis may be difficult since necrotizing fasciitis often presents with mild erythema in the skin as with common cellulitis (Figs. 1) [15,18]. It spreads rapidly along fascial planes, resulting in overwhelming toxicity [6,17,19], and devastating prognosis [8,19]. Without evident cutaneous cause of abdominal cellulitis, an intra-abdominal origin should be searched for [8,17]. Cellulitis in the presence of an intraabdominal cause such as appendicitis in this case, should be a warning. When facing opportunistic infection to take over, time matters and there is no place for conservative treatment [3,15,19]. Here, prompt intervention and necessary reoperations, along with antibiotic treatment, prevented further flare up of infection or progression to shock, and resulted in a good prognosis.

Three cases of appendicitis were retrieved from the literature involving specifically the triangle of Jean-Louis Petit [14,15,20]. The cases reported by Hua [15] and Coulier [14] were perforated and abscessed appendicitis within the peritoneal cavity, which fused through the posterior lumbar abdominal wall to largely expand within the subcutaneous fat of the flank. We posit that the appendix herniated

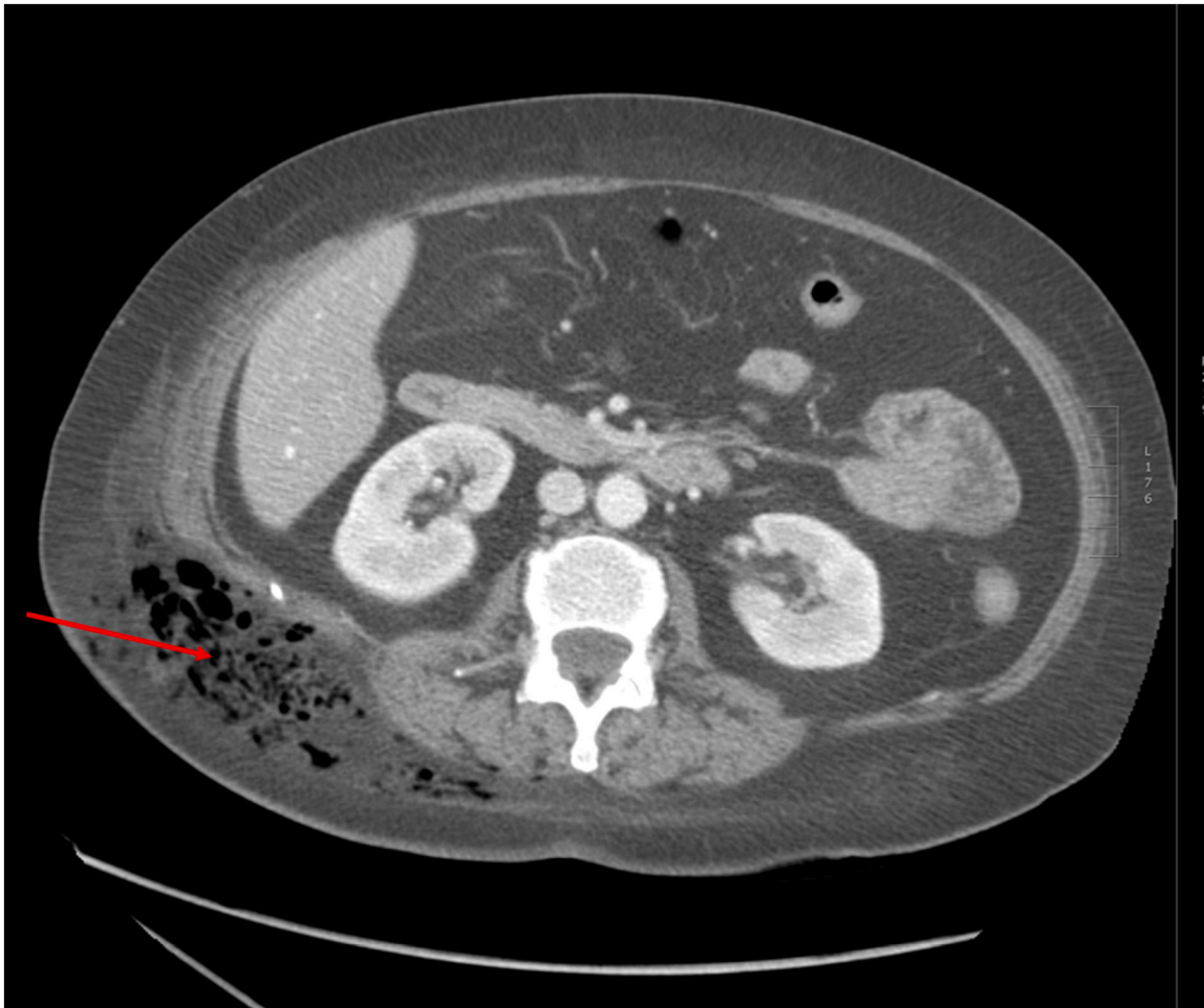


Fig. 2. Abdominal computed tomography showing extensive subcutaneous emphysema (red arrow) with soft tissue necrosis. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

through the triangle of Jean-Louis Petit and subsequently perforated, given the close proximity of the appendix and the Petit's triangle, the unusually small pre-psoas abscess and large abdominal soft tissue abscess and the relatively preserved aspect of the proximal appendix (Figs. 2 and 3). The case presented by Ali [20] was a lumbar hernia with a scarred but not currently inflamed. Although these cases and the present one are very interesting in terms of rarity, presentation and discussion, they in fact represent a curiosity. They explain how infection may transgress the abdominal wall in an anatomical point of view, as in inguinal or femoral hernias [11,12]. However, despite its sporadic occurrence, necrotizing fasciitis in majority of the appendicitis cases, finds a way to reach the abdominal wall without a hernia [8,16–19].

The mortality is very high, should necrotizing fasciitis occur [8,9,12,16–19]. Once diagnosis is done, there are no alternatives to immediate intervention, wide debridement of necrotic tissues, treatment of the underlying cause, and broad-spectrum antibiotics [6]. As in this case, further surgical exploration may be mandatory [6].

According to this discussion, these assumptions must anyhow be kept in mind:

- 1) Appendix within a hernia is unusual
- 2) Appendicitis within a hernia is even more unusual
- 3) Lumbar hernia represents <1.5 % of abdominal hernias
- 4) Necrotizing fasciitis of the abdominal wall rarely originates from an intra-abdominal source

- 5) Immediate diagnosis of an appendicitis causing a necrotizing fasciitis in the back as first hypothesis would be very impressive
- 6) In the absence of an obvious cause of necrotizing fasciitis of the abdominal wall, an intra-abdominal cause must be investigated
- 7) Prompt surgical intervention is mandatory

In conclusion, necrotizing fasciitis of the abdominal wall may be caused by a complicated appendicitis. Appendicitis may occur within a hernia, and unusual sites may be involved offering a path to additionally unexpected sites of severe infections. The present case of necrotizing fasciitis arising from an appendicitis within the lumbar triangle of Jean-Louis Petit is a demonstration of this totally out of the ordinary situation that must nevertheless be kept in mind.

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Author contribution

EB reviewed managed and reviewed the case. EB wrote the manuscript. LB was involved in the provision and revision of medical imaging. EB and LB critically reviewed and approved the final version of the article.

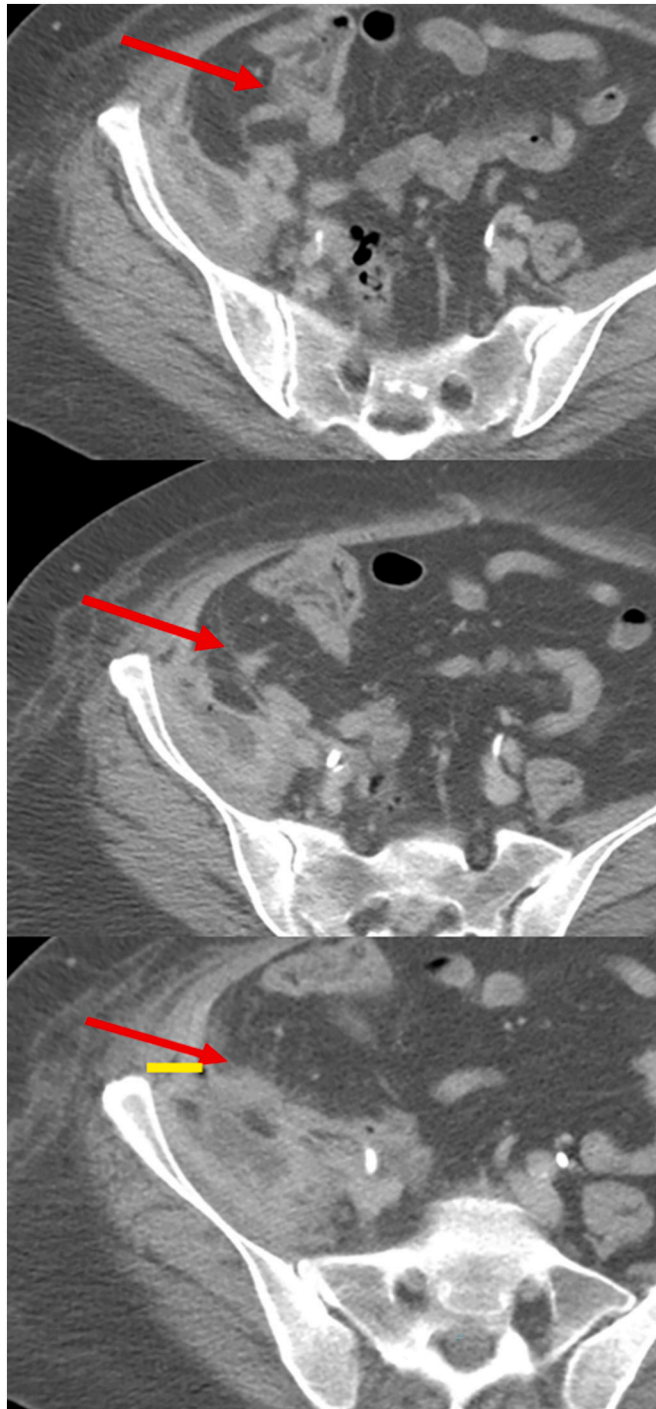


Fig. 3. Relatively preserved appendix (red arrows) extending towards the triangle of Jean-Louis Petit with distal perforation and abscess formation. Note the short distance between the site of appendiceal rupture and the Petit's triangle (yellow line). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



Fig. 4. Retroperitoneal abscess extending into the abdominal soft tissues through the triangle of Jean-Louis Petit (red arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

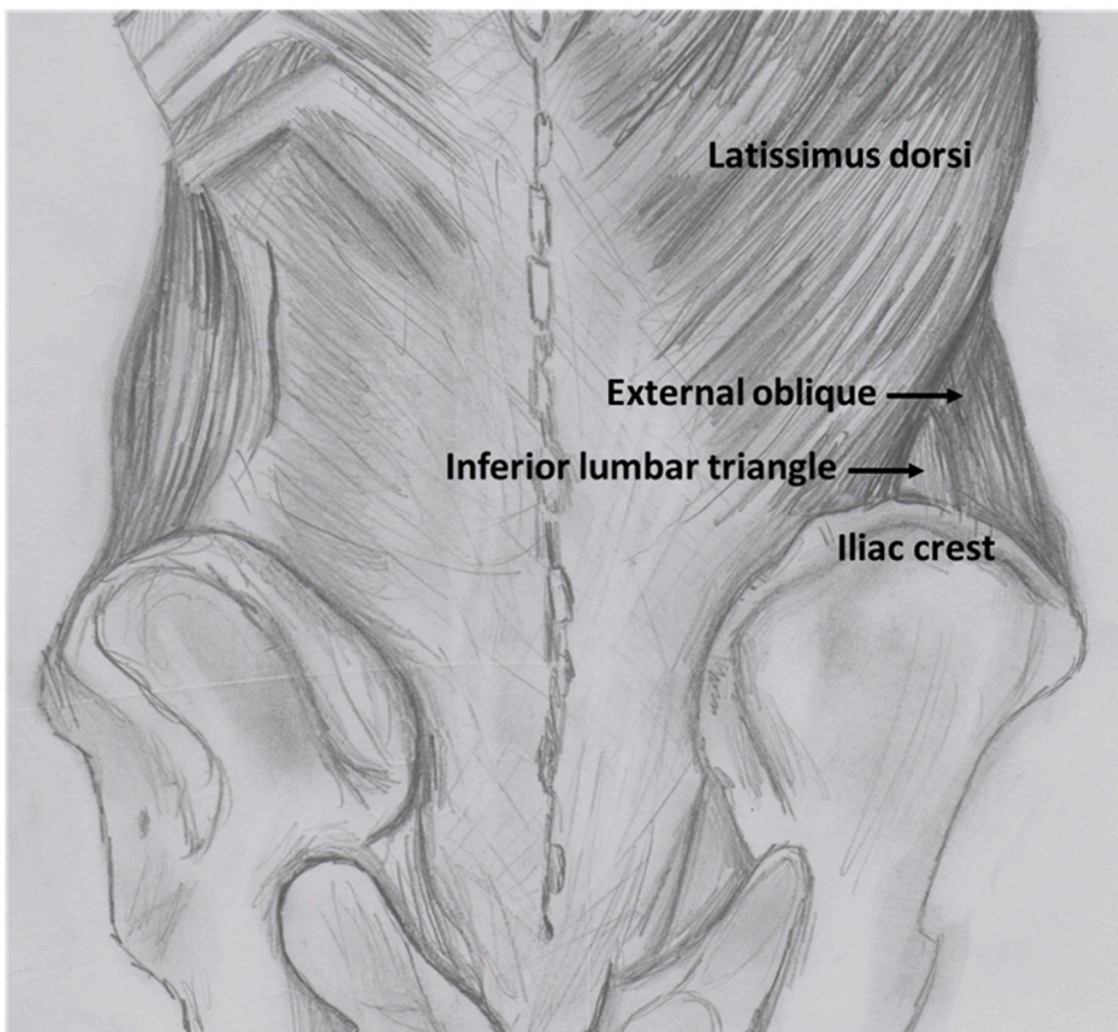


Fig. 5. Right inferior lumbar triangle of Jean-Louis Petit.

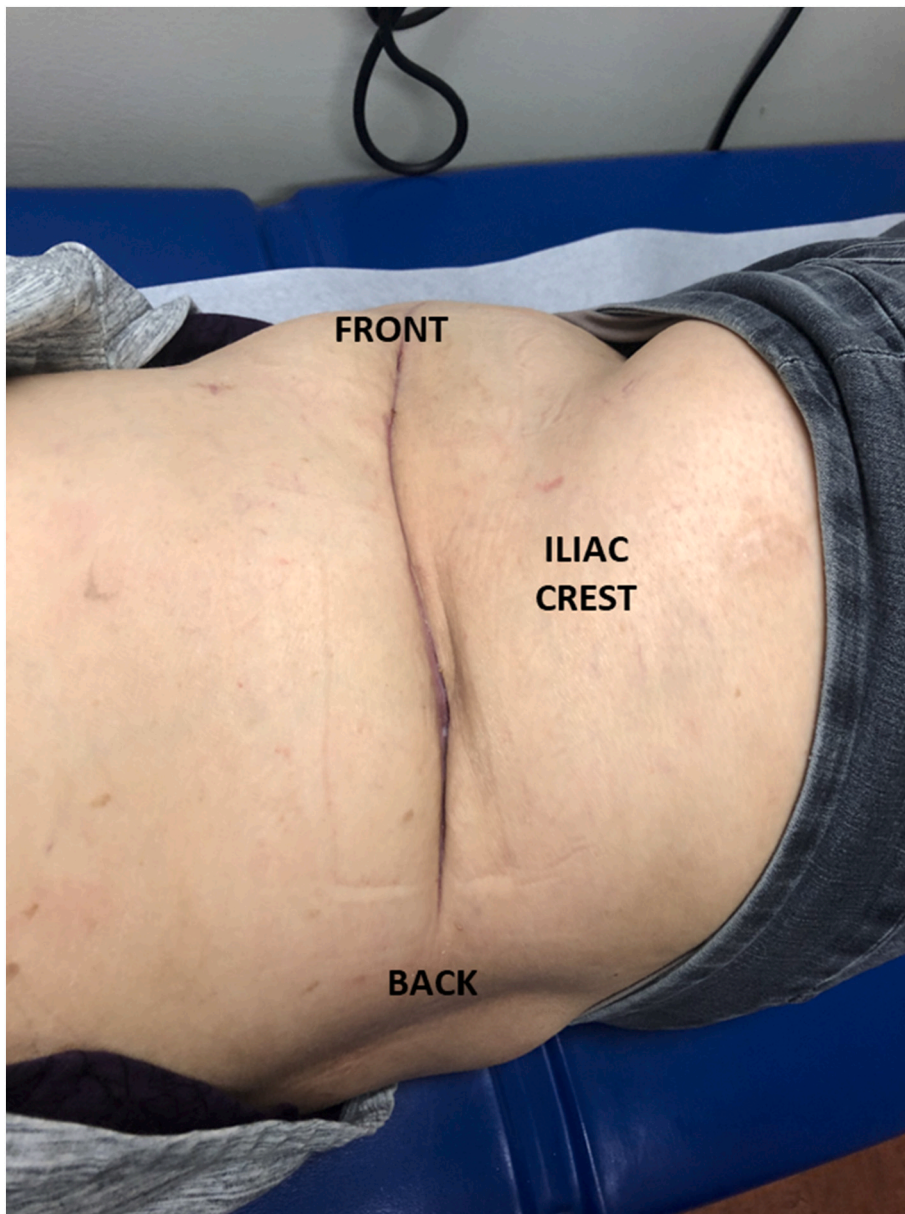


Fig. 6. Follow-up of the patient three months after initial intervention with the healed incision.

Consent

The patient has given her consent.
There is no possibility to identify the patient from the text or images.
The patient's consent is joined.

Ethical approval

No need for Ethical approval for case report in our center.

Registration of research studies

None.

Guarantor

EB is responsible for the work.

Declaration of competing interest

No conflicts of interest to declare.

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References

- [1] D.P. Wickramasinghe, C. Xavier, D.N. Samarasekera, The worldwide epidemiology of acute appendicitis: an analysis of the Global Health Data Exchange dataset, *World J. Surg.* 45 (2021) 1999–2008, <https://doi.org/10.1007/s00268-021-06077-5>.
- [2] F.T. Drake, N.E. Mottey, E.T. Farrokhi, M.G. Florence, M.G. Johnson, C. Mock, S. R. Steele, R.C. Thirlby, D.R. Flum, Time to appendectomy and risk of perforation in acute appendicitis, *JAMA Surg.* 149 (2014) 837–844, <https://doi.org/10.1001/jamasurg.2014.77>.
- [3] T.W. Chin, K.W. Ko, K.H. Tsang, Necrotising fasciitis: a rare complication of acute appendicitis, *Hong Kong Med. J.* 24 (2018) 535–537, <https://doi.org/10.12809/hkmj166180>.

- [4] A. Romanoff, J. Freed, T. Heimann, A case report of necrotizing fasciitis of the abdominal wall: a rare, life-threatening complication of a common disease process, *Int. J. Surg. Case Rep.* 28 (2016) 355–356, <https://doi.org/10.1016/j.ijscr.2016.09.005>.
- [5] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, SCARE Group, The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230, <https://doi.org/10.1016/j.ijssu.2020.10.034>.
- [6] L. Lancerotto, I. Tocco, R. Salmaso, V. Vindigni, F. Bassetto, Necrotizing fasciitis: classification, diagnosis, and management, *J. Trauma Acute Care Surg.* 72 (2012) 560–566, <https://doi.org/10.1097/TA.0b013e318232a6b3>.
- [7] C.W. Chen, C.W. Hsiao, C.C. Wu, S.W. Jao, T.Y. Lee, J.C. Kang, Necrotizing fasciitis due to acute perforated appendicitis: case report, *J. Emerg. Med.* 39 (2010) 178–180, <https://doi.org/10.1016/j.jemermed.2007.09.026>.
- [8] M. Takeda, Y. Higashi, T. Shoji, T. Hiraide, H. Maruo, Necrotizing fasciitis caused by a primary appendicocutaneous fistula, *Surg. Today* 42 (2012) 781–784, <https://doi.org/10.1007/s00595-012-0140-x>.
- [9] D. Patoulias, M. Kalogirou, I. Patoulias, Amyand's hernia: an up-to-date review of the literature, *Acta Med. (Hradec Kral.)* 60 (2017) 131–134, <https://doi.org/10.14712/18059694.2018.7>.
- [10] S. Linder, G. Linder, C. Månsson, Treatment of de Garengot's hernia: a meta-analysis, *Hernia* 23 (2019) 131–141, <https://doi.org/10.1007/s10029-018-1862-5>.
- [11] S. Tsuruta, H. Miyake, H. Nagai, Y. Yoshioka, N. Yuasa, M. Fujino, Clinicopathological characteristics of De Garengot hernia: six case reports and literature review, *Surg. Case Rep.* 7 (2021) 14, <https://doi.org/10.1186/s40792-020-01098-z>.
- [12] K. Rajaguru, E.E. Tan, D. Lee, Amyand's hernia with appendicitis masquerading as Fournier's gangrene: a case report and review of the literature, *J. Med. Case Rep.* 10 (2016) 263, <https://doi.org/10.1186/s13256-016-1046-9>.
- [13] P. Sharma, Lumbar hernia, *Med. J. Armed Forces India* 65 (2009) 178–179, [https://doi.org/10.1016/S0377-1237\(09\)80140-8](https://doi.org/10.1016/S0377-1237(09)80140-8).
- [14] B. Coulier, M. Gogoase, A. Ramboux, F. Pierard, Extra-abdominal lumbar abscesses caused by retroperitoneal gastrointestinal perforations through the lumbar triangle of petit: report of two cases diagnosed by CT, *Abdom. Imaging* 37 (2012) 1122–1128, <https://doi.org/10.1007/s00261-012-9847-9>.
- [15] J. Hua, L. Yao, Z.G. He, B. Xu, Z.S. Song, Necrotizing fasciitis caused by perforated appendicitis: a case report, *Int. J. Clin. Exp. Pathol.* 8 (2015) 3334–3338.
- [16] C. Beerle, H. Gelpke, S. Breitenstein, R.F. Staerkle, Complicated acute appendicitis presenting as a rapidly progressive soft tissue infection of the abdominal wall: a case report, *J. Med. Case Rep.* 10 (2016) 331, <https://doi.org/10.1186/s13256-016-1122-1>.
- [17] S. Taif, A. Alrawi, Missed acute appendicitis presenting as necrotising fasciitis of the thigh, *BMJ Case Rep.* 2014 (2014), bcr2014204247, <https://doi.org/10.1136/bcr-2014-204247>.
- [18] I. Elahabadi, G. Bazmandegan, H. Salehi, A. Jafari, J. Ahmadi, Z. Kamaib, Fournier's gangrene after missed acute perforated appendicitis: a case report, *Clin. Case Rep.* 9 (2021), e04989, <https://doi.org/10.1002/ccr3.4989>.
- [19] J. Oh, Acute perforated appendicitis complicated by necrotizing fasciitis and bladder perforation, *Cureus* 13 (2021), e12764, <https://doi.org/10.7759/cureus.12764>.
- [20] S.M. Ali, S. Subramaniam, Appendicular abscess as an unprecedented cause of an inferior lumbar hernia, *Ann. R. Coll. Surg. Engl.* 99 (2017) e85–e87, <https://doi.org/10.1308/rcsann.2016.0351>.