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History of Present Illness

76 year-old male with PMHx of chronic kidney disease, diabetes mellitus, peripheral arterial disease presents with right foot pain x 1 month. Patient reports he recently underwent a left above-the-knee-amputation 30 days prior however since being discharged home he had progressive pain in his right heel. He was seen for his scheduled appointment with his vascular surgeon today and upon evaluation was sent to the ER .

Pertinent Physical Exam

Vitals: T 98.9 HR 76 99% RA RR 14 BP 116/49

General: AAOx3, appears uncomfortable

Chest: RRR, no murmurs, no respiratory distress, clear breath sounds bilaterally

Musculoskeletal:

Left LE: post op AKA staples in place, clean, dry, no erythema, no discharge, 2+ Femoral pulse

Right LE: large heel ulcer eroding exposed muscle and surrounding erythema with blue-green borders, minimally tender along wound margins, 1+ DP pulse

Significant Diagnostic Results:

WBC 14.49 XR R Foot: bony erosions at calcaneus

Hgb 8.8

Electrolytes wnl

BUN 36

Creatinine 2.28



Questions:

1. What is the diagnosis and initial management of this infection?
2. What underlying condition(s) pre-disposed this patient to such an infection?
3. What other important diagnosis should be considered and what diagnostic study can confirm this?
4. What causes the vibrant neon blue-green discharge with this pathogen?

Answers:

1. Pseudomonas aeruginosa infection, start empiric antibiotics
2. Peripheral Arterial Disease, Diabetes Mellitus
3. Osteomyelitis; Xray and/or CT to assess for bony erosions
4. Pyocyanin and Pyoverdine

Case Discussion:

The patient was evaluated at bedside by the ED team and he reported that the small heel ulcer had grown significantly over the past month since he had his left AKA procedure. He noticed green discharge for the past 7 days. His exam was notable for a large malodorous wound with erosion into the bony prominences of the calcaneus. He was treated empirically on Piperacillin-Tazobactam and Vancomycin. Wound cultures and blood cultures were sent. The XR of the right foot revealed erosions into the calcaneus indicating osteomyelitis.

Vascular surgery and Podiatry were consulted in the ED and the patient was admitted for further management. Unfortunately the wound cultures grew multidrug-resistant Pseudomonas Aeruginosa that was resistant to Piperacillin-Tazobactam. The patient's clinical condition deteriorated and subsequently underwent a Right AKA. After an extended 16 day hospital course he was discharged home. Pathology report of the amputated limb revealed severe necrosis with abscess formation with evidence of acute osteomyelitis and severe occlusive atherosclerosis of the posterior tibial artery.

Pearls:

1. Pseudomonas is a common hospital acquired infection that may significantly alter a patient's morbidity and mortality. It can develop into a devastating opportunistic pathogen and should always be considered in patients who are immunocompromised or presenting in a post-operative state such as our patient.
2. Pseudomonas is a gram negative bacilli that is oxidase positive and ubiquitous in soil, water and skin flora. It thrives on moist surfaces and is commonly associated with endotracheal tubes, ventilators, IV catheters, foley catheters, burns and skin wounds.
3. Recognizing the characteristic skin findings may help provide early appropriate antibiotic therapy. The classic blue-green discharge is due to the metabolites pyocyanin (blue) and pyoverdine (yellow-green). Additionally the bacteria produces an odor described as "fruity grape-juice-like" or as others may describe as "fresh tortilla chips".
4. Treatment of Pseudomonas ulcers should include IV antibiotics and aggressive debridement of any necrotic or infected eschars. For the skin and soft tissue infections antibiotic therapies that are recommended include beta-lactams, carbapenems or fluoroquinolones. However Pseudomonas is considered a problematic microorganism that is intrinsically prone to developing high-resistance to anti-microbial agents. Therefore consider sending wound cultures early on in the clinical course to adjust for sensitivities.

References

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2. Ayser Yildiz P, Özdiş T, Döğbay M, Gazel Tunçan O, Hızal K. Peripheral arterial disease increases the risk of multidrug-resistant bacteria and amputation in diabetic foot infections. *Turk J Med Sci*. 2018 Aug 16;48(4):845-850. doi: 10.3906/sag-1803-217. PMID: 30119162.