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CLINICAL VIGNETTE

Burkholderia Bacteremia Related to Ultrasound-Guided Peripheral IV Placement

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Case Presentation

A 27-year-old male with epilepsy was admitted to the hospital for continuous EEG monitoring. After multiple unsuccessful attempts by the floor nursing staff to place a peripheral intravenous catheter (pIV), the hospitalist procedure team placed a 22-gauge pIV on hospital day (HD) #1 into the cephalic vein of the proximal right forearm utilizing real-time ultrasound guidance during the procedure. In placing the pIV, standard technique was followed including using sterile ultrasound gel to search for an appropriate target vessel and placement of the pIV under semi-sterile technique. The following steps were followed after the target vein is selected: changing to sterile gloves, sanitizing the overlying skin with chlorhexadine solution, applying a sterile probe cover and using sterile single-use ultrasound gel over the probe cover prior to attempting placement via realtime guidance and puncturing the skin with the needle and catheter.

On HD #3, he developed a fever to 39.7°C and heart rate of 124/bpm. Blood pressure was 128/85 with a respiratory rate of 22 and an oxygen saturation of 93% on room air. He complained of new pain and redness of his right forearm, and physical exam was notable for proximal right forearm erythema, edema, and induration around the site of the pIV (see Figure 1). No other localizing infectious signs or symptoms were present, and chest x-ray and urinalysis were unremarkable. After the pIV was removed and blood cultures were obtained, he was empirically started on IV vancomycin and piperacillin-tazobactam for suspected gram-positive infection as well as potential hospital acquired organisms given the time between admission and onset of his symptoms. Chart review showed no history of multi-drug resistant bacterial or fungal infections. His fever continued despite broad parenteral coverage, and the erythema and edema of his right forearm worsened, spreading both distally and proximally up to his antecubital fossa on HD #4 (see Figure 2). *Burkholderia cepacia* subsequently grew on HD #5 from the blood cultures obtained on HD #3. Consultation with infectious diseases revealed previous *Burkholderia* infections at our institution had been sensitive to trimethoprim-sulfamethoxazole (TMP-SMX). While awaiting sensitivity testing results, TMP-SMX was initiated, and vancomycin and piperacillin-tazobactam were discontinued. The patient's fever improved as did the right forearm with reduced erythema, edema, and tenderness (see Figure 3). Final sensitivities confirmed susceptibility to TMP-SMX, and the patient was discharged home to complete a seven-day course.



Figure 1 – Initial presentation of right forearm on HD #3



Figure 2 – Right forearm on HD #4 with worsening appearance



Figure 3 – Right forearm on HD #6 after 24 hours on TMP-SMX

Discussion

Obtaining IV access is an increasing problem with an estimated 8-23% of ER patients meeting criteria for difficult venous access.¹ Point-of-care ultrasound is becoming more and more prevalent with increasing availability of ultrasound machines at the bedside as well as providers trained in their use. Ultrasound-guided pIV placement can help address the problem of difficult venous access as it increases the cannulization success rate, decreases the number of failed pIV placement attempts, and

ultimately reduces potentially unnecessary central venous catheter placements which carry greater risk.^{2,3} Significant complications of ultrasound-guided pIV placement are rare, but this technique does carry higher risk for infection as compared with non-ultrasound-guided pIV placement due to the targeting of deeper veins, and the CDC recommends enhanced sterile technique as compared to typical pIV placement.⁴

Even when utilizing enhanced technique as recommended, infections may occur with *Burkholderia*, an aerobic, gram-negative rod that may cause respiratory, bloodstream, and urinary tract infections in healthcare facilities. *Burkholderia* is not a typical gram-positive skin organism like *Streptococcus* and *Staphylococcus* and is resistant to many antibiotics.⁵ Multiple case studies have reported *Burkholderia* outbreaks due to contamination of diagnostic and therapeutic healthcare items.^{6,7} While single-use ultrasound gel is generally regarded as sterile, a case series of 14 patients with *Burkholderia* bacteremia from 3 different ICUs in a tertiary care hospital in Saudi Arabia revealed single-use ultrasound gel as the likely shared culprit with the gel thought to be contaminated during the manufacturing process.⁷ Muradali et al. have also demonstrated that ultrasound gel does not have any bacteriostatic or bactericidal properties and even permits bacterial growth when cultured in agar gel.⁸

Conclusion

This case highlights the need to be aware of the potential for ultrasound gel-related nosocomial infections, especially due to *Burkholderia*. As is common with *Burkholderia* infections, the usual “broad” inpatient empiric antibiotic therapies may not adequately treat the patient, and early infectious disease service consultation can significantly impact patient care while awaiting final culture results.

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