Candida Osteomyelitis of the Midfoot

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Purpose and Literature Review

Staphylococcus aureus is the most frequent infecting organism to cause osteomyelitis, while Candida is one of the least frequent infecting species to cause osteomyelitis (1). The most common infecting Candida organism to cause osteomyelitis is Candida albicans (6). Candida albicans is a saprophytic microorganism that is ubiquitous in nature and can reside on hair or mucus membranes in healthy individuals. Osteomyelitis due to Candida, and other fungal species, is mainly seen in immunocompromised patients who are receiving broad-spectrum antibiotics or central parenteral nutrition (2). Factors that increase the chances of acquiring candidemia include: intravenous drug use, indwelling arterial or venous catheters, diabetes mellitus, corticosteroids, myeloperoxidase deficiency, hospitalization and surgery (2). Candida osteomyelitis is most commonly a result of hematogenous dissemination, but it can also be due to direct inoculation or contiguous infection (4). When hematogenously disseminated, Candida may seed bone instantaneously or present as a late manifestation (5). In most cases, the diagnosis of Candida osteomyelitis is delayed from one month up to a year (3). Virtually any bone can be infected when candidemia occurs, but the most commonly infected bones in adults are the lumbar vertebra, ribs and sternum (4). In this case study, an unusual presentation of Candida albicans osteomyelitis is presented in a foot with coexisting charcot arthropathy.

Case Study

A 49-year-old female presented to the emergency department complaining of worsening left foot edema, erythema and pain. Injury, trauma and ulcerations to the foot were denied. Patient's past medical history included: systemic lupus erythematosus, immunosuppression, steroid-induced diabetes mellitus type two, peripheral neuropathy, left ankle fracture, pedal ulceration, osteomyelitis and digital amputation. Upon examination, pedal pulses were palpable and protective sensation was absent up to the ankles. Pitting edema, erythema and calor was noted to the midfoot. A fluctuant mass was palpable at the level of the first tarsometatarsal joint. Upon manipulation of the midfoot, diastasis, hypermobility and crepitus could be palpated most notably at the first, second and third tarsometatarsal joints. The presumptive diagnosis for this patient was Charcot arthropathy but to rule out an infection, the patient's first tarsometatarsal joint and overlying fluctuance were aspirated. The patient's inflammatory markers were elevated upon presentation but her white blood cell count and vitals were within normal limits. With computed tomography, charcot changes including deformity, destruction and debris were noted at the first through third tarsometatarsal joints. Erosive changes at the base of the first metatarsal and medical cuneiform were found to be suspicious of osteomyelitis. Mulitiloculated fluid collections were noted to be surrounding the first and second tarsometatarsal joints, tibialis anterior tendon and extensor hallucis longus tendon. Three days after aspirating the patient's first tarsometatarsal joint, the culture grew Candida albicans. The patient was then started on the appropriate intravenous antifungals by infections disease. While in house, the patient was scheduled for a left foot incision and drainage with bone biopsy and culture. Intraoperatively, the multiloculated fluid that was seen on computed tomography was a lobulated soft tissue mass that was overlying the first tarsometatarsal joint. Upon further dissection, the mass was noted to be stemming from the first tarsometatarsal joint and encompassing the tibialis anterior tendon and extensor hallucis longus tendon. Post-operatively, conservative and surgical treatment options were discussed with the patient. The patient did not want a charcot restraint orthotic walker for long term conservative care so limb salvage and charcot reconstruction were discussed. The patient opted to undergo a naviculocuneiform and first and second tarsometatarsal joint arthrodesis, gastrocnemius recession and have an external fixator applied.

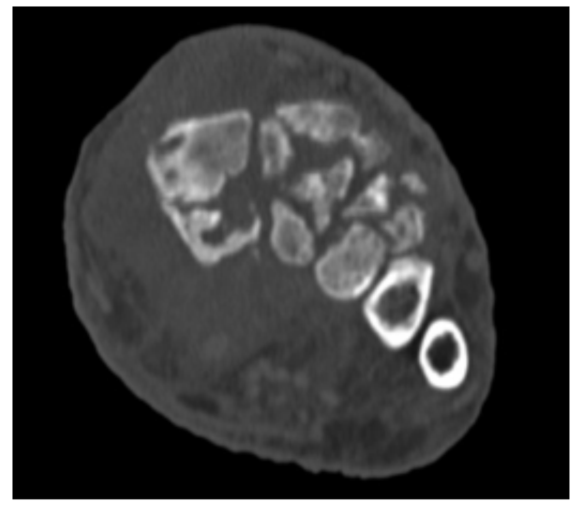

Figure 1. Computed tomography demonstrating extensive deformity, destruction, dislocation and debris at the bases of the first through third metatarsals.

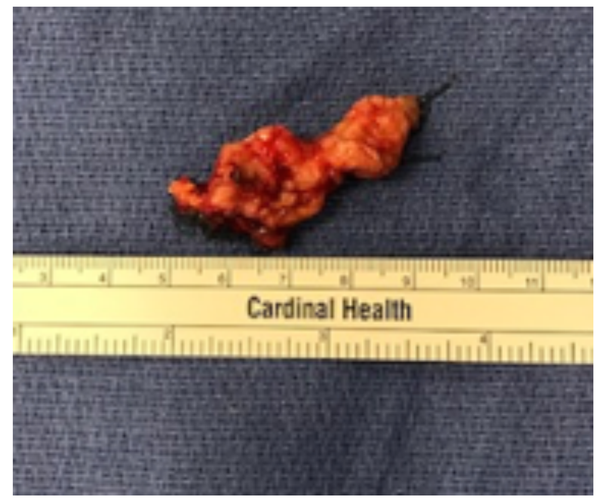

Figure 2. 4.0 cm x 2.0 cm x 1.0 cm soft tissue mass consisting of reactive synovitis was found to be stemming from the first tarsometatarsal joint.

Case Study and Surgical Procedure

The patient was brought to the operating room and placed on the operating table in a supine position. After general anesthesia was administered, a well-padded thigh tourniquet was applied. The left lower extremity was then prepped and draped in a usual sterile manner and technique. Next, the limb was elevated, exsanguinated and the thigh tourniquet was inflated. Attention was directed to the medial aspect of the left foot where a linear incision was made from the talonavicular joint to the first metatarsal head. The incision was then deepened through the subcutaneous tissue with blunt dissection. The neurovascular bundles were identified, protected and retracted. Next, the deep fascia, capsule and periosteum were sharply incised and reflected from the naviculocuneiform joint to the first metatarsal shaft. Attention was then directed to the first tarsometatarsal joint where a sagittal saw was used to prep the joint for arthrodesis. After the joint was planed, the base of the first metatarsal and medial cuneiform were noted to be cystic and friable. Next, the sagittal saw was used to plane the naviculocuneiform joint. The wound was irrigated with copious amounts of sterile saline. Prior to fixation, the cysts within the medial cuneiform and first metatarsal base were packed with cancellous bone chips. After joint preparation was completed, the medial column was reduced into anatomic alignment and then a medial column dynamic compression plate was fitted, placed and stabilized with temporary fixation. The proximal aspect of the plate was fixated with permanent fixation first. Next, the compression slot within the metatarsal was utilized, demonstrating excellent compression across the joints. The remainder of the plate was further fixated with locking screws. Excellent stability and repositioning of the medial column was achieved. The deep fascia, periosteum and capsule were closed as one layer, then the subcutaneous tissue was sutured and finally, the skin was reapproximated.

Figure 3. Preoperative radiograph demonstrating erosions, deformity, debris, and dislocation at the first through third tarsometatarsal joints. Prior open reduction internal fixation of a fibular fracture.

Case Study and Surgical Procedure Continued

The tourniquet was dropped and we focused our attention on the posterior aspect of the operative leg. A linear incision was made along the posterior medial aspect of the leg. The incision was deepened through the subcutaneous tissue, using blunt dissection, to the level of the gastrocnemius aponeurosis. The paratenon was identified, incised and retracted. Next, a transverse gastrocnemius recession was performed allowing for improved dorsiflexion of the hindfoot. The wound was irrigated with sterile saline. The paratenon and subcutaneous tissue were sutured, while the skin was stapled. Prior to directing our attention back to the foot, the operative limb was elevated, exsanguinated and the thigh tourniquet was reinflated. For our third procedure, an incision was made from the shaft of the second metatarsal to the intermediate cuneiform. Blunt dissection was used to deepen the incision down to the extensor digitorum brevis tendon. With the tendons retracted and neurovascular bundles protected, the capsule and periosteum were sharply incised and retracted. Upon reflection, loose osteophytes and fracture fragments were noted within the joint and then resected. Next, the second tarsometatarsal joint was curetted, fish-scaled and then irrigated with sterile saline. After joint preparation was completed, the second metatarsal was reduced into anatomic alignment and then a dynamic compression plate was fitted, placed and stabilized with temporary fixation. The proximal aspect of the plate was fixated with permanent fixation first. Then the compression slot within the second metatarsal was used. Prior to fully compressing the joint, cancellous bone chips were employed to fill any voids. The remained of the plate was further fixated with locking screws. Good reduction, bony apposition and compression was noted at the joint. The wound was irrigated with sterile saline. The deep fascia, periosteum and capsule were closed as one layer, then the subcutaneous tissue was sutured and finally, the skin was reapproximated. For our final procedure, an external fixator was applied to the patient's foot and leg. The wires and incision sites were covered with iodoform soaked gauze and a dry sterile dressing. The patient tolerated the procedure well.

Figure 4a. Preoperative radiograph demonstrating erosions, deformity, debris, and dislocation at the first through third tarsometatarsal joints.

Figure 4b. Intraoperative radiograph demonstrating open reduction and internal fixation of the naviculocuneiform, first and second tarsometatarsal joints with dynamic compression plates.

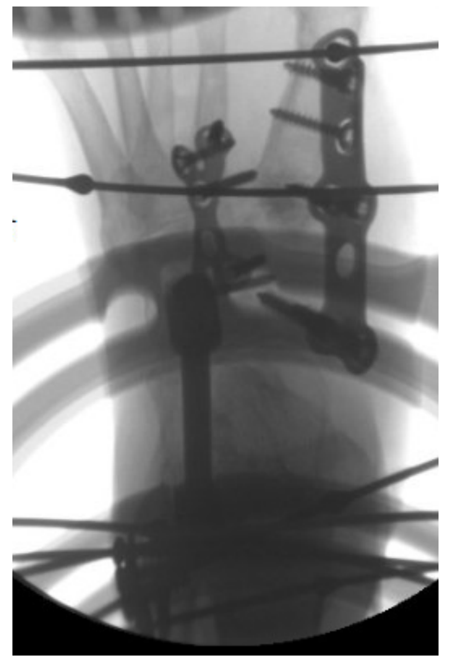

Figure 4c. Intraoperative radiograph demonstrating application of an external fixator.

Results

The patient was compliant with the postoperative protocol and completed her intravenous antifungal therapy. Repeat cultures that were obtained intraoperatively had no growth. The patient remained in the external fixator until a proximal wire in the tibia became unstable, infected and painful. At four weeks post operatively, the external fixator was removed. Once the external fixator was removed, the patient was placed in a below knee cast for one week. After one week, the patient was transitioned into a pneumatic walking boot and was allowed to weightbear. After three weeks of protected weightbearing, the patient was transitioned into diabetic shoes and inserts. Shortly after transitioning into diabetic shoes and inserts, the patient developed a tibial stress fracture where the unstable proximal pin was located. She was placed back into a pneumatic walking boot and the stress fracture healed uneventfully. Since then, the patient has had no further complications and is back into diabetic shoes and inserts.

Discussion

The most common presenting symptom in patients with Candida osteomyelitis is local pain (5). When patients at risk or with a past medical history of candidemia complain of bone pain, a thorough and prompt work up for osteomyelitis is warranted to improve potential outcomes (2). A complete work up for osteomyelitis should include: laboratory evaluation, advanced imaging and an aspiration, culture or biopsy. Inflammatory markers in most patients with Candida osteomyelitis are moderately to minimally elevated while their white blood cell count is mildly elevated (4). Osteomyelitis on radiographs presents as lytic lesions, erosions, rarefaction or cortical destruction (5). On magnetic resonance imaging, osteomyelitis will have a decreased signal intensity on T1-weighted images and an increased signal intensity on T2-weighted images. Due to the multifocal nature of Candida osteomyelitis, a radionuclide bone scan may be needed in addition to magnetic resonance imaging. Once the diagnosis has been made, conservative or surgical treatment options should be decided upon. When it comes to conservative treatment, Candida osteomyelitis has been effectively treated with prolonged antifungal therapy in uncomplicated cases. In more complicated cases, surgical intervention along with antifungal therapy may be warranted for successful eradication, and structural stability (4).

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