CASE REPORT / OLGU SUNUMU

DOI: 10.4274/mjima.galenos.2024.24246.22
Mediterr J Infect Microb Antimicrob 2024;13:24246.22
Erişim: http://dx.doi.org/10.4274/mjima.galenos.2024.24246.22

Neurobrucellosis Cauda Equina Syndrome: Rare of Rarity

Neurobrucellosis Cauda Equina

Hassan Mohammed Abdel RAHMAN[1,2], Omar Mohammed ALNASHIWATY[3], Abdallah Abdelkader ELSAYED[4], Rabab Mahmoud AHMED[5], Farouk Mostafa FARIS[6]

[1]Associate Consultant of Infectious Disease, Madinah Cardiac Center, Al Madinah, KSA
[2]Kafr El-Sheikh Fever Hospital, Egypt
[3]Internal medicine and Infectious disease consultant, KSA
[4]Nephrology team at MCC Al Madinah, KSA
[5]Internal medicine Department, Kasralainy Faculty of Medicine, Cairo University, Egypt.
[6]Critical Care Department, Kasralainy Faculty of Medicine, Cairo University, Egypt.

Abstract
We reported a case of 68-year-old female patient with hypertension and a previous history of spinal fixation four years ago. She was admitted to the ICU due to sepsis. She was presented with low back pain, sciatica in her left lower limb, saddle hypoesthesia, urine incontinence, and an inability to walk or stand. Three days before admission, she developed a fever. While reviewing the history of the present illness, repeated consumption of unpasteurized milk and cheese was reported. Blood culture results confirmed Brucella species, supported by a positive Rose Bengal test and tube agglutination test .MRI of the spine showed abnormal enhancement of the Cauda Equina. The patient received anti-Brucella treatment with gentamicin, rifampicin, and doxycycline for six months, resulting in an excellent response. After six months, laboratory data and radiological findings normalized, and the neurological signs completely resolved.
Keywords: Neurobrucellosis; Cauda equina syndrome; Fever

Hassan Mohammed Abdel RAHMAN MD, Associate Consultant of Infectious Disease, Madinah Cardiac Center, Al Madinah, KSA/Kafr El-Sheikh Fever Hospital, Egypt
dr.gobara22@gmail.com
0000-0002-7002-2550
19.07.2024
18.11.2024

Epub: 19.11.2024

Cite this article as: Rahman HMA, Alnashiwaty OM, Elsayed AA, Ahmed RM, Faris FM. Neurobrucellosis Cauda Equina Syndrome: Rare of Rarity. Mediterr J Infect Microb Antimicrob 2024;13:24246.22

Introduction

Brucellosis (also known as 'undulant fever,' 'Mediterranean fever,' or 'Malta fever') is the most common zoonosis worldwide and considered as an important public health problem in many resource-limited settings , it is transmitted to humans from infected animals (cattle, sheep, goats, camels, pigs, or other animals) by ingestion of food products (such as unpasteurized dairy products) or by contact with tissue or fluids. It is also by Inhalation of infected aerosolized particles ; so The microbiology laboratory should be notified if brucellosis is suspected, because the organism is a biohazard to laboratory personnel. [1-3]
It affects, approximately 500,000 cases worldwide annually [4] .The prevalence is in progression because of growing international tourism, trade, and migration [5,6].

Usual neurological symptoms resulting from involvement of both the central nervous system (CNS) and the peripheral nervous system (PNS) occur due to direct impact on the nervous system or indirectly due to toxic-febrile neurobrucellosis. These symptoms are reported in 3 to 12% of brucellosis cases in most large series [7-9].
Cauda equina syndrome—characterized by low back pain, sciatica, saddle hypoesthesia, lower extremity motor weakness, and bowel or bladder dysfunction—can be a rare and atypical manifestation of neurobrucellosis [10,11]. The incidence or prevalence of cauda equina syndrome associated with brucellosis cannot be determined as it is only published in case reports [12,13]. Despite the challenging diagnosis of cauda equina syndrome with brucellosis, successful antibiotic treatment has been reported in patients with stable neurological conditions, often without the need for surgical intervention.

Case Presentation

The reported case aged 68-year-old, Saudi hypertensive female, arrived at the emergency department. She fulfilled sepsis criteria. While reviewing the history of the present illness, she had a three-month history of back pain, anorexia, fatigue, nausea, and limited mobility due to sciatica and left leg pain. Three days prior, she developed intermittent fever, night sweats, and urine incontinence. The patient reported consuming unpasteurized milk and raw cheese frequently. Four years earlier, She underwent bilateral knee arthroplasty, laminectomy for lumbar disc prolapse, and decompression and fixation of L4-S1.
Examination revealed that, the patient appeared irritable and depressed, morbid obese (weight=103 Kg, height 158 cm, BMI= 41.3 kg/m^2), GCS= 15. The patient cannot stand up without assistance and she cannot easy walk due to severe pain primarily in her left lower limb. Her vital signs included a temperature of 38.3 °C, heart rate of 117 beats/min, blood pressure of 100/52 mmHg, and a respiratory rate of 26 breaths/min. Oxygen saturation was 92% on room air. Local tenderness over the lumbar and sacral vertebrae was noted, with no signs of meningeal irritation. Although the neurological examination was challenging, muscle tone and strength remained intact, along with preserved reflexes.
Upon examining the surgical site, there were no signs of cellulitis, purulent discharge, redness, or warmth.
Laboratory results revealed: white blood cell count: 13.2×10^3/mm, hemoglobin: 11.6 g/dL, platelet count: 354×10^3/mm, ESR: 90 mm/hour, CRP: 89.5 mg/L, alanine transaminase: 20 U/I, aspartate transaminase: 27 U/I, alkaline phosphatase: 88 U/I, gamma glutamic transferase: 102 U/I, total bilirubin: 0.89 mg/dl, direct bilirubin: 0.27 mg/dL, albumin: 2.86 g/L, total protein: 75 g/L, creatinine: 2.73 mg/dL; urea: 95 mg/dL. Lactate: 5.4 mmol/L, Na: 139 mEq/L, K: 4.5 mEq/L
ABG = PaO_2: 61 mmHg, $PaCO_2$: 49 mmHg, PH: 7.3, HCo3 : 17 mEq/L
APACHE II SCORE (on admission) = 16 points
SOFA SCORE (on admission) = 5 points with estimated mortality ≤ 33%
Patient after admission; dehydration and electrolytes were corrected and proper hydration done and her kidneys recovered
Brucella testing in serum was positive with 2 tests (Rose Bengal test and Tube agglutination test) the titer was 1/640 as per protocols. The requested MRI spine not done Because the patient was not cooperative , morbidly obese and sick ; at the beginning the clinical situation was not clear, the impression and provisional diagnosis is brucella spondylodiscitis especially positive results of brucella serology, epidemiological history and clinical presentation s/p lumbosacral decompression fixation 4 years ago. Two sets of blood cultures drawn as a part of septic work up which came later positive for Brucella species. Other serological tests (HBsAG, HCV-AB, HIV, RF, anti-CCP, ANA, and QuantiFERON) were negative, and urine examination was unremarkable.
She received a triple regimen: Doxycycline 100 mg twice daily, Rifampicin 600 mg orally daily, and Gentamycin 5 mg/kg intravenously once daily for 10 days, with proper monitoring to doses with trough and peak levels strictly and achieving clearance of bacteremia. The patient responded dramatically, and her fever subsided. She regained the ability to stand with support and began walking ,10 days later on treatment ; MRI lumbosacral done and revealed the following: The patient had undergone posterior laminectomy with internal fixation at L4, L5, and S1 levels, Mild retrolisthesis of L3 over L4 (grade I) and subsequent mild thecal sac compression was observed, and bilateral neural foraminal narrowing. At the L3-4 level, there was a central disk herniation extending into the superior vertebral endplate of L4, forming a small Schmorl's node. Subtle abnormal contrast enhancement of the cauda equina nerve roots was noted, with tethering at the L4 level. (Figure 1). Spondylodiscitis and mass effect were rulled out .
Additional imaging of the pelvis, left hip, and knee showed no significant abnormalities. The patient declined lumbar puncture. However, based on her clinical presentation, history of brucella endemicity in Saudi Arabia, consumption of raw milk and cheese, and positive blood cultures and serology tests, and finally MRI lumbosacral, the final diagnosis with neurobrucellosis complicated by bacteremia.
Echocardiography did not reveal any signs suggestive of endocarditis, and systemic workup ruled out other focal brucellosis.

After completing a 10-day course of Gentamicin the patient was discharged to the ward. The treatment plan included continuing with doxycycline and rifampicin for 6 months. The plan was to continue on the same regimen since the patient markedly improved clinically and bacteremia was cleared , However, two months later, Rifampicin was replaced with Ciprofloxacin (500 mg orally every 12 hours) due to elevated liver enzymes. The patient showed clinical improvement and was able to walk unsupported. After six months, all neurological signs improved, laboratory data and radiological findings resolved, and clinical signs completely resolved. The erythrocyte sedimentation rate (ESR) decreased to 30 mm/hour, C-reactive protein (CRP) decreased to 0.314 mg/L, and the brucella titer became negative. Repeated imaging revealed no evidence of infection or loosening of fixation screws, with no paraspinal soft tissue collection.

We obtained written consent from first-degree relative, including consent for publication. The patient understands that efforts will be made to conceal her identity.

Discussion

Brucellosis is a zoonotic disease that primarily affects animals and secondarily affects humans [14]. Occupational risks contribute to a higher incidence in men compared to women [15,16]. In cases of neurobrucellosis, bacterial invasion of the central nervous system leads to an inflammatory disorder characterized by the production of pro-inflammatory cytokines and increased matrix metalloproteinases (MMP) [17]. This inflammatory response also triggers the production of mitogen-activated protein kinases, specifically MMP-9 [18,19].

In this case, the primary challenge stemmed from the atypical presentation (neurobrucellosis in the form of cauda equina syndrome without concurrent spondylodiscitis nor cerebral affection), complicated by signs of sepsis and difficulties in obtaining a comprehensive medical history. Despite additional comorbidities such as obstructive sleep apnea and acute kidney injury, thorough investigations ruled out surgical site infection and disseminated infection. The patient responded favorably to appropriate antibiotic therapy and supportive measures in the intensive care unit, obviating the need for surgical intervention.

There is no consensus regarding the optimal antibiotic therapy and treatment duration for neurobrucellosis. However, early intensive therapy is recommended to prevent severe complications. Surgical intervention should be considered in cases of persistent or progressive neurological deficits resulting from nerve root or spinal cord compression [20].

Cauda Equina Syndrome is an exceptionally rare manifestation of spinal brucellosis, characterized by challenging early diagnosis due to non-specific symptoms [21]. However, by reviewing literature, we found few neurobrucellosis cases could be presented with Cauda Equina Syndrome.

Deepak Menon et al. (22), reported a 57-year-old man with a year-long severe backache and bladder symptoms showed hypotonia, weakness, and absent reflexes in his lower limbs. His MRI indicated cauda enhancement and exudates in the conus–epiconus area. Positive CSF led to treatment with ceftriaxone, rifampicin, doxycycline, and dexamethasone, resulting in significant improvement.

The second case described also by **Deepak Menon et al.** (22), a 27-year-old male with walking difficulties, bladder symptoms, and hearing loss had spasticity, pyramidal weakness, and sensory loss up to D10. Absent plantar and abdominal reflexes with bilateral sensorineural hearing loss were noted. MRI showed diffuse nerve root enhancement. Positive brucella IgG in serum and CSF were detected. Treatment with antibiotics and steroids, improves his condition.

The third case presented by **Fatemeh S. Mahdavi et al.** (23): A 29-year-old male with lower back pain and limb weakness for 50 days underwent plasma exchange for suspected Myelitis without improvement. Neuro-brucellosis was suspected due to dairy exposure. Positive 2ME, Wright, and Coombs Wright tests in serum and CSF confirmed the diagnosis. MRI showed cauda equina and nerve root enhancement. Electromyography suggested acute anterior horn cell disease or polyradiculopathy. Treatment included ceftriaxone, ciprofloxacin, and doxycycline. The patient was discharged with a continuation of injectable ceftriaxone and oral ciprofloxacin and doxycycline. Improvement was observed after one month.

Another interesting case was described by **Niloofar A. Yazdi et al. (24)**; a 61-year-old woman with severe paraparesis and ataxia was diagnosed with brucellosis after presenting with fever, chills, fatigue, back pain, and limb weakness. Despite initial treatment with Rifampin and Doxycycline, her neurological symptoms worsened. Methylprednisolone offered temporary relief but symptoms relapsed. Further tests confirmed brucellosis; Brain MRI demonstrated abnormal hyperintense lesions involving bilateral superior cerebellar peduncles and intramedullary hyperintense lesions throughout the cervical and thoracic cord. Radicular enhancement was also detected in the cauda equina. Extended treatment with Ceftriaxone, Rifampin, Doxycycline, Ciprofloxacin, and Prednisolone led to full recovery without neurological damage.

Moreover, **Afshar Etemadia et al. (25)** reported the case of a 55-year-old female with low back pain, paraparesis, and urinary retention showed leukocytosis, elevated ESR and CRP, but negative Brucella tests. MRI revealed L4–L5

vertebral inflammation and epidural abscesses. Post laminectomy and foraminotomy, Brucella was cultured from the abscess. A three-month antibiotic course with doxycycline and rifampicin resulted in a favorable outcome.

Conclusion

In the context of neurobrucellosis, Cauda Equina Syndrome is an exceptionally rare presentation. However, when identified promptly and managed optimally, medical treatment can effectively address this condition, particularly if no neurological deficits are present. By emphasizing early recognition and implementing appropriate therapeutic strategies, clinicians can mitigate the risk of serious complications and unnecessary surgical interventions.

Acknowledgement: none

Funding: none

Conflict of Interests: Authors declared no conflict of interest

References

1. G. Pappas , N. Akritidis , M.Bosilkovski et la. Brucellosis. N Engl J Med 2005; 352:2325.
2. WHO/CDS/EPR/2006.7. Brucellosis in humans and animals Geneva: World Health Organization, 2006.
3. **Centers for Disease Control (CDC) Brucellosis Reference Guide 2017.** https://www.cdc.gov/brucellosis/pdf/brucellosi-reference-guide.pdf (Accessed on May 23, 2019).
4. **RA Greenfield , DA Drevets ,LJ Machado LJ, et al.** Bacterial pathogens as biological weapons and agents of bioterrorism. Am J Med Sci 2002; 323:299.
5. **G. Pappas , P.Panagopoulou , L. Christou et al.** Brucella as a biological weapon. Cell Mol Life Sci 2006; 63:2229.
6. **M. Bosilkovski , M. Dimzova , K. Grozdanovski** . Natural history of brucellosis in an endemic region in different time periods. Acta Clin Croat 2009; 48:41.
7. **S. K. Yuksek , B. Gulhan , A.O. Parlakay A. et al**. A case of childhood Brucellosis with neurological involvement and epididymo-orchitis. J Infect Dev Ctries. 2014;8(12):1636-8.
8. **M.Tajdini, S. Akbarloo , SM. Hosseini et al**. From a simple chronic headache to neurobrucellosis: A case report. Med J Islam Repub Iran. 2014;28:12.
9. **FE Elzein, M. Mursi** . Brucella induced Guillain-Barré syndrome. Am J Trop Med Hyg. 2014;91(6):1179-80.
10. **G. Pappas, P. Papadimitriou , N. Akritidis et al** . The new global map of human brucellosis. Lancet Infect Dis 2006;6(2):91–9.
11. **VL Atluri, MN Xavier, MF De Jong et al.** Interactions of the human pathogenic Brucella species with their hosts. Annu Rev Microbiol 2011;65:523–41.
12. **Kaya O, Avşar K, Zeynep Akçam F.** Unusual manifestations of brucellosis. Arch Med Sci (2011); 7: 173-175.
13. **Jayakumar RV, Al-Aska AK, Subesinghe N et al.** Unusual presentation of culture positive brucellosis. Postgrad Med J (1988); 64: 118-120.
14. **MW Al-Sous, S. Bohlega , MZ Al-Kawi, et al.** Neurobrucellosis: clinical and neuroimaging correlation. AJNR Am J Neuroradiol 2004;25(3):395–401.
15. **N. Ceran, R. Turkoglu, I. Erdem, et al.** Neurobrucellosis: clinical, diagnostic, therapeutic features and outcome. Unusual clinical presentations in an endemic region. Braz J Infect Dis 2011;15(1):52–9.
    A. **Raptopoulou, AH. Karantanas, K. Poumboulidis, et al.** Brucellar spondylodiscitis: noncontiguous multifocal involvement of the cervical, thoracic, and lumbar spine. Clin Imaging 2006;30(3):214–7.
16. **PC Baldi , GH. Giambartolomei.** Immunopathology of Brucella infection. Recent Pat Antiinfect Drug Discov. 2013;8(1):18-26.
17. **MC. Miraglia, R. Scian, CG Samartino et al.** Brucella abortus induces TNF-α-dependent astroglial MMP-9 secretion through mitogen-activated protein kinases. J Neuroinflammation. 2013;10:47.
18. **C. G. Samartino , MV Delpino, C. P. Godoy C et al.** Brucella abortus induces the secretion of pro-inflammatory mediators from glial cells leading to astrocyte apoptosis. Am J Pathol. 2010;176(3):1323-38.
19. **M Bahemuka, A Rahman Shemena, C P Panayiotopoulos et al.** Neurological syndromes of brucellosis. Journal of Neurology, Neurosurgery, and Psychiatry 1988;51:1017-1021.
20. **R.V. Jayakumar, A.K. Al-Aska, N. Subesinghe et al.** Unusual presentation of culture positive brucellosis. Postgraduate Medical Journal (1988) 64, 118-120.
21. **M. Deepak, V. Nibu , N.Siddaiah et al.** An Unusual Cause for Cauda Equina and Spastic Paraparesis: Two Cases of Brucellar Arachnoiditis without Spondylodiscitis or Constitutional Symptoms. Annals of Indian Academy of Neurology; Volume 25; Issue 6: 2022.

22. **S. Fatemeh, A. Nahid , M. Atossa** . Lumbosacral polyradiculitis associated with brucellosis. ID cases; Volume 23, 2021.
23. **A.Niloofar Yazdi, M.Najme-sadat , A. Samira , et al.** Diffuse Neurobrucellosis of Cerebellum, Brainstem, Spinal Cord, and Cauda Equina: A case report and Literature review. J Radiol Case Rep. 2022 May; 16(5): 1–9.
24. **E. Afshar , M. Rezvan , B. Saeed** . Cauda equnia syndrome due to Brucella spondylodiscitis and epidural abscess formation: A case report. Interdisciplinary Neurosurgery 17 (2019) 42–44.