Journal on Surgery
www.journalonsurgery.org

Case Report

ISSN: 2691-7785

Open Access, Volume 3

The Utility of Diffusion Weighted MRI Imaging in the Diagnosis of Infectious Sacroiliitis

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Abstract

MRI imaging plays an important role in musculoskeletal infections to allow prompt diagnosis and early treatment. Diffusion Weighted Imaging (DWI) is an additional pulse sequence that can be obtained in cases where infection is suspected to enhance the diagnostic ability of an MRI. DWI sequences are not routinely obtained during standard imaging and there is a paucity of literature discussing their role in Musculoskeletal infection. We present a case report which illustrates the benefit of DWI imaging in diagnosing a challenging case of de novo septic sacroiliitis.

Keywords: Septic sacroiliitis; Diffusion weighted imaging; Musculoskeletal joint infection; MRI.

Introduction

MRI imaging plays an important role in musculoskeletal infections to allow prompt diagnosis and early treatment. Diffusion Weighted Imaging (DWI) is an additional pulse sequence that can be obtained in cases where infection is suspected to enhance the diagnostic ability of an MRI [1]. DWI sequences are not routinely obtained during standard imaging and there is a paucity of literature discussing their role in Musculoskeletal infection [2]. We present a case report which illustrates the benefit of DWI imaging in diagnosing a challenging case of de novo septic sacroiliitis.

Case report

A 59 year old male presented with pain in the right buttock area that started rather acutely in relation to a nonspecific injury involving his Right Lower Extremity (RLE). Patient had a sudden jerky movement of the RLE during a dream and hit his RLE along the side of his recliner. He could not walk, or weight bear effectively following this incident and tried to take care of it by resting at home for a few days and eventually presented to the ER by ambulance 3 days later since the symptoms progressively worsened. The patient had a constant dull throbbing pain in his right buttock that was non-radiating and aggravated by any movements of the RLE or weight bearing. The patient denied fevers, chills, loss of appetite or weight. He denied any intervention in the area in the past. Patient had a past medical history of Hypertension, Hyperlipidemia, Gastro-esophageal reflux disease and post-traumatic stress disorder. Patient was a nonsmoker with a history of alcohol abuse and a remote history of methamphetamine use but denied any recent use of street drugs.

Manuscript Information: *Received: Sep 07, 2023; Accepted: Oct 04, 2023; Published: Oct 11, 2023*

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Citation: *Joglekar SB. The Utility of Diffusion Weighted MRI Imaging in the Diagnosis of Infectious Sacroiliitis. J Surgery. 2023; 3(2): 1122.*

He was awake, alert, and oriented on examination with no acute distress. Patient demonstrated exquisite tenderness along the Right Sacroiliac Joint line inferior end w/o local swelling/ warmth/ erythema over any area. His hip joint line was without any tenderness to palpation. His affected LE was without any e/o deformity or limb length discrepancy. Log rolling of the hip was without any pain. Hip rotations in flexion were painless. Flexion-Abduction-External Rotation and Patrick test reproduced pain. Patient was able to perform only a limited active straight leg raise. Passive straight leg raising demonstrated increased pain beyond 70 degrees. Patient was found to be neurovascularly intact on examination.

Patient's labs showed a white cell count of 9.5 and an ESR of 55 and CRP of 13.9 on admission. Patient was found to have positive blood cultures on the day of admission that were later demonstrated to grow Streptococcus infantarius type II subspecies infantarius. Patient's ECHO was negative for vegetations or other abnormalities. His pelvis and hip x-rays were negative for any abnormalities (Figure 1). Patient was empirically started on iv Ceftriaxone based on susceptibility testing.

Advanced imaging included CT scans of the pelvis followed by an MRI. CT Pelvis was w/o any destructive or bony changes at the R SI joint (Figure 2). No e/o hip effusion/ bony involvement was found. MRI was w/o remarkable changes that could fully explain patient presentation. Diffusion weighted images appeared to show some hyperintense signal in the area around the inferior SI joint and beneath the iliacus however other series especially the T2 weighted images did show any correspond images (Figure 3). The MRI scan was read out as negative for any abnormalities. Due to correlation of signal changes on diffusion weighted images with area of TTP and pain on clinical exam as well as a strong clinical suspicion NM bone scan was ordered as the next step. The bone scan detected increased perfusion and blood pool activity in the right sacroiliac joint with increased uptake of Technitium-99m in the right sacroiliac joint. A diagnosis of Right septic sacroiliitis was thus established (Figure 4).

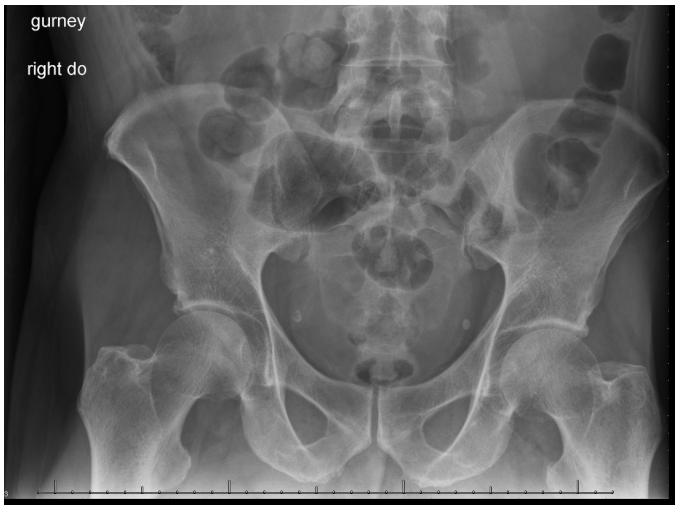

Figure 1: Unremarkable Plain X-ray of the Pelvis. No destructive changes, sclerosis or lucency is noted at the sacroiliac joint.

Patient was found to have gradual improvement in his symptoms while in the hospital and improvement in functional status. Patient had a PICC line placed, and arrangements were made to have home IV infusions for IV Ceftriaxone. Patient was eventually discharged on the 4th day with WBAT with a walker for support and was followed up in the Orthopedic and ID clinics at 3 week intervals with WBC, ESR, and CRP trends.

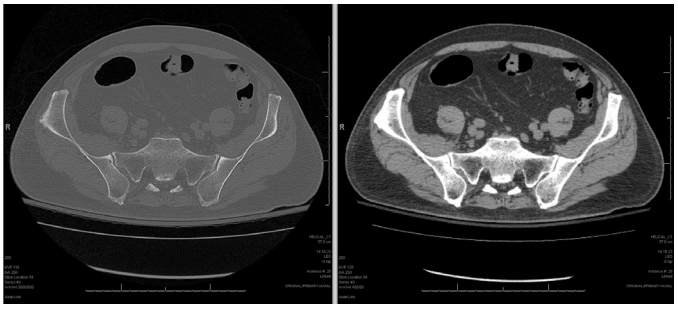

Figure 2: CT scan of the pelvis does not show any radio dense or radiolucent lesions or irregularity at the Sacroiliac joint.

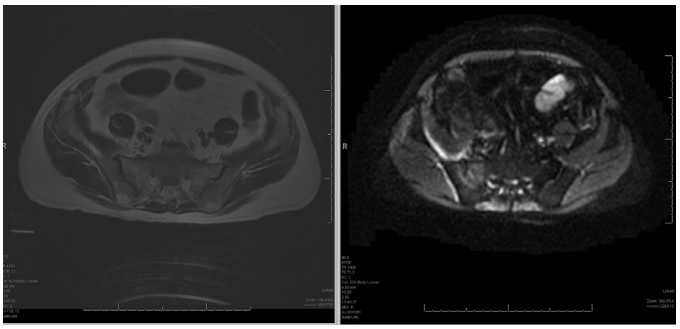

Figure 3: MRI imaging with T2 FSE (Left) and DWI High B value (Right) images showing hyperintensity at SI joint as well as beneath the iliacus on DWI images.

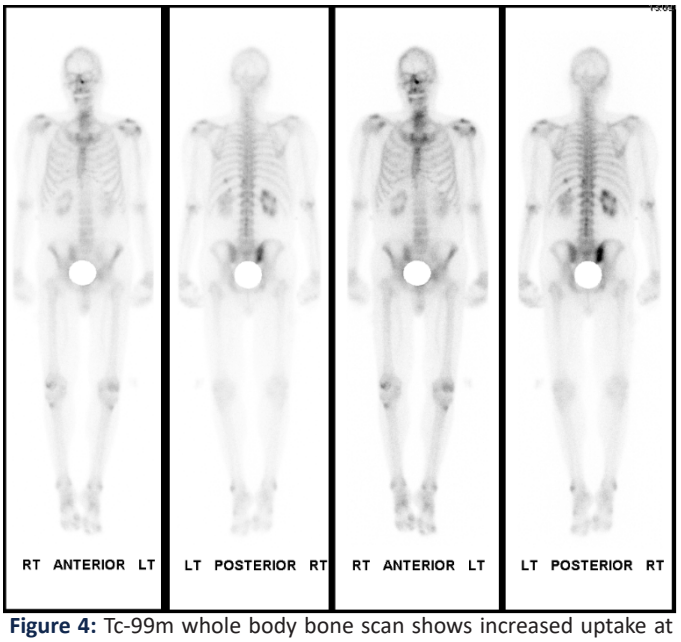

Figure 4: Tc-99m whole body bone scan shows increased uptake at the Right SI joint.

Discussion

Accurate diagnosis and prompt treatment is crucial in case of musculoskeletal infection. MRI imaging has become the mainstay of MSK imaging with standard imaging including the spin-echo, proton density, and short tau inversion recovery (STIR) MRI sequences. Routine MRI imaging sequences may not be specific enough in some instances especially when IV contrast cannot be given. Diffusion Weighted Imaging (DWI) sequences can provide the necessary information in such cases and avoid delays in diagnosis [2]. DWI sequences are based on the diffusion of water molecules at the microscopic level and the relatively impeded movement of intracellular water compared to extracellular water provides the differentiation between tissues with high cellularity versus those with cellular disruption or necrosis. DWI imaging has some limitations related to artefacts at tissue interfaces or metal implants and low resolution. Despite these limitations, DWI has been helpful in diagnosis of vertebral fractures, bone marrow infection, bone marrow malignancy, primary bone, and soft tissue tumors [1].

A hyperintense signal on DWI sequence is usually associated with the impeded motion of intracellular water. In this case the hyperintense signal of purulent material is secondary to its viscosity which impedes the movement of water in an abscess [1]. This quality of purulent collections can help differentiation of septic from non-septic effusions, bursitis, and tenosynovitis [2]. Hyperintense signal on DWI can also help differentiate spine infection from MODIC changes as well as pyomyositis from necrotic tumors [2]. This modality has a wide variety of application in musculoskeletal infection and its addition to routine imaging sequences when infection is suspected can enhance the utility of MRI imaging. In a DWI study the strength and duration of application of diffusion sensitizing gradients is indicated by their "b-value" and the Apparent Diffusion Coefficient (ADC) is calculated as a measure of tissue diffusivity. The appearance on high b value and high ADC images is helpful in differentiating various pathologies. The sensitivity and specificity of diffusion-weighted images for detecting soft tissue abscesses has been found to be 92% and 80%, respectively [3]. Noncontrast-enhanced MRI with DWI has comparable diagnostic performance to contrast-enhanced MRI for diagnosing soft-tissue abscesses [4]. In an DWI study the strength and duration of application of diffusion sensitizing gradients is indicated by their "b-value" and the Apparent Diffusion Coefficient (ADC) is calculated as a measure of tissue diffusivity. The appearance on high b value and high ADC images is helpful in differentiating various pathologies. Infectious Sacroiliitis is a rare disease, with misleading clinical signs that often delay diagnosis and critical antibiotic treatment [5]. The disease has a prevalence of only 2–5/100 000 people per year in the general population and diagnostic imaging is very important in early diagnosis. In the case described above diagnosis of joint infection was possible only because of DWI images that were obtained. These images highlighted the hyperintense signal in and around the sacroiliac joint because of the purulence secondary to the septic joint arthritis. DWI sequences enabled early diagnosis and prompt treatment of this patient.

Conclusion

Magnetic Resonance Imaging (MRI) with Diffusion Weighted Imaging (DWI) sequences should be strongly considered during routine imaging protocols for the detection of sacroiliitis, allowing early detection and prompt treatment of this rare condition.

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