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Case Report

Antibiotic Hydroxyapatite Impregnated Bulk Autograft for Traumatic Large Bone Void. Technique & Case Report

Ahmed Aljawadi^{1*}, Noman Jahangir¹, Adam Reid², Jason Wong² and Anand Pillai¹

¹Department of Orthopaedics, Wythenshawe Hospital, Southmoor road, Wythenshawe, Manchester, M23 9LT

²Department of Plastic Surgery, Wythenshawe Hospital, Southmoor road, Wythenshawe, Manchester, M23 9LT

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ABSTRACT

Background: Mid-foot open fractures are rare, and usually presents with high energy trauma. Staged approach for the management of open midfoot fractures was described by few authors.

Case presentation: Up to authors best knowledge, this is the first article describing the management of mid-foot open fracture that presented 6 weeks post injury and had absent medial cuneiform at presentation, with multi-fragmentary fracture of middle and lateral cuneiform associated with fracture of proximal second, third and fourth metatarsals.

Management and Outcomes: Management involved conjoint ortho-plastics care, External fixation, with iliac crest graft covered with Gentamicin Eluting Injectable Bone Graft Substitute (Cerament-G) to replace missing medial cuneiform, free Superficial Circumflex Iliac Artery Perforator (SCIP) Flap. This surgical approach resulted in successful union of iliac crest graft restoring the medial cuneiform alignment, with no evidence of infection.

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Case Presentation

Open fractures of foot are rare with no definitive known evidence of epidemiology in literature [1]. We are not aware of any open foot fractures presented in literature with loss of medial cuneiform. We present an open Gustilo Anderson IIIB midfoot fracture seen at 6 weeks post injury. A 23 years old fit and well gentleman had road traffic accident with crush type of injury to the foot while visiting a foreign country. He had absent medial cuneiform with multi-fragmentary fractures of middle and lateral cuneiforms associated with fracture of proximal second, third and fourth metatarsals. He had wound on dorsal aspect of foot approximately 15 × 8 cm extending from medial to lateral aspect. He was initially managed by debridement and splint. He came back to UK and had a debridement and external fixation at one of the peripheral units and subsequently referred to tertiary unit with orthoplastic facility at around 6 weeks mark. The patient was not diabetic or smoker.

Surgical Technique and Outcomes

As a preoperative workup, patient was assessed by plastic surgeons and planned to have a free microvascular flap. CT scan with 3D reconstruction was done to assess bone defect and planning (Figure 1-4). The wound had healthy base with some slough at the periphery which was debrided. Iliac crest autograft was harvested and shaped to fill the gap left by loss of medial cuneiform. Articular cartilage of navicular and base of first metatarsal was debrided to encourage fusion. Autograft was covered with Gentamicin Eluting Injectable Bone Graft Substitute (Cerament-G) to replace the medial cuneiform and bring medial column to length (Figure 5-8). Middle, lateral cuneiforms and metatarsals fractures were sticky so intra-operatively, a decision was made to continue managing them expectantly. Another reason to avoid any internal fixation was delayed presentation of open fracture. Tibialis anterior tendon was repaired, and external fixator was adjusted. A free Superficial Circumflex Iliac Artery Perforator (SCIP) Flap harvested from right side to replace the soft tissue defect. Patient was kept Non

*Correspondence to: Ahmed Aljawadi, Department of Orthopaedics, Wythenshawe Hospital, Southmoor road, Wythenshawe, Manchester, M23 9LT; E-mail: Ahmed.aljawadi@doctors.nt.uk

weight bearing for 8 weeks postoperatively, and soft tissues healed well. His radiographs at 5 months showed complete healing and overall position of foot was maintained (Figure 9, 10). His soft tissues healed well with no signs of infection.



Figure 1-4: Pre-op CT scan.

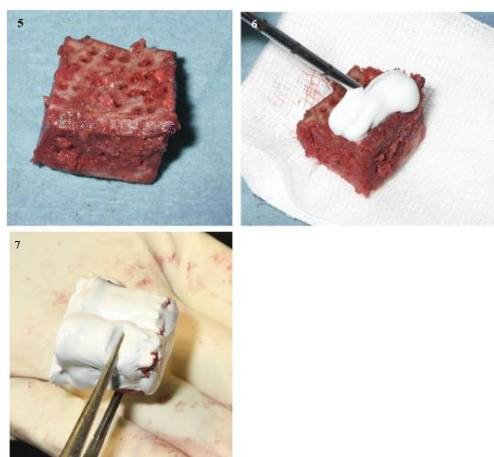


Fig. 5-7: Harvested Iliac Crest Bone Graft and Cerament G.



Figure 8: Intraoperative Fluoroscopic Image Showing Bone Graft Used to Replace the Missing Medial Cuneiform.

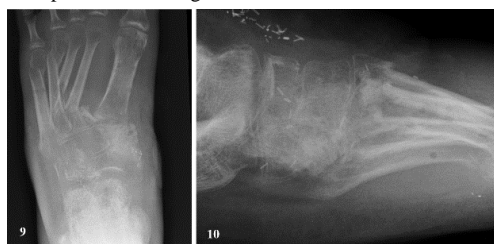


Figure 9 - 10: Follow-up XR at 5 months Post-Operatively.

Discussion

Midfoot injuries are rare and usually the result of high energy trauma and often happens in context of multiple trauma [2]. Isolated Medial cuneiform fracture reported few times in literature [3, 4]. Chandran et al. (2006) reported 40% malunion rate in complex midfoot fractures, with more than half of the patients had problems with weight bearing and tiptoeing with associated long-term morbidity [5]. Staged surgical approach for management of complex midfoot fracture was assessed by Kadow et al 2014 [6]. Staged approach included bridging external fixation followed by the definitive internal fixation to allow time for soft tissue to settle in patients with extensive soft tissue injuries. The study recommended that staged surgery in a carefully selected patients was successful to restore anatomical alignment and was associated with reduced wound complications. Up to authors' best knowledge this is the first article describing the management mid foot injury involved Gustillo III B fracture of mid-foot tarso-metatarsal bones with absent medial cuneiform, which presented 6 weeks after injury.

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