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Case Report

Brucellosis Presenting as A Localized Fluid Collection in The Leg: A Case Report from An Endemic Area

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Abstract

Introduction: Brucellosis is one of the most important zoonotic diseases worldwide, and Kurdistan is an endemic province in Iran. Microorganisms can be found in different fluids and tissues of the body. This study is the first to report the detection of Brucella in an isolated collection.

Case Report: The patient was a 53-year-old Iranian farmer whose chief complaint was weight loss, malaise, low back pain, and pitting edema in his left leg. He had no history of underlying disease, and his Wright test was positive. As an incidental finding during color Doppler sonography performed to rule out DVT, a localized fluid collection was observed in the medial and distal portions of the left leg. Fluid was aspirated, and the results showed a positive Coombs Wright test and a positive PCR test for brucellosis. The patient's brucellosis was successfully treated with a combination regimen of Doxycycline (100mg PO BID), Rifampin (600mg PO daily), and Gentamycin (80mg/2ml IV TDS), and supportive care. After a 3-week hospitalization, symptoms resolved, and the patient showed significant improvement, including weight gain, at the 2-month follow-up.

Conclusion: This is an uncommon case of Brucella infection in a localized fluid collection in an endemic area. Brucellosis can be found in fluid collections that may have no connection to any body fluids.

Keywords: Brucellosis, Body Fluids, Zoonosis, Leg

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Introduction

Brucellosis is considered one of the most significant zoonotic diseases worldwide.[1] It can cause various morbidities in both human and animal populations.[2] Iran is an endemic area for brucellosis, with an incidence rate ranging from 98 to 130 per 100,000 population. One of the provinces in Iran most affected by brucellosis is Kurdistan, located in the west of the country.[3] An analysis between 2012 and 2016 showed that the prevalence of bovine brucellosis in different regions varied significantly, with the lowest being 3% in Iran and Iraq and the highest being more than 7% in Kuwait and Jordan. In addition, brucellosis in goats in Iran was quite serious, with a prevalence of 3.5% in 2014. The test-and-sacrifice method for controlling the disease is generally practical only in locations where the rate of infection is less than 2%.[4] The most common clinical symptoms observed in patients with brucellosis are fever (89%), chills (52.3%), arthralgia (48.6%), and weight loss (30.3%).[5]

Brucellosis is an infection that is transmitted from animals to humans. The main ways of spreading the disease are through the consumption of unpasteurized milk and its products and by handling infected animal tissues. Besides, the disease can also be transmitted through the breathing of contaminated aerosols in places such as stables.[6]

A conclusive diagnosis of brucellosis can be made by culturing the organism from blood, body fluids (such as synovial fluid), or tissues (such as bone marrow or liver biopsy). Serological tests (including Wright, Coombs Wright, and 2ME) and molecular tests (such as PCR) are also valuable, though culture remains the gold standard.[7-9] The standard treatment for brucellosis includes a combination of antibiotics such as doxycycline, rifampin, and an aminoglycoside (gentamicin or streptomycin).[9]

Our study represents an unusual report of Brucella detection, verified by seropositive and polymerase chain reaction (PCR) assays, in a local fluid collection unrelated to synovial fluids.

Case Report

The patient, a 53-year-old Iranian male farmer,

presented with a chief complaint of chronic low back pain and recurrent falls over the past 6-7 months. His condition worsened over the last 2 months, leading to bed confinement. He had previously consulted his family physician due to significant weight loss (14 kg in 2 months), malaise, inability to walk, and swelling above the left ankle. The physician ordered laboratory tests.

The patient had no history of underlying diseases, chronic cough, or family history of illness. He had a history of methadone use and alcohol consumption, and smoked approximately 30 pack-years of cigarettes. The patient was referred to an infectious disease specialist and admitted to the infectious ward after the results of his laboratory tests showed a positive Wright test. The patient's vital signs were stable during the physical examination, but he appeared cachectic. He had pitting edema in the left lower leg. His weight loss and night sweats prompted a request for an oncologist consultation and the initiation of malignancy work-ups (Table 1).

As shown in Table 1, the patient exhibited normochromic normocytic anemia, likely due to chronic disease. Coagulation test results were within normal limits. Viral tests for HIV-Ab, HBsAg, and HCV-Ab were negative, whereas ESR and CRP levels were significantly elevated. Serological tests for brucellosis returned positive results with high titers. Other laboratory tests showed no abnormalities, and the PPD test result was negative.

For the observed leg swelling, pitting edema, and a size difference of more than 3 cm between his lower extremities, Color Doppler Ultrasound of the left lower extremity veins was performed, ruling out DVT. However, accidental sonography findings suggested a collection in the medial and distal portions of the left leg (approximately 110×12 mm) associated with tenosynovitis of the posterior tibialis tendon sheath (with no history of trauma). Fluid aspiration was performed under ultrasound guidance, and the results are presented in (Table 2).

As shown in Table 2, a turbid bloody fluid with a moderate predominance of neutrophilic white blood cells, confirmed through a positive Coombs-Wright test, was diagnosed from the patient's left leg collection.

Abdominopelvic sonography showed no abnormalities, and the liver and spleen were both normal in size.

Table 1. The laboratory findings of the Patient

Hematological		
Test	**Result**	**Normal Range**
White Blood Cell	6.80 *10^3/mm3	4-10 *10^3/mm3
Red Blood Cell	4.52 million/mm3	4.5-6.5
Platelet	256 * 10^9 / l	120-550 * 10^9 / l
Hemoglobin	10.8 g/dl	13-17
Mean Corpuscular Volume	82.3 fL	80-100
Partial thromboplastin time	31	25-35 sec
Prothrombin time	11	10-12 sec
Erythrocyte Sedimentation Rate	32 mm/h	5-12 mm/h
Biochemical		
Blood Urea Nitrogen	8 mg/dl	8-20
Serum Creatinin	0.7 mg/dl	0.9-1.3
Sodium	139 meq/l	135-149
Potassium	3.7 meq/l	3.5-5.5
Calcium	8.8 mg/dl	8.6-10.3
Iron	75 mcg/dl	70-175
C Reactive Protein	71 mg/l	0-6
TIBC	330 mcg/dl	210-440
Ferritin	131 ng/ml	21.81-274.66
Serological		
Wright	1/2560 (Positive)	Positive/Negative
Coombs Wright	1/320 (Positive)	Positive/Negative
2ME	1/640 (Positive)	Positive/Negative
HIV-Ab	Negative	Positive/Negative
HBS-Ag	Negative	Positive/Negative
HCV-Ab	Negative	Positive/Negative
Tumor Markers		
Serum CEA	2.43 ng/ml	less than 6.5
CA 19-9	4.14 U/ml	Up to 37

Table 2. The results of the Fluid collection analysis

Fluid Analysis	Result	Synovial Fluid	Result
Lactate Dehydrogenase Fluid	484 u/l	Color	Bloody
Adenosine Deaminase Fluid	14.2 U/l	Neutrophil/Lymphocyte ratio	90%/10%
Synovial Fluid	Negative	WBC	8000 cells/µL
Coombs Wright Fluid	1/40	Glucose	70 mg/dl
2ME Fluid	Negative	Protein	3.8 mg/dl

Considering the patient's inability to walk and persistent low back pain, a neurology consultation was requested, and a Thoracolumbar MRI without gadolinium (Figure 1) and an EMG-NCV test were performed. Thoracolumbar MRI of this patient is seen in (Figure 1). Lumbar MRI revealed significant degenerative changes with disc herniations causing spinal canal stenosis and nerve compression.

This lumbar MRI image shows three different sections of the lumbar spine.

A. This section shows significant degenerative changes in the vertebral bodies, with decreased disc height and endplate irregularities. Moderate central canal stenosis was observed.

B. This section demonstrates a central disc herniation that compresses the thecal sac and nerve roots. Facet joint hypertrophy also contributed to spinal canal narrowing.

C. This section shows a large central disc herniation causing severe spinal canal stenosis and compression of the thecal sac and the nerve roots. Degenerative changes were also observed in the vertebral bodies and facet joints.

Overall, this MRI indicates significant degenerative changes in the lumbar spine with disc herniations and spinal canal stenosis, which may be the cause of the patient's symptoms.

A bone scan (Figure 2) was performed based on the patient's symptoms and laboratory test results. Bone scan revealed several uptakes, suggesting a mild-to-moderate inflammatory/osteoblastic process. Increased activity in the left ankle could be attributed to inflammatory arthritis and degenerative osteoarthritis in the rest of the spine and knees.

The patient was prescribed a standard treatment and medical therapy for brucellosis, including a combination regimen of Doxycycline (100mg PO BID), Rifampin (600mg PO daily), and Gentamycin (80mg/2ml IV TDS), along with Famotidine (20mg PO daily), Half saline fluid (1000cc IV BID), and Enoxaparin (60 mg SC BID). The response to treatment was dramatic. After 3 weeks of hospitalization, the symptoms resolved, and the patient was discharged from the ward. After almost 2 months of follow-up, the patient had significant weight gain according to his impression and treatment.

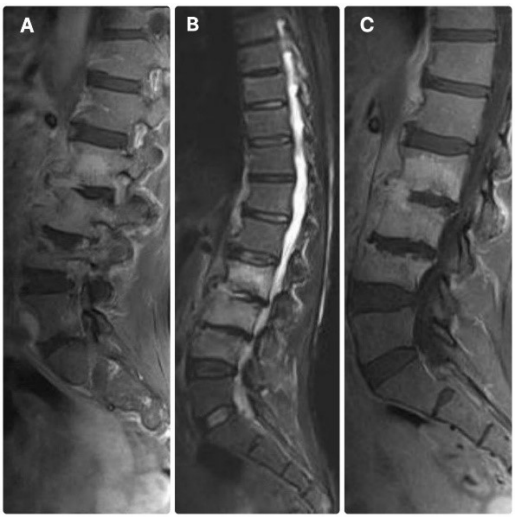

Figure 1. Thoracolumbar MRI without Gadolinium

Discussion

This case report details a very atypical and unheard-of human brucellosis presentation: a localized fluid collection in the leg's soft tissue, with no communication with a joint or any other typical foci. Brucellosis is endemic to the Kurdistan Province of Iran, with an average annual incidence of 56 cases per 100,000 population. This fact makes the recognition of the diverse clinical manifestations of brucellosis extremely essential for timely diagnosis and treatment.[10] While brucellosis is a very versatile infection and can be found in various body fluids and tissues, such as synovial, pleural, and cerebrospinal fluids, the liver, and spleen, This case illustrates the pathogen's ability to involve unexpected anatomic sites.[7, 11-14]

Essentially, this presentation of a localized bloody fluid collection in the left leg raised speculation of malignancy or other pathologies. Most importantly, diagnostic workup showed a positive Brucella polymerase chain reaction test and high serological titers both in the serum and the aspirated leg fluid; hence, this collection was confirmed to be the focal site of the Brucella infection. Other findings included normocytic normochromic anemia that resolved after treatment. The patient showed clinical improvement, and after the full course of a standard brucellosis antibiotic regimen, the anemia resolved, and there was weight gain.

One of the major new discoveries is the isolation of Brucella from a localized collection of soft tissue that is far from the usual site. This is most likely due to blood spread. In acute brucellosis, bacteremia is quite frequent; thus, bacteria may spread to different tissues.[7] We hypothesize that the leg soft tissue was the inoculation site, possibly aided by microtrauma. Although the patient did not report any significant traumatic events, his immobility and wheelchair use may have caused repeated minor injuries, leading to the creation of a perfect nidus for bacterial

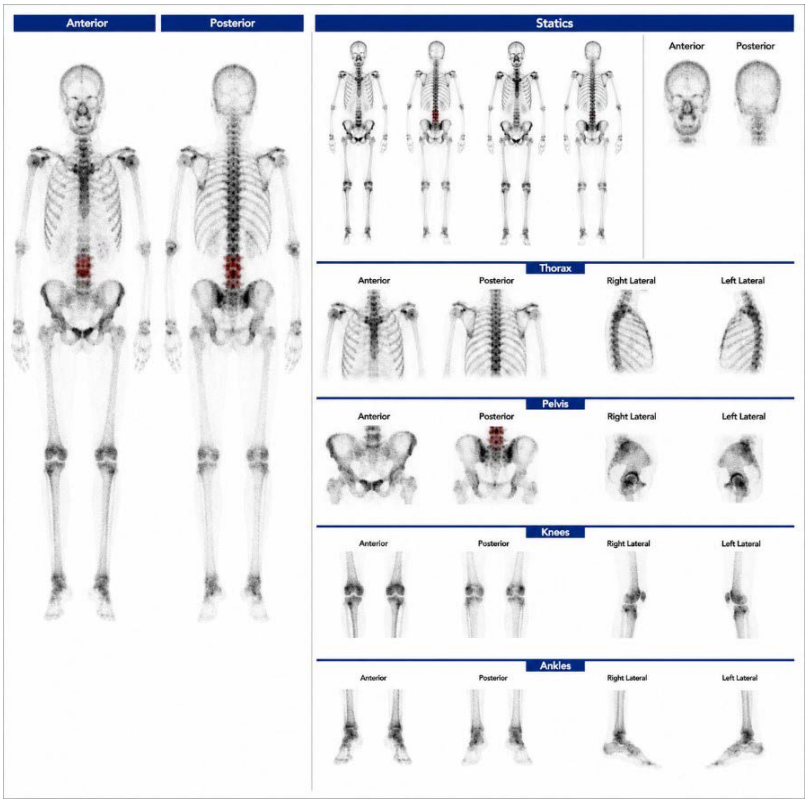

Figure 2. Patient's bone scan according to his symptoms

seeding and subsequent inflammatory fluid collection. The presence of blood in the aspirate is another evidence that the area is closely linked to the local vasculature and there was an intense inflammatory response.

Our findings are supported by several previously reported cases. For instance, Abeer et al. described a rare presentation of brucellosis as a breast abscess in a patient from an endemic area, which was confirmed by positive culture.[15] In another case report by Sunnetcioglu et al., a rare thyroid abscess caused by Brucella was documented in an endemic region.[16] In a different case report by Kazaz et al., a patient from an endemic area was found to have a rare thyroid abscess infection by Brucella melitensis. The authors emphasize that localizing brucellosis in the thyroid should not be overlooked in the differential diagnosis of bizarre infections of the thyroid, thus avoiding any delay in diagnosis and aggravation of the .[17] Rizkalla et al. reported a case of spinal brucellosis (spondylodiscitis) in a patient whose symptoms were initially mistaken for metastatic cancer.[18]

This finding is in line with the principle that brucellosis may be a "great imitator" with different kinds of focal complications.[19] Nevertheless, our case seems to be unique. A comprehensive search of the literature did not reveal any previous instances of a fluid collection that tested positive for Brucella in the leg soft tissue, which is entirely different from a joint or bursa. Most reported musculoskeletal involvements are spondylitis, sacroiliitis, or arthritis.[11,12] The lack of previous cases similar to ours could be interpreted as an argument against our explanation. In addition, there is a theoretical chance of a false-positive PCR in a bloody aspirate because of contamination from circulating bacterial DNA.[20] We believe that this is not the case for two reasons: (1) the PCR was positive for Brucella only and no other organisms, and (2) the elevated serological titers in both blood and fluid, along with the patient's great response to the specific anti-Brucella therapy, are strong supporting evidence for an actual infection at the site.

As this is a report of a single case, the main drawback is the usual limitation of not being able to determine what causes what or apply the results to a broader population. Although the idea of infection through microtrauma is reasonable, it remains a hypothesis and cannot be confirmed retrospectively. In addition, we could not grow the bacterium from the fluid, which would have been the best method to confirm live organisms; the diagnosis was made by PCR and serology only. Lastly, the patient's first condition was complicated, and although cancer was ruled out, it is still possible that some other inflammatory diseases might have caused the fluid in the body. However, the reaction to the therapy indicates that brucellosis is the only reason.

This odd instance case presents several points that can be explored in future studies. First, multicenter prospective studies in regions with a high incidence of brucellosis should clarify the prevalence of atypical presentations through systematic documentation. It is our suggestion that in similar situations, as much as possible, cultures should be taken from atypical fluid collections to identify viable Brucella organisms. The study on the origin of the local infection on the release of microtrauma and endothelial damage for bacterial seeding can be furthered by animal models. Finally, more doctor awareness is

needed so that brucellosis becomes a routine differential diagnosis of unexplained fluid collections in patients coming from endemic areas, even if it is at a considerable distance.

This single case is limited in several ways: it cannot demonstrate the cause of the condition or its frequency; the proposed explanation—that the bacteria spread through the bloodstream following a minor injury—is a reasonable but unconfirmed hypothesis; and the diagnosis lacks the most definitive confirmation (i.e., identification of live bacteria in the fluid), relying instead mainly on indirect DNA and antibody tests.

If you are a physician in an area where brucellosis is endemic, this disease ought to be on your differential diagnosis list for any confounding fluid accumulation, even in bizarre anatomical locations. On the other hand, subsequent investigations ought to concentrate on confirming such seldom cases systematically, isolating the bacteria from the fluids for microbiological confirmation, and employing animal models to verify the conjecture that minor injuries facilitate the

Conclusion

This case report describes a novel brucellosis presentation: a localized fluid collection in the leg soft tissue without joint communication, in a patient from an endemic region of Iran. Diagnosis was confirmed by positive *Brucella* PCR and elevated serological titers in both serum and aspirated fluid, with clinical improvement following antibiotic therapy.

The case highlights the pathogen's ability to seed unexpected anatomic sites via hematogenous spread, possibly facilitated by microtrauma from immobility. While brucellosis is known as a "great imitator," literature review revealed no prior report of a *Brucella*-positive fluid collection in leg soft tissue distinct from joint or bursal involvement.

Limitations include the lack of culture confirmation, an unconfirmed microtrauma hypothesis, and inability to establish causation or frequency. Nevertheless, the therapeutic response strongly supports true infection.

For clinicians in endemic areas, brucellosis should be considered in the differential diagnosis of unexplained fluid collections, even in anatomically distant locations. Future studies should systematically document atypical presentations and prioritize culture isolation from unusual fluid collections.

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Competing Interests

The authors declare that they have no competing interests.

Ethical Approval

Ethical Approval: This study was approved by the Institutional Review Board (IRB) of Kurdistan University of medical science (Ethics Code: IR.MUK.REC.1404.213). All procedures performed were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments.

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