Application of External Fixator for Acute Treatment and Stabilization of Gunshot Wound to the Tarsal Navicular

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Introduction:

Although less in common comparison to other parts of the world, according to the CDC, gunshot wound related injuries in the united states in 2014 were 81,034 (1). Despite the relative commonplace of these injuries, literature on the surgical approach for fixation and stabilization of fractures secondary to gunshot wounds to the lower extremity, the specific foot and ankle are limited in the Podiatric and Orthopedic literature (2). Of the available literature, outcomes range from very good to very poor, with some cases of severe and debilitating injury requiring limb amputation (3). Recently, Husain and colleagues demonstrated that in patients with gunshot wounds to the lower extremity, external fixation could be used for treatment (4). The authors concluded that external fixation was also removed at this time. The patient was then placed in posterior mold fiberglass cast for one month at which point he was transitioned to normal shoe gear and full weight bearing. The patient returned for normal physical activity at 6 weeks and has no complaints to date.

Discussion:

In an effort to minimize complicating factors, management of gunshot wounds to the foot and ankle should include early antibiotics, rigid fixation and stabilization of the affected bones and joints as well as addressing the soft tissue defects (9). Specifically, use of external fixation has been reported to be a useful tool in the management of extremity injuries that have complicating factors barring the surgeon from using internal fixation and play an integral role in extremity gunshot wound management (10). Halawi and colleagues put forward a treatment algorithm for the management of extremity gunshot wounds as a means of helping the surgeon streamline the decision making process of injury management which is similar to how we manage our patient and manage gunshot infected injuries as a whole (11). The current case represented a scenario where we felt that a staged approach to fixation would be in the patient's best interest and give the highest likelihood of a non complicated outcome. Furthermore, external fixation, while not as technically challenging as definitive internal fixation modalities (i.e. internal fixation), serves as a very important tool to help buy the patient time before more invasive modalities are used (12).

Many considerations must be taken in both the acute and subacute care of patients who have sustained such injuries to bony structures. One of the most important of which being the blood supply to the affected bones (5). This is particularly the case with the Navicular, which the decision making process of injury management which is similar to how we manage our patient and manage gunshot infected injuries as a whole. The decision was then made to bring the patient back for talo-navicular/naviculo-cuneiform arthrodesis approximately 4 weeks after that it was then elected to bring the patient back for talo-navicular/naviculo-cuneiform arthrodesis. The patient was discharged within 24 hours of this initial intervention and followed for about one month on a weekly basis in the Foot and Ankle Trauma Clinic until all wounds had healed. Approximately 4 weeks after that it was then elected to bring the patient back for talo-navicular/naviculo-cuneiform arthrodesis utilizing non locking plate and cortical screws (Figure 6).

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Abstract:

Gunshot wounds are relatively common injuries that often require surgical management either orthopedic or otherwise. The current paper describes a case of a gunshot wound to the tarsal navicular with a stepwise account of the management and outcome. The patient was followed for about one year and has since returned to normal activity without any complaints, complications or limitations.

Technique:

A 22 year-old male, who was shot in the right foot while involved in an altercation, presented to the Sinai-Grace Hospital Emergency Department immediately after the injury. The patient has a history of SVT for which he underwent cardiac catheterization about 5 years prior. He denies illicit drug use and admits to social alcohol and tobacco use, although there was no documentation as to how much or how often.

On presentation the patient was evaluated by the on call trauma team and cleared of any other injuries other than the one sustained to his right foot. On examination the patient had an entry wound measuring about 1.50 ft from the tarsometatarsal aspect of the midfoot. There was no palpable bleeding and neurological exam was unremarkable. Patient had moderate swelling to the midfoot with no infection or wound. There was a palpable thrill over the anterior aspect of the foot. He did have Excoriations Hallux Longus, Flexor Hallux Longus, Tibialis Anterior and Posterior Tibial tendons intact. X-ray and CT scan (Figure 2) were obtained and showed a large diaphyseal fracture of the talus which did not involve the naviculocuneiform joints. The patient was examined the following day and had a stepwise account of the management and outcome. The patient was started on IV ancef every eight hours in combination with appropriate antibiotics for approximately 4 weeks in order to allow for NPO status as well as OR and anesthetizing availability for irrigation and debridement of the wound opened round, removal of bullet and application of external fixation to both stabilize the fractured bones as well as to distract the Talonavicular and Naviculocuneiform joints. Under General Anesthesia, the bullet was easily identified and removed from the entry wound and sent for sterilization prior to being handed to the proper authorities (3). Pins were specifically placed in the distal tibia, calcaneus, the medial cuneiform as well as the base of the 5th metatarsal and distraction was applied to the joints adjacent to the Navicular (Figures 4 and 5). The patient's open wound was left open and packed with sterile dressing.

The decision was then made to bring the patient back for talo-navicular/naviculo-cuneiform arthrodesis approximately 4 weeks after that it was then elected to bring the patient back for talo-navicular/naviculo-cuneiform arthrodesis. The patient was discharged within 24 hours of this initial intervention and followed for about one month on a weekly basis in the Foot and Ankle Trauma Clinic until all wounds had healed. Approximately 4 weeks after that it was then elected to bring the patient back for talo-navicular/naviculo-cuneiform arthrodesis utilizing non locking plate and cortical screws (Figure 6). The patient was then placed in posterior mold fiberglass cast for one month at which point he was transitioned to normal shoe gear and full weight bearing. The patient returned for normal physical activity at 6 weeks and has no complaints to date.

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