Case Report

Development of an Iliacus Muscle Abscess after School Exercise in a 17-Year-Old Female Student

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Keywords

Iliacus muscle abscess · Psoas abscess · Methicillin-susceptible *Staphylococcus aureus* · School exercise

Abstract

Primary psoas abscess is due largely to hematogenous or lymphatic spread under immuno-compromised conditions, whereas secondary psoas abscess is due largely to direct spread from adjacent infected structures. Trauma or hematoma within the muscle may predispose to the development of a primary abscess, especially if infection is present prior to injury, despite the absence of previous signs or symptoms of infection. This report describes a 17-year-old female high school student who developed an abscess within her iliacus muscle due to methicillin-susceptible *Staphylococcus aureus* after running 3 km on a hill as a school exercise. She was positive for antinuclear antibody and had had atopic dermatitis, suggesting that these factors, as well as exercise-related minor trauma or hematoma within the muscle, may have predisposed to abscess formation. She was treated with appropriate antibiotics and surgical drainage, resulting in recovery after 4 weeks.

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Introduction

A psoas abscess, defined as a collection of pus in the iliopsoas muscle compartment, may present with nonspecific clinical symptoms, including subacute hip, low back, or groin pain [1]. Primary psoas abscess is due largely to hematogenous or lymphatic spread under immunocompromised conditions, whereas secondary psoas abscess is due largely to direct spread from adjacent infected structures, such as the vertebral bodies, discs, or hip joint [2, 3]. Three case series of large numbers of patients with psoas abscess [4–6] reported that these patients were generally older with mean ages of 58 [5], 64 [4], and 70 [6] years. This finding was not unexpected, as prosthetic joint infection was found to be associated with psoas abscess in elderly patients. By contrast, one report described a young adult with primary psoas abscess [7]. Primary psoas abscess is often caused by *Staphylococcus aureus* infection, with the incidence of methicillin-resistant *S. aureus* increasing in these patients [8], whereas secondary psoas abscess is mainly caused by infection with *Escherichia coli* [9]. Imaging modalities, including ultrasonography, computed tomography, and magnetic resonance imaging (MRI), are useful in revealing abscesses located in the iliopsoas compartment [10]. The diagnosis of psoas abscess is often delayed because of its nonspecific clinical symptoms; thus, long-term treatment is generally required until the abscess is cured. The present study describes a female high school student with an abscess within the right iliacus muscle, which could be broadly defined as a psoas abscess, caused by methicillin-sensitive *S. aureus* (MSSA). The patient was successfully treated with appropriate antibiotics and surgical drainage.

Case Presentation

A 17-year-old girl visited the emergency clinic of our hospital because of acute right groin pain after waking up on Day –1. One day earlier (Day –2), she ran 3 km on a hill as a school exercise. She reported no previous episodes of infection but was found to have atopic dermatitis of the bilateral cubital fossa. Her parents and her 2 siblings were neither allergic nor had any autoimmune diseases. The patient was hospitalized on Day 0 in the orthopedic department to assess the cause(s) of persistent groin pain. Pelvic computed tomography did not show clear evidence of abnormalities, although her laboratory data were slightly abnormal, including a white blood cell count of 11,800/ μ L (neutrophils 81%) and a serum C-reactive protein concentration (CRP) of 1.0 mg/dL (reference, <0.29 mg/dL). On Day 2, however, she had developed a persistent fever with a serum CRP concentration of 10.7 mg/dL, and a venous blood culture showed the presence of a cluster of gram-positive cocci. MRI study of the pelvic area revealed inflammatory signs in her right iliacus muscle. She was started on intravenous cefazolin (4 g/day) and daptomycin (350 mg/day). On Day 5, blood gram-positive cocci were identified as MSSA, and urine culture showed the presence of *Staphylococcus epidermidis*. On Day 6, daptomycin was replaced by oral minocycline (MINO; 200 mg/day), and she was continuously administered cefazolin and MINO. On Day 7, she was still febrile and complained of inability to extend her hip joint. Repeat MRI clearly revealed an abscess, measuring 5 × 3 × 3 cm, within the right iliacus muscle (Fig. 1), with imaging also showing suspected inflammation of the right ilium (not shown). Surgical drainage of the abscess was successful, alleviating her fever and reducing her CRP concentration to 2.74 mg/dL 3 days later. Culture of the pus obtained by drainage of the abscess was also positive for MSSA. Repeat blood cultures became negative on Day 11, and the drainage tube was removed on Day 17. MRI on Day 21 showed

improvement of the abscess, and her CRP concentration was normal. The patient was discharged on Day 28. However, because she still showed signs of inflammation of the right ilium, she was continued on oral MINO and cephalexin for an additional 6 weeks at the outpatient clinic.

The time required from onset of groin pain to the precise diagnosis of primary iliacus muscle abscess was 8 days, whereas the time from diagnosis to recovery with intravenous antibiotics and abscess drainage was 4 weeks. Repeated echocardiography during her hospitalization showed that she was negative for infectious endocarditis. Immunological analysis after the disease became stabilized showed that the patient was positive for antinuclear antibody (1:80, reference, <1:40). Her serum IgG, IgA, IgM, and IgE concentrations were 1,668 mg/dL (reference, 820–1,740 mg/dL), 202 mg/dL (reference, 90–400 mg/dL), 77 mg/dL (reference, 52–270 mg/dL), and 2,471 IU/mL (reference, 0–170 IU/mL), respectively; and her C3, C4, and CH50 concentrations were 57 mg/dL (reference, 80–140 mg/dL), 22.6 mg/dL (reference, 11–34 mg/dL), and 27 U/mL (reference, 30–45 U/mL), respectively. These findings indicated that this patient may have had an autoimmune disease, although she was clinically asymptomatic.

Discussion/Conclusion

The iliopsoas compartment is composed of a group of extraperitoneal psoas and iliacus muscles that extend from the posterior mediastinum to the hip joint. Various pathologic processes, including inflammatory, hemorrhagic, and neoplastic conditions, have been reported to involve this compartment and are diagnosed by imaging modalities. Most psoas abscesses have pyogenic causes, with fewer having tuberculous causes. Aspiration and drainage have been shown to be effective in the diagnosis and treatment of psoas abscesses [10].

Trauma or hematoma within the muscle may predispose to the development of primary abscesses [11]. Psoas hematomas may be caused by acute hip flexor or psoas strain. In these patients, infection may have been present prior to injury, even in the absence of previous signs or symptoms of infection. Our patient had no known previous history, but her running for 3 km on a hill 1 day earlier may have caused right iliacus muscle strain. Psoas abscess following athletic exercise, although rare, was previously reported [12]. In addition, atopic dermatitis and underlying autoimmune disease may have played a role in abscess formation. Atopic dermatitis may have caused MSSA bacteremia [13] and autoimmune disease may have aggravated an infectious complication. Indeed, psoas abscesses have been reported to correlate with systemic lupus erythematosus [14, 15]. The iliacus muscle abscess in our patient was not likely secondary to the spread of infection from adjacent infected structures because she had no such diseases. Thus, she likely developed a primary iliacus muscle abscess.

Although fever, flank pain, and limited hip movement are the classic triad of psoas abscess, initial symptoms may vary, as does the time required to develop the full triad of symptoms [16, 17]. In our patient, 9 days were required from initial exercise to a correct diagnosis of iliacus muscle abscess. The causative agent was MSSA which caused septicemia revealed by blood culture and was later confirmed by abscess drainage. Suitable antibiotics and abscess drainage are considered appropriate treatment, with surgical drainage regarded as superior to percutaneous drainage for prompt recovery [1].

In summary, this case illustrates that even in young adults without underlying diseases or immunocompromised conditions, primary iliacus muscle abscess may develop. Thus, for

any patients complaining of cryptogenic groin pain with fever, blood culture as well as timely MRI studies of the pelvic area are required for precise diagnosis and appropriate management.

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Statement of Ethics

The work was carried out in accordance with the Declaration of Helsinki. A written informed consent for publishing this case (including publication of images) was obtained from the patient's parents.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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Author Contributions

Y.T., M.A., and K.Y. took care of the patient and performed surgery. T.M. was involved in the diagnosis of imaging. S.I. also took care of the patient at the outpatient clinic. Y.T. and S.I. wrote the manuscript which was approved by all authors.

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Fig. 1. Axial magnetic resonance imaging of the pelvic area showing an abscess lesion (arrow) within the right iliacus muscle. **a** High signal on fat-saturated T2W1. Arrowhead indicates edematous signals at the right iliacus muscle besides an abscess. **b** Low signal on T1W1. **c** High signal on DW1.