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MULTIFOCAL OSTEOARTICULAR BRUCELLOSIS: A RARE CASE OF SPONDYLODISCITIS, VERTEBRAL ABSCESS, AND KNEE ARTHRITIS

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Abstract

Brucellosis is a zoonotic disease transmitted from animals to humans, most commonly through direct contact with infected livestock or consumption of contaminated animal products such as unpasteurized dairy. It presents with a wide clinical spectrum, ranging from mild flu-like symptoms such as fever, fatigue, and muscle pain to more severe complications involving multiple organ systems if left untreated. Osteoarticular involvement is the most frequent complication, but the simultaneous occurrence of spinal brucellosis, vertebral abscess, and peripheral arthritis is rare and poses significant diagnostic challenges. Brucellosis is an endemic disease in Armenia. According to annual statistics from the National Institutes of Health, the number of brucellosis cases has increased during the last decade. The aim of the case report is to highlight the challenges in the management of a patient with multifocal osteoarticular brucellosis. A 51-year-old male agricultural worker was admitted to the hospital with fever, fatigue, lumbar pain, restricted mobility, and night sweats. Magnetic resonance imaging (MRI) revealed L4–L5 spondylodiscitis with an epidural abscess and epiduritis. Tuberculosis was excluded, while serological testing (Wright test 1:400, Huddleson test 3+) and enzyme-linked immunosorbent assay (ELISA) confirmed brucellosis (IgM and IgG strongly positive). During hospitalization, the patient developed swelling of the left knee; synovial fluid polymerase chain reaction (PCR) was positive for Brucella, confirming knee arthritis (gonitis). Laboratory evaluation demonstrated elevated erythrocyte sedimentation rate (ESR) (53 mm/h), C-reactive protein (CRP) (72.74 mg/L), and fibrinogen (724 mg/dL), indicating active infection. The final diagnosis was acute brucellosis, osteoarticular form with spondylitis, vertebral abscess, and left gonitis. He received combination antibiotic therapy with supportive care, resulting in clinical improvement and decreased inflammatory markers by discharge. This case highlights an unusual triad of brucellar spondylitis, epidural abscess, and **knee arthritis (gonitis)**. *Early recognition, supported by imaging and serology, and prompt initiation of appropriate therapy are essential to prevent long-term sequelae.*

Keywords: *Brucellosis, Spondylitis, Vertebral abscess, Gonitis, Treatment*

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Introduction

Brucellosis is one of the most widespread bacterial zoonotic infections, with more than 500,000 new human cases reported annually worldwide, particularly in endemic regions such as the Mediterranean basin, the Middle East, South and Central Asia, and parts of Latin America and Africa [*WHO, 2006; Beeching et al., 2022; Pappas et al., 2006*]. Caused by Gram-negative coccobacilli of the genus Brucella, the infection is most frequently transmitted to humans through direct contact with infected animals or through the ingestion of unpasteurized dairy products [*Beeching et al., 2022; Qureshi et al., 2023*]. In addition to its medical impact, brucellosis also has a substantial socioeconomic burden**,** as it affects the livestock industry and predominantly occurs in low- and middle-income countries [*Pappas et al., 2006*]**.**

In Armenia, brucellosis remains endemic and continues to represent an important challenge for the healthcare system. According to national epidemiological records, the annual number of newly diagnosed cases remains consistently high, reflecting both the persistence of infection among livestock and difficulties in controlling human transmission [*Hovhannisyan et al., 2024*]. The chronicity of the disease, its ability to mimic a wide range of clinical conditions, and the absence of pathognomonic symptoms in the early stages often delay diagnosis and treatment. Consequently, many patients present with complications that could otherwise be preventable.

The clinical spectrum of brucellosis is broad, ranging from acute febrile illness to chronic or relapsing disease with multisystem involvement. Initial manifestations often include nonspecific symptoms, including fever, night sweats, malaise, headache, myalgia, and arthralgia, which may remit spontaneously and recur in a wave-like pattern [*Beeching et al., 2022*]. However, if untreated or inadequately treated, the infection may progress to more severe forms, with involvement of various organ systems. Among the systemic complications, osteoarticular disease represents the most frequent and clinically significant manifestation, occurring in 20–85% of complicated cases [*Ebrahimpour et al., 2017*; *Geyik et al., 2002*]. In large series, peripheral arthritis often affects the knees in approximately 30%–36% of patients**,** followed by the hips, sacroiliac joints, ankles, and less commonly the elbows or shoulders [*Mousa et al., 1987; Ebrahimpour et al., 2017*].

Osteoarticular brucellosis most commonly presents as spondylitis, spondylodiscitis, sacroiliitis, or peripheral arthritis. Spinal involvement, particularly lumbar spondylitis, is considered the most serious osteoarticular complication due to its potential to cause irreversible neurological damage and disability [*Tali et al., 2015; Namiduru et al., 2004; Lee et al., 2008; Colmenero et al., 1996*]. The lumbar vertebrae are predominantly affected, followed by the thoracic and cervical regions [*Lee et al., 2008; Li et al., 2023*]**.** The pathophysiology involves hematogenous dissemination of Brucella to the richly vascularized vertebral bodies, often leading to focal destructive lesions. In advanced cases, the infection may spread to the intervertebral discs and paravertebral or epidural tissues, resulting in abscess formation [*Tali et al., 2015; Starakis et al., 2009*]**.** Although brucellar spondylitis is widely documented, vertebral and paravertebral abscesses are less frequent and typically indicate a delayed diagnosis [*Gerges et al., 2022; German et al., 2010; Duyur et al., 2001*]**.**

Radiological examinations are crucial for detecting and characterizing brucellar osteoarticular complications**.** MRI is particularly sensitive for identifying early spondylodiscitis, vertebral abscesses, and epidural extension, as well as for evaluating spinal cord compression [*Tali et al., 2015; Starakis et al., 2009*]. A characteristic radiographic finding in brucellar spondylitis is the Pedro Pons sign, representing an erosive lesion at the anterior superior corner of the vertebral body, often accompanied by loss of vertebral height and deformity [*Tali et al., 2015*]. Nevertheless, even with modern imaging and serological tools, diagnosis may remain challenging due to the overlap of clinical and radiological features with conditions like spinal tuberculosis [*Altunçekiç et al., 2022*].

In addition to spinal involvement, brucellosis may also present with peripheral joint manifestations. Brucellar arthritis most frequently affects large joints such as the knee and hip; less commonly, it involves the shoulder, wrist, or ankle [*Mousa et al., 1987; Ebrahimpour et al., 2017*]. Knee involvement, or brucellar gonitis, is particularly significant, as it may lead to severe pain, joint

swelling, and functional impairment. In adults, it may present late or atypically, complicating diagnosis [*Mousa et al., 1987; Duyur et al., 2001*]. Particularly in patients with comorbidities like rheumatoid arthritis, brucellosis may masquerade as a disease flare-up, leading to delayed diagnosis [*Duyur et al., 2001*].

The simultaneous occurrence of spinal brucellosis with vertebral abscess and peripheral arthritis is uncommon and rarely described in the literature [*Gerges et al., 2022; Duyur et al., 2001; Altunçekiç et al., 2022*]**.** Such cases present diagnostic and therapeutic challenges. On the one hand, the disease may mimic tuberculosis, malignancy, or degenerative disorders, leading to inappropriate interventions. On the other hand, delayed recognition of the brucellar etiology can result in prolonged morbidity, neurological deficits, or irreversible joint destruction. Management complexities are amplified by the need for prolonged antibiotic therapy and, in some cases, surgical intervention for spinal stabilization or abscess drainage [*Duyur et al., 2001; Krishna et al., 2021; Li et al., 2023*]**.**

Given these challenges, early recognition of atypical presentations is vital. A thorough epidemiological history, including occupational exposure and consumption of unpasteurized dairy products, should raise clinical suspicion for brucellosis when evaluating chronic back pain, vertebral lesions, or large-joint arthritis in endemic regions [*World Health Organization 2006, Beeching et al., 2022, Hovhannisyan et al., 2024*]. Laboratory confirmation is usually achieved through serological assays (e.g., SAT, ELISA), with culture as the gold standard. Molecular methods like PCR offer enhanced sensitivity, particularly in tissue samples, but remain less available in resource-limited settings as well as culture [*Mousa et al., 1987*].

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The present case illustrates the uncommon triad of brucellar spondylitis, vertebral abscess, and brucellar gonitis**.** By reporting and analyzing such rare but clinically significant manifestations, we aim to contribute to the literature on brucellosis complications, highlight the importance of prompt diagnosis, and emphasize a multidisciplinary management approach in complex cases.

CASE PRESENTATION

A 51-year-old male agricultural worker was admitted to the Department of Infectious Diseases with complaints of generalized weakness, recurrent fever, low back pain, restricted mobility, and excessive sweating. The patient reported illness lasting approximately six weeks. His initial symptoms included urinary frequency, for which he was treated in a regional hospital, after which the urinary complaints resolved**,** but lumbar pain persisted. He subsequently consulted a neurologist, and MRI revealed L4–L5 spondylodiscitis with epidural abscess, epiduritis, degenerative–dystrophic changes, and disc herniation. Tuberculosis was ruled out after evaluation by a phthisiatrist, and serological testing (Wright–Huddleson test) demonstrated anti-Brucella antibodies with a titer of 1:400, consistent with brucellosis. The patient was referred to our center for further management.

On admission, the patient was oriented, with normal skin and mucous membrane coloration. Vital signs were stable: blood pressure 120/80 *mm Hg*, heart rhythm regular, oxygen saturation 96%. There were no meningeal signs, peripheral edema, or neurological focal deficits. Cardiopulmonary examination was unremarkable, liver was palpable at the right costal margin, and the spleen was not enlarged. During hospitalization, the patient developed swelling of the left knee joint. Synovial fluid aspiration was performed because of the severe pain (Figure 1), and PCR confirmed Brucella infection, confirming Brucella infection. Ultrasonography of the knee revealed marked synovitis, degenerative meniscal changes, and signs of lateral meniscus tear.

Chest radiography demonstrated enhanced bronchovascular markings with localized pleural

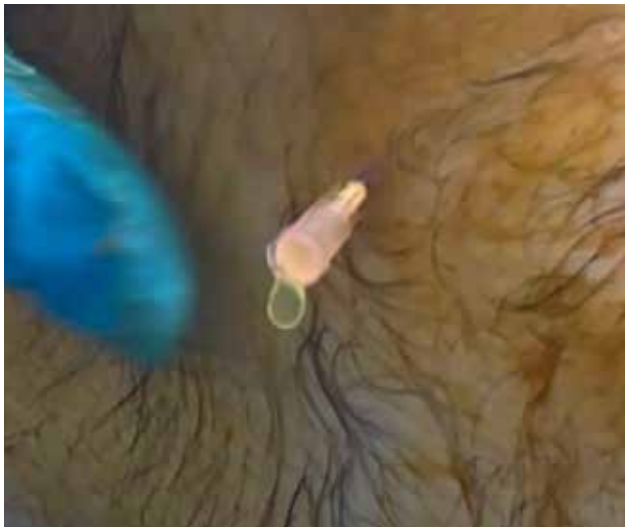

Figure 1. *Synovial fluid aspiration of the knee*

thickening in the left axillary line. Echocardiography excluded valvular vegetations, myocardial hypertrophy, or pulmonary hypertension.

Based on clinical, radiological, and laboratory findings, the final diagnosis was: acute brucellosis, osteoarticular form, left-sided gonitis, L4–L5 spondylodiscitis, epiduritis, and epidural abscess.

Laboratory investigations are presented in Table 1. Serological assays by ELISA were positive for both anti-Brucella IgM (3.4, reference <1.0) and IgG (3.5, reference <1.0**)**. Wright's agglutination test was 1:400, and Huddleson's reaction was strongly positive (3+). Viral serology for HBV, HCV, HIV, and syphilis was negative.

Chest radiography demonstrated enhanced bronchovascular markings with localized pleural thickening in the left axillary line. Echocardiography revealed no valvular vegetations, myocardial hypertrophy, or pulmonary hypertension.

Based on clinical, radiological, and laboratory findings, the final diagnosis was: acute brucellosis, osteoarticular form, left-sided gonitis, L4–L5 spondylodiscitis with epiduritis and epidural abscess.

The patient received supportive infusion and anti-inflammatory therapy, along with a combination antibiotic regimen, including 3 weeks of gentamicin, trimethoprim–sulfamethoxazole, and chloramphenicol. The patient's condition improved under treatment, with resolution of fever and reduction in inflammatory markers by discharge. He was prescribed doxycycline and rifampicin therapy for 6 months, with follow-up by a neurosurgeon and an infectious diseases specialist.

Discussion

Brucellosis remains a major zoonotic infection in endemic regions, with significant clinical and socioeconomic impact [*World Health Organization 2006; Beeching et al., 2022; Hovhannisyan et al., 2024; Qureshi et al., 2023; Pappas et al., 2006*]. Osteoarticular involvement is the most frequent complication, occurring in 20–85% of cases, and represents the main cause of morbidity in human brucellosis [*Mousa et al., 1987, Ebrahimpour et al., 2017, Geyik et al., 2002*]. Within this spectrum, spinal disease is the most severe manifesta-

Table 1

Laboratory findings of the patient at admission and discharge

Parameter	Laboratory findings at		Reference Range
	Admission	Discharge	
Hemoglobin (*g/L*)	115.0	100.0	130–170
Erythrocytes (10^12/*L*)	4.12	3.63	4.20–6.00
MCV (*fL*)	84.5	82.6	76.0–100.0
Leukocytes (10^9/*L*)	6.1	6.73	4.0–10.0
Neutrophils (%)	64.4	71.9	40.0–73.0
Lymphocytes (%)	27.0	29.0	15.0–45.0
Monocytes (%)	7.9	7.6	4.0–12.0
Eosinophils (%)	0.5	2.2	0.5–7.0
Basophils (%)	0.2	0.3	0.0–2.0
Platelets (10^9/*L*)	285.0	318.0	150–400
ESR (*mm/h*)	53.0	39.0	<20
Albumin (*g/L*)	41.19	35.0	35.0–52.0
Creatinine (*μmol/L*)	61.0	122.0	44–100
ALT (*U/L*)	15.0	18.5	0.1–41.0
AST (*U/L*)	12.6	10.4	0.1–50.0
ALP (*U/L*)	103.6	107.5	35.0–120.0
GGT (*U/L*)	27.9	40.4	0.1–55.0
Glucose (*mmol/L*)	5.5		3.5–6.0
C reactive protein (*mg/L*)	72.74	33.36	0.10–5.00
RF (*IU/mL*)	16.4	10.79	0.00–14.00
Prothrombin Index (%)	118.0	99.0	80–120
Prothrombin Time (sec)	12.1	13.4	12–16
Fibrinogen (*mg/dL*)	724.0	652.0	200–400
INR	0.9	1.01	0.9–1.5

Notes: *CRP – C reactive protein, ALT - alanine aminotransferase, AST - aspartate aminotransferase, ALP - alkaline phosphatase, RF - Rheumatoid Factor, GGT - Gamma-Glutamyl Transferase, ESR - erythrocyte sedimentation rate, MCV - mean corpuscular volume*

tion, while peripheral arthritis, particularly gonitis, is more common in younger patients but can also affect adults [*Namiduru et al., 2004; Mousa et al., 1987; Duyur et al., 2001*]. The simultaneous presentation of spinal brucellosis with epidural abscess formation and knee arthritis, as observed in our patient, is rare and diagnostically challenging.

SPINAL BRUCELLOSIS

Spondylitis is the predominant osteoarticular manifestation in adults, usually involving the lumbar region, particularly the L4–L5 vertebrae [*Tali et al., 2015, Namiduru et al., 2004, Lee et al., 2008, Geyik et al., 2002*]. In our case, MRI demonstrated L4–L5 spondylodiscitis with epidural abscess formation, consistent with the typical localization pattern. The development of epidural or paravertebral abscesses is considered uncommon, reported in only a minority of cases [*Tali et al., 2015, Gerges et al., 2022, German et al., 2010*]. These complications are often associated with delayed diagnosis or inadequate treatment and may result in neurological deficits or irreversible spinal deformities [*Namiduru et al., 2004, Lee et al., 2008, Altunçekiç et al., 2022, Krishna et al., 2021*]. In our patient, although degenerative changes and disc herniation coexisted, the combination of clinical suspicion, epidemiological background, and confirmatory serology facilitated timely recognition of brucellosis as the underlying etiology.

PERIPHERAL JOINT INVOLVEMENT

Brucellar arthritis most frequently affects the knee and hip joints, with the knee being the most common site of monoarthritis [*Mousa et al., 1987, Ebrahimpour et al., 2017, Geyik et al., 2002*]. In adults, however, isolated gonitis is less frequent and often associated with disseminated or advanced disease [*Duyur et al., 2001*]. Synovial fluid PCR confirmed the presence of *Brucella* DNA in our patient's knee effusion, further validating the musculoskeletal localization of the infection. The presence of concomitant spinal involvement and gonitis highlights the multifocal nature of osteoarticular brucellosis, which has been described only sporadically in the literature [*Gerges et al., 2022, Duyur et al., 2001, Priya et al., 2022*].

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DIAGNOSTIC CONSIDERATIONS

Brucellosis poses a diagnostic challenge because its clinical manifestations overlap with those of other infections such as tuberculosis, pyogenic spondylitis, or autoimmune diseases [Lee et al., 2008, Priya et al., 2022]. In endemic areas, however, the presence of chronic back pain, vertebral lesions, or large-joint arthritis should raise suspicion [World Health Organization 2006, Beeching

et al., 2022, Hovhannisyan et al., 2024].

Serological tests, such as the Wright agglutination test, ELISA, and Huddleson's reaction, remain the mainstay of diagnosis in resource-limited settings where culture may not be feasible [Beeching et al., 2022, Qureshi et al., 2023].

In our case, both IgM and IgG anti-Brucella antibodies were strongly positive, while the Wright test titer of 1:400 provided diagnostic confirmation in conjunction with clinical and imaging findings. Importantly, tuberculosis was excluded by a specialist consultation, reducing the risk of misdiagnosis.

Management and outcome

Treatment of osteoarticular brucellosis requires prolonged combination antimicrobial therapy to prevent relapse and complications [Li et al., 2023]. While the World Health Organization recommends doxycycline combined with rifampin, with or without aminoglycosides, resource limitations often influence antibiotic selection [World Health Organization 2006, Qureshi et al., 2023]. Our patient was treated with a regimen including gentamicin, trimethoprim–sulfamethoxazole, and chloramphenicol, followed by a combination of doxycycline and rifampin. Clinical improvement was observed, with reduction of inflammatory markers and resolution of fever by discharge. However, the risk of relapse or chronic sequelae, particularly from spinal involvement, underscores the need for long-term follow-up.

Significance of the case

The present case emphasizes several important aspects. First, it illustrates the polymorphic nature of brucellosis and its ability to mimic other conditions. Second, it underscores the importance of considering brucellosis in the differential diagnosis of both chronic back pain and large-joint arthritis in endemic regions. Finally, it highlights the rarity of concurrent vertebral abscess and gonitis, a manifestation reported only sporadically in the literature [Gerges et al., 2022, Duyur et al., 2001]. Awareness of such unusual combinations can facilitate earlier recognition and initiation of appropriate therapy, thereby reducing morbidity and preventing long-term disability.

Conclusion

Brucellosis continues to be a major public health concern in endemic regions such as Armenia, where delayed diagnosis frequently results in musculoskeletal complications. Spinal brucellosis is the most severe osteoarticular manifestation, and although epidural abscesses are rare, they represent a serious complication that can lead to neurological deficits. Peripheral joint involvement, particularly gonitis, is more common in pediatric patients; its occurrence in adults, combined with vertebral infection and abscess formation, is unusual.

The present case illustrates the importance of maintaining a high index of suspicion for brucellosis in patients presenting with chronic back pain and joint swelling in endemic areas. A multidisciplinary approach, including radiological imaging, serological testing, and molecular confirmation, is essential for early diagnosis. Prompt initiation of appropriate combination antimicrobial therapy can result in favorable outcomes, though long-term follow-up remains crucial to detect relapse or sequelae.

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The present case illustrates the importance of maintaining a high index of suspicion for brucellosis in patients presenting with chronic back pain and joint swelling in endemic areas. A multidisciplinary approach, including radiological imaging, serological testing, and sometimes molecular confirmation**,** is essential for early diagnosis. Prompt initiation of appropriate combination antimicrobial therapy can result in favorable outcomes, though long-term follow-up remains crucial to detect relapse or sequelae.

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CONTENTS

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