Open reduction and Internal Fixation of a Neglected Posterior Pilon Variant Fracture in an Uncontrolled Diabetic with Peripheral Neuropathy: A Case Report and Literature Review

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It is estimated that 4% of all fractures are ankle fractures, and pilon fractures as a whole represent less than 1% of all lower extremity fractures (7). Amongst those, 7% to 44% of all ankle fractures involve the posterior malleolus (6). In a retrospective case series of 270 patients suffering from unstable ankle fractures, the relative frequency of the posterior malleolar fracture was noted to be 25%, and of those fractures 20% represented the posterior variant (10). The posterior pilon variant fracture pattern is an increasingly recognized fracture morphology characterized by posteroomedial extension of the fracture of the posterior rim of the tibia and involves a portion of the medial malleolus with varying amounts of articular impaction of the tibial plafond (10). This fracture pattern has severe impact of the stability of the talus in the ankle mortise, and often results in tibial subluxation and dislocation (12).

Case Report

The patient was a 56-year-old female with past medical history uncontrolled, CDM, HTN, TIA, Peripheral Neuropathy, Depression, and disc herniation who presented to the ER with complaint of acute pain and displacement to her left ankle. She related an event 6 weeks prior to presenting to the ER in which she fell at home and heard something distinctly “pop” in her left ankle. She had significant swelling to her ankle since the described inciting event but did not pursue treatment and continued to ambulate normally with full weight bearing to the affected extremity. She then had another subsequent fall at home and noticed a frank change in the position of her ankle with sudden increase in pain. No open wounds were appreciated to the affected extremity and the patient denied constitutional symptoms. The patient was found to be hypothermic with blood sugar of 565 (HbA1c 12.3), leukopenic, thrombocytopenic. The patient’s pancytopenia lead to the diagnosis of multiple myeloma however she refused to pursue treatment or further evaluation. Both the PI and DP pulses were audible on Doppler exam. Capillary fill time to the remaining digits of the left foot was immediate. The foot did appear clinically subluxed with a valgus position at the level of the mid-tibia. Light touch sensation was absent distal to the level of the mid-tibia bilaterally. Her compartments were soft and compressible and her pain was not felt to be out of proportion.

On plain film radiographs she was found to have an AO/ASIF fracture pattern with an oblique Weber B fracture. The ankle was noted to have displaced from distal anterior to proximal posterior, a spiral fracture of the posterior malleolus with extension into the medial malleolus with 1.1cm medial displacement, approximately 15 degrees of traumatic valgus rotation, and 2.1cm of posterior talus subluxation. Peristalsis around the fracture margins of the injury had a minimum radiographic age of 4 weeks (Figure 1). CT without contrast was obtained. The fracture was re-documented with the additional findings of comminution of the posterior malleolus and medial malleolar components with approximately 1cm of posterior displacement and 1.5cm of proximal displacement of the posterior malleolus component. Approximately 45% of the distal tibial articular surface was involved in the fracture. Given her uncontrolled DM, peripheral neuropathy and the age of the injury a below knee amputation was recommended to the patient as a potential principle procedure however the patient refused and was instead consulted for limb salvage surgery.

Operative Technique

The ankle joint was prepared through minimal incisions. An incision was then made to the lateral hindfoot for the purpose of preparation and reduction of the subtalar joint. A manual reduction was then performed relocating the talar on the tibial plafond and plating was placed temporary palpable to the extremity with capillary refill time immediate to the residual digits. The ankle was placed in a cylinder cast for 6 weeks post-operatively before removal for full weight bearing.

Discussion

Fractures of the medial and lateral malleoli are often times accompanied by fracture of the posterior malleolus due to the tibial plafond being a biconcave structure (1). The posterior pilon variant fracture pattern is an increasingly recognized fracture morphology characterized by posteroomedial extension of the fracture of the posterior rim of the tibia and involves a portion of the medial malleolus with varying amounts of articular impaction of the tibial plafond (10). This fracture pattern has severe impact of the stability of the talus in the ankle mortise, and often results in tibial subluxation and dislocation (12). Proposed mechanisms of injury resulting in this distinct fracture pattern include forced hyperplantarflexion, an abduction-external rotation force, and a combination of rotational and axial loads (10). Studies have also suggested a poorer prognosis and higher arthritic incongruity with ankle fractures involving a posterior malleolar component, including the posterior pilon variant (11, 13).

In this case the patient’s severe peripheral neuropathy and psychosocial issues prevented her from seeking immediate medical treatment and evaluation of her ankle injury. This resulted in a delayed presentation of 6 weeks duration. At the time of diagnosis of her posterior pilon variant, significant bony callus formation was appreciated adjacent to her fracture margins further limiting the ability to appropriately close reduce her fracture/dislocation. Decision was made to pursue a joint prosthesis and remain as minimally invasive as possible with the preparation of her ankle and subtalar joints for the purpose of arthrodesis. The failure of her injury and the timeframe of surgical interventional increased the difficulty of operative reduction however we were able to successfully translocate the talar and foot as a unit anteriorly under the distal residual tibial plafond. The stability afforded by her static omiarticuclary nail has allowed her to resume full unrestricted weight bearing at 12 weeks post-op and she has returned to pre-injury level of daily activity.

To the authors knowledge no other case reports of neglected posterior pilon variant fractures fossilized in this fashion have been presented in the literature. This case was certainly heroic limb salvage, however represents a potential addition to the treatment algorithm of neglected trimallolar and posterior pilon variant fractures in the compromised patient insisting upon pursuit of their affected extremity.

References


Due to the increased complexity of the fracture pattern, it is recommended to follow a systematic approach. Klamer et al. proposed a classification which describes 3 major categories of increasing degree of complexity and the operative strategy for each. Type 1 fractures contain a single medially based posterior malleolar fragment which can be fixed through a posterolateral approach. Type 2 fractures are those in which the posterior fragment is split with possible posteroomedial comminution, which would require an additional incision medially or limited posteroomedial to reduce and fixate the posteroomedial fragment or separate medial malleolar. For Type 3 fractures, there is an additional anteromedial fragment present which necessitates a medial approach in addition to a posteroomedial incision for appropriate reduction and fixation. They recommend the fibrillation to be addressed only after the tibia has been fixedated and that this syndromes may need addressed.

To the authors knowledge there is currently no other documented case of a posterior pilon variant fracture being treated with a combination of intra-medullary nailing and multi-ring external fixator. The purpose of this case report was to examine the functional outcome of a neglected posterior pilon variant fracture addressed using this fixation in a high risk patient with neuropathy.

Figure 1 - Initial Films Obtained at Presentation to ER

Figure 3 - Ankle Dissection from posterior to anterior view

Figure 4 - Final Post-op images

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