Management of fungal osteomyelitis in setting of deep hardware infection status post ankle ORIF

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Statement of Purpose

The presence of fungal osteomyelitis is uncommon and underreported in literature. Fungal osteomyelitis can be acquired by direct inoculation post traumatic injuries contaminated with soil, open wounds or surgery, hematogenous spread or extension from a contiguous site of infection.

This case report documents the incidence and overall treatment of candida infection in the setting of wound dehiscence and deep hardware infection status post open reduction internal fixation of a trimalleolar ankle fracture. The main goal is to review and add to the body of literature of healing rates concerning fungal osteomyelitis, with one of the first documented cases occurring in the ankle.

Literature Review

Bone fungal infections are very rare, generally occurring in immunocompromised patients and rarely found in the foot and ankle.[1] Candida infection develops as a manifestation of systemic candidemia in most cases, with inoculation via direct implantation being reported as rare. Risk factors predisposing to candida infection include those that would cause significant immunosuppression.[2]

Per the author's research, there have been very few cases reported of fungal osteomyelitis localized to the foot with only a handful documented.[3] The candida species is documented in the literature as the common organism in fungal osteomyelitis with Candida albicans being the most common species.[1,3] Treatment with oral fluconazole was reported with positive response and wound healing.[3]

One case series documented five cases with incidence of a fungal component in a total of 35 of osteomyelitis in diabetic foot infections. The fungal species isolated from bone cultures included the Candida species with Candida albicans, C parapsilosis, and C glabrata. Healing rates were reported to be 40% with positive outcomes associated with oral treatment of fluconazole.[4]

Initial Clinical and Radiographic Images

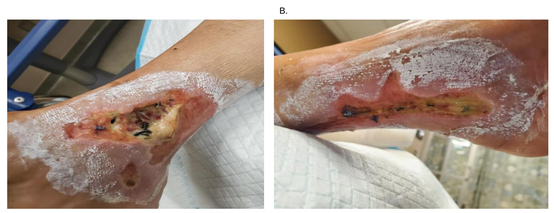


Fig 1: initial clinical presentation of postoperative dehiscence, medial (A) and lateral (B) right ankle wound.

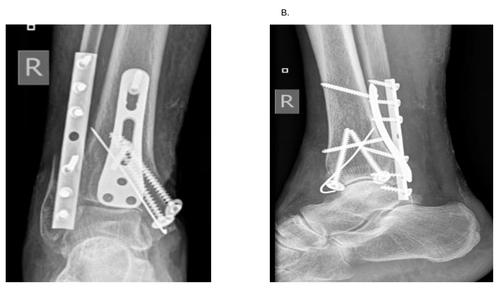


Fig 2. initial AP (A) and lateral (B) radiographic views

Case Study

A 67 year old otherwise healthy woman, non-diabetic and non-immunocompromised presented with wound dehiscence and deep hardware infection status post right ankle ORIF done in a foreign country. This patient sustained a fall and underent trimalleolar right ankle ORIF and was instructed to delay her return to the US. She had her leg cast removed as she complained of discomfort to the area and discovered open wounds to her surgical sites. Once stable, she flew back to the US for treatment. On initial presentation, this patient was aseptic and had exposed hardware to medial and lateral right ankle with fibronecrotic wounds. Initial wound cultures grew enterobacter cloacae, candida parapsilosis and repeat blood cultures remained negative. The following day, she underwent removal of hardware, wound debridement, bone biopsy, and implantation of antibiotic beads impregnated with vancomycin. The posterior malleolar hardware was left intact to avoid an additional surgical site and potential new wound. The surgical pathology revealed acute osteomyelitis of both fibula and tibia. On noninvasive vascular studies, she was found to have >75% stenosis in the right lower extremity contributing to delayed wound healing. The patient was taken for a repeat wound debridement, application of wound vac, and application of external fixator for stability of subacute ankle fracture. Deep wound and bone cultures taken from this procedure resulted in Candida parapsilosis. In the following week, patient underwent removal of wound vac and application of an amniotic graft. The patient was receiving ceftriaxone in house and discharged the following week with ceftriaxone 2gmIV daily and fluconazole 400mg PO daily. Due to the delay of culture results, Fluconazole was added to the therapy and was chosen from the culture sensitivity as well as ease of administration.

The following week, her repeat cultures were consistent with acute and chronic osteomyelitis and candida parapsilosis. Patient was being followed routinely in office with the wounds being managed with a wound vac medially and silver alginate laterally. During this course, non-invasive arterial studies showed arterial insufficiency to the right lower extremity. A referral to vascular surgery was made, and she underwent an angioplasty and right SFA atherectomy. The resulting intervention had distal runoff to the right foot via the anterior tibial to the dorsalis pedis and peroneal arteries with multiple collaterals at the ankle. 7 weeks status post initial presentation, the patient underwent removal of external fixator, excision of fibrotic posterior tibial tendon and tibial bone cultures resulting in acute osteomyelitis. She went on to complete 7 weeks of fluconazole and was transitioned to cefpodoxime 200mg 2 times daily until the bone was no longer exposed medially.

With local wound care and wound vac, patient's wounds were showing interval improvement. 15 weeks status post initial presentation, a bone biopsy revealed benign bone and she underwent wound debridement and repeat application of amniotic graft. At this time, she was given two weekly doses of Dalbavancin 1500mg IV. Over the course of the next 6 months, she maintained local wound care and aggressive physical therapy with the use of an Arizona brace and a walker.

11 months status post right ankle fracture with dehiscence, osteomyelitis, wound infection, several debridement, and aggressive physical therapy. She reported pain and stiffness to ankle with daily activities and was uninterested in long term bracing. After discussion of surgical options, patient elected for right ankle fusion. One year after initial presentation, she underwent right ankle fusion which healed uneventfully. Four months following ankle fusion, the patient is pleased with improvement in her pain and ambulating without assistance.

Full epithelialization of the dehiscence occurred following the culture of candida parapsilosis and enterobacter cloacae with antibiotic/antifungal treatments and vascular optimization; with ankle fusion occurring at the 12 month follow up.

Clinical and Radiographic Course

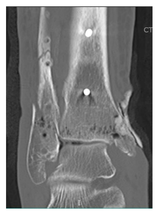


Fig 3. AP(A) and lateral(B) CT views post initial hardware removal

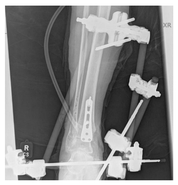


Fig 4. AP(A) and lateral(B) radiographic views post application external fixator

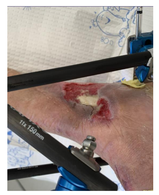
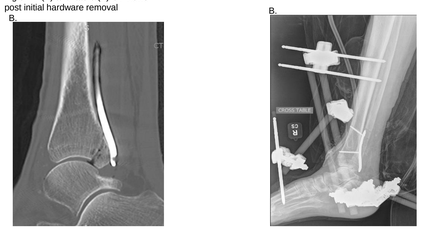


Fig 5. medial(A) and lateral(B) clinical images 1 month status post application external fixator



Radiographic Course Continued

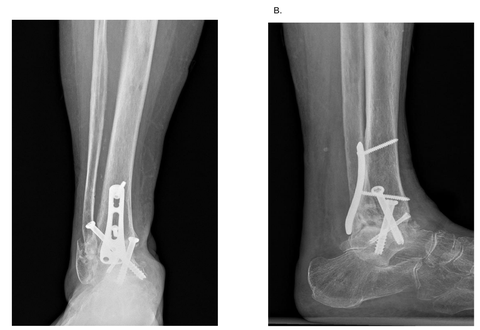


Fig 6. AP (A) and lateral (B) radiographic views 2 months status post ankle fusion

Discussion

Bone fungal infection is very rare, occurring in the immunocompromised patient population.[1] Candida infection develops as a manifestation of systemic candidemia in most cases. Direct implantation of Candida is a very rare cause. The most common pathogen in the setting of fungal infection is candida albicans, in this incidence, candida parapsilosis was cultured.[2] An appropriate course of anti-fungal treatment was added along with a standard antibiotic course for deep hardware infection.[3] Oral fluconazole was used for antifungal treatment, which matches previous case series in which full healing was achieved.[4] It is of note that this patient had no prior comorbidities that influenced wound healing other than the diagnosed and treated arterial insufficiency.

A focused multi-disciplinary approach was necessary for an excellent outcome in this patient's sequelae. A full vascular workup should always be considered in the setting of a chronic, difficult to heal wound. Benefit from revascularization in setting of combined infection and arterial insufficiency is critical in achieving full epithelialization in the context of wound dehiscence.[5]

Reconstructive considerations were limited, given the patient's desire for minimum surgical exposures following the event. The patient was also offered bracing and AFO devices for more conservative management. The patient elected for straightforward fusion following sequelae of ankle pain following resolution of infection and epithelialization. Despite patient adversity to extensive intervention in this incidence, other reconstructive options can be considered for optimized restoration and function to the joint prior to arthrodesis in similar cases.

Although rare, a fungal panel should be a component among this approach in culturing deep hardware infections with special awareness in setting of travel abroad. A thorough multidisciplinary approach is vital in achieving excellent long term outcome in setting of slow to heal dehiscence and deep hardware infections. For future studies, a look into different treatment modalities such as impregnated implantation devices like antibiotic beads may benefit treatment outcomes.

References

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