Isolated Talonavicular Arthrodesis as an Option for Severe Rocker Bottom Foot Deformity: A Case Report

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We report on a case of post-burn contracture and right foot deformity in a 37-year-old female who underwent two surgical interventions at the age of seven years. The patient remained well without any associated problems until she presented to our hospital at the age of 37 years with severe pain and right foot deformity. A few treatment modalities have been reported, and amputation has been suggested as the best approach. However, our patient was treated with a talonavicular arthrodesis and a soft tissue procedure, which resulted in a stable, plantigrade, and pain-free foot with an unsupported, bipedal gait.

Key Words: Rocker bottom foot, Arthrodesis, Foot deformities

The objective of arthrodesis of the foot is to correct the deformity of the involved joint and achieve a stable, pain-free plantigrade foot. This provides a better functional outcome for the patient with the increased stress in the surrounding non-fused joints.

An arthrodesis of the foot joint can be performed in situ in patients with a chief complaint of pain in the foot but has no foot deformity, or in patients who cannot maintain gait stability after surgery for correction of the foot deformity.

Double and triple arthrodesis are common procedures that are often performed to restore and maintain the physiologic alignment of the hindfoot. It is also performed in severely deformed rockerbottom foot correction surgery where we reconstruct a destroyed midfoot joint. The need for an isolated talonavicular (TN) joint fusion can arise, although rarely, in cases of navicular fracture, isolated degenerative or idiopathic TN joint etiology.

Gross visualization of the entire cartilage area is required for complete denudation of the cartilage. Thus, isolated fusion of the TN joint has been associated with a high non-union rate due to poor visualization of the entire cartilage area, and the great chance of avascular necrosis (AVN) of both talus and navicular. It is also difficult to obtain a stable fixation because of the morphometric shape, the short length and the small size of navicular bone.

CASE REPORT

A 37-year-old female with a history of burn injury to the right foot was presented to our clinic with a sharp pain on the navicular bone that was aggravated with weight bearing and right foot deformity area. The patient reported being burned by hot water at the age of 6 months, and was operated twice at the age of 7 years to correct the foot deformity (details not available). For the past 36 years, the patient has been doing well and walking with minimal pain. However, she noted that the pain has been increasing in severity within the last year and she was unable to walk, and complained of pain even at rest. There was no history of recent trauma.

Upon physical examination, the patient had an antalgic gait with limb shortening of 3.5 cm on the right lower extremity. She also had a valgus hindfoot, abducted midfoot and scarred skin over...
her right anterolateral ankle (Fig. 1). There was an anterolateral post-burn scar and band contracture (Fig. 2) on the patient’s right ankle, and a tender bony prominence on the surface of the medial midfoot. The second distal toe was also amputated and the toe tip was protruding over the skin, giving rise to a corn. There was no evidence of previous or ongoing infection.

Radiologic examinations (Fig. 3) revealed a talo-first metatarsal angle of 75° on weight bearing anteroposterior (AP) view and 60° on lateral view. The angle of the calcaneal pitch was 17° while the midfoot was abducted, pronated, and the navicular bone held down against the floor. Scanogram showed a 3.5 cm shortening of the right lower limb (Fig. 4).

The patient underwent the TN fusion using two partially thread-ed cancellous screws (Fig. 5). Both peroneal tendons of the lateral compartments were lengthened and the extensor digitorum ten-don was transferred to the extensor hallucis longus (EHL) muscle. Then we excised the tip of the second toe, along with the corn and anterolateral scar of the right foot. A myocutaneous free flap was obtained from the ipsilateral latissimus dorsi and used to cover the defect. Postoperatively, the patient was kept on a cast stabilization of non-weight bearing for 6 weeks, followed by 6 weeks of gradual weight-bearing as tolerated.

Three months postoperatively, the patient obtained a plantigrade foot and was able to walk pain free without any support (Fig. 6). Radiologically, an assessment of the AP talo-first metatarsal angle revealed 41° with forefoot valgus and 11.8° on lateral view, while the calcaneal pitch angle measured 5° (Fig. 7).

**Figure 1.** Burn scar over extensor digitorum longus tendon (arrow).

**Figure 2.** Anterolateral scar over ankle.

**Figure 3.** Radiologic examinations revealed a talo-first metatarsal angle to be 75° on weight bearing anteroposterior view (A) and 60° on lateral view (B).
DISCUSSION

There has been very few reports published on the treatment of rocker-bottom feet deformity complicated by burn contracture.

This condition is of rare occurrence. Besides, it is very difficult to generalize the specific treatment plan for all cases because each case is unique and has specific conditions.7,8)

Lateral column lengthening is generally used to correct hindfoot valgus and severe flat foot deformity. However, our patient has a very tight soft tissue tension on the lateral aspect of the foot despite previous resection, scar band release, and lateral side tendon lengthening. It is generally believed that isolated TN fusion is not commonly recommended for the relieve of pain or functional restoration of the midfoot,9,10) with the great chance of AVN, non-union, malunion and progressive posttraumatic arthritic changes. However, in our particular case, isolated TN fusion became the treatment of choice because the patient suffered from a severe shortening of the lateral ray, along with an extreme valgus of the forefoot.

A double or triple arthrodesis would require a substantial amount of bone resection, especially at the talar neck. This is not always a good choice because it leads to further shortening of the foot.

It would be prudent to mention here that one of the presenting

Figure 4. Scanogram showed a shortening of 3.5 cm of the right lower limb.

Figure 5. Postoperative radiographs showed talonavicular arthrodesis state with two cannulated screws. Anteroposterior (A), lateral (B), and hindfoot (C) alignment view on standing.

Figure 6. The patient obtained a plantigrade foot and was able to walk pain free without any support at three months postoperatively.
The chief complaint of the patient was difficulty in managing her daily footwear. The patient’s feet would slide off her shoes with every step. Amputation at the level of trans-metatarsal would have aggravated this problem postoperatively.

Next, we also excised the second toe tip because it was protruding out of the dorsum of the foot and producing a corn. Peronei lengthening was done to correct the overall abduction inclination of the foot. Transfer of the extensor digitorum longus to the EHL had caused the force of the tendon to be diverted medially. The anterolateral thigh flap was based on the perforator derived from the descending branch of the lateral circumflex femoral artery.

An alternative treatment option for a patient with severe rocker bottom deformity is to amputate the foot at the level of the trans-metatarsal bone. The rationale is that such procedure is less complicated and has a rapid recovery time. However, the patient refused this treatment modality.

Therefore, we performed an isolated TN arthrodesis of the foot and the lateral side soft tissue reconstructive surgery. This procedure can be an excellent treatment option for the patients with a severe rocker-bottom foot deformity and especially in selected cases like this where the foot length is shortened, and this procedure would result in a reduction of lever arm after fusion.

REFERENCES