The surgical management of resistant club foot by rotation skin flap and extensive soft tissue release

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Summary. Resistant club foot remains an unsolved problem because of the complex aetiological and pathological factors, and is still seen quite frequently, especially in developing countries. The posteromedial skin contracture is a potent deforming force which is responsible for many failures or relapses. I report the results of an operation in which a rotation skin flap was combined with an extensive soft-tissue release. The age of the children was from 9 months to 10 years. The follow-up period was from one to 9 years with an average of 43 months, and in 50 cases for more than 5 years. I consider that the outcome has been excellent or good in 94 out of 100 feet.

Introduction
Although congenital club foot is common, there are problems in its treatment. The reasons for this are the complex aetiological and pathological factors which increase with age as a result of the adaptive changes which develop as the child starts walking. A high incidence of recurrence, ranging from 36 to 68% with conservative and operative treatment, has been reported by many authors [1, 3, 11]. However, there is a general agreement that manipulation and serial plaster casts, as advocated by Kite during his 45 years experience [6], still offers the best treatment for all mild and many moderate cases if it is started soon after birth. McCauley [7, 8] reviewed the literature and found that between 1930 and 1965, 25.3% of papers recommended a surgical approach; during 1965–1970 this rose to 56%. The trend is, therefore, more towards operation. In developing countries, like India, many children are not brought to hospital at an early age, or are unreliable in making return visits, which makes conservative treatment ineffective. In such a situation, operation is more likely to be indicated.

The posterior contractures, the varus deformity at the tarsal (Fig. 1) and tarsometarsal joints, plantar contractures, the abnormality of the bones and lateral contractures have all been well described. However, the contracture of the skin on the posteromedial aspect, which is a potent deforming element, and an important factor in recurrence, has received little attention. Although a large number of operations have been described which deal with the abnormal anatomy [2, 5, 12, 13, 14], the correction of the contracture of skin on the posteromedial aspect of the foot has been neglected.
The aim of the present study has been to assess the value of correction of this skin contracture, using the lax dorsolateral skin by a rotation skin flap, and combined with an extensive soft-tissue release.

**Material and method**

This surgical technique has been used at our hospital since 1974 in resistant congenital talipes equinovarus. This report describes 100 deformed feet in 67 patients who have been adequately followed up. The operation has been undertaken only in moderate and severe deformities, which remained uncorrected after conservative or surgical treatment, or with no previous treatment. It has been carried out mostly after the age of one year, with only three cases between nine months and one year of age. Fifty-five cases (83 feet) were aged under four years, nine cases (12 feet) were between four and eight years and only three cases (5 feet) were between eight and ten years of age. The deformity was unilateral in 34 and bilateral in 33. There were 52 boys (82 feet) and 15 girls (18 feet). The diagnosis was idiopathic congenital club foot in all the cases, except for two cases of arthrogryposis multiplex congenita.

**Preoperative assessment.** As well as the clinical assessment, anteroposterior and lateral radiographs were taken. The calcaneometatarsal angle was studied in the anteroposterior view [15] and the talocalcaneal area was clearly visible which is not present in the club foot [9].

Operative technique

**Marking and raising of the skin flap.** The incision consists of two parts, semi-circular in the foot and longitudinal in the leg. The circular part of the incision is marked with a divider, one prong of which is placed over the centre of the ankle joint in front, and the other is opened so as to reach behind the base of the 5th metatarsal (Fig. 2). The incision is marked from the dorsal and medial aspect of the foot to the insertion of the Achilles tendon, and it is then prolonged upwards and longitudinally along this tendon for about 10 cm. A thick flap of skin and subcutaneous tissue is raised for about 1.5–2 cm: No other incisions are necessary.

**Extensive soft tissue release.** Posterior, medial, subtalal and lateral release, together with talonavicular reduction and fixation with a K-wire [14], and tarsometatarsal mobilisation [4] was carried out in all the feet. Additional procedures included plantar fasciotomy in 50 feet, dorsolateral wedge resection in 17 feet and posterior tibial transfer in 3 feet.

**Rotation of the skin flap.** The flap was rotated medially and posteriorly, and the wound closed (Fig. 2c–d).

**Postoperative management.** A well-padded below knee plaster cast was applied in the corrected position. However, in severe deformities staged correction was carried out every 2–3 weeks under anaesthesia, with immobilisation in plaster, in order to avoid circulatory embarrassment. The K-wire was removed after 3 weeks. The period of immobilisation was from 6 weeks to 3 months. After this the child was allowed to walk in ordinary shoes.

The result of the operation was assessed clinically with regard to healing of the wound and correction of the various components of the deformity. Radiographs were also taken at follow-up, and it was found that even in a normal looking foot there was sometimes radiological undercorrection of the talocalcaneal index and/or calcaneometatarsal angle. However, substantial radiological improvement had occurred in every case whenever radiographs were taken. Clinical correction was, therefore, always relied upon when assessing the results.

**Hidden equinus.** This is present when the heel does not touch the ground while sitting on the feet, even though the foot is fully plantigrade on standing. As sitting on the feet is an important function in India for activities of daily living, the correction of hidden equinus was also considered when assessing the correction of deformity.

**Results**

The criteria used for grading the correction of deformity were:

- **Excellent** – healthy scar, the deformity fully corrected and the foot fully plantigrade without any hidden equinus;
- **Good** – a healthy scar, the foot fully plantigrade without any hidden equinus, but a minor degree of metatarsus varus present;
- **Poor** – moderate deformity with contracture of the scar, or overcorrection with a valgus foot.

All the cases were followed-up for from one year to nine years (Figs. 3 and 4) with an average of 43 months. In 50 cases, the follow-up was more than five years. The results obtained were excellent in 52, good in 42 and poor in 6.

There were only a few complications. Superficial infection of the skin edges occurred in 8 feet. These healed with antibiotics during the period of