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Case Report

Imaging Findings of Testicular Abscess and Sacroiliitis as a Rare Complication of Brucellosis

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ABSTRACT

Brucella is a global cause of zoonotic infection and is mostly transmitted to humans through unpasteurized milk and dairy products. Brucella can affect many organs focally or systemically and cause different symptoms. However, brucella has a specific affinity for the musculoskeletal system. The most common symptoms in brucella patients are related to musculoskeletal involvement. Musculoskeletal involvements are generally in the form of spondylodiscitis (usually in the lumbar region), sacroiliitis, bursitis, and osteomyelitis. Brucella most commonly causes unilateral epididymoorchitis in the genitourinary system. In brucella epididymoorchitis, if the diagnosis is delayed or wrong treatment options are applied, serious complications such as necrotizing orchitis and testicular abscess may result, and orchiectomy may be required. Ultrasound plays an important role in diagnosis and patient follow-up in brucella epididymoorchitis. MRI, on the other hand, is an effective imaging method in revealing the relationship of the lesion with the testis and the correct localization, thanks to its higher contrast resolution and multi-plane techniques. In countries where brucella is endemic, brucella infection should be considered in cases of epididymoorchitis that does not respond to treatment or in cases of accompanying sacroiliitis and spondylodiscitis.

Keywords: Brucella musculoskeletal involvement, necrotizing orchitis ultrasound, MRI images, testicular abscess

INTRODUCTION

Brucella is a multisystemic disease transmitted zoonotically. Brucellosis is transmitted by direct and indirect animal contact, indirectly by contaminated raw milk products, or directly by infected tissues.[1] Clinical findings and involvement may be osteoarticular (20-30%), genitourinary system involvement most commonly epididymorchitis (up to 40%), liver abscess (1%), central nervous system involvement (1-2%), and cardiovascular system.[2] Prostatitis, cystitis, pyelonephritis, renal, and testicular abscess are genitourinary consequences of brucellosis EO (epididymorchitis).[1] The most prevalent urogenital complication is Brucella EO. *Brucella* EO must be diagnosed and treated as soon as possible since it can develop major complications such as necrotizing orchitis, testicular abscess, suppurative infection, infarction, and atrophy.[3]

In this article, we presented a simultaneous testicular and sacroiliac involvement of brucellosis, which is rarely encountered in daily clinical practice and rarely reported in the literature.

CASE PRESENTATION

A 23-year-old male patient from Afghanistan was admitted to the emergency department with right testicular pain lasting for 1 week and had no other symptoms or complaints. On physical examination, erythema on the right scrotum was observed with edema. Scrotal pain decreased with an elevation of the right testis, which shows a positive Phrene's sign. Laboratory results showed leukocytosis (12 000/mm^3). In the scrotal Doppler ultrasound (US) examination of the patient, the increased size of the right testis and epididymis was observed with higher blood flow than the left side. The patient was then diagnosed with epididymoorchitis.

He was treated with conventional antibiotics for 15 days with the diagnosis of epididymorchitis. The testicular pain did not resolve. Moreover, new symptoms such as low

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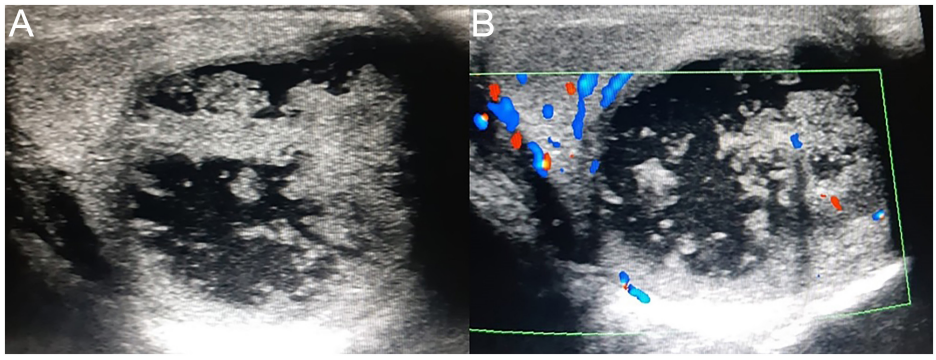

Figure 1. **(A, B)** Thick-walled cystic-necrotic abscess formations observed in the right testis, resulting in loss of the intact testicular parenchyma during ultrasound examination (A). No vascular signal was coded in necrotic abscess formations in the Doppler ultrasound examination. Instead, note the increased blood flow in the epididymis and testicular parenchyma (B).

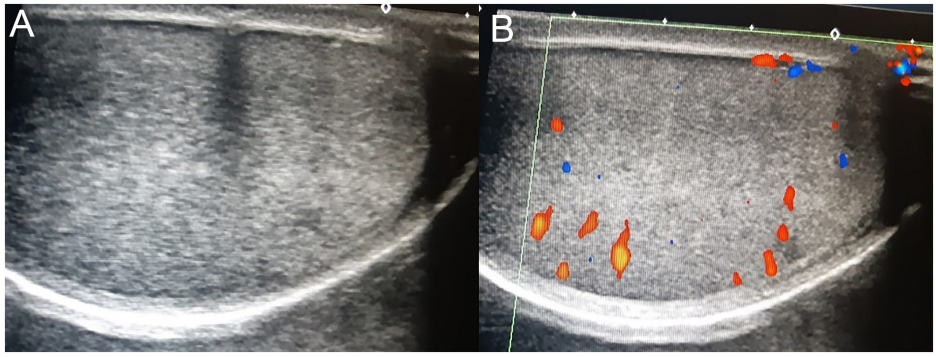

Figure 2. **(A, B)** The parenchymal echo and the blood flow of the left testis were in normal ranges on the grayscale (A) and Doppler ultrasound examination (B), respectively.

back pain, fatigue, night sweats, and fever occurred in the patient. In the physical examination, the right scrotum was red and edematous. In the Doppler US examination, the size and the blood flow of the epididymis augmented, and thick-walled cystic-necrotic abscess formations in the right testis were observed, resulting in loss of the intact testicular parenchyma (Figure 1A). The left testis was of normal parenchyma and echo intensity, and the blood supply of the left side was normal (Figure 1B). Contrast-enhanced scrotal, lumbar, and sacroiliac MRI was performed for the diagnosis of correlation and to find out the reason for the low back pain. There were pathologically diffusion-limiting abscess formations in diffusion-weighted series (Figures 2A and B). In the right testicular parenchyma, the volume of the intact parenchyma was decreased due to abscess formations. In contrast-enhanced T1-weighted series, scrotum, and epididymal enhancement increased secondary to inflammation. The left testicular parenchyma was normal on the grayscale (Figure 3). In addition, there were obvious signal alterations (subchondral marrow edema) consistent with unilateral sacroiliitis in the sacroiliac MRI (Figure 4). No brucella involvement was observed in the contrast-enhanced lumbar MRI of the patient (Figure 5).

Tumor markers were requested by the urologists to rule out possible testicular tumoral pathologies. In this patient with epididymoorchitis and sacroiliac involvement, infective pathologies were considered a high priority, and a tube agglutination test was performed with a preliminary diagnosis of brucellosis. In the laboratory findings of the

MAIN POINTS

- Brucellosis should also be considered in patients with musculoskeletal symptoms in areas where brucellosis is endemic.
- Because brucellosis is multisystemic, if there is an organ involvement due to brucella, other organ involvement of brucella should be considered in patients with various other symptoms.
- If there is testicular involvement, it should be diagnosed in the early period and treated effectively and correctly.
- If brucellar epididymoorchitis does not regress after antibiotic therapy, necrotizing orchitis should be suspected as a complication.
- *Brucella*, testis involvement may mimic the tumor with imaging features. Therefore, tumor markers should be checked.

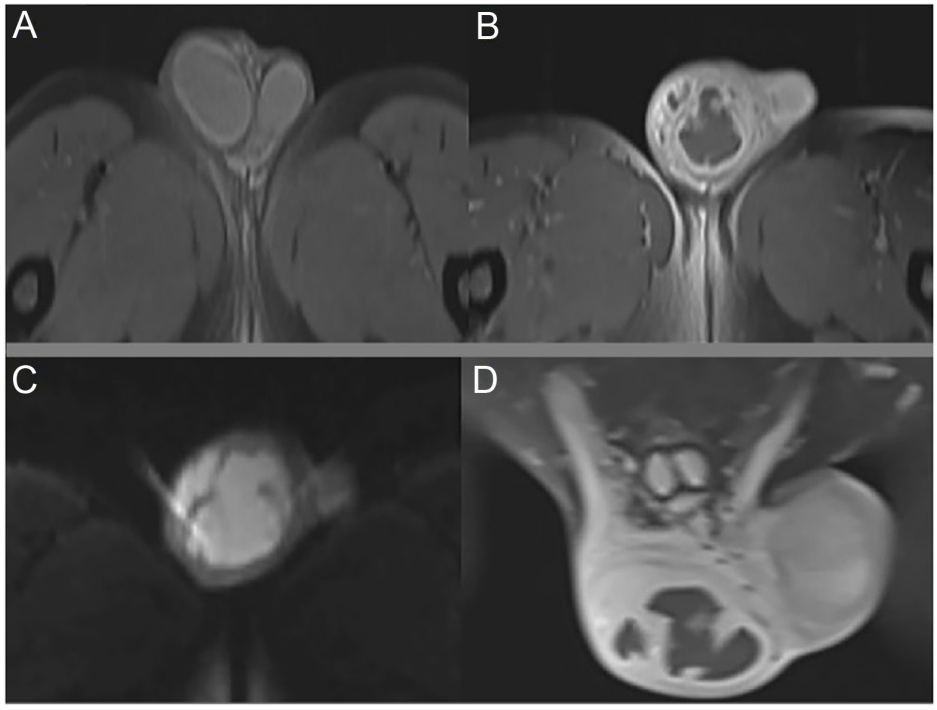

Figure 3. **(A-D)** Nonenhanced T1 weighted axial plane (A), fat-suppressed enhanced T1 weighted axial plane (B), diffusion-weighted axial plane (C), and fat-suppressed enhanced T1 weighted coronal plane (D) magnetic resonance images of the bilateral testis. Heterogeneous signals in nonenhanced T1 weighted image, diffusion restriction, and contrast enhancement were observed in the right testis, while the left testis parenchyma was normal.

patient, tumor markers (alpha-fetoprotein and human chorionic gonadotropin) were in normal ranges and the blood culture test was negative. Brucella spot and Wright agglutination tests were performed and each was positive (1/320 titer Wright agglutination test). Based on clinical and laboratory findings, the patient was prediagnosed with brucella epididymorchitis and sacroiliitis and started treatment with doxycycline and streptomycin.

Although clinical symptoms regressed in the follow-up, increased parenchymal loss of the right testis was observed in the ultrasound follow-up. Orchiectomy was recommended for parenchymal loss of the patient's right testis, but the patient refused this therapy and was discharged with antibiotic therapy. However, the patient did not apply for a control examination.

DISCUSSION

Brucellosis is a zoonotic bacterial infection worldwide. Brucellosis is less common in developed countries and especially common in the Mediterranean regions, the Middle East, South American, and African regions. Brucellosis can affect many organs or systems. The

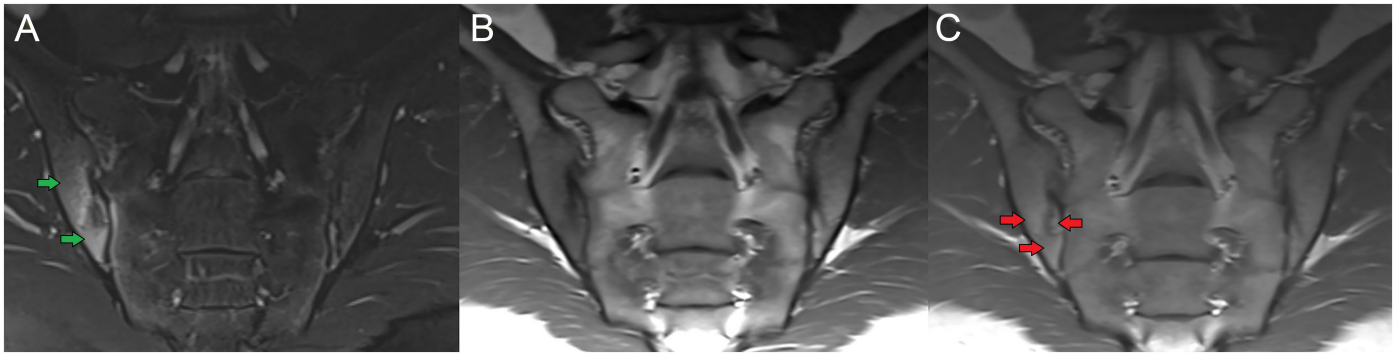

Figure 4. **(A-C)** Fat-saturated T2-weighted (A), nonenhanced T1-weighted (B), and enhanced T1-weighted (C) sacroiliac magnetic resonance images in the coronal plane indicate the unilateral involvement of the right sacroiliac joint. In addition, subchondral edema (green arrows) and contrast enhancement of the right sacroiliac joint (red arrows) was observed on the magnetic resonance images.

Figure 5. No remarkable contrast enhancement was detected in the vertebrae or intervertebral discs of the lumbar region, suggesting a brucella involvement.

symptoms are nonspecific, and brucellosis has a specific affinity for the musculoskeletal system.[4,5]

Physical examination, a detailed anamnesis, and specific laboratory tests (Rose Bengal, tube agglutination, Coombs test, blood culture) are required to diagnose this disease. A positive result of the blood culture test comes forefront if the tube agglutination test titer value is higher than 1/160.[6]

Brucella sacroiliitis is usually unilateral. Conventional radiography is the first choice for the diagnosis of sacroiliitis. However, it cannot adequately detect bony abnormalities in the early stages of the disease. Computed tomography has a higher sensitivity than conventional radiography, showing minimal bone erosions and joint space narrowing. MRI is the preferred imaging method because it can indicate inflammatory changes in the early stage and does not contain radiation. Erosions with bone loss that are hypointense on T1-weighted sequences reflect structural changes due to inflammation. Subchondral bone marrow edema is observed as hypointensities in the T1-weighted imaging series, hyperintense in the T2-weighted images, and fat-suppressed T2 and short tau inversion recovery (STIR) sequences. In the T1-weighted images with fat suppression, contrast enhancement can be observed in the sacroiliac joint space and surrounding bone marrow, suggesting an active disease.[7,8]

Brucellosis most commonly causes unilateral epididymoorchitis in the genitourinary system, and other genitourinary system involvements are cystitis, tubo-ovarian abscess, and prostatitis. Prostate gland involvement may mimic the imaging findings of cancer. The most common symptoms in nonspecific clinical presentations of genitourinary brucellosis are fever, epididymal swelling, and erythema of the scrotum.[9-11] Brucellar epididymoorchitis generally has a good prognosis. If the diagnosis is delayed or the wrong treatment options are applied in brucellar epididymoorchitis, this situation may cause serious complications such as necrotizing orchitis, testicular abscess, and orchiectomy may be required.[12]

Ultrasound plays a vital role in diagnosis and patient follow-up in brucella epididymoorchitis. MRI, on the other hand, is an effective imaging method with higher contrast resolution, multi-plane techniques, and revealing the relationship of the lesion with the testis and the correct localization.[9,13] The tail of the epididymis is the most affected area, and isolated orchitis involvement is rarely encountered in brucellosis. Ultrasound findings include increased size of epididymis and testis, edema, and hypoechoic appearance of these intrascrotal organs. In addition, increased thickness of the scrotal wall and reactive hydrocele are frequently accompanied. The peak systolic velocity of the epididymis reaches a value greater than 15 cm/s.[14] Focal hypoechoic areas in diffusely enlarged testis may belong to granulomatous infections or areas of necrosis. Brucella rarely causes necrotizing orchitis. Therefore, this complication should be differentiated from other pathogens (*Mycobacterium tuberculosis or Salmonella* species) that cause necrotizing orchitis.[9,15] In brucellar epididymoorchitis, MRI findings are nonspecific and generally seen as heterogeneous hypointense areas in T2-weighted series. The size of the epididymis and testis may increase, and an enhancement is detected in the T1-weighted series with a contrast medium. Heterogeneous enhancement with nonenhanced hypointense bands may be observed. When abscess occurs as a complication, hyperintense fluid collections and septations are observed in the T2-weighted images.[16,17]

General recommendation in the treatment of acute brucellosis; can choose one of 3 treatment recommendations in nonpregnant adults and children older than 8 years without neurobrucellosis, spondylodiscitis, and endocarditis.

- Doxycycline 200 mg orally once or twice daily for 6 weeks and streptomycin 1 mg intramuscularly once a day for 2-3 weeks. While on doxycycline therapy, gentamicin is

administered as 3-5 mg per kg of body weight once daily for 1-2 weeks, either intramuscularly or intravenously.
- A daily dose of 600-900 mg of rifampin is administered orally for 6 weeks while on doxycycline therapy.[18]

In brucellar epididymoorchitis, imaging findings may resemble a tumor. In our case, normal tumor markers and positive tube agglutination tests suggested brucellosis. Therefore, Brucella infection should be considered in the differential diagnosis of epididymoorchitis with concomitant sacroiliitis and spondylodiscitis, especially in countries where brucella is commonly encountered as an endemic health problem.

Informed Consent: Written informed consent was obtained from patient, who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Conception - S.K.; Data Collection - S.K., V.K.; Literature Review - S.K., V.K.; Supervision - V.K.; Data Analysis and Interpretation - V.K., S.K.; Manuscript Drafting - S.K.; Critical Review - V.K., S.K.

Declaration of Interests: The authors declare that they have no competing interest.

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Erratum

Erratum

In the article by Ahlatcı et al., titled 'The Effect of Nettle Seed Extract on Malondialdehyde, Copper, Zinc and Superoxide Dismutase Levels in Kidney Tissue of Rats Exposed To Ionising Radiation,' published in the January 2020 issue of Archives of Basic and Clinical Research (Arch Basic Clin Res 2020; 2(1): 1-6; DOI: 10.5152/ABCR.2020.20011), the information under the title 'Statistical Analysis' has been updated. Authors have informed the editorial board that there were inadvertent errors in the naming of certain statistical methods. This information has been evaluated by the editor and deemed appropriate to update the PDF file.

You can access the updated version of the article through the following link:

https://abcresearch.net/en/the-effect-of-nettle-seed-extract-on-malondialdehyde-copper-zinc-and-superoxide-dismutase-levels-in-kidney-tissue-of-rats-exposed-to-ionising-radiation-16229"