



TECHNIQUE GUIDE

Three-Dimensional Patient-Specific Cut Guides for Correction of Charcot Midfoot Deformities

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Abstract

Charcot arthropathy of the foot and ankle is a challenging pathology that can require intensive surgical reconstruction. Most often the pathology involves breakdown of the midfoot. Osteotomies of the midfoot to resect and correct the deformity can be unpredictable and time-consuming. With the advent of 3D printing, we propose a new technique utilizing custom cut-guides for midfoot osteotomies in Charcot reconstruction. This provides a reproducible, accurate and pre-planned direction for reconstruction. We present a series of four patients who underwent Charcot reconstruction with custom cut-guides with discussion of the pre-operative planning period and surgical technique.

Keywords

Charcot, Osteomyelitis, Midfoot arthrodesis, Patient specific instrumentation, 3D printed implant

plantigrade and coaxial to the lower leg to facilitate tibio-calcaneal alignment with axial loading.

Internal pedal amputations” date back to as early as 1887 when midfoot amputations were done in patients with skeletal tuberculosis [5,6]. The rationale behind internal pedal amputations is to preserve bone

midfoot. Midfoot osteotomies are a commonly-used to restore a functional forefoot to rearfoot relationship. The osteotomy must be planned to correct the planes of deformity which can be technically challenging both in planning and surgical execution [7].

Patient specific cut guides using computed tomography and three dimensional planning have

plastic, and maxillofacial surgery. These guides have been used in mandibular reconstruction, total knee arthroplasty, total hip arthroplasty, and long bone corrective osteotomies. In the realm of the foot and ankle they have been utilized in total ankle arthroplasty

in many facets of deformity correction but has yet to be described in the use of foot deformity in the presence of Charcot neuroarthropathy.

We present a novel adaptation of the midfoot osteotomy with use of patient-specific three dimensional cut guides to surgically correct midfoot

Introduction

The surgical management of Charcot neuroarthropathy is one of the most challenging aspects of modern-day foot and ankle surgery. This progressive, debilitating condition has a strong predilection for the joints of the foot and ankle, particularly the midfoot with around a 60% incidence of tarsometatarsal joint involvement [1-3]. Surgical reconstruction of Charcot deformity aims at creating a stable, plantigrade and ulcer-free foot, with the “superconstruct” method proving to be the gold standard of care [4]. Proper

Citation: Gulati AR, Johnson L, Highlander PD (2023) Three-Dimensional Patient-Specific Cut Guides for Correction of Charcot Midfoot Deformities. Int J Foot Ankle 7:082. doi.org/10.23937/2643-3885/1710082

Accepted: April 03, 2023; **Published:** April 05, 2023

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