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Comparative study of complete subtalar release and Joshi's external stabilization system in the management of neglected and resistant idiopathic clubfoot

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ABSTRACT

Background: Various procedures have been used for the management of neglected and resistant clubfoot. The aim of our study was to assess the clinical and radiological correction by Joshi's external stabilization system (JESS fixator) and Simons subtalar release in resistant and neglected idiopathic congenital talipes equinovarus in children between the ages of 1 and 2 years.

Methods: A total of 50 resistant and neglected clubfeet were randomly divided into two equal groups of 25 feet each. Group I was treated with JESS fixator and group II was treated with complete subtalar release as described by Simons. Assessment of correction achieved was done both clinically and radiologically. Functional outcome was assessed with Ponseti scale.

Results: The change in clinical deformity and radiological correction of deformity were statistically significant within each group, but not significant when compared to each other. In group I excellent results were obtained in 17 (68%) and good in 8 (32%) of the feet. In group II, excellent results were found in 16 (64%) and good in 9 (36%) feet out of the 25 feet. Pin-site infections were seen in two cases in group I and serious skin problems occurred in two feet in group II.

Conclusion: We conclude that there were no statistical significant differences between the outcomes of the two techniques in this short-term follow-up of 2.4 years. Thus, functional distraction using JESS can be utilized as an alternative method in cases of neglected and resistant clubfoot.

1. Introduction

Resistant and neglected clubfoot is a frequent problem faced by an orthopedic surgeon especially in a developing country. Such feet become stiff and may not be usually amenable to conservative management with casts or stretching. Callosities or pressure sores may develop on the lateral and dorsal parts of the foot once the patient starts walking [1] (Fig. 1). The optimum management of these feet is still uncertain. The treatment options include soft tissue procedures or Ilizarov external fixator application [2,3].

The complete subtalar release (Simons procedure) consists of a standard posteromedial release with additional release of the talonavicular joint, calcaneofibular joint and the interosseous ligament. Multiple studies have shown the ability of complete subtalar release to correct the deformity in cases of resistant and neglected clubfoot [4–7]. However this procedure is fraught with frequent wound complications and its results are at times unpredictable [8]. Moreover operating on poor skin with callosities can lead to wound healing problems and may not be advisable. The discovery of principles of distraction histogenesis by Ilizarov opened a new chapter in the management of complex deformities of limbs. But the use of Ilizarov fixator in patients younger than 6 years having small feet presents considerable problems as the same is bulky and difficult to manage [9]. On the basis of similar principals Joshi devised a simple external fixator (Joshi External stabilization system), in early 1990s which is especially useful for patients with small feet [10,11].

The aim of our study was to assess the deformity correction both clinically and radiologically along with functional outcomes by Simons subtalar release or Joshi's external stabilization system (JESS fixator) in resistant and neglected idiopathic congenital talipes equinovarus foot (age group 1–2 years).

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Fig. 1. Two-year-old boy with neglected clubfoot showing callosities on the dorsal and lateral aspect of the foot.

2. Materials and methods

The present study was performed with due approval of the institution's ethics committee from November 2008 to March 2010. A total of 50 feet (in 34 patients) suffering from resistant and neglected idiopathic congenital talipes equinovarus deformity (CTEV) in the age group 1–2 years were included in the study. Patients who had undergone previous surgical procedure were excluded.

These cases were then randomly allocated into two groups in a way that every alternate case fell in the same group. Patients in group I were treated by JESS fixator and those in group II were treated by complete subtalar release as described by Simons.

Patients were thoroughly examined clinically to rule out any other associated congenital anomaly and degree of deformity was noted. Anteroposterior (AP) and lateral views of bilateral feet with ankle were taken in a standardized manner and relevant radiological angles were measured to assess the deformity and range of ankle motion.

2.1. Group I

2.1.1. Joshi's external stabilization system (JESS)

No pretreatment casts were used in this group. Each set of JESS fixator consists of following standard components: Link joints, distractors, K wires and connecting rods. Surgical procedure was carried out under general anesthesia in supine position.

2.1.2. Wire insertion

Two or three transfixing Kirschner wires of 2 mm or 1.5 mm diameter were passed in the tibia perpendicular to the long axis of the leg from lateral to medial side. First of these wire was inserted at g one fingerbreadth below and behind the tibial tuberosity. The second wire was passed distally parallel to the first at a distance little shorter than the middle segment of the "z" rod.

Next the metatarsal wires were passed. Two separate Kirschner wires one in neck and the other in metatarsal shaft were passed from medial and lateral sides respectively engaging cortices of two or three metatarsals on each side. The distance between these wires was kept 2–3 mm more than the distance between the holes in the block of the distractor, using the block as a jig.

The course of posterior tibial artery was palpated and two transfixing parallel wires were passed into the calcaneum from medial to lateral side avoiding the artery and perpendicular to long axis of calcaneum along the plane of heel.

The axial calcaneal wire was passed along the long axis of calcaneum from posterior to anterior, entering from just distal to the insertion of the Achilles tendon.

2.1.3. Attachment of "z" and "l" rods

2.1.3.1. Tibial attachment. The tibial wires were attached to the middle segment of the "z" rods by link joints on the medial and lateral sides. The wires were prestressed by bringing them toward each other by few millimeters while tightening the joints. The two limbs of the "z" rods then lie perpendicular to the long axis of the tibia. One connecting rod was used to span the anterior limbs of the "z" rod, which project downward, and another to span the posterior limbs which projecting upwards. Care was taken to maintain a fingerbreadth clearance between the skin and the "z" rod and all subsequent connections to the Kirschner wires.

2.1.3.2. Metatarsal attachments. Two small "l" rods were attached to the metatarsal wires on medial and lateral sides of the foot with one limb projecting planterwards, and the angle of the "l" was placed distally and the planter projections were connected by a connecting rod.

2.1.3.3. Calcaneal attachments. Two "l" rods were attached to the transfixing calcaneal wires on either sides of the heel, in the same manner as described for the metatarsal "l" rod attachments. Behind the foot these rods were connected to each other by a connecting rod on which the axial calcaneal wire was clamped. The planter projections of the "l" rods were again connected by a connecting rod.

2.1.3.4. Calcaneo-metatarsal connection. A pair of appropriate sized distracters was attached to the calcaneal and metatarsal wires on either side of the foot keeping the distraction knobs anteriorly for sake of easier handling during distraction.

2.1.3.5. Tibio-calcaneal connection. One distractor was mounted on each side of the axial calcaneal wire connecting

i. The transverse rod between the posterior limbs of the "z" rod, and
ii. A transverse rod spanning between the hind limbs of the "l" rod.

The distraction nuts were kept distally to avoid impingement and discomfort in the popliteal fossa.