



Intra-Abdominal Appendiceal Abscess Tracking to the Foot: Case Report and Review of the Literature

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Abstract

We report a case of perforated non-retrocecal appendix in a child resulting in an infection with multiple pelvic and right lower extremity abscesses tracking along the ileo-femoral vessels from the pelvis to the foot. The only predisposing factor in the patient's history was juvenile dermatomyositis quiescent for seven years on no medications.

Case Presentation

A 16-year-old female was admitted to a children's hospital for intractable right lower extremity pain and edema, fever, elevated white blood count, and elevated serum creatinine kinase. Magnetic Resonance Imaging (MRI) findings showed multiloculated thigh abscesses, with profound muscle and soft tissue inflammatory changes extending from the femoral canal to the knee (Figure 1A and 1B). In the operating room, a 27 cm medial thigh incision drained 400 cc of foul smelling pus from a collection extending from the anterior hip capsule to the knee. Gram stains and culture indicated *Escherichia coli* (*E. coli*). There was significant tissue and fascial inflammation with necrosis of the sartorius, pectineus, and adductor magnus, longus, and brevis muscles, necessitating extensive debridement. Following irrigation and debridement, a wound VAC (vacuum assisted closure) was placed over the medial thigh. Calf swelling noted during surgery, prompted MRI of the calf demonstrating inflammation and fluid in the leg (Figure 1C and 1D). On hospital day 2, surgery for additional wash out yielded foul smelling necrotic tissue from the thigh, necessitating a 37 cm right lateral thigh incision with irrigation and debridement. Lower leg fasciotomy with a 17 cm right lateral incision and a 15 cm medial leg incision exposed all four compartments, with more drainage of pus. Medial and lateral wound VACs were placed on the thigh and leg. Following wash out, abdominal and pelvic Computed Tomography (CT) was obtained to evaluate for ruptured appendicitis. CT showed a dilated appendix with appendicoliths and multiple pelvic abscesses from ruptured appendicitis (Figure 2). Interventional radiology placed a 10 French right lower

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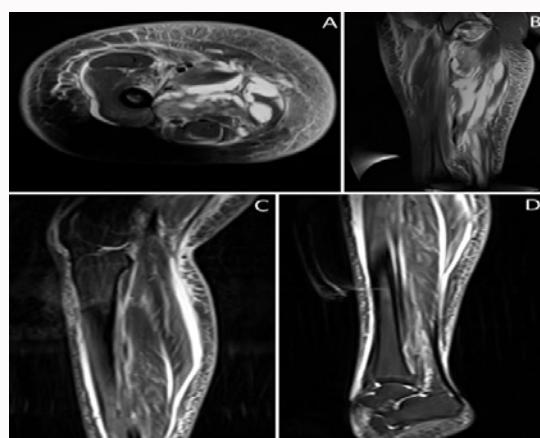


Figure 1: MRI imaging. Right thigh (A) axial and (B) sagittal STIR weighted images demonstrate multiloculated abscesses in the posterior thigh, inflammation of the adductor magnus, adductor longus, sartorius, gracilis, semimembranosus and vastus medialis. There is diffuse soft tissue edema. MRI of the right calf (C) upper calf and (D) lower calf STIR weighted images demonstrate extensive subcutaneous and muscular edema. There is fluid within the crural fascia.

Table 1: Timeline of hospital course.

Hospital Day	Procedure	New Findings
1	Hospital admission MRI of the right thigh Incision and drainage of medial thigh	Multiloculated thigh abscesses, profound muscle and soft tissue inflammatory changes extending to the knee Tissue necrosis, significant fascial inflammation Cultures positive for <i>Escherichia Coli</i>
2	MRI of right calf Incision and drainage of: right lateral thigh, right lateral leg, medial leg and drainage of medial thigh CT of abdomen/pelvis Interventional Radiology placed 10 French drain for iliopsoas abscess Intubation/ventilation initiated	Inflammation extending to distal leg, fluid in the crural fascia Ruptured appendicitis with intra-abdominal abscess Septic shock
3	Surgical drainage of iliopsoas abscess with insertion of 3 Penrose drains	
4	Washout and drainage of thigh and leg incisions	
5	Weaned off of sedation and pressor support	
7	Closure of medial and lateral leg incisions	
9	Closure of lateral thigh incision	
11	Closure of medial thigh incision with placement of 2 right lower quadrant Penrose drains	
47	Discharged with plan for interval appendectomy	

Table 2: Cases of appendicitis resulting in lower extremity abscess.

	Age	Abscess Location	Appendix Location	Complications	Treatment*	Survived
Edwards [10]	76	Psoas to thigh	Retrocecal	Myositis, necrosis, sepsis	Surgical drainage	No
Dheer [11]	57	Gluteal/abdominal wall to knee	Retrocecal	Myositis, subcutaneous emphysema, necrosis	Surgical drainage and debridement	Not reported
EI-Masry [12]		Psoas to thigh	Retrocecal		Appendectomy Surgical drainage	Yes
Sharma [13]	6	Psoas to thigh	Retrocecal	Myositis, sepsis	Appendectomy Surgical drainage	Yes
Ushiyama [14]	83	Psoas to thigh	Retrocecal	Myositis, subcutaneous emphysema	Appendectomy Curettage	Yes
Hsieh [1]	56	Psoas to thigh	Retrocecal	Myositis, subcutaneous emphysema	Appendectomy Surgical drainage	Yes
Yildiz [15]	27	Inguinal ligament to groin	Retrocecal	Sepsis	Appendectomy Surgical drainage and debridement	Yes
Sookraj [16]	67	Psoas to thigh	Retrocecal	Necrosis	Appendectomy Curettage	Yes
Lal [17]	40	Gluteal to thigh	Retrocecal	Subcutaneous emphysema	Appendicectomy Surgical drainage Ileotransverse colectomy	Yes
English [18]	56	Iliacus to thigh	Retrocecal	Necrosis	Surgical drainage and debridement Interval appendectomy	Yes
Nanavati [19]	53	Gluteal/psoas to thigh	Retrocecal		Surgical drainage Ileocolostomy	Yes
Naidoo [20]	50	Psoas to knee	Retrocecal	Necrosis, sepsis	Appendectomy Surgical drainage and debridement	No
Van Hulsteijn [2]	73	Iliopsoas to thigh	Retrocecal	Myositis	Surgical drainage Ileoascendostomy	Yes
Case Report	16	Psoas to foot	Not retrocecal	Myositis, necrosis, sepsis	Surgical drainage and debridement Interval appendectomy	Yes

quadrant drain, obtaining 20 cc of pus, likewise growing *E. coli* on culture. Patient's sepsis progressed, requiring inotropic support with epinephrine and norepinephrine. On day 3, a 10 cm right iliopsoas abscess, adjacent to the interventional drain, was surgically drained and irrigated using an extraperitoneal approach. To facilitate drainage of the retroperitoneum, three separate extraperitoneal Penrose drains (1-inch) were placed in the retrorenal area, through the femoral triangle, and in the subcutaneous tissue. The peritoneal cavity was not opened.

On hospital day 7, as sepsis resolved, washout and wound closure of the medial and lateral leg and partial wound closure of the lateral thigh were performed. On hospital day 9, the lateral thigh wound was closed. On hospital day 11, two medial thigh drains were placed and the right medial thigh wound was closed. Patient was discharged on hospital day 47, following wound care and rehabilitation. The patient's hospital course is summarized in Table 1. Appendectomy

was performed several months later.

Discussion

Ruptured appendicitis with contamination of the ipsilateral lower extremity is recognized in cases of retrocecal appendix, primarily affecting older or immunocompromised patients (Table 2). The retrocecal appendix is in close proximity to the psoas, allowing infection from a ruptured appendix to track along tissue planes following the psoas muscle into the thigh as it inserts on the lesser trochanter of the femur [1]. A thigh abscess resulting from rupture of a non-retrocecal appendix positioned in the right pelvis (Figure 2), as in this case, is unreported in the literature [2]. Furthermore, ruptured appendiceal abscess tracking along the femoral vessel all the way to the foot is unreported.

The only predisposing factor in the patient's medical history was dermatomyositis at age 5, treated with steroids and methotrexate.

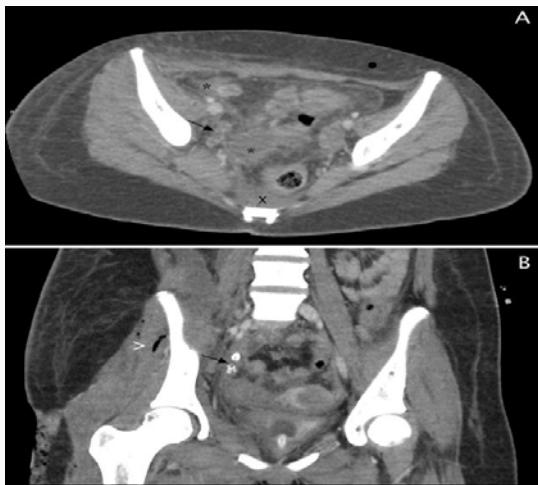


Figure 2: CT abdomen and pelvis with contrast. (A) Axial image demonstrates multiple abscesses (*), free fluid(x), inflammatory changes of the subcutaneous and intra abdominal fat and enlarged pelvic appendix (arrow). (B) Coronal image shows dilated appendix with appendicolith (arrow). Post operative intramuscular air seen (>).

Juvenile Dermatomyositis (JDM) is an autoimmune disease manifested by skin lesions and proximal muscle weakness. Diagnosis is made by clinical presentation, muscle biopsy demonstrating inflammatory infiltrate, perifascicular atrophy and connective tissue fibrosis, and blood studies showing elevated muscle enzymes and inflammatory markers. Initial therapy is systemic steroids, with additional treatments including intravenous gamma globulin and methotrexate to achieve remission [3-5]. Once remission is achieved, long term abnormalities from the muscle and soft tissue inflammation may result in residual fatty replacement and atrophy of the muscle and connective tissue fibrosis [6]. Of the three clinical courses described for JDM (chronic, polycyclic and monocyclic) this patient was categorized as monocyclic due to the successful treatment of JDM with no further recurrences [7]. This patient had been in remission and off steroids for seven years. We suspect residual changes in muscle and fascia from the original JDM episode predisposed the patient to infection spread down the soft tissue planes to the foot, causing near fatal sepsis. Connective tissue fibrosis may have compromised the separation of compartments [8]. In this case, MRI evidence of atrophy and fatty deposits may have been obscured by swelling and fluid signal from edema. While the patient experienced unilateral leg weakness, marked muscle inflammation, and laboratory values consistent with active myositis, laboratory values did not confirm recurrence of juvenile dermatomyositis.

Conclusion

Although the most common pediatric inflammatory myopathy, JDM still remains rare and clinical implications of remission poorly understood [9]. Clinicians must remain cognizant of potential life-threatening complications from JDM even in disease which has been clinically quiescent and patients who are not on steroid therapy. Based on this case experience, we recommend extensive imaging to delineate the sites of infection and aggressive surgical drainage as necessary to achieve adequate abscess drainage to resolve the progressive sepsis.

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