Misidentification of *Candida parapsilosis* as *C famata* in a Clinical Case of Vertebral Osteomyelitis

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Abstract: A case of vertebral osteomyelitis involving misidentification of *Candida parapsilosis* as *C famata* by the VITEK 2 compact is described. Species-specific primers were used in the polymerase chain reaction to correctly identify the clinical isolate. When uncommon species of *Candida* are reported using automated systems, heightened clinical suspicion is warranted.

Key Indexing Terms: *Candida parapsilosis*; Vertebral osteomyelitis; *Candida famata*. **[Am J Med Sci 2011;341(1):71–73.]**

Candida species are the fourth most commonly isolated pathogen in nosocomial blood stream infections in the United States.[1] Although *Candida albicans* remains the most commonly isolated species, infections with non-*albicans Candida* sp. are occurring at increasing rates.[2] Because differences in pathogenicity and susceptibility to antifungal agents are species specific, timely and accurate differentiation of *Candida* sp. is necessary to determine appropriate therapy. Commercially available automated systems for rapid identification of *Candida*, such as the VITEK 2 YST, have become useful tools for clinicians worldwide. The VITEK 2system (BioMérieux, Durham, NC) uses a colorimetric identification card (YST) that compares biochemical reaction patterns with a proprietary database to differentiate yeast species. Although accurate for commonly isolated yeasts in clinical laboratories, misidentifications of infrequent pathogens by this system have been reported.[3,4] We describe a case of vertebral osteomyelitis from *C parapsilosis* that was initially misidentified as *C famata* by the VITEK 2 compact.

CASE REPORTS

A 72-year-old man with coronary artery disease, Parkinson disease and diabetes presented to the Emergency Department with progressively worsening low back pain over 3 weeks. Surgical history included a nonemergent laparoscopic cholecystectomy 6 weeks before presentation and an indwelling catheter placement for long-term vascular access 5 months before the start of symptoms. The patient underwent catheter placement at a community hospital after refusing peripheral intravenous access.

Physical examination revealed pain with flexion and extension of the lumbar spine but no neurological deficits. Inspection of the catheter site and abdominal scars showed no signs of infection. Laboratory tests showed mild anemia (hemoglobin, 11.6 g/dL), hypoalbuminemia (albumin, 2.8 g/dL) and an increased erythrocyte sedimentation rate (62 mm/hr). Magnetic resonance imaging of the lumbar spine revealed extensive discitis at the L2–L3 interspace with collapse and posterior compression of the cauda equina (Figure 1A).

The patient was admitted and given empiric antimicrobial therapy with vancomycin and levofloxacin. Intervention by Radiology Department attempted L2–L3 disc space aspiration on the second day of admission. No organisms were identified by hematoxylin and eosin, or periodic-acid Schiff stain of the specimen and routine cultures revealed no growth at 48 hours. On day 4 of hospitalization, Neurosurgery Department performed a second percutaneous aspiration of the L2–L3 vertebral interspace. Histological examination of the second specimen also revealed no organisms; however, the blood agar plate of the first specimen now exhibited light growth. Gram staining revealed budding yeast subsequently identified as *C famata* by the VITEK 2 compact. On day 6 of admission, the blood agar plate from the second aspiration grew yeast identified as *C parapsilosis*. Blood and urine cultures obtained at admission remained sterile. Fungal and mycobacterial cultures were not ordered on either aspirate.

The Department of Infectious Diseases was consulted after the identification of 2 separate yeasts from presumably sterile sites. Despite lack of antifungal therapy, the patient was in significantly less pain and ambulating with minimal difficulty. Considering the patient's clinical improvement, the consultants expressed concern that antibiotic administration before the procedure had hindered growth of the true pathogens. They did not feel his current antibiotics could be safely discontinued and were hesitant to add an antifungal to his regimen. Given the presumed rarity of either *Candida* sp. as pathogens in osteomyelitis, the 2 *Candida* isolates were discounted as contaminants. The consultants recommended removal of the chemo port, placement of a peripherally inserted central catheter and a prolonged course of vancomycin and levofloxacin. The patient refused removal of his intravascular catheter, stating he wanted a second opinion. He was subsequently discharged to continue vancomycin and levofloxacin at home.

Approximately 1 month after discharge, the patient experienced recurrence of his low back pain. Repeat magnetic resonance imaging revealed progressive destruction of the L2–L3 interspace (Figure 1B). The patient was admitted and started on intravenous fluconazole in addition to his antibacterial regimen. Open debridement and intervertebral body fusion of the L2–L3 disc space was performed. Intraoperative biopsy revealed numerous fungal organisms consistent with *Candida* sp. on Gömöri methenamine silver stain, which was identified as *C parapsilosis* using the VITEK 2 compact. Vancomycin and levofloxacin were discontinued, and the patient was changed to oral fluconazole. Transthoracic echocardiogram showed no evidence of valvular vegetations or dysfunction, and the patient at this time agreed to removal of his longstanding vascular catheter. Twelve months after discharge, the patient remained on fluconazole and was ambulating without pain or difficulty.

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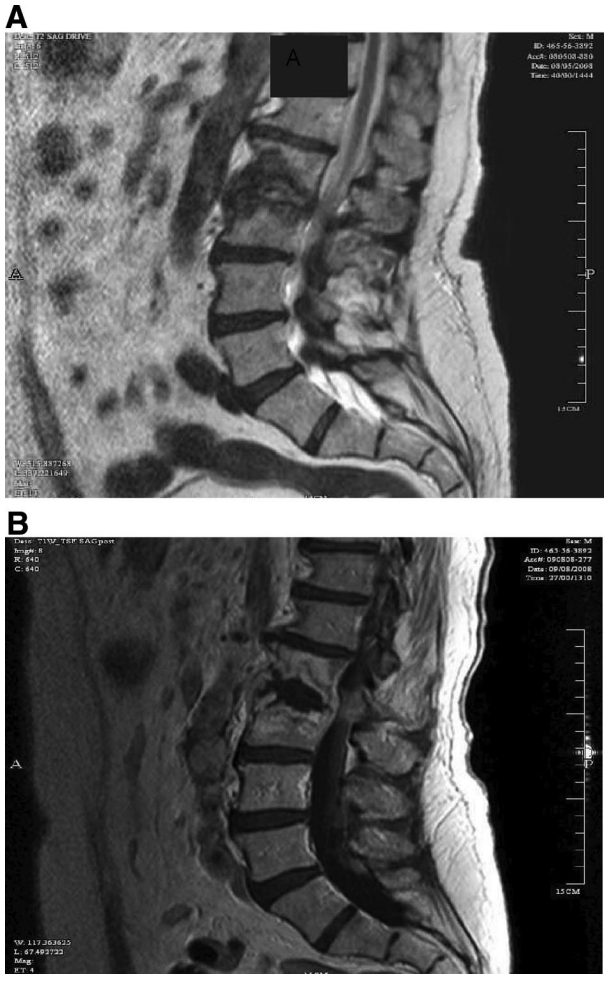

FIGURE 1. Magnetic resonance image of lumbosacral spine in the patient with vertebral osteomyelitis. (A) Extensive disc degeneration with involvement of vertebral bodies at L2–L3 interspace. (B) Progression of L2–L3 vertebral osteomyelitis with complete obliteration of intervertebral disc and posterior displacement of cauda equina.

METHODS

The *C parapsilosis* and *C famata* isolates from the first hospitalization were obtained from the clinical laboratory. Species-specific oligonucleotide primers for *C parapsilosis*[5] and *C famata*[6] were used to amplify rRNA genes by polymerase chain reaction using cycling reactions described for each species. For *C parapsilosis* forward and reverse primer sequences were 5′-GGCGGAGTATAAACTAATGGATAG-3′ and 5′-TCCTCCGCTTATTGATATGC-3′. Forward and reverse primers for *C famata* were 5′-TCCTTCTTGGTTGGGTTCCT-3′ and 5′-GGTCCCAACAGCTATGCTCT-3′. No amplification occurred with *C famata* primers; however, both isolates produced amplification products with *C parapsilosis* primers (Figure 2). The automated VITEK 2 identification system initially identified the true pathogen, *C parapsilosis*, as *C famata* based on biochemical assays and carbohydrate fermentation patterns. In this case, the initial isolates differed by tests for 2 carbohydrates (D-raffinose and gentiobiose), which was insufficient to distinguish them as distinct species.

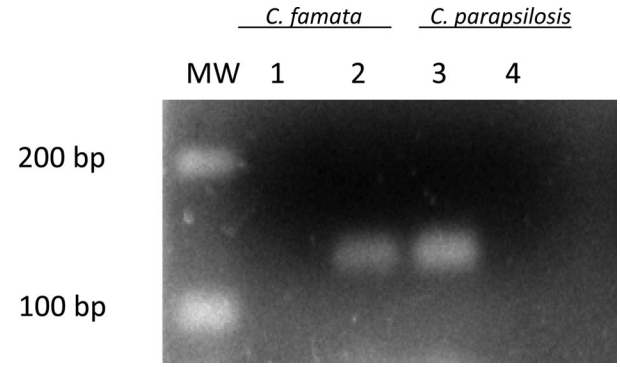

FIGURE 2. Agarose gel electrophoresis of polymerase chain reaction products. Lanes: MW, molecular weight standards; Target DNA: lanes 1, 2, *C famata*; lanes 3, 4, *C parapsilosis*; Primers used: 1, *C famata*; 2, *C parapsilosis*; 3, *C parapsilosis*; 4, *C famata*.

DISCUSSION

When compared with genetic methods of identification, the VITEK 2 maintains a sensitivity and specificity greater than 95% for commonly isolated yeasts from clinical specimens.[3,4,7] However, difficulties in distinguishing species with similar metabolic profiles are known to occur. Two recent comparative studies reported the misidentification of *C parapsilosis* as *C famata*.[3,4] One study estimates the VITEK 2 YST has an accuracy as low as 71.7% for *C parapsilosis*; however, assessing the morphologic features on cornmeal agar plates improved identification of this yeast to 93.3%.[4] The overall clinical impact of this low discriminatory power has not been determined; however, as we report in this case, it is potentially quite profound. Routine use of supplemental identification tests, including polymerase chain reaction with species-specific primers, should be considered when uncommon yeasts are identified from clinical sources.

Candida sp. represent an uncommon cause of vertebral osteomyelitis[8]; however, widespread use of intravascular catheters and broad-spectrum antibiotics have resulted in increasing numbers of hematogenous infections with these organisms.[9] As with other forms of invasive candidiasis, *C albicans* is isolated in more than half of the reported cases of vertebral osteomyelitis caused by *Candida* sp.[9] Historically, *C parapsilosis* has been a rare cause of vertebral osteomyelitis, with only 4 previously reported cases.[10–12] However, *C parapsilosis* is increasingly isolated in catheter-related bloodstream infections.[13,14] Given that spinal osteomyelitis usually results from hematogenous spread of pathogens, the frequency of *C parapsilosis* vertebral osteomyelitis should be expected to increase as well.

C famata (teleomorph *Debaryomyces hansenii*) is uncommonly isolated in catheter-related bloodstream infections.[15] Misidentifications of *C guilliermondii* as *C famata* frequently occur with phenotypic methods, including the VITEK 2 YST.[4,6,17] Morphologic features can distinguish *C famata* from *C guilliermondii* and from *C parapsilosis*; however, these differences can be variable, and recognition requires considerable expertise.[4,6] Although *C parapsilosis* and *C famata* are generally susceptible to fluconazole,[14,16] both species exhibit increased minimal inhibitory concentrations of currently uncertain clinical significance to echinocandins.[14,17] In contrast, *C guilliermondii* exhibits *in vitro* resistance to fluconazole, echinocandins and amphotericin but remains susceptible to the newer triazoles.[16,17] Given the differences in

antifungal susceptibilities, clinical microbiology laboratories should consider implementing molecular methods to confirm phenotypic identification of *C famata*.

In summary, we report a case of lumbar spine osteomyelitis with *C parapsilosis* that was originally misidentified as *C famata* by the VITEK 2 YST. This misidentification resulted in a delay of recognizing the correct pathogen and subsequent appropriate therapy for this serious infection. Misidentification of fungal species with the VITEK 2 YST is infrequent with commonly isolated clinical yeasts but may lead to poor clinical outcomes in those instances where isolates of vastly different pathogenic potential are mistaken. Clinicians and microbiologists should be aware of the pitfalls of automated identification systems and have heightened suspicion when uncommon fungal pathogens are reported.

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