Talectomy in patients with recurrent deformity in club foot

A LONG-TERM FOLLOW-UP STUDY

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We reviewed 24 feet in 15 patients who had undergone talectomy for recurrent equinovarus deformity; 21 were associated with arthrogryposis multiplex congenita, two with myelomeningocele and one with idiopathic congenital talipes equinovarus. The mean follow-up was 20 years. Good results were achieved in eight feet (33%) in which further surgery was not needed and walking was painless; a fair result was obtained in ten feet (42%) in which further surgery for recurrence of a hindfoot deformity had been necessary but walking was painless; the remaining six feet (25%) were poor, with pain on walking. All patients wore normal shoes and could walk independently, except one who was wheelchair-bound because of other joint problems. Recurrent deformity, the development of tibiocalcaneal arthritis and spontaneous fusion of the tibia to the calcaneum were all seen in these patients.

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Resistant deformities in patients with club foot, particularly arthrogryposis and myelomeningocele, remain a challenging problem. Talectomy has been advocated as a salvage procedure for recurrent equinovarus deformity in these patients, converting the deformity into a stable plantigrade position. Most articles concerning talectomy claim good short-term results but there have been few long-term studies. The mean follow-up in most series was 7.5 years (2 to 13). The longest is that in the paper by Cooper and Capello, with a mean of 20 years. However, almost half their patients suffered from poliomyelitis with calcaneovalgus deformity rather than equinovarus.

We described the results of talectomy in arthrogrypotic equinovarus feet in 1984, with a mean follow-up of four years. We have now followed up these patients for 20 years.

Patients and Methods

We reviewed 24 feet in 15 patients with severe equinovarus deformity who had undergone talectomy. Thirteen patients (21 feet) were diagnosed as having arthrogryposis multiplex congenita, one patient (one foot) had congenital idiopathic talipes equinovarus and one patient (two feet) a myelomeningocele. There were seven girls and eight boys with a mean age at talectomy of 5.3 years (3 to 11). The mean follow-up was 20 years (13 to 27). The mean number of operations before talectomy was two (one to three), most being a posteromedial release. In one patient talectomy had been performed as the primary procedure. All patients except one were skeletally mature at the time of final follow-up.

The operative technique used was similar to that described by Menelaus. Surgery was performed under general anaesthesia with a mid-thigh tourniquet and an anterolateral approach. As much talus was removed as possible. This is important because remnants of the talus may interfere with the position of the calcaneum within the ankle mortise and may grow, resulting in late deformity. The calcaneum was then positioned in the mortise. The fibula or the calcaneum occasionally required shaving to allow satisfactory alignment of the calcaneum. The position was maintained by a cast for three to four months. Kirschner wires were used in addition in four patients.

All patients were examined clinically to assess the appearance of the foot, the residual deformity, the level of activity, the walking tolerance and problems with wearing shoes. Standing anteroposterior and lateral radiographs of the ankle and foot were taken at follow-up. We measured the tibiocalcaneal angle on the lateral view and assessed the presence or absence of tibiocalcaneal arthritis or spontaneous tibiocalcaneal fusion. We also measured the position of the calcaneum in relation to the mid-line long axis of the tibia on the lateral view by projecting it into the calcaneum which was divided into four sections from posterior to anterior (Fig. 1).
The final results were assessed and graded as follows.

1) Good. Plantigrade or less than 15° of equinus; mild residual hindfoot deformity requiring no further surgery; painless on walking at final follow-up.
2) Fair. More than 15° of equinus or residual hindfoot deformity requiring further surgery; painless on walking at final follow-up.
3) Poor. More than 15° of equinus; residual deformity of the hindfoot requiring further surgery; walking limited by pain.

Results

Good. Eight feet had good results although four showed mild recurrent deformity: one 10° of equinus, one mild hindfoot varus and two mild hindfoot valgus. None required further surgery. The other four were all plantigrade. All the patients wore normal shoes at follow-up and walked independently. They had no limitation of their walking ability (Figs 2 and 3).

Fair. Ten feet had fair results and all required further surgery because of recurrent deformity of the hindfoot. Recurrent equinovarus deformity occurred at a mean of ten years (2 to 20) after talectomy. Four feet required repeat lengthening of tendo Achillis, two required revision of a spontaneous tibiocalcaneal fusion in equinus and four calcaneal osteotomy to correct varus deformity. They were all free from pain at the final follow-up. All patients were able to wear normal shoes, eight had good walking tolerance, and one patient (two feet) elected to use a wheelchair because of other joint problems.

Poor. Six feet had poor results and all required further surgery for recurrent hindfoot deformity. Three underwent operation for both residual deformity and pain and three for residual deformity only, but subsequently developed pain.

Of the three feet which had revision for residual pain and deformity, one had an equinocavovarus deformity for which excision of the navicular and calcaneocuboid fusion were performed 11 years after talectomy. The remaining two feet had recurrent varus deformity. A Dwyer calcaneal osteotomy was performed six years after talectomy in one. Eventually, tibiocalcaneal fusion was required for ‘ankle pain’, 10 and 14 years after talectomy, after which the pain decreased.

Of the three feet which had a revision procedure for residual deformity, one had excision of the navicular and an anterolateral closing wedge osteotomy for equinovarus deformity. The other two had repeat lengthening of tendo Achillis, ‘ankle’ release and mid-tarsal osteotomy for equinocavovarus deformity. Initially, the patients did not complain of pain on walking despite their deformities. However, they all had pain at long-term follow-up.

All wore normal shoes at their last visit and all could walk independently with a mean duration of 30 minutes. Radiological assessment. Eight feet had radiological changes of osteoarthritis at the tibiocalcaneal joint eight to ten years after talectomy. Two had severe tibiocalcaneal ‘ankle’ pain. They were treated by tibiocalcaneal fusion but despite achieving solid radiological fusion they still had
mild residual pain. One had a talar remnant (Fig. 4). No further surgery was necessary for this foot. No Charcot-like changes were seen in any foot.

Radiological examination revealed spontaneous tibiocalcaneal fusion in seven feet at a mean of four years (2 to 6) after talectomy (Fig. 5).

The mean tibiocalcaneal angle measured on the latest radiographs was 77° (50 to 128). The mean posterior displacement of the calcaneum in relation to the longitudinal mid-axis of the tibia was 2.2 cm (1.8 to 3.8) or a position of three in our classification. There was no correlation between the final clinical outcome and the tibiocalcaneal angle (Table I) or between the position of the calcaneum and radiological arthritis (Table II).

Table I. Correlation between final outcome and tibiocalcaneal angle

<table>
<thead>
<tr>
<th>Final outcome</th>
<th>Tibiocalcaneal angle (°)</th>
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<tbody>
<tr>
<td>Good</td>
<td>79 (55 to 105)</td>
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<tr>
<td>Fair</td>
<td>82 (50 to 128)</td>
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<td>Poor</td>
<td>75 (60 to 95)</td>
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Table II. Correlation between extent of posterior displacement and osteoarthritis

<table>
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<th>Posterior displacement*</th>
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<th>No osteoarthritis</th>
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Discussion

The aim of talectomy for recurrent equinovarus deformity of the foot, particularly in patients with arthrogryposis and myelomeningocele, is to obtain a stable, plantigrade pain-free foot. This is seldom achieved even after repeated soft-tissue procedures. Menelaus reported good results in 79% of his cases, but his longest follow-up was only four years. Another series of 34 feet in 18 children with arthrogryposis showed good results in 71% of patients, with a mean follow-up of 11 years. The authors recommended talectomy as a primary procedure or after failure of less radical treatment, but relapse into equinovarus or cavus occurred between two and six years after surgery. Another study combined the results of talectomy in patients with arthrogryposis and myelomeningocele and reported excellent to good results in 71.4% of patients, but the mean follow-up was only four years. A review with the longest follow-up of patients treated by talectomy reported satisfactory results in 92% at a mean of 20 years. However, most had suffered from poliomyelitis and had a calcaneovalgus deformity.

Previous reports also support our experience that talectomy alone cannot correct residual forefoot deformity in club feet. This may require further surgery to achieve an acceptable appearance and position. Since talectomy was carried out to correct deformity of the hindfoot, additional operation to correct forefoot deformity was not considered a failure of talectomy or a poor result.

We noted eight cases of radiological tibiocalcaneal arthritis. This has not been reported in previous series probably due to the longer follow-up in our study. Four of these patients did not experience pain on walking. Another two had limited walking ability because of pain. Two feet required tibiocalcaneal fusion more than ten years after talectomy because of severe arthritic pain.

Spontaneous tibiocalcaneal fusion was noted in seven feet. We do not know the cause of this; our previous study suggested that it may be due to repeated micro-injury to the tibiocalcaneal joint causing haemorrhage and subsequent bone formation. These patients did not experience pain on walking, but two required revision of the fusion because of an equinus position.

Relapse of deformity of the hindfoot requiring further surgery was noted in 67% of feet at a mean of ten years after talectomy. One report noted such a recurrence (seven out of 34 feet) at between two and six years after talectomy.
The higher incidence in our series may be partly due to the longer duration of follow-up. A total of 11 operations was needed in our series for relapse of hindfoot deformity.

Posterior displacement of the calcaneum has been advocated by many authors.\textsuperscript{2,3,8,11} This would give a normal contour to the back of the heel and provide a relative anterior placement of the axis of the tibiocalcaneal ‘ankle’ joint. We did not find any correlation between the clinical outcome and the final position of the mid-longitudinal axis of the tibia in relation to the calcaneum.\textsuperscript{11}

Persistent club-foot deformity in patients with arthrogryposis and myelomeningocele is difficult to correct. Our results show that talectomy can provide good to fair results in 75\% of feet at a mean follow-up of 20 years. Additional problems can occur. Recurrent deformity was noted at a mean of ten years in 16 feet (67\%). Osteoarthritic changes at the tibiocalcaneal joint occurred between eight and ten years after talectomy in eight feet (33\%) but only two were painful enough to require fusion. Some pain was present in six feet (25\%) at follow-up. We conclude that talectomy is a useful operation in the management of the complex club foot but it should be used with caution due to the possibility of long-term complications.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References