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Case Report

Psoas abscess caused by *Escherichia coli* pyelonephritis, A Case Report[☆]

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ABSTRACT

An iliopsoas abscess is a rare accumulation of pus in the iliopsoas muscle compartment and can be divided into primary and secondary abscesses. Considering the rarity and nonspecific symptomatology, as well as the generally insidious subacute onset, a delay in diagnosis and treatment frequently occurs. We present a case of a 74-year-old woman with a psoas abscess due to an *E. coli* pyelonephritis. Psoas abscesses resulting from genitourinary tract infections are infrequently described in literature. The aim of this case report is to raise awareness of the nonspecific presentation and the importance of a thorough history and clinical examination to reduce delay in diagnosis. Clinicians should also keep in mind that a psoas abscess is often diagnosed prior to detection of the primary disease and should be attentive for these primary lesions. A follow-up of at least 1 year is recommended due to the reported relapse in 15% to 36% of the cases up to one year after initial presentation.

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Introduction

An iliopsoas abscess is an accumulation of pus in the iliopsoas muscle compartment and can be divided into primary and secondary abscesses. A delay in diagnosis and treatment frequently occurs due to the rarity and nonspecific symptomatology as well as the generally insidious subacute onset [1,3]. Psoas abscesses resulting from genitourinary tract infections

are infrequently described in literature. We present a case of a 74-year-old woman with a psoas abscess due to an *E. coli* pyelonephritis.

Case report

A 74-year-old woman with a history of rheumatic arthritis and lumbar radiculopathy presented to our department

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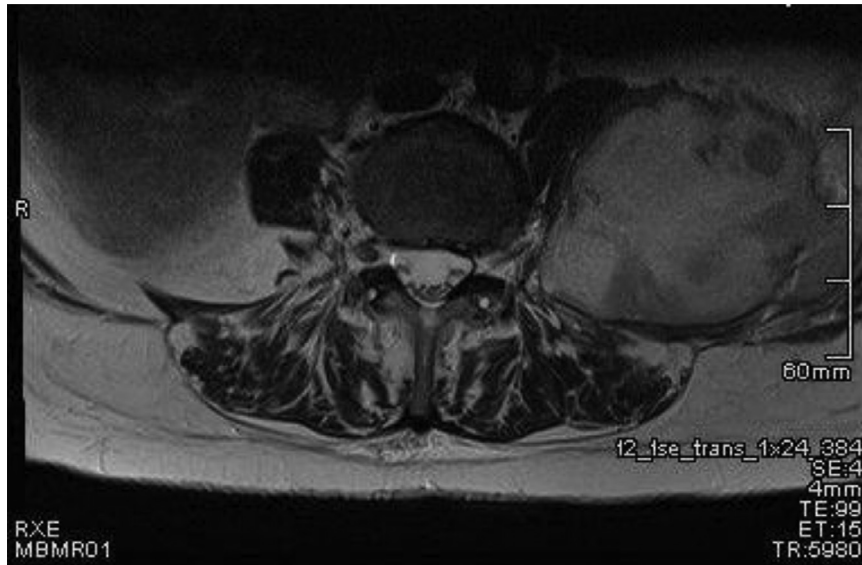


Fig. 1 – Magnetic resonance imaging (MRI) showing an added mass (7.8×6.2 cm in the axial plane) posterolateral in the left psoas muscle.

complaining of severe lumbar pain radiating to her left leg for 3 weeks. Clinical examination solely showed a painful extension, internal and external rotation of the left hip joint. Radicular testing was negative and there were no signs of sensory loss, diminished reflex function, motor weakness or upper motor neuron lesion. Shortly after hospitalization she developed a fever of 39.2°C of unknown origin. Laboratory tests showed a leukocytosis ($17.27 \times 10^3/\mu\text{L}$), an elevated erythrocyte sedimentation rate ($>120 \text{ mm}$) and elevated C-reactive protein (223.9 mg/L). Blood cultures were negative, whereas an active urine sediment with 690 WBCs/ μL and marked bacteriuria with *Escherichia coli* was detected. In urgent lumbar magnetic resonance imaging (MRI) an added mass (7.8×6.2 cm in the axial plane) posterolateral in the left psoas muscle was detected next to a disc herniation of L2-L3 (Fig. 1). A contrast-enhanced abdominal computed tomography (CT) confirmed a large left psoas collection with capsular ring enhancement indicating a psoas abscess (Fig. 2). During the CT-guided abscess drainage a bad-smelling, purulent discharge (180 mL) was obtained and a double lumen tube drain with pigtail catheter was inserted (Fig. 3). Pus culture was positive for an omni sensitive *Escherichia coli*. Therefore, we started ciprofloxacin 500 mg twice a day. Despite a good clinical and biochemical response initially, inflammatory parameters started to increase again on day 10. An additional PET-scan showed regression of the abscess collection, but a rheumatoid arthritis exacerbation in shoulders, hips, knees and left elbow. It also revealed pyelonephritis as the primary focus of infection. Supplementary treatment with corticosteroids (16 mg) besides ciprofloxacin (1g twice a day) resulted in a significant improvement in the patient's general condition and the inflammatory parameters. Repeated CT confirmed further regression of the psoas abscess (Fig. 4) and our patient was discharged without any complications. Antibiotic treatment was continued for a total duration up to 6 weeks.

DISCUSSION

An iliopsoas abscess is an accumulation of pus in the iliopsoas muscle compartment and can be divided into primary and secondary abscesses. It is a rare condition, however, due to the nonspecific presentation, recent research suggests an underestimation of the actual incidence [1]. Psoas abscesses are more common in males than females, with a median age of 44 to 58 years in developed countries. In most cases a unilateral presentation is found, bilateral psoas abscesses are uncommon [2].

The iliopsoas muscle is the primary flexor of the hip and is formed by the iliacus and psoas major muscles. The psoas major originates from the transverse processes and lateral borders of Th12 and the 5 lumbar vertebrae and passes along the posterior abdominal wall. The Iliacus originates from the superior portion of the iliac fossa and both enter the thigh beneath the inguinal ligament. Both parts pass the hip joint and course to a common insertion site via the iliopsoas tendon at the lesser trochanter. The surface of the muscle is embedded in the dense psoas fascia, extending from the lumbar vertebrae to the iliopubic eminence. It is behind this fascia that an iliopsoas abscess can develop. The iliopsoas is innervated by the roots of L1-L3 and the muscular branches of the femoral nerve. The psoas major receives blood supply from the ipsilateral lumbar arteries whereas the medial circumflex femoral artery and iliac branch of the iliolumbar artery supplies the iliacus. Both drain venous blood through the lumbar veins. The iliopsoas is in close contact with the diaphragm, the kidneys, the renal vessels, the ureter and the sigmoid colon on the left and the caecum and appendix on the right. Due to the proximity of these adjacent structures, the iliopsoas is predisposed to infectious spreading originating from these sites [3–5].

Whereas a primary abscess results from a lymphatic or hematogenous spread from a distant site, a secondary abscess

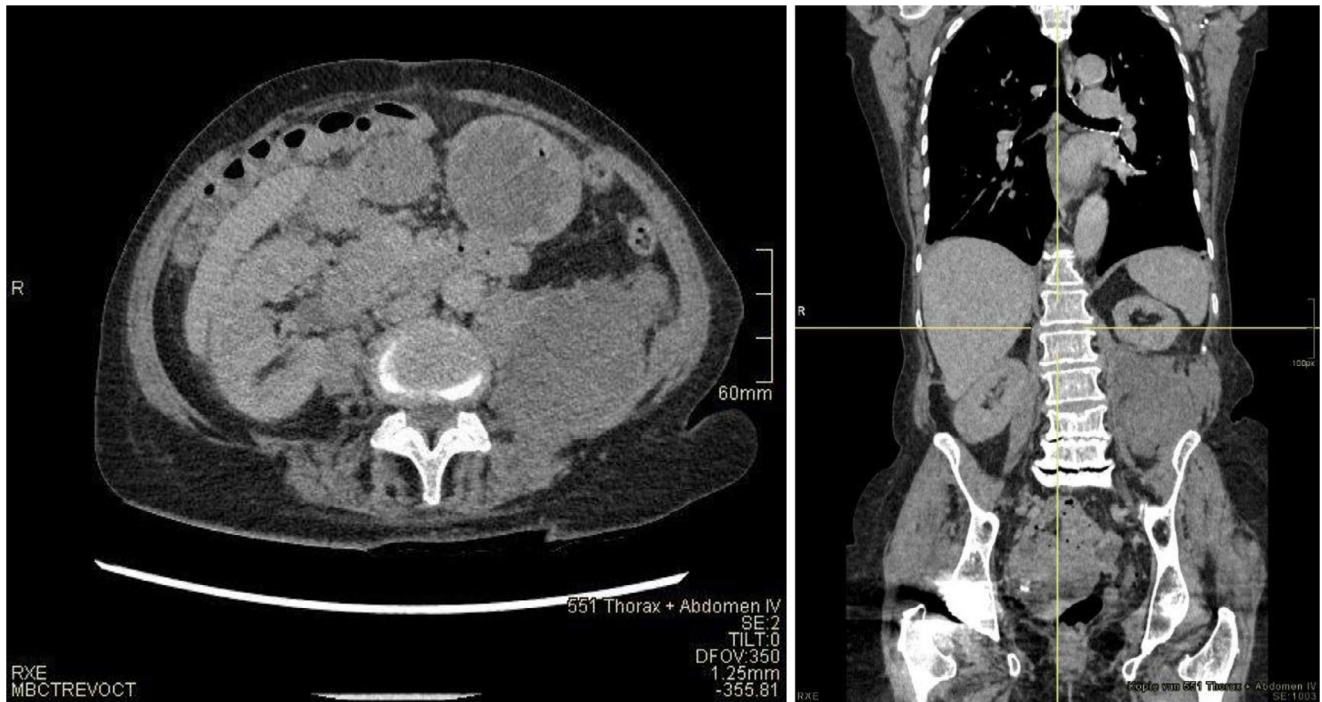


Fig. 2 – Computed tomography (axial view (A), coronal view (B)) of the abdomen revealing a left psoas abscess (*).

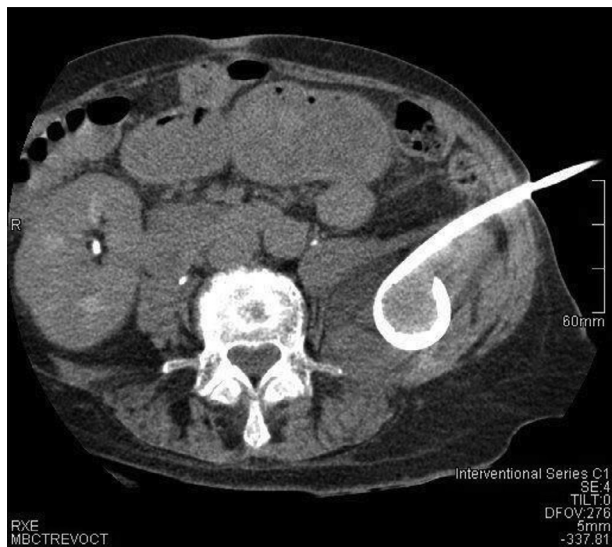


Fig. 3 – Computed tomography (axial image), guided drainage of left psoas abscess.

derives from a direct extension of an adjacent infectious process into the psoas muscle. Most abscesses (in Europe) are secondary, associated with infection of the hip joint (after hip arthroplasty), vascular structures (infected aortic aneurysm), vertebral discs and bodies (osteomyelitis or discitis), gastrointestinal (eg, Crohn's disease, colitis, appendicitis) or genitourinary tract (after renal surgery, pyelonephritis) (Table 1) [3,6]. A shift from tuberculosis and digestive diseases to skeletal pathology has been observed during the last decades [3,4]. Risk

factors for primary abscess include renal failure, diabetes, HIV infection or other forms of immunosuppression whereas secondary abscesses are more seen after trauma or instrumentation in the hip region, lumbar spine or inguinal region [3,6]. In our case there was no history of hip arthroplasty, trauma or instrumentation in adjacent regions nor immunosuppression other than rheumatoid arthritis.

Most infections causing a primary psoas abscess are associated with a single organism. *Staphylococcus aureus*, including methicillin-resistant *Staphylococcus aureus* (MRSA), is most frequently reported as the bacterial cause of the abscess followed by streptococci and *E. Coli* [2,6,7]. In contrast, secondary abscesses are predominantly described as polymicrobial infections, which often contain a broad spectrum of enteric bacteria. *Escherichia coli* is described as the leading organism, mainly with abscesses caused by gastrointestinal and urinary tract infections [2].

Considering the diverse and nonspecific symptomatology, as well as the generally insidious subacute onset, a delay in diagnosis and treatment frequently occurs. The characteristic triad of fever, limp and back pain, as first reported by Mynter in 1881, only occurs in approximately 30% of cases. Common clinical features include back or abdominal/flank pain, limping, inguinal mass, fever of unknown origin, malaise and weight loss. Painful or reduced hip mobility as well as the “psoas sign” or a palpable mass may be present as well. Our patient presented herself only with back pain, a fever of unknown origin and painful hip mobility. The nonspecific presentation often leads to consideration of other diagnoses first (eg, septic hip arthritis, gastrointestinal or renal tract pathology), adding to a delay in correct diagnosis. Therefore, it is of the utmost importance to perform an in depth history and de-

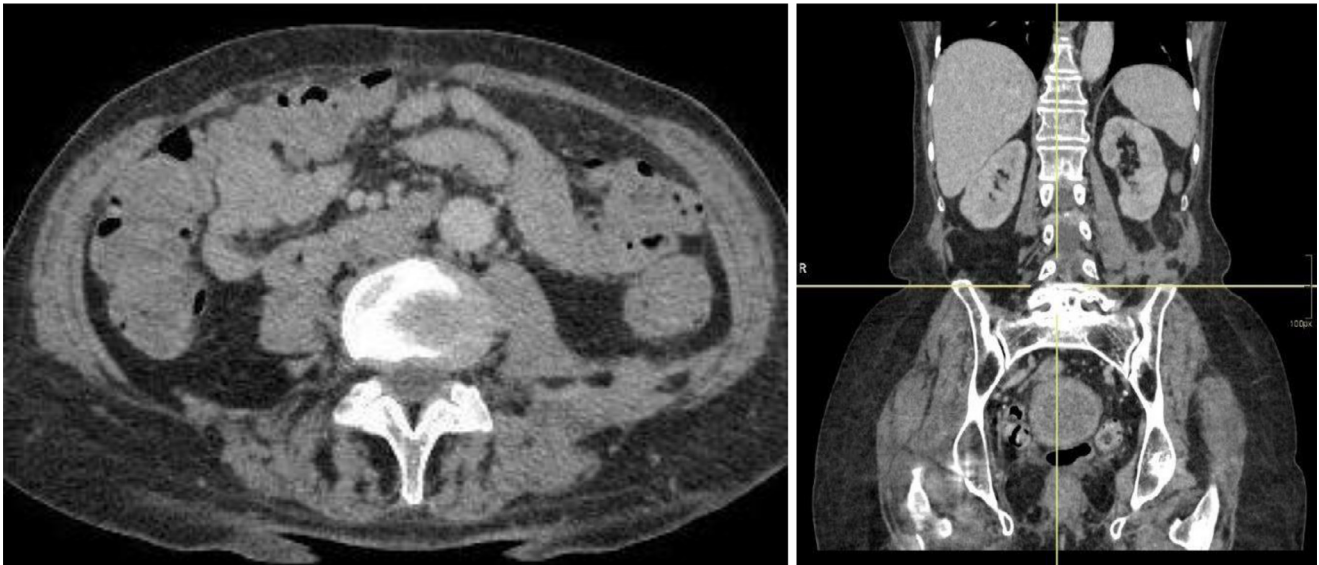


Fig. 4 – Computed tomography (axial view (A), coronal view (B)) of the abdomen. Regression of psoas abscess after drainage and targeted antibiotic treatment.

tailed clinical examination to increase the awareness of an iliopsoas abscess [3].

If a psoas abscess is suspected, further investigations (such as laboratory tests, imaging and cultures) are necessary for diagnosis and identification of the primary source of infection. An elevated C-reactive protein and erythrocyte sedimentation along with leucocytosis and thrombocytosis reveals an ongoing inflammatory process [3]. To confirm the diagnosis additional imaging is required. Computed tomography (CT) with and without IV contrast is considered as the modality of choice [4]. Abscesses typically present with a capsular ring enhancement on CT with contrast. Although MRI is more sensitive than CT in detecting intra-abdominal abscesses, it is more complex and does not have the advantage to perform a guided percutaneous abscess drainage, as in our patient [3]. In all suspected cases, both blood cultures (positive in 41% to 68% of cases) and abscess aspirates should be obtained, including mycobacterial cultures when *M. tuberculosis* is suspected or in case of persistent negative cultures [3,5]. Positive urine, respiratory or sputum cultures must be considered as indirect indicators of a causative microorganism. Antimicrobial therapy should be tailored to culture and susceptibility results [3].

Regardless of the cause of a psoas abscess, the initial management consists of percutaneous drainage and antibiotic treatment. Some authors have suggested that targeted antibiotics alone may be sufficient to treat abscesses up to 60 mm. However, an aspirate of the abscess is preferable in selecting a targeted antibiotic treatment. Following needle aspiration, a pigtail catheter may be placed in situ to allow further drainage. It has been established that for most cases an image guided percutaneous drainage is a very effective and safe alternative to open surgical drainage [3,8]. Initial empiric antibiotic treatment without source control, should cover a broad spectrum of organisms, especially staphylococcal and enteric bacteria since these are the most common causative organisms. De-

pending on the results of the abscess fluid culture and sensitivity, adjustments should be made [3]. In our case, the ongoing pyelonephritis due to *E. Coli* was recognised as the primary source of infection. The treatment with ciprofloxacin based on urinalysis was continued after the culture of the aspirated abscess fluid showed massive growth of *Escherichia coli* without polymicrobial contamination with an identical antibiogram as the *E.coli* cultured from urinalysis. It must be noted that the optimal duration of the antibiotic therapy has yet to be determined. Currently two to six weeks of therapy following adequate drainage has been proposed [4,6,8,9].

Complications of a psoas abscess involve paralytic bowel ileus, hydronephrosis (due to ureteric compression) and hip septic arthritis including prosthetic joint infection. Septic shock and deep venous thrombosis due to extrinsic compression of the femoral and iliac vein may compromise the outcome significantly. Another well documented hazard is inadequate drainage or antimicrobial therapy with reported relapse in 15% to 36% of the cases up to one year after initial presentation [2,3]. Psoas abscesses have a significant morbidity and mortality, with reported mortality ranging between 2.4% and 19% in one series. Associated risk factors for mortality include bacteremia, cardiovascular disease, advanced age and *E. Coli* infection of which the last two were present in our case [2,8]. A mild restriction of hip flexion up to 15 degrees can remain present due to residual fibrosis within the iliopsoas sheath [6].

The aim of this case report is to raise awareness of the nonspecific presentation and the importance of a thorough history and clinical examination to reduce delay in diagnosis. Clinicians should also keep in mind that a psoas abscess is often diagnosed prior to detection of the primary disease and should be attentive for these primary lesions. A follow-up of at least 1 year is recommended due to the reported relapse in 15% to 36% of the cases up to one year after initial presentation.

Patient consent

The authors obtained from the patient written informed consent for the publication of this case report and images.

REFERENCES

- [1] Garner JP, Meiring PD, Ravi K, Gupta R. Psoas abscess - not as rare as we think? *Colorectal Dis* [Internet] 2007;9(3):269–74. Mar [cited 2022 Mar 20]Available at: <https://pubmed.ncbi.nlm.nih.gov/17298628>.
- [2] López VN, Ramos JM, Meseguer V, Pérez Arellano JL, Serrano R, Ordonez MAG, et al. Microbiology and outcome of iliopsoas abscess in 124 patients. *Medicine (Baltimore)* [Internet] 2009;88(2):120–30. Mar [cited 2022 Mar 28]Available at: <https://pubmed.ncbi.nlm.nih.gov/19282703>.
- [3] Shields D, Robinson P, Crowley TP. Iliopsoas abscess – A review and update on the literature. *Int J Surg* 2012;10(9):466–9.
- [4] Sato T, Kudo D, Kushimoto S. Epidemiological features and outcomes of patients with psoas abscess: A retrospective cohort study. *Ann Med Surg* [Internet] 2021;62:114. Feb 1 [cited 2022 Mar 20]Available at: [pmc/articles/PMC7819806](https://pubmed.ncbi.nlm.nih.gov/34819806).
- [5] Moriarty CMH, Baker RJ. A pain in the Psoas: Groin injury in a collegiate football athlete. *Sports Health* [Internet] 2016;8(6):568. Nov 1 [cited 2022 Feb 7]Available at: [pmc/articles/PMC5089355](https://pubmed.ncbi.nlm.nih.gov/275089355).
- [6] Mallick IH, Thoufeeq MH. Iliopsoas abscesses. *Postgr Med J* [Internet] 2004;80:459–62. [cited 2022 Feb 27]Available at: www.postgradmedj.com.
- [7] Lin MF, Lau YJ, Hu BS, Shi ZY, Lin YH. Pyogenic psoas abscess: analysis of 27 cases. *J Microbiol Immunol Infect* 1999;32(4):261–8.
- [8] Frank D, Neal B, Jacobs A. Iliopsoas abscess due to nephrolithiasis and pyelonephritis. *Clin Pract Cases Emerg Med* 2018;2(3):264–5.
- [9] Huang JJ, Ruaan MK, Lan RR, Wang MC. Acute pyogenic iliopsoas abscess in Taiwan: Clinical features, diagnosis, treatments and outcome. *J Infect* 2000;40(3):248–55.