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Manifestation of Brucella infection post an accident: A case report

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Abstract

Brucellosis is an endemic infection in Iran, affecting different parts of human body. However, less attention has been paid to accidental injuries among rural inhabitants. Here, we report a rare case of Brucella melitensis infection on a left leg wound following a tibia surgery caused by an accident over 13 years. Therefore, in brucellosis endemic countries, Brucella spp. should be considered as one of the possible causes of further infections as accident consequences. The data highlights the importance of the accurate and on-time identification of an infection cause before prescribingany antibiotics.

Keywords: Brucella; Tissue infection; Tibia surgery; Accidental exposure; Case report; Rural lifestyle.

Introduction

Brucellosis caused by Brucella, is one of the most common zoo noses infections, however, it is neglected. This Gram-negative bacterium primarily targets animals. However, humans are predominantly infected by this bacterium through contact with the blood and tissue of an infected animal or the use of unpasteurized animals [1,2]. It has been demonstrated that different occupational-related groups are at a high risk of the disease including veterinarians, abattoirs, hunters, laboratory staff, and rural workers. The main risk factors mostly include direct exposure to animal fluids, insufficient usage of personal protective equipment, and lack of biosafety standards knowledge [3,4]. Therefore, individuals who are involved in high-risk jobs, need to have been informed about such opportunistic infections in terms of any accidental exposures and thus prevention of any probable infective progress.

We report *Brucellamelitensis (B.melitensis)* infection development on a wound following a tibia surgery caused by an accident. The report emphasizes the urgent need to consider *brucellosis* as one of the possible causes of further infections as accident consequences, especially in rural populations.

Case presentation

Here by, we present a 42-year-old man with an infected wound on the left leg as a consequence of an accident with a vehicle happened in 2005 (Figure 1). The accident led to a broken tibia and the patient went through surgery and the injured tibia was replaced with prosthetics. Antibiotics were prescribed

by the specialist though with no specific test to explore the cause of the infection. The patient presented himself to thein order to figure out the cause of his infection and relieve the stress which has endured for years.

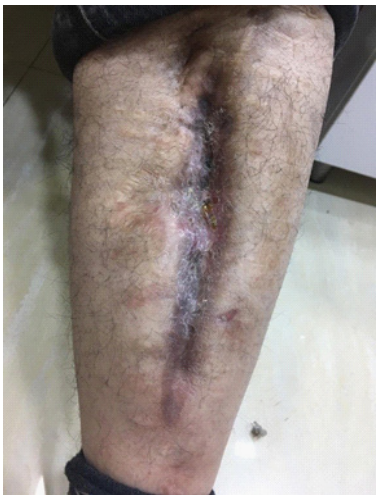

Figure 1: The infection caused by *Brucella melitensis* on the left leg of the patient with the scar from the car injury. This image was taken at the time of referring to the laboratory.

The patient's history was carefully investigated by the experts. The firstly noticed data was his occupation in animal husbandry. In fact, he lives in a town in the province of Tehran called Pishva which is traditionally surrounded by farmlands. Therefore, he has been consuming raw dairy products routinely.

Unfortunately, he was not able to recall the names of the antibiotics, nevertheless, they were insufficient to cure the incident. Thus, the wound has not healed since the accident and the infection has persisted so far. Furthermore, there was a small amount of discharged fluid from the wound.

As the background of the case was taken to attention and according to the fact that brucellosis is an endemic zoonotic infection in Iran [5], the presence of existing organism causing the infection and also determination of its specie was aimed through a range of tests with confidence the organism of interest.

To begin with, the wound secretions were directly cultured on blood agar, chocolate agar, and McConkey agar for 72 hours in an incubator at 35°C. Meanwhile, the wound secretions were extracted and enriched in the environment of BacT/ALERT® (BioMérieux company) PF to identify the existence of any bacterium as well.

After 84 hours of growth in the BacT/Alert® PF plus bottle using Bact/Alert® 3D (BioMérieux company), the fluid in this environment was used to culture on blood agar, chocolate agar, and McConckey agar again. Moreover, the fluid extracted from the BacT/Alert® bottle after 84 hours of growth was put through Vitek®2 (Bio Mérieuxcompany).

At the next step, the serological tests were applied to the patient such as Brucella capture (vircell), Wright, Coombs Wright, and 2ME. Initially, there was no growth on any of the agars (blood agar, chocolate agar, and McConckey agar) cultured directly from the wound secretions of the patient; after 72 hours of incubation at 35°C. Meanwhile, the BacT/Alert® 3D signaled a positive bacterial growth after 84 hours of growth from the PF plus bottle. Furthermore, the Vitek®2 identified B.melitensis from the fluid used in BacT/Alert® PF plus bottle. The further sub-culturing of the BacT/Alert® PF plus bottle's fluid on blood agar, chocolate agar, and McConckey agar supported the presence of a bacterium similar to Brucella's characteristics. On McConckey agar, there was no culture growth, however, on both blood agar and chocolate agar, growth was detected. The morphology of these cultures were as small white colonieson blood agar and chocolate agar and they appeared as coccobacilli under a light microscope. The Gram staining of these cultures indicated a Gram-negative bacterium and finally B.melitensis was identified which was in accordance with the serological test results. These tests were Brucella capture, Wright, Coombs Wright, and 2ME. Brucella capture, Wright, Coombs Wright, and 2ME titer results for this patient were 1/640, 1/320, 1/320, and 1/320, respectively.

Nevertheless, the route of the infection remains unclear-which probably occurred through unpasteurized dairy product consumption, contact with animal blood and tissue, or less probably,a hospital-acquired infection. Aerosol procedures like aspiration can be a way of transmitting this disease in hospital environments [6]. What is certain is that the patient must have been tested for a variety of pathogens which may cause such symptoms according to his living area. The given antibiotics had not been specific as no suspicion to Brucella spp. had been considered. This negligent treatment has led to a prolonged and painful manifestation of the case. He was also advised to amputate the affected leg.

Not only has he suffered a long time, but also he has possibly transmitted Brucella to other in-touch people. In the end, the infectious specialist provided him with specific antibiotics against Brucella which resulted in a partial improvement within 7 months. However, the patient gave up the treatment and therefore the wound did not heal completely.

Discussion

A review of laboratory-acquired brucellosis demonstrated that only 11% of infections were caused by laboratory accidents, however, 88% of the cases got infected due to aerosolization of the bacterium during its identification process [7]. With early detection of the cause of an infection, laboratory and hospital workers can handle such cases with more care and scrutiny. A series of tests mentioned in the methodology immediately after exposure can pin down the bacterium causing the infection. Thus, the chance of transmission to health care workers, laboratory workers, and other patients would be less. This case also shows the significance of bacterium identification before prescribing antibiotics. The patient could have been saved from an insufferable treatment by these simple tests and even an emergence of potential bacterial resistance.

In this experiment, the patient was evaluated serologically through his wound secretions to ensure the presence of this bacterium. The direct culturing of the secretions on blood agar, chocolate agar, and McCockey agar did not result in any growth. This could stem from antibiotic consumption by the patient or the lack of strength of the bacterium growing in these environments. Thus, this method is not reliable as the only way of assessment. The use of BacT/Alert® PF plus bottles with beads to neutralize antimicrobials can facilitate growth [8]. Hence, the

secretions extracted from the wound were used in this bottle. Interestingly, the BacT/ALERT® Media Culture's recommendation is the use of blood. Nonetheless, in this case, the extracted secretions from the wound were investigated considering that the bacterial population in the blood might be low and non-detectable. The neutralization of antimicrobials and an environment fit for facultative microbes of the BacT/Alert® PF plus bottle can explain the success of this method [9]. The application of PF plus bottle can also explain the reason that the sub-culturing of the fluid inside this bottle had a growth on blood agar and chocolate agar. What is more, neutralizing the antimicrobials and an environment to strengthen the bacterium in this bottle could add to this result.

According to Lowe et al., Brucella spp. would grow on blood agar and chocolate agar but not on McConckey agar as its characteristic [6]. This fact was also seen in our results as well.

Vitek®2 successfully detected the presence of B.melitensis from PF plus bottle fluid. The antibody titer of the patient was also another way to ensure our findings and the history given by the patient. Agglutination titer more than or equal to 1:160 can be defined as brucellosis [10]. As stated in the results, Brucella capture, Wright, Coombs Wright, and 2ME were above this number. This indicates brucellosis for the patient.

The laboratory found the cause of his infection by the mentioned tests and the results were shared with the patient and he immediately started treatment for brucellosis. Unfortunately, he gave up his treatment after some months, and therefore the wound did not heal. His poor drug compliance can be due to the long treatment process of over 13 years. It goes without saying that early detection would provide him with a better treatment.

According to the obtained data of the presented case, we strongly recommend that patients with infected wounds must be immediately tested for the determination of the agent causing the infection. Otherwise, the infection may cause resistance to antibiotics, prolonged treatments, and the possibility of transmitting infectious diseases to health care workers and other patients in a hospital setting. Furthermore, treatment with random antibiotics which do not target the bacterium causing the infection must be taken to the attention which may lead to increased bacterial resistance and also a prolonged treatment process. Mean while, the health staff's insufficient knowledge about this matter may expand the disease throughout the hospital or laboratory.

Declarations

Ethics approval and consent to participate: This study was approved by Iranian society for support patients with infectious diseases.The patient gave informed consent for both sampling and for participating in the survey/ questionnaire.

Consent for publication: Written informed consent for publication from the patient was obtained.

Availability of data and materials: All data generated during this study are available from the corresponding author up on reasonable request.

Disclosure statement: The authors declare that they have no competing interests.

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Authors' contributions: AHN designed the study and interpreted the data. SN and MJ collected the sample, interviewed the patient, and conducted diagnosis tests. MSL wrote the first draft of manuscript. FA reviewed and finalized the manuscript. AR visited the patient and reviewed/edited the manuscript. All authors have read and approved the manuscript.

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