

Long-term Outcome of a Permanent PMMA Spacer in a Complex Charcot Reconstruction

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Statement of Purpose

Charcot Neuroarthropathy (CN) is a severe and potential limb threatening condition. This musculoskeletal disorder places the patient at high risk for complications including ulcerations, infections, and limited functional ability. When surgical correction is indicated, often osseous and soft tissue reconstruction is required to create a braceable, functional limb. To address the infectious osseous deficits caused by CN, polymethylmethacrylate (PMMA) spacers have been historically utilized as a temporary spacer to address the infection and dead space created by the resection of bone. With the use of a PMMA spacer as a permanent osseous alternative, we can avoid repeat surgeries, eradicate infections and maintain adequate functionality of the limb.

Literature Review

Elmarsafi et al validated the utility and longevity of permanent PMMA-AEC (antibiotic eluted cement) spacers in the infected foot by documenting 14 retained spacers and 6 successful spacer exchanges in 30 high-risk patients, with a mean follow-up period of 52 months giving a 66.7% salvage rate (1). In October 2017, Elmarsafi et al published a follow up study further validating the use of PMMA spacers as an invaluable tool for high risk limb salvage patients (2). Due to the paucity of literature on this subject, it is important for replication and further discussion to substantiate the validity of PMMA spacers as a long term spacer.

Pre-Operative Clinical and Radiographic Imaging



Fig 1a: Pre-operative clinical image of the plantar view of the foot categorized as Eichenholtz Stage I with osseous destruction and dislocation and a Stage II/III by the Sanders and Frkyberg criteria; Fig 1b: Pre-operative radiographic medial oblique view of the left foot; Fig 1c: Pre-operative clinical image of the lateral view of the foot; Fig 1d: Pre-operative radiographic lateral view of the left foot

Case Study

We present a case of a 62 year old Hispanic male with a history of diabetes for one year that presented to the clinic with dull and achy pain which was a 5 on a scale of 1-10. He also complained of swelling for about 12 weeks on his left foot. The patient is a farmer and a highly functionally demanding person. Upon presentation, the foot was categorized as an Eichenholtz Stage I with osseous destruction and dislocation. In addition, the foot was also categorized as a Stage II/III by the Sanders and Frkyberg criteria. The severe dislocation and instability of the medial and lateral columns of the foot further complicated this patient's condition. It was determined that surgical intervention would be required for this patient to create a functional and braceable limb.

Immediate Post-Operative Radiographic Images



Fig 2a: Immediate post-operative dorsoplantar view radiographic image; Fig 2b: Immediate post-operative medial oblique view radiographic image; Fig 2c: Immediate post-operative lateral view radiographic image

During the first operation, the cuboid was determined to be osteomyelitic, and thus a cuboidectomy was performed. In addition, a 6.5 mm screw and plate was used to fuse the medial column. An initial PMMA spacer, infused with vancomycin and gentamicin, was placed to fill the void of the resected cuboid. The lateral column did not receive any fixation and there were no post-operative infections. The PMMA spacer was determined to be used as a permanent spacer. Following radiographic confirmation of osseous healing, the patient was placed in a CROW (Charcot Restraint Orthotic Walker). Following 12 months of successful/ulcer-free weight-bearing in a CROW walker, the patient was transitioned to a custom, extra-depth diabetic shoe.

Analysis and Discussion

Our case examined the long term use of a PMMA spacer to address the osseous void that was created by the removal of the cuboid bone. The decision was made to use the PMMA spacer instead of a cadaveric, autograft or synthetic allografts. PMMA is a minimally porous acrylic polymer formed by mixing two sterile components (3), that acts as a space filler creating tight spaces, and holding implants against bone acting as a grout (4). Utility of PMMA is rather common in the lower extremity, with or without an antibiotic bath, to serve as a temporary fill. Antibiotic-submerged PMMA spacers have been deemed a beneficial tool in limb-salvage procedures as can be seen in this study and in previous literature by Elmarsafi et al. This case is an example of a successful approach as an alternative to the classic reconstruction procedures that currently exist.

12 Month Post-Operative Radiographic Images



Fig 3a: Immediate post-operative dorsoplantar view radiographic image; Fig 3b: immediate post-operative medial oblique view radiographic image; Fig 3c: Immediate post-operative lateral view radiographic image

References

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