Gallium-67 citrate scan in the early assessment of psoas muscle abscess

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A psoas abscess is a collection of pus within the iliopsoas muscle compartment. It may arise via contiguous spread from adjacent structures or hematogenously from distant infections. Diagnosis is challenging and often delayed due to the rarity of the disease and the high frequency of low back pain in the general population. Although the condition is rare, the frequency of diagnosis of psoas abscess has increased with the availability of more effective diagnostic tools. In the early stage, especially before abscess formation, CT findings may be imperceptible. We report a case of bilateral psoas abscesses. Gallium-67 citrate scan adds valuable information to clarify the diagnosis and assists in treatment planning in the early stage of the infection.

Introduction

The psoas muscle is a retroperitoneal muscle that originates from the lateral borders of the 12th thoracic to fifth lumbar vertebrae, and ends as a tendon that inserts into the lesser trochanter (1). A psoas abscess is a collection of pus in the psoas compartment, and can be primary or secondary. The clinical presentation is often nonspecific and thus can lead to misdiagnosis. Classic presentations include fever, low back pain, and anterior thigh or groin pain. Some patients may present with fever of unknown origin. At this moment, the gallium scan may be one of the choices to detect the infectious source. The patient reported here had primary psoas muscle infection, which was illustrated on a gallium scan and treated successfully with surgical drainage and antibiotic therapy. Concomitant infection is common in patients with psoas abscess. Gallium scan offers early detection of psoas abscesses, identification of adjacent involvement, and a whole-body survey of concomitant infectious foci.

Case report

A 51-year-old male presented to our emergency facility complaining of severe low back pain. The patient had undergone surgery (using posterior fixation) for a T-12 compression fracture years ago. Five days before the visit, he began to sustain a lumbar strain after falling off his motorcycle. His pain was recorded as dull and of progressively mounting intensity. The pain got worse over the course of the day and severe enough to wake him from sleeping.

At the emergency department, a complete blood count and comprehensive serum biochemical analysis revealed moderate leukocytosis. Results of the KUB (kidney, ureter, and bladder scan) and lumbar spine came back inconclusive. Post-contrast CT of the abdomen did not demonstrate any significant findings except for posterior fixation for the T9 to L2 vertebrae (Fig. 1). A subsequent MRI (Fig. 2A) revealed mild edematous changes in the bilateral psoas muscles (curved arrows), and some loculated fluid collection in the anterior paravertebral region of L2-3 (white arrow), suspicious for abscess formation. With the tentative diagnosis of psoas muscle abscess, the patient was administered a teicoplanin-ciprofloxacin combination for a week, but maintained an elevated CRP (C-reactive protein) level. A Ga-67 citrate scan was performed for infection screening, and then, to delineate Ga-67 uptake in the bilateral psoas muscles (Fig. 3). Empiric antibacterial regimens containing
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Fig. 1. Post-contrast CT axial (A) and coronal reconstruction (B) images did not reveal obvious abnormality in bilateral psoas muscles (asterisks).

Fig. 2. An initial MRI (A) revealed mild edematous changes in bilateral psoas muscles (curved arrows), and some loculated fluid collection in the anterior paravertebral region of L2-3 (white arrow). MRI (B) repeated 3 weeks afterward showed progression of the inflammatory procedure in the psoas muscles, more on the right (open arrows). (C) As early as 4 weeks after the drainage, there was marked resolution of the abscesses on followup MRI.

Fig. 3. Retrospective fusion of Ga-67 citrate scan and previous CT delineating bilateral psoas abscesses (arrows). No active lesion was noted in the spine.
teicoplanin, clindamycin, and penicillin were prescribed to cover possible pathogens.

**Discussion**

The iliopsoas muscle has a rich vascular supply that makes it vulnerable to hematogenous spread of infection from occult sites. The clinical presentation of iliopsoas abscess is variable and often nonspecific. Patients may present with fever, flank pain, back pain, or limp. Diagnosis is challenging due to the high frequency of low back pain in the general population. Abscess formation promptly requires surgical drainage before antibiotic therapy (2). Imaging investigations are helpful in making a definitive diagnosis. Contrast-enhanced computed tomography is considered to be the gold standard (3). It provides definitive diagnosis in almost all cases (3-6). Ultrasonography is diagnostic in only 60% of cases of psoas abscess, compared with 80% to 100% for CT (7). Once the abscess is formed, these image modalities may help locate the area that needs to be drained.

MRI offers detailed images of soft tissues, as well as manipulation of the signal characteristics, and is able to discriminate between cellulitis, abscesses, hematomas, and tumors (8-11). In addition, edema within the surrounding fat may be seen as a high signal on T2-weighted images. Following appropriate treatment, MRI may delineate changes in volume and surrounding inflammation without the need for repeated exposure to ionizing radiation—thus allowing withdrawal of antibiotics, with resolution of combined imaging signs and clinical symptoms (12). Nevertheless, in the early infectious process or prior to abscess formation, the infected lesions may be imperceptible on CT and MR imaging. But Gallium-67 scanning has proved to be an effective modality of detecting infectious lesions, as shown in our case (13).

Ga-67 citrate has been used widely to localize a variety of infectious lesions. The exact mechanism of Ga-67 citrate delivered into the inflammatory lesions is still unclear; it is probably an exchange of transferrin-Ga-67 complex with lactoferrin at the lesion site. The sensitivity of Ga-67 for screening psoas abscess is 92% (14). Since 69 to 94% of cases with psoas abscess had concomitant infection at other sites (14, 15), it is crucial to identify all of the infectious foci and treat them appropriately. Ga-67 citrate scans are capable of whole-body surveillance, while CT and MRI are mostly focused on limited areas of the body. In the case shown here, the patient presented with low back pain, which was confused with muscle strain or a neurological problem. The results on CT and MRI were inconclusive at the early stage of the infection. A gallium scan, especially co-registered with CT image, illustrated the infected focus and guided the treatment decision (15-18). The Ga-67 citrate scan added valuable information to clarify the diagnosis and assist in treatment planning.

**References**
