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Case Report

Resolution of concomitant *Achromobacter xylosoxidans* burn wound infection without adjustment of antimicrobial therapy

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ABSTRACT

Achromobacter xylosoxidans is part of an emerging group of Gram negative bacterial infections with potentially severe sequelae, especially in the immunocompromised population such as burn patients. While antimicrobial therapy for patients with *A. xylosoxidans* bacteremia has been reported, the literature is scarce with regard to treatment in patients with positive tissue cultures only. Herein, we report our institution's experience with such a case and a brief review of the current literature on this micro-organism in the setting of non-bacteremic infection.

KEY WORDS

Achromobacter xylosoxidans; alcaligenes xylosoxidans; burn; tissue culture

INTRODUCTION

Achromobacter xylosoxidans (also known as *Alcaligenes xylosoxidans*) is one of a group of emerging Gram-negative bacterial infections that has recently been described in the patient population with burns.[1] It is an opportunistic pathogen that is frequently found in aqueous environments such as respirators, incubators and disinfectant solutions,[2] and has also been reported to have significant pathogenicity and mortality in patients with major co-morbidities, especially in the hospital setting.[3] Much of the literature however, is focused on *A. xylosoxidans* bacteremia[4] rather than wound infection per se and questions remain as to whether such cases should be specifically treated. This article reports our institution's experience with non-targeted antimicrobial treatment for a patient who had intra-operative tissue cultures positive for *A. xylosoxidans* but was not bacteremic.

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CASE REPORT

A 46-year-old woman with poorly controlled seizures sustained extensive thermal burns amounting to 41.5% of the total body surface area from an overturned kettle. After initial resuscitation, she was admitted to the intensive care unit and commenced on empiric antibiotic coverage with penicillin, cloxacillin and gentamicin. Subsequently, she underwent multiple, repeat surgeries for burns excision and staged, free and cadaveric skin grafting. Her course of stay was prolonged due to the repeated breakdown of cadaveric grafts as well as the failure of autologous grafts to take in the presence of various documented wound infections such as *Escherichia coli*, multi-resistant *Acinetobacter baumannii* (MRAB), *Enterococcus, Klebsiella* and MRAB

bacteremia [Table 1]. Using Vitek 2 (bioMérieux, Inc., Durham, NC) *A. xylosoxidans* was isolated from intra-operative tissue cultures separately on two occasions and antibiogram results [Table 2] reported sensitivities to trimethoprim-sulfamethaxazole and piperacillin/tazobactam. Antibiotic regimes, however, were not specifically adjusted to target *A. xylosoxidans*. Further cultures were negative for *A. xylosoxidans* and the patient

Table 1: Time course of events Open and closed arrows indicate period of antibiotic usage (e.g. From 4 to 19 December inclusive, caspofungin was used). CVC = central venous catheter, MRAB = multi-drug resistant *Acenitobacter baumannii*

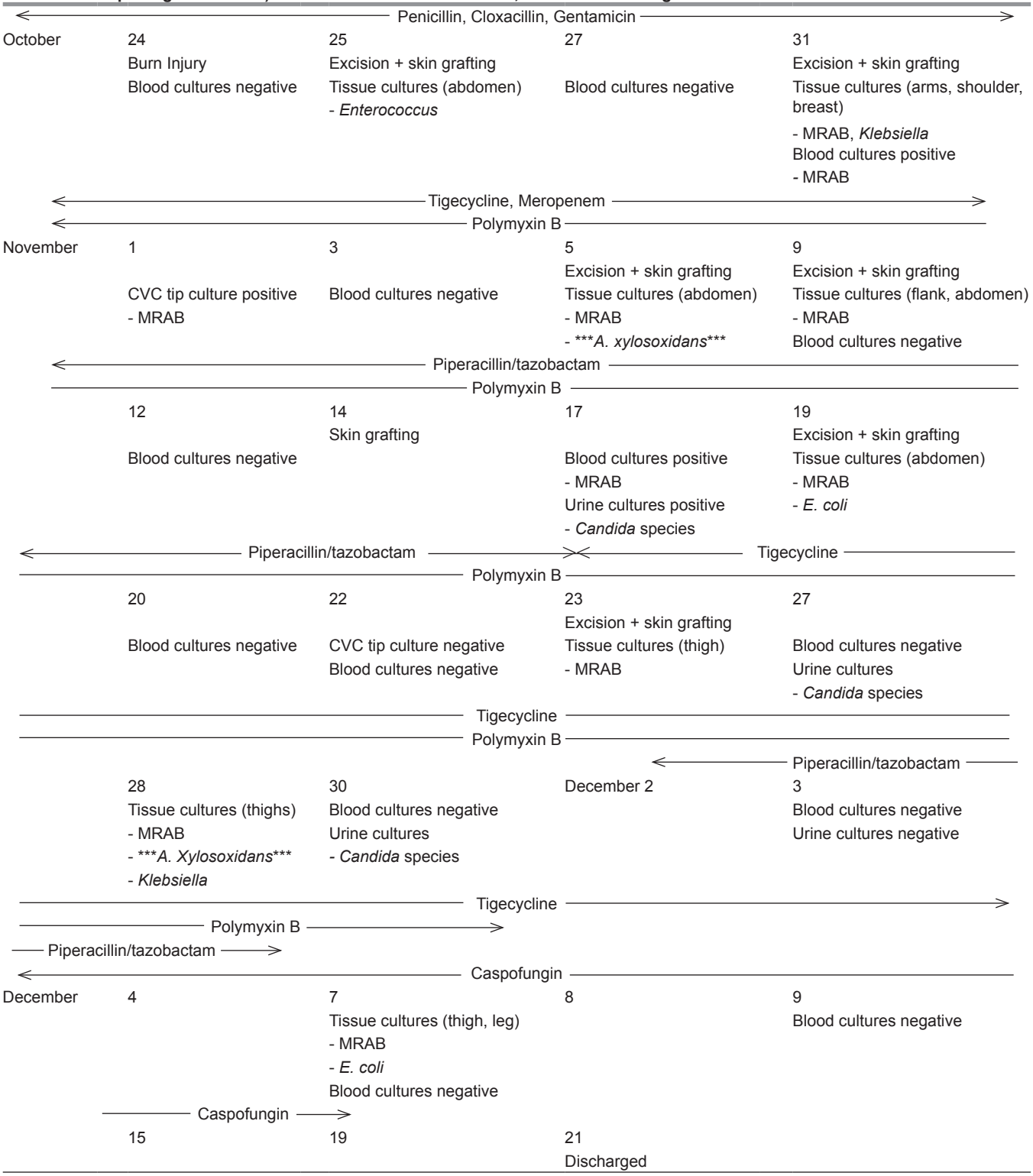

Table 2: Antibiogram results for *Achromobacter xylosoxidans*

	5 November 2012	28 November 2012
Amoxicillin/clavulanic acid	Sensitive	Not tested
Ceftriaxone	Resistant	Not tested
Amikacin	Resistant	Resistant
Gentamicin	Resistant	Resistant
Ciprofloxacin	Resistant	Resistant
Co-trimoxazole	Sensitive	Sensitive
Piperacillin/tazobactam	Not tested	Sensitive

was discharged after almost two months of inpatient stay and treatment. She is being followed-up in the outpatient setting and has been doing well.

DISCUSSION

A. xylosoxidans is one of several emerging infections in burn patients,[1] but is especially pertinent in view of reports of epidemiological outbreaks in burn units.[5] Moreover, burn patients are at increased risk of infection by *A. xylosoxidans* due to the resultant compromised immune system and consequent risk of bacteremia and attendant sequelae. The literature, however, is scarce with regard to its pathogenicity in the setting of negative blood cultures, and the clinical decision to tailor antimicrobial therapy remains a difficult one.

Brief literature review on non-bacteremic *A. Xylosoxidans* infections

Eshwara *et al*.[6] reported their experience with such a case by continuing with levofloxacin and cefotaxime that were chosen initially for empirical antibiotic coverage prior to antibiogram results in a patient with local wound infection of the breast which had metastatic ductal carcinoma. Although the choice of antibiotic regime and eventual wound culture sensitivities were concordant, their patient unfortunately met with demise due to septic shock. This led the authors to conclude that the presence of *A. xylosoxidans* infections despite sterile blood cultures should not be underestimated but they made no mention of whether it should be specifically treated as such. D'amato *et al*.[7] also described a case of non-bacteremic *A. xylosoxidans* meningitis following a gun-shot wound that was treated successfully with intravenous antibiotics (nafcillin/ceftazidime/gentamicin → trimethoprim-sulfamethaxazole /ceftazidime/gentamicin → ceftazidime).

These cases raise several questions. First, the absence of documented *A. xylosoxidans* in the bloodstream may not provide sufficient evidence to allow for non-treatment as demonstrated by the previous two cases. Second, antibiogram results may not be sufficiently reliable for efficacious therapy should the clinical decision be made for treatment. While Gómez-Cerezo *et al*.[4] and Aisenberg *et al*.[8] both suggested that anti-pseudomonal penicillins or carbapenems would be a reasonable antimicrobial choice, they differed on trimethoprim-sulfamethoxazole. Jacquier *et al*.[9] have showed that carbapenems though still remains efficacious as the last resort of antibacterial therapy, especially doripenem and meropenem, in eradicating *A. xylosoxidans*. In all likelihood, the variation in antibiotic susceptibilities likely reflects the growing acquisition of multi-drug resistance in different strains of *A. xylosoxidans*. Finally, routine source determination may not be worthwhile in the event of a documented infection due to the inconsistent yield of positive cultures from environmental swabs and clinical material. [5] This begets the question of when it is appropriate to consider *A. xylosoxidans* as a possible infection complicating the recovery of burn patients. The corollary to this is the choice of "empirical" antibiotic therapy in presumptive cases.

Critique of current case

In our case, there was no objective evidence of *A. xylosoxidans* bacteremia. Although we did not consciously tailor our antibiotic coverage to specifically target the pathogen, our patient managed to survive. This is most probably due to the use of broad spectrum antibiotics including meropenem in the overlapping period from 1 to 9 November, which is in agreement with the suggestions of Gómez-Cerezo *et al*.,[4] Aisenberg *et al*.,[8] and Jacquier *et al*.[9] Intra-operative tissue cultures remained negative for *A. xylosoxidans* until November 28, six days after piperacillin/tazobactam had been stopped on November 22. However, from November 28 onwards, the patient was clinically well and her wounds were healing. Therefore, despite positive tissue cultures for *A. xylosoxidans*, antibiotic therapy was only directed against MRAB infections that had persisted. It is also almost impossible to pin-point exactly whether graft failure (on November 5 and 28) was due to *A. xylosoxidans* alone, but what may be under-recognised is the potential synergy between this Gram-negative infection and other increasingly recognised pathogens in burn infections such as MRAB. In short, we propose that additional antibiotic coverage for documented *A. xylosoxidans* wound infection should be considered if the patient remains septic and clinically unwell [Figure 1].

This report has served to highlight the potential diagnostic and management dilemmas of

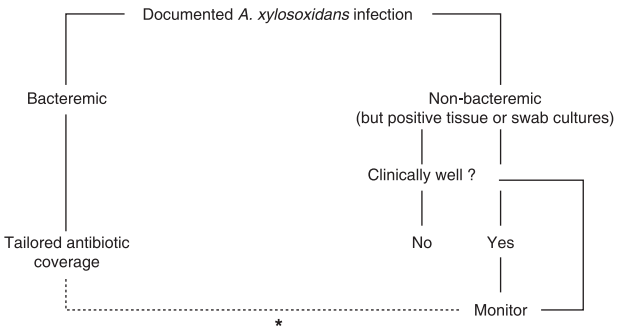

Figure 1: Algorithmic approach for documented *A. xylosoxidans* infections. (*it may be worth considering adjusting antibiotic coverage if there is a strong suspicion for concomitant *A. xylosoxidans* infection due to difficulty in isolation of the organism)

A. xylosoxidans infection in the absence of positive blood cultures. Further studies on the pathogenicity of *A. xylosoxidans* in the presence of other emerging nosocomial infections such as MRAB, the optimal antibiotic regime(s), as well as patient profiles for risk stratification, are warranted for burn physicians of the present and near future to adequately address this rapidly emerging, multi-drug resistant pathogen of increasing significance.

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