

CASE REPORT

Salvaging The Limb - Outcome Of Hindfoot Fusion In Chopart's Amputee With Diabetic Charcot Arthropathy

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ABSTRACT

Chopart's amputations often have better outcome compared to higher level amputation with limb length preservation, larger weight bearing surface, and lower energy demand. Diabetic Charcot arthropathy and severe foot deformity is a treatment challenge. Reconstructive surgery with hindfoot arthrodesis is viable for plantigrade and stable foot, more fitting for orthotic shoe wear. We described a 62-years old male with underlying type 2 diabetes mellitus, presented with infected left diabetic foot ulcer and treated with Chopart's amputation. Debridement of the Chopart's stump was done, the wound healed and patient ambulating with a shoe filler. A year later, he noticed a progressive varus deformity of the left ankle following a trivial fall. He was in pain thus unable to bear weight. The hindfoot was in equino-varus deformity with tight Achilles tendon and uncorrectable, leading to left hindfoot fusion. Patient was able to progress to full weight bearing ambulation with no pain post-operatively.

Keywords: Chopart's amputation, Hindfoot arthrodesis, Charcot's arthropathy

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INTRODUCTION

Diabetes Mellitus causes complications like neuropathy, nephropathy, retinopathy and dermatopathy. The prevalence of Diabetes Mellitus in Malaysia increased from 17.5% in 2015 to 18.3% in 2019 (1). Charcot arthropathy is described as neuroarthropathy of the joints and bones which are non-infectious and progressive in nature that leads to fractures, multiple joint dislocations and disruption of bone architecture. It may cause permanent foot deformation with potential of limb loss, commonly as a late complication of Diabetes Mellitus. The goal of treatment is to achieve a stable, plantigrade and shoeable which able to prevent recurrent ulceration. The reconstruction surgery in Charcot foot involves arthrodesis of the joints, which needs a stable fixation. Surgery in a Charcot foot with an amputated diabetic foot involves a higher risk of wound infection and higher rate of fusion failure. Careful selection of patients, pre-operative optimisation, good compliance of patients, with regular follow-up are necessary for a successful outcome for arthrodesis.

CASE REPORT

A 62-years old male, with underlying type 2 diabetes

mellitus on insulin. First presented in 2015 with infected left diabetic foot ulcer and treated with Chopart's amputation. Throughout the next 2 years, he had multiple admissions and debridement of the Chopart's stump were performed. The wound healed and patient ambulating with a footwear which have a filler inside the shoes.

A year later, he noticed a progressive varus deformity of the left ankle following a trivial fall. Patient was in pain thus unable to bear weight using the footwear which have a filler inside the shoes, requiring the aid of walking frame. His daily activity and occupation was affected.

On clinical examination, the hindfoot is in varus deformity with slight equinus deformity (Fig. 1A- 1B). The Achilles tendon is tight. No wound or callosity noted on the Chopart's amputation stump. The deformity is not correctable. There is reduced in ankle dorsiflexion 0-10 degree, and ankle plantar flexion 0-15 degree.

The radiographs of the left ankle showed a post Chopart amputation, with Charcot arthropathy changes in reconstruction and reconstitution phase according to Eichenholtz's classification (Fig. 1C-1D). There are multiple bone fragments with sclerotic edges involving the medial and lateral malleolus, and the talus bone. The tibiotalar and subtalar joint is subluxated and articular surface is not congruent. Serial blood infective markers were in normal range.



Figure 1: Pre-operative photographs showing the left foot post Chopart's amputation in equinovarus deformity from A-anterior view, B-posterior view. Pre-operative radiograph on C and D showing Charcot's arthropathy changes with multiple bone fragments with sclerotic edges.

We performed a left hindfoot fusion using the Expert Hindfoot Arthrodesis Nail (Synthes®) using a medial and lateral ankle approach. Intraoperatively, there were abundance of fibrous tissue, bone debris and bone loss (Fig. 2). The bony fragments from medial and lateral malleolus and the talus were used as autologous bone graft. Additional tibiotalar screw is used to increase the stability of the fusion due to multiple bony fragment (Fig. 3).

Post-operatively, patient was advised to monitor the wound with regular dressing at the clinic. He was put on below knee back slab and instructed for non-weight bearing ambulation until the wound healed. He attended regular physiotherapy for limb strengthening and advised to use crutches for ambulation. After the arthrodesis, patient was advised to use partial foot prosthesis.

After a year post-operative, the wound healed completely. Based on clinical and radiological parameters, fusion has been achieved (Fig. 4). Patient was able to progress to full weight bearing ambulation without any pain. There is an improvement in the mean SF-36® scoring comparing pre-operation and 6-month post operation, especially



Figure 2: Intra-operative photographs showing A) bone loss after all the fragmented bone been removed B) Bone graft been applied C) bone graft been covered by DBX putty.



Figure 3: Post-operative radiograph showing Charcot hind-foot deformity corrected using hindfoot arthrodesis nail.



Figure 4: A) and B) showed a clinical photograph at one-year post-operative of a plantigrade foot with stable fixation and healed wound. C) and D) is the radiograph one-year post-operative showing fusion of the hindfoot had been achieved.

in physical functioning (15 to 45), role limitations due to emotional problems (0 to 33), pain (32 to 75) and general health (50 to 60). Mean Visual-Analogue-Scale Foot and Ankle (VAS FA) improved from 35.5 to 64.5. At 2 years follow-up, both the SF-36® and VAS FA scale scores improved significantly without complication.

DISCUSSION

Charcot neuroarthropathy presents as a swollen, warm, erythematous area around the foot or ankle. Nowadays, Diabetes Mellitus remained as the most common cause. Diabetic charcot neuroarthropathy can be classified with systems which predict the outcome and prognosis. The most common used is anatomic system described by Sanders and Frykberg (2). The evolution of diabetic neuroarthropathy of the foot has been discerned by radiographic classification used by Eichenholtz (3), divided into three different stages.

Chopart's amputations have superior function compared to higher level amputation as they have better preservation of limb length and better sensory perception. It also acts as a terminal weight bearing and being able to weight bear with larger surface. It is more cosmetically acceptable with less disturbance of self-confidence. In the lower extremity, the higher the levels of amputation required higher energy demands for ambulation. Therefore a more distal amputation is better for the patients with good functional outcomes.

In Chopart's amputations, due to the dynamic and static imbalance of tendons, the heel will fall into varus and equinus deformity due to rebalancing of the tendon unable to be done in view of lack of healthy anterior soft tissues. The equinus deformity will stretch the anterior soft tissues causing the anterior scar to move towards the plantar weight-bearing zone, resulting in anterior wound dehiscence. Hindfoot arthrodesis has been used to relieve tension and promote healing. In a case series of 24 Chopart's amputees where hindfoot fusion were performed shown good results where only 3 cases had wound breakdown requiring further operation. The time taken for patient to bear weight with a prosthesis ranged from 6 weeks to 24 weeks (mean 10). The mean AmpuPro score was good with none having further skin dehiscence of pressure point on the stump. However, there has been no literature reporting on hindfoot arthrodesis in Chopart's amputee with Charcot arthropathy.

Studies have reported on the good outcome of one-stage correction of deformities in Charcot arthropathy using retrograde intramedullary hindfoot arthrodesis nail. In a case series of 20 patients, limb salvage had been achieved in all patients. Whereas 80% of patients with ulceration achieved good healing, and able to regained independent mobilisation (4).

In another series of 21 patients of hindfoot fusion for Charcot osteoarthropathy using curved retrograde nail, complete tibiototalcalcaneal fusion was achieved in 16 of 21 patients (76%). Hardware failure occurred in 7 cases (30%), and further managed which later able to achieve consolidation. In five cases, postoperative hematoma occurred and had to be drained. In another 8 cases (35%) wound edge necrosis was treated with local wound care. A secondary infection occurred in 2 cases resulting in below knee amputation (3). Fixation via intermedullary fixed angle device with a bone graft helps to provides a safe and rigid fixation especially in patient with charcot neuroarthropathy (4). Fixation stability is important in determining the parameters which influence mechanical stability of the implant and risk of failure (5).

In our patient, a Chopart's amputee with Charcot arthropathy, hindfoot fusion has been performed to correct the foot deformity, reduce the pain and increase the mobility of the patient. After one-year follow-up period, there is no sign of wound infection and there is good progress of tibiototalcalcaneal fusion rate. The patient is able to achieve a stable plantigrade foot, ability to fully weight bearing and better fitting together with the shoe filler. Despite a good short-term result, all diabetic patients still require a regular follow up to review the progression of the charcot neuroarthropathy and the possibility for future surgical intervention if needed.

CONCLUSION

In conclusion, hindfoot arthrodesis can be used to correct the hindfoot deformity which able to achieve fusion with a good functional outcome in a Chopart's amputee with Charcot arthropathy.

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