

Concepts in beaming of the midfoot in surgical treatment of charcot neuroarthropathy

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Abstract

Charcot neuroarthropathy is a devastating complication of neuropathy, particularly in those with diabetes mellitus. The high complication rate and economic burden suffered by those with this condition calls for treatment methods that allow patient's with this pedal deformity to ambulate. The most common presentations of Charcot foot involve the tarsometatarsal joints and the hindfoot. Certain radiographic parameters, including cuboid height and Meary's angle have also been shown to increase the risk of ulceration, a major risk factor for amputation when paired with deformity. In these instances, beaming the medial and lateral columns of the affected foot using large diameter screws allows for correction of deformity and distribution of weightbearing forces that these patients' feet are unable to endure. A previous retrospective cohort study has shown improvement in radiologic alignment in patients that underwent medial, lateral, and hindfoot beaming. The benefit of particular screw design and implant material are compared and discussed. Furthermore, various techniques and constructs will be reviewed. Cases can commonly be complicated by concomitant soft tissue infection and osteomyelitis, which is also discussed.

Keywords: Neuropathy; Midfoot; Orthopedics

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Introduction

Traditionally, Charcot neuroarthropathy (CN) of the midfoot was treated non-operatively with off-loading in a total contact cast (TCC). Although promising findings were reported following the introduction of the super construct notion, more research on this topic is required. The outcomes of a sequential series of 20 patients operated with the superconstruct idea are provided, as well as an analysis of non-operative versus operative treatment.

From July 2017 to June 2020, twenty patients were operated on. The average age was 58 years (50-80), and the average weight was 116 kg (68-156), resulting in a BMI of 31. (26-45). Preoperative patients were offloaded in a TCC until there was less edoema and skin temperature measurement or the ulcer healed, which took around 16 weeks. The surgery was performed without the use of a tourniquet, with a typical medial and lateral incision. The average duration of follow-up is 24 (5-40) months. The average time for a surgery was 227 (150-315) minutes. Medial column fusion was required in five cases as an isolated procedure, 12 cases in conjunction with lateral column fusion, and three cases in conjunction with talocalcaneal fusion.

Four individuals had their implants partially removed. All of the wounds healed with a favourable clinical outcome. During surgical mobilisation, two patients experienced an acute Charcot episode in the ankle joint. One patient suffered a significant talus collapse, leading in a below-knee amputation, for a 5% amputation rate.

At the time of the follow-up radiographic evaluation, all patients had bone union. Nineteen patients are ambulated in orthopedic shoes at latest follow up, giving a 95% satisfactory result.

In modern times, demographics have changed dramatically; diabetes mellitus is now the most common cause of Charcot neuropathy; the incidence ranges from 0.1 percent to 5 percent in diabetic neuropathy and is a serious complication that increases the morbidity and mortality of diabetic patients. Traditionally, the primary treatment of acute Charcot disease has been non-operative, with off-loading treatments such as total-contact casting (TCC) or similar orthotic appliances (for example, CAM boots) being used. The typical practise is to use this therapy modality as a temporary measure during the acute and active stages of the disease.

This notion has recently been called into question. Some authorities advocate for early surgical stabilisation even during the fragmentation stage of Charcot arthropathy. However, this is a heated area for dispute and controversy among scientists, and additional research is needed to obtain a widely acknowledged conclusion. When there is severe deformity and instability that cannot be controlled with off-loading bracing, when ulceration occurs or is unavoidable, and when there is accompanying osteomyelitis or discomfort, surgical therapy in Charcot disease is needed. The Charcot's foot is a catastrophic consequence of sensory neuropathy produced mostly by type 2 diabetes. Because it has a large impact on these vulnerable patient cohorts, it is a hot topic of research and controversy. The main short and long-term goal of the treatment is to give the patient with Charcot foot arthropathy the ability to walk with a plantigrade, functional foot, enhancing their quality of life and lowering morbidity and mortality. The therapy is a

substantial undertaking because the pattern of the abnormalities varies greatly between individuals, and each case presents a unique set of problems to solve. Internal and external fixation techniques, as well as their combination, are used in surgical reconstruction. Which method is more efficient and appropriate is a perennial source of debate and disagreement in the foot and ankle surgery community, since scientific evidence is still conflicting and lacking in offering definitive solutions. We discovered several general themes after analysing the literature. For starters, many surgeons favour internal fixation procedures because they are simpler and more comfortable in regular practise. Other doctors, on the other hand, prefer external fixation techniques to address more difficult abnormalities through staged surgeries, especially if the soft tissue envelope is in poor condition. It is also worth noting that combining both to capitalise on each offer is becoming increasingly popular.

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