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Case Report

Complex Brucellosis with Cervical Spine Abscess and Orchitis: A Case Report Highlighting Diagnostic and Management Challenges in Iraq

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ABSTRACT

Brucellosis, a significant zoonotic infection, is characterized by protean manifestations that can make timely diagnosis difficult. This case report details a severe and atypical presentation of brucellosis in a 41-year-old male from a rural area in Kirkuk- Iraq, a region where the disease is endemic. The patient presented with a one-month history of debilitating upper back pain, fever, and constitutional symptoms. His condition was complicated by the formation of large para-vertebral and epidural abscesses in the cervical spine. For which he was treated with empirical antibiotics, but his symptoms persisted, and he subsequently developed acute brucellar orchitis. The diagnosis was ultimately established through serological testing, as blood cultures remained negative. This case underscores the critical importance of including brucellosis in the differential diagnosis for patients from endemic areas presenting with complex, multisystemic inflammatory conditions, particularly severe osteoarticular infections, and genitourinary involvement. The patient responded well to a prolonged, multidrug antibrucellar regimen, resulting in a favorable outcome.

Introduction

Brucellosis remains a major public health concern in many parts of the world, particularly in the Middle East, including Iraq [1]. It is a zoonotic disease caused by Gram-negative coccobacilli of the genus Brucella, which comprises four main pathogenic species: *B. melitensis* (from camels and sheep), *B. suis* (from pigs), *B. abortus* (from cattle), and *B. canis* (from dogs). These species are the primary causes of human brucellosis. According to the Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, thirteenth edition 2024. Humans are typically infected through the consumption of unpasteurized dairy products or through direct contact with infected animals or their bodily fluids [2]. The clinical spectrum of brucellosis is exceptionally broad. While many patients present with an acute febrile illness characterized by non-specific symptoms such as fever, sweats, malaise, and arthralgia, a substantial proportion may develop chronic or focal disease [3]. The pathogen has a predilection for the reticuloendothelial system, which can lead to its dissemination and the establishment of focal infections in virtually any organ system. Osteoarticular involvement is the most common focal complication, followed by genitourinary disease [4]. Spinal infection is a well-documented and serious manifestation of brucellosis. However, severe presentation with extensive cervical abscess formation is less common [5,6]. This report describes the case of a patient with a rare and challenging combination of complications: a severe infection of the cervical spine with large prevertebral and epidural abscesses,

complicated further by acute orchitis and splenomegaly. The objective of this report is to highlight the diagnostic and therapeutic challenges posed by atypical brucellosis, and to emphasize the need for a high index of suspicion in endemic settings to prevent severe morbidity, and long-term sequelae.

Case Presentation:

A 41-year-old male, residing in a rural area on the outskirts of Kirkuk- Iraq, was referred to our medical department for persistent symptoms. His illness began one month before the gradual onset of severe upper back and neck pain, associated with intermittent high-grade fevers, chills, drenching night sweats, profound fatigue, joint pain, and significant weight loss. During this month, he visited multiple rheumatologists and neurologists and received several courses of different antibiotics and neuropathic analgesics, none of which alleviated his symptoms. The condition was investigated by a neurosurgeon, who ordered a Magnetic Resonance Imaging (MRI) scan of the cervical spine. The MRI revealed significant findings suggestive of a paravertebral abscess. The patient refused surgical drainage of the abscess and was placed on a course of broad-spectrum antibiotics (Vancomycin, Ceftriaxone, and Metronidazole) and analgesics. Consequently, his clinical condition did not improve. The fever and malaise continued over the following week, and he developed new, distressing symptoms of severe scrotal pain and swelling. Upon his admission to our hospital, a more detailed history was obtained. Confirmed that his occupation involves raising cattle and sheep and that in recent months, several animals in his flock had experienced spontaneous abortions. This crucial epidemiological link immediately raised the suspicion of brucellosis. On physical examination, the patient appeared ill, and febrile. His vital signs were notable for a temperature of 38°C, a heart rate of 120 beats per minute, and blood pressure of 110/60 mmHg. There was marked tenderness and swelling of the right side of the scrotum, with associated redness of the overlying skin. Abdominal palpation revealed a palpable spleen tip, consistent with mild to moderate splenomegaly. Neurological examination showed normal tone, and power of the upper and lower limbs, no sensory level, and normal deep tendon reflexes.

Laboratory results before admission to the hospital showed leukocytosis (WBC: 14.3 x 10^9/L) and highly elevated inflammatory markers, with a C-reactive protein (CRP) of 55.6 mg/L and an erythrocyte sedimentation rate (ESR) of 52 mm/hr. Blood work performed upon admission to our service, and over the following days continued to show persistent abnormalities. The WBC count remained elevated at 12.37 x 10^3/uL, with a pronounced relative lymphocytosis of 53.8%. Platelet count was high at 504 x 10^3/uL, indicating thrombocytosis, and the ESR remained elevated at 36 mm/hr. Liver enzymes were mildly elevated (ALT: 63 U/L, AST: 44 U/L). Serological tests for brucellosis performed on the patient were conclusively positive. The Anti-Brucella IgG antibody level was high at 19.7 Index (Positive >11), and the Brucella Agglutination test was also positive. The Anti-Brucella IgM was equivocal, as seen in cases of brucellosis that have been ongoing for several weeks. A blood culture for Brucella species was drawn, and the result returned after 1 month, showing no growth. The fastidious nature of the organism, and prior antibiotic exposure often lead to negative cultures, even in the presence of active disease.

Imaging Findings:

- Abdominal Ultrasound confirmed splenomegaly with a spleen measurement of 16.7 cm.
- Scrotal Ultrasound: Revealed an enlarged right testicle (30x37mm) with a thickened outline (6.5mm) and a minimal hydrocele, leading to a diagnosis of acute right-sided orchitis.
- MRI of the Cervical Spine. This initial scan was critical. It showed a straightening of the normal cervical lordotic curve, indicative of severe muscle spasm. The key findings were two large fluid collections. One was located in the prevertebral space, extending from C5 to T1, measuring 58 x 10 mm. A second collection measuring 29 x 7 mm was found in the epidural space at the C6-C7 level. These abscesses were causing moderate spinal canal stenosis, and there was evidence of subtle abnormal signal within the spinal cord itself at this level, suggesting early myelopathy. These findings pointed towards a severe, destructive infection involving the vertebral elements and surrounding soft tissues of the cervical spine. Non-contrast MRI sequences were sufficient to detect infection and abscess formation; additional time was required, and a Time-sensitive diagnosis was needed to prevent neurological complications.
- The lack of neurological symptoms could be explained by the fact that the condition was detected early, treatment with appropriate antibiotics was started quickly, corticosteroids were given before the final diagnosis was made, and the spinal cord compression probably lasted for only a short time, before any permanent damage from reduced blood flow or inflammation could occur.

Given the severe spinal involvement with abscess formation, other etiologies were considered. Tuberculous spondylitis (Pott's disease) can present similarly and is a key differential in many regions[6]. Pyogenic infections, particularly with Staphylococcus aureus, are a common cause of spinal epidural abscesses and were considered, especially given the history of a surgical procedure. However, the constellation of symptoms, the strong epidemiological link to livestock, the presence of orchitis, and the definitive positive serology made brucellosis a unifying diagnosis. Bone marrow examination was not performed in this patient. There were clear reasons not to perform it, including both clinical and diagnostic considerations. Serology: Already established Diagnosis, Anti-Brucella IgG = 19.7 (positive >11). Thersitical picture and epidemiological link (contact with livestock, animal abortions) were highly suggestive of brucellosis. The final diagnosis was Brucellosis with severe, multi-systemic involvement, manifesting as:

- A severe osteoarticular infection of the cervical spine, resulting in large prevertebral and epidural abscesses with spinal cord compression.
- Acute right-sided brucellar orchitis.
- Splenomegaly.

Based on the diagnosis of severe, complicated brucellosis with deep-seated abscesses and organ involvement, a prolonged multi-drug antibiotic regimen was initiated. The patient was treated according to established guidelines for such complicated cases[2]:

- Doxycycline: 100 mg orally, twice daily for 6 weeks
- Rifampin: 300 mg orally, twice daily for 6 weeks

● Streptomycin: 1 g intramuscularly, once daily for the initial 2 weeks

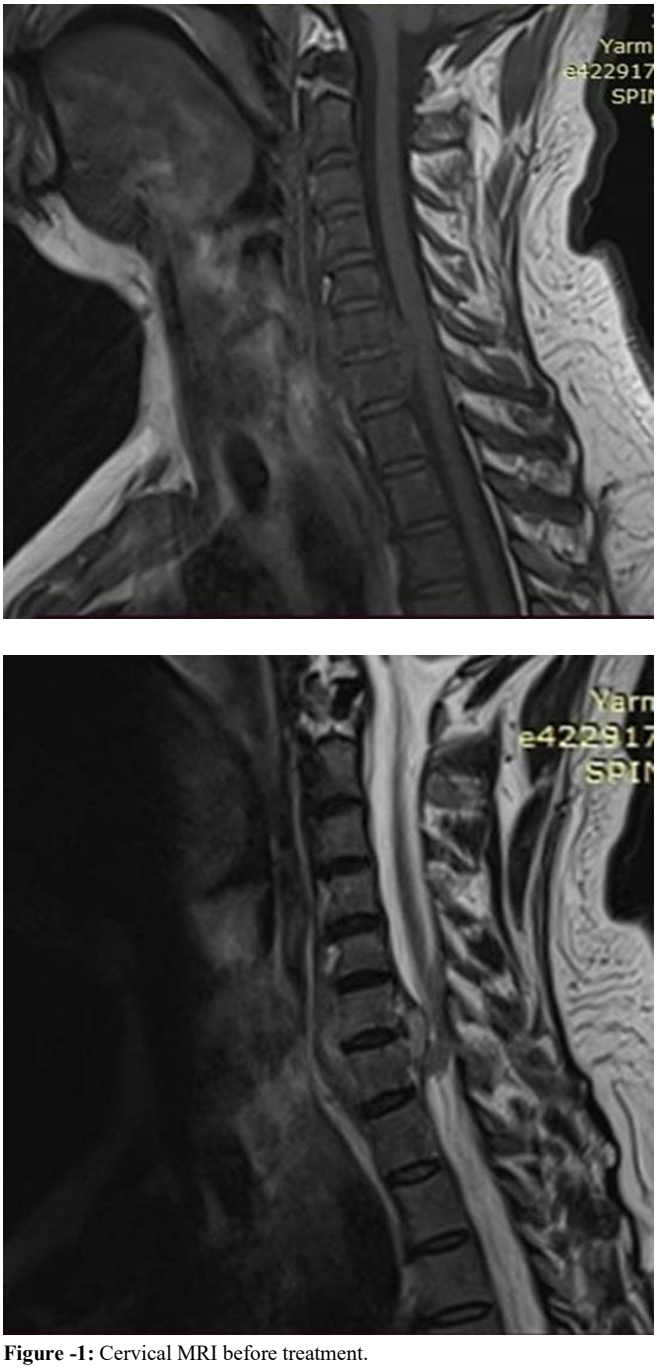

Figure -1: Cervical MRI before treatment.
- T1 WI at C6-C7 level demonstrated low signal epidural collection.
- T2 WI at C6-C7 level demonstrated high signal epidural collection.

This triple-therapy approach is recommended to ensure bactericidal activity and adequate penetration into deep tissues like bone and abscess cavities, thereby reducing the risk of relapse.

The patient responded remarkably well to the targeted anti-brucellar therapy. Over the course of a month, his fever resolved completely, and his constitutional symptoms abated. He reported a significant improvement in his neck pain and mobility, and the painful scrotal swelling gradually subsided. Follow-up inflammatory markers showed a trend towards normalization. He was discharged to complete his six-week course of oral antibiotics. He will be followed up in the outpatient clinic to monitor for any long-term complications or evidence of relapse.

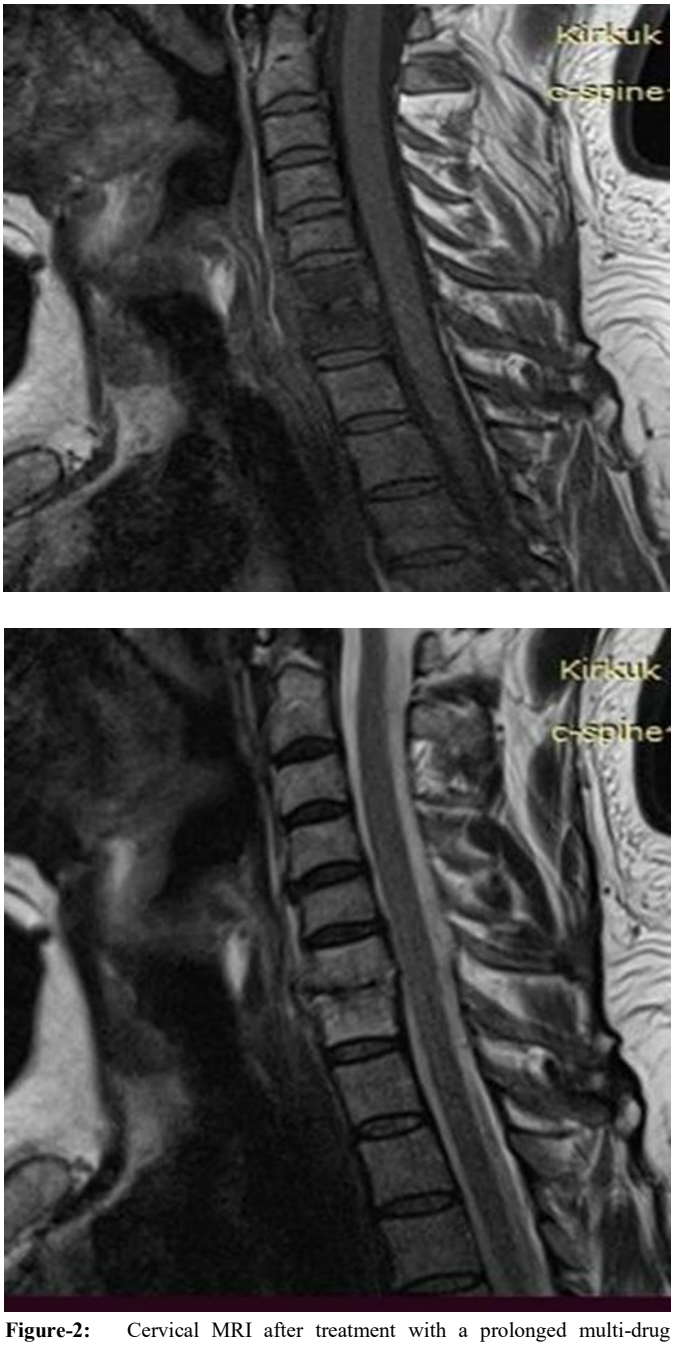

Figure-2: Cervical MRI after treatment with a prolonged multi-drug antibiotic regimen
- T1 WI
- T2 WI showed a significantly reduced size of the epidural collection with spondylodiscitis changes.

Table -1: Follow-up Serology

Date	Test Name	Result	Reference Range	Interpretation
March 30, 2024,	Anti-Brucella IgG	19.5 Index	Positive: > 11	Positive
	Anti-Brucella IgM	Negative	Negative: < 9	Negative
	Brucella Agglutination	Positive	N/A	Positive
April 21, 2024	Anti-Brucella IgG	19.7 Index	Positive: > 11	Positive
	Anti-Brucella IgM	6.28 Index	Negative: < 9	Negative
	Brucella Agglutination	Positive	N/A	Positive
May 15, 2024	Anti-Brucella IgG	2.73	Negative: < 9	Negative
	Anti-Brucella IgM	5.1	Negative: < 9	Negative

Discussion

This case is a powerful illustration of the severe and varied clinical spectrum of brucellosis. The simultaneous presentation of a life-threatening cervical spine infection with large abscesses and acute orchitis is a rare but well-described pattern of focal brucellosis[7]. The diagnostic journey of this patient, marked by a month of non-specific symptoms and ineffective treatments, highlights a crucial clinical challenge: brucellosis is often a "great imitator," and a delay in diagnosis can lead to significant morbidity. The diagnosis of spinal brucellosis can be particularly challenging. While the lumbar spine is most affected, cervical involvement, though rarer, carries a higher risk of severe neurological deficits, including quadriplegia [5]. The formation of extensive prevertebral and epidural abscesses, as seen in this patient, is a serious complication that requires aggressive medical management and sometimes surgical decompression.

The negative blood culture in this case is not unusual. Blood cultures for Brucella are only positive in a fraction of cases, with sensitivity varying widely depending on the stage of illness and laboratory techniques [8]. Therefore, serology plays a pivotal role. The high IgG titer in this patient indicated an established infection, while the equivocal IgM was consistent with an active infection for over a month. In endemic areas, the combination of a compatible clinical syndrome, a clear epidemiological risk factor (as in this patient's contact with aborting livestock), and positive serology is often sufficient to confirm the diagnosis and initiate treatment. The choice of a three-drug regimen including an aminoglycoside (Streptomycin) for the initial phase is reserved for complicated cases, such as those with spinal involvement, to maximize efficacy and prevent treatment failure or relapse [9]. Surgery in spinal brucellosis is reserved for neurological deficits, instability, large abscesses, or failure of medical therapy; reports from 2023–2024 show good outcomes when decompression and stabilization are required [10]. Our patient improved without surgery, consistent with conservative management being reasonable in selected cases. Finally, this case serves as an important public health reminder. Brucellosis is preventable. Public health strategies focusing on animal vaccination, pasteurization of dairy products, and educating farmers and abattoir workers about occupational hazards are essential for controlling the disease in endemic regions like Kirkuk [11].

Conclusion

This case of severe, multi-systemic brucellosis presenting with a cervical spine infection, large abscesses, and orchitis highlights the importance of clinical suspicion. Clinicians in endemic regions must consider brucellosis in the differential diagnosis of patients with unexplained fever, constitutional symptoms, and evidence of focal infection, especially in the osteoarticular or genitourinary systems. A thorough occupational and exposure history is invaluable. Serological testing is a cornerstone of diagnosis, particularly when blood cultures are negative. Prompt initiation of appropriate, prolonged combination antibiotic therapy is critical for achieving a favorable outcome and preventing the devastating complications of this versatile pathogen. Early serology, prompt MRI when axial pain is present, and initiation of a Doxycycline-based regimen including an aminoglycoside followed by prolonged oral therapy is key to preventing neurological sequelae.

Patient Consent:

Informed consent was obtained from the patient for the publication of this case report and any accompanying images. All patient identifying information has been anonymized.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No financial support, funding, or personal relationships influenced the preparation, analysis, or reporting of this case.

Authors Contributions

All authors contributed equally to the manuscript and read and approved the final version.

All authors meet the ICMJE criteria for authorship and agree to be accountable for all aspects of the work.

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