

Treatment of Critically Sized Defect of the First Metatarsal with Autogenous Bone Grafting

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The Orthopedic Center

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Introduction

- First metatarsal fractures are rare, with only a 1.5% prevalence reported in the literature.¹
- A traumatic disruption of the integrity of the first metatarsal, if left untreated, can affect gait and cause pain^{1,2}
- Factors to consider when treating large defects of the first metatarsal are length of the first metatarsal, soft tissue coverage, morbidity of donor site, and infection.
- Autogenous bone grafts is the gold standard in post-traumatic reconstruction of large metatarsal defects. Defects less than 2 cm and up to 4 cm have been shown to be successfully treated with autogenous bone graft techniques.
- Fixation options in cases of soft tissue defect should include external fixation initially, with possible internal fixation once infection has been ruled out.
- A disadvantage of using external fixation is the risk of pin site infection.
- To our knowledge, there is only one study published in the literature that shows successful healing of a defect larger than 4 cm in the first metatarsal²

Case Report

- A 53 year-old-male presented to the Emergency Department after sustaining a traumatic crush injury to his left foot. Significant displacement and comminution noted to the first metatarsal (Fig 1-2). Dorsalis pedis artery and extensor tendons were intact.
- Appropriate open fracture protocol was initiated including cultures, tetanus prophylaxis, intravenous antibiotics, splinting of the extremity and urgent operative intervention. An irrigation and debridement, application of a mini external fixator, and percutaneous pinning was performed (Fig 3-4).
- The mini external fixator was left on for approximately eight weeks with an additional two washouts performed during that time period. A bone stimulator was started at four weeks post-operatively. Final open reduction and internal fixation with autogenous iliac bone crest and a 6-hole plate was performed about nine weeks after initial injury.
- The patient began weightbearing at ten weeks post-operatively. He is currently four years status post surgery and is in a pair of custom fabricated orthotics and is pain free (Fig 5-6).

Figure 1:



Figure 2:



Figure 3:



Figure 4:



Figure 5:



Figure 6:



Discussion

- The literature on autogenous grafting of post-traumatic first metatarsal defects is limited.
- Authors have commented on the poor success of autogenous avascular grafting in defects larger than 5 cm.⁵⁻⁷
- Makrinis et. al described the masquelet technique as an effective procedure for an extensive first metatarsal defect².
- Several studies have reported the use of vascularized fibular grafts in treatment of metatarsal defects which have been very successful^{3,5}
- We present treatment of a five cm first metatarsal defect with iliac crest avascular bone graft with successful results.
- Well designed randomized, controlled trials are needed to raise the low level of evidence for this subject.

References

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