Case Report

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Misidentification of *Brucella melitensis* as *Bergeyella zoohelcum* by MicroScan WalkAway®: A Case Report

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Key Words
Misidentification · *Brucella melitensis* · *Bergeyella zoohelcum* · MicroScan · Brucellosis

Abstract
Objective: To describe the misidentification of *Brucella melitensis* as *Bergeyella zoohelcum* by MicroScan WalkAway®, a commonly used bacterial identification system. ***Clinical Presentation and Intervention:*** A 35-year-old man was admitted to the Intensive Care Unit with sepsis syndrome. Three sets of aerobic blood culture samples were positive after 48 h of incubation. The isolated organism was identified as *B. zoohelcum* using the MicroScan WalkAway (Siemens Healthcare Diagnostics Inc., West Sacramento, Calif., USA). However, due to the rareness of the pathogen, the isolate was reidentified as *B. melitensis* with Vitek® 2 system and later 16S ribosomal sequence analysis confirmed the isolate as *B. melitensis* having 100% match. ***Conclusion:*** This case showed that *Brucella* can be misidentified using MicroScan WalkAway. Countries where brucellosis is endemic need to be careful while using such automated identification systems in order not to miss the diagnosis of *Brucella*.

Introduction

Brucella is an endemic pathogen in many Middle Eastern countries that include United Arab Emirates, Saudi Arabia, Oman and Kuwait [1, 2]. Its potential as an agent of bioterrorism has also been established. It is therefore essential that all laboratories be able to identify this pathogen accurately and rapidly. The confirmative diagnosis of brucellosis is made by isolation of the pathogen from blood, bone marrow, or other tissues/fluids. For diagnostic purposes automated blood culture systems (e.g. BACTEC or BacT/ALERT) [3] and identification systems (e.g. Vitek 2 or MicroScan WalkAway) are widely being used in laboratories around the world. In the past, *Brucella* had been misidentified as *Moraxella phenylpyruvica* by API 20NE system [4], *Ochrobactrum anthropi* by API 20NE system [5] and RapID NF Plus system [6], as *Haemophilus influenzae* biotype IV and *Moraxella* species with use of MicroScan panels [4].

Here, we report a case of misidentification of *Brucella melitensis* as *Bergeyella zoohelcum* using MicroScan WalkAway® system.

Case Report

A 35-year-old critically ill man was admitted to the intensive care unit of Al-Qassimi Hospital, a tertiary referral health care facility in Sharjah, United Arab Emirates, with a working diagnosis of sepsis syndrome, hepatitis and thrombocytopenia. The pa-

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tient had fever, hypotension, sinus bradycardia, bilateral pleural effusion and ascites. In addition to blood product transfusion and treatment of shock, he was also started on intravenous amikacin 500 mg once daily. Three sets of aerobic blood culture specimens were positive after 48 h of incubation for the presence of microorganisms by automated microbial detection system (BacT/ALERT® 3D system, bioMérieux, Durham, N.C., USA). The isolated organism was a tiny Gram-negative coccobacillus that gave positive catalase and oxidase test. The organism was identified as *B. zoohelcum* by the MicroScan WalkAway (Siemens Healthcare Diagnostics Inc., West Sacramento, Calif., USA) system using MicroScan NegCombo Type 44 panel with a 64% probability. Based on the blood culture reports the sepsis was attributed to *B. zoohelcum* and ciprofloxacin 750 mg every 12 h was added to the regimen.

However, due to the rareness of the pathogen, the isolate was re-identified using Vitek® 2 system (bioMérieux, Inc., Durham, N.C., USA) Gram-negative card as *B. melitensis* with a 99% probability. Subsequently, the isolate was referred for 16S ribosomal sequence analysis. The isolate was identified as *B. melitensis* with 100% match. The patient's serum was also positive for presence of *Brucella* antibody by *Brucella* microagglutination test with a titer of 1:640. Further detailed history revealed that the patient had close contact with dogs kept as pets in his home and goats in his farm. The patient's hepatitis profile and HIV antibody status were negative.

Discussion

Accurate and rapid identification of *Brucella* spp. is necessary to provide appropriate treatment to the affected individual and take necessary measures to prevent laboratory-acquired infections [7]. In this case, a *Brucella* isolate was picked up by the BACTEC system from blood within 48 h; however, the isolate was misidentified as *B. zoohelcum* by MicroScan WalkAway. In recent times, automated microbial detection systems like BACTEC 9240 and BacT/ALERT have increased the speed, effectiveness and reliability of *Brucella* isolation from clinical specimens [3]. However, identification of *Brucella* species using commercial rapid identification systems has remained inconsistent and challenging [4–6, 8]. This might be due to several reasons including relative biochemical inactivity of the pathogen, failure to incorporate identifying characteristics of *Brucella* species into their databases and lack of suitable panels for its accurate identification [9].

In our case, the isolate was reidentified as *B. melitensis* by the Vitek 2 system and later confirmed by 16S rRNA analysis with a match of 100%. The patient's serum was also positive for *Brucella* antibody using the *Brucella* microagglutination test having a titer of 1:640. This showed that the diagnosis of human brucellosis can be challenging and laboratories should use a range of tests including molecular techniques to reach a confirmative etiological diagnosis [8].

Because brucellosis is prevalent in the Middle East, to our knowledge, most laboratories in this region use automated microbial detection and identification systems in their setups and MicroScan WalkAway remains a very popular choice. However, the MicroScan WalkAway system (Siemens Healthcare Diagnostics Inc.) can misidentify *Brucella* species as some other pathogen like *B. zoohelcum* in our case. We believe that such identification ambiguity can create uncertainties surrounding the use of bacterial identification systems for identifying *Brucella* during routine laboratory testing. Because of this inappropriate identification of *Brucella* species by various commercial rapid identification systems, the sentinel laboratory guidelines for suspected agents of bioterrorism prepared by the American Society of Microbiology do not recommend the use of commercial identification systems for *Brucella* identification [10].

Misidentification of *Brucella* spp. in the laboratory does carry a high risk of laboratory-acquired infections [7] due to aerosol generation and exposure among the laboratory personnel. In order to avoid such incidents in our laboratories, we suggest that whenever a Gram-negative coccobacillus is isolated from blood and bone marrow cultures, the laboratory staff should inform the laboratory director and further handling of the pathogen should be carried out in the biosafety cabinet to perform catalase, oxidase and slide agglutination tests. The confirmatory tests should be performed in a biosafety level 3 reference laboratory instead.

Conclusion

This case showed that *Brucella* was misidentified as *B. zoohelcum* by the MicroScan WalkAway system. This can result in inaccurate identification of the true pathogen and inappropriate treatment of the patient. Laboratories using MicroScan WalkAway systems need to be careful enough not to miss the diagnosis of *Brucella* till the deficits of the system are addressed.

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