SYMPTOMATIC CALCANEONAVICULAR BARS

THE RESULTS 20 YEARS AFTER SURGICAL EXCISION

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Eleven patients were reviewed an average of 23 years after they had been treated by excision of a symptomatic calcaneonavicular bar in 16 of their feet. Of these feet 69% (11 feet) had a good or excellent result. Of the five failures, three feet had good results after subsequent triple arthrodesis, but two treated by repeated excision of the bar were still unsatisfactory. Beaking of the talus seen before operation correlated with poor results.

Operation is usually advised when symptoms from a calcaneonavicular bar in a child's foot persist despite conservative treatment and an adequate orthotic support. This was first recommended by Badgley in 1927. Harris and Beath (1948) considered that an arthrodesis was usually indicated, but that good results could follow simple excision of the bar, provided that there was no beaking of the talus or other abnormality of the foot.

Mitchell and Gibson (1967) reported a series of cases treated by block excision of the calcaneonavicular coalition, in which an attempt was made to reduce the risk of recurrence of the bar by diathermy coagulation of raw cancellous bone and careful postoperative splintage of the foot with plaster and then a below-knee iron. Cowell (1970) reported interposing the muscle belly of extensor digitorum brevis at the site of excision in an attempt to reduce recurrence, and fat also has been used for the same purpose (Tachdjian 1983).

We have been able to assess the results of surgical excision of the bar in 16 feet after a minimum follow-up of 20 years. We also report the effect of beaking of the talus upon the result, and on triple arthrodesis which was used in a few cases when excision of the bar failed to relieve symptoms.

PATIENTS

Search of the records at Princess Margaret Rose Orthopaedic Hospital revealed that 22 patients had been operated on for symptomatic calcaneonavicular bar in the period from 20 to 29 years before. Eleven of these patients, seven men and four women with 16 involved feet, were traced and were able to attend for review. Assessment included a questionnaire on symptoms and function, a clinical examination of ankle and subtalar joint movement and power, and radiographs of both feet.

Ten of the 11 patients had originally presented with pain, felt only on walking by seven and both on walking and at rest by three. Peroneal spasm had been observed in three, but the notes did not record whether the other patients had suffered from intermittent spasm. The eleventh patient had presented with stiffness rather than pain; eight other patients were noted to have limited subtalar movement. All 16 feet with symptoms (bilateral in five patients) had calcaneonavicular coalition. In three feet beaking of the talus was apparent on the pre-operative radiographs, and in one of these cases minor degenerative changes involved the talonavicular joint.

In all, 16 feet were assessed (9 left and 7 right). Their original management is described in Mitchell and Gibson (1967). It included splintage in plaster and then in below-knee irons for up to six months after operation.

RESULTS

Symptoms had started in the 11 patients when they were from 4 to 11 years old (mean 8.4 years). The bar had been resected when they were from 10 to 14 years old and when the patients were reviewed for this paper they were from 31 to 40 years old, that is, 20 to 29 years after operation (mean 23 years).

Table I gives details of the patients and the outcome of the initial operation. Three feet in two patients required triple arthrodesis later for symptoms which had persisted after excision of the bar; this second operation produced relief. Only one patient (Case 2) still had painful feet.

Satisfactory results after excision (8 patients). Of the 16 feet, 11 were symptom-free after excision of the calcaneonavicular bar. One patient had minor discomfort in the subtalar region of the affected foot after prolonged standing, but had no other symptoms. One woman, who
Table 1. Details of 11 patients who had excision of calcaneonavicular bars over 20 years before

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Presence of bar</th>
<th>Age at onset (years)</th>
<th>Age at operation (years)</th>
<th>Follow-up (years)</th>
<th>Inversion</th>
<th>Eversion</th>
<th>Subjective result of excision</th>
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<td>11</td>
<td>24</td>
<td>Bilateral triple arthrodesis</td>
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<td>Triple arthrodesis</td>
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<td>Excellent</td>
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</tbody>
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* symptomatic
† satisfactory after subsequent triple arthrodesis
0; later developed talar beak in unoperated foot

had bilateral excision of bars, fractured her right ankle at 18 years of age and had since had slight aching in that hindfoot. Her other foot was asymptomatic and her activities were unrestricted.

**Unsatisfactory results after excision** (3 patients).

**Case 2** (Table 1). This patient presented at 11 years of age with pain in the feet during walking and running. Bilateral calcaneonavicular bars were excised, but pain continued with marked limitation of activity. Radiographs showed recurrence of the bars, and they were both re-excised at 16 years of age. When the patient was 26 years old the right bar was excised again, and at 30 years of age the left bar was also operated on for a third time. Both feet remained stiff and painful, and the patient was dissatisfied (Figs 1 and 2).

**Case 3.** This patient presented at 11 years of age with pain in the feet even at rest. Beaking of the talus was seen in the right foot, and the bilateral presence of accessory navicular bones was noted. Both calcaneonavicular bars were excised, but the symptoms recurred, although less severely than before operation. At the age of 12 years bilateral triple arthrodesis was performed and since then the feet have been asymptomatic (Figs 3 and 4).

**Case 5.** This patient was noted to have had a rigid flat
foot on the right side since infancy. At the age of 10 years a calcaneonavicular coalition was diagnosed on radiographs and the bar excised. However, pronounced talar beaking was evident at this stage, as were degenerative changes in the hindfoot (Figs 5 and 6). Triple arthrodesis was performed one year later because function of the foot was still abnormal and there was aching in the region of the subtalar joint. After this operation the foot functioned well and was asymptomatic (Fig. 7). The opposite foot remained free of symptoms though there was evidence of a non-ossified calcaneonavicular bar. 

**Range of subtalar movement** (Table I). The range of subtalar movement was independently assessed by two of the authors. Excision of the bar had not restored movement to normal, although it was of interest that in two patients (Cases 1 and 10) the unoperated and painless foot with no bar was stiffer than the foot from which a symptomatic bar had been excised. In Case 8 the contralateral unoperated foot had developed a talar beak and degenerative changes in the talonavicular joint. Patients with excellent relief of symptoms had a mean range of subtalar movement of 26° (range 20° to 40°), whereas those with a satisfactory result had a more restricted range (mean 16°, range 5° to 25°).

**Radiology.** All patients had ossified calcaneonavicular bars on the same side as their symptoms when they presented; one patient had an additional asymptomatic bar. Three feet had talar beaking pre-operatively, and two of these subsequently had triple arthrodesis. One foot with a minor beak remained asymptomatic. Harris views were taken to exclude talocalcaneal coalition. Two feet other than those of Case 2 showed partial re-ossification in the region of the bar (recurrence rate 25%) but they remained free of symptoms. No patient, other than the one with an unsatisfactory result, had any radiological evidence of increasing degeneration at the time of late follow-up.

**DISCUSSION**

Congenital tarsal coalition was first described by Buffon in 1750 (Conway and Cowell 1969). This is usually recognised clinically by the reduction or absence of subtalar movement, associated with radiological bridges between two or more of the tarsal bones. Jack (1954) suggested that coalition represented a failure of the normal segmentation of the mesenchyme of the hindfoot. This is supported by later studies of the developing fetus (Harris 1955).

The incidence of tarsal coalition is unknown (Stormont and Peterson 1983), and estimates from selected series of symptomatic patients are misleading. Furthermore, even the recommended oblique and axial radiographic views of the foot may fail to show a proportion of coalitions (Conway and Cowell 1969), particularly if the bar has not yet ossified. Accuracy of diagnosis is unlikely to be significantly increased by computerised and standard tomography since some coalitions remain cartilaginous or fibrous.

The symptoms of tarsal coalition are aching, and sometimes hindfoot stiffness with, on occasion, abnormal alignment of the hindfoot to the leg. An association with peroneal spasm was first recorded by Sir Robert Jones (1897). Although spasm may intermittently produce flattening of the foot (Slomann 1921) this feature is by no means pathognomonic of a tarsal bar (Coleman 1983). Classically, pain develops as the bar begins to ossify towards the end of the first decade of life, although foot stiffness may provoke earlier referral. Later in life, trauma may act as a trigger for the start of symptoms.

When conservative methods of treatment have failed, hindfoot alignment can be improved, and subtalar movement can be preserved or even increased by block excision of the bar. Mitchell and Gibson (1967), reviewing their patients an average of six years after excision, found satisfactory results in about 75% of the feet. Relief was better in those patients who obtained good inversion of the heels and this correlation is maintained in the results of the present study, 20 years after the operation. Mitchell and Gibson found recurrence of the bar in a third of the feet they treated; this compares with the present study in which the success rate was 69%. 11 of the 16 feet reviewed being satisfactory.

Cowell (1970) reported that excision and inter-
position of the extensor brevis gave good results in 90% of cases. More recently Swiontkowski, Scrafton and Hansen (1983) also reviewed this procedure at an average of four years after operation. A satisfactory result was recorded in 90% of their patients, though four required triple arthrodesis.

The present study reviews results after a mean of 23 years and confirms that the good results of excision of a calcaneonavicular bar are maintained into adult life (Fig. 8). It is also apparent that failure of the primary excision operation should lead to consideration of an early triple arthrodesis rather than to further attempts at excision as was done in our Case 2. The three feet in this series treated by a triple fusion within 12 months of failure of excision of the bar all remained painfree with no restriction of activities. The single patient who underwent repeated bilateral excision still had pain.

When beaking of the talus is present at the time of first referral, it is likely that the foot has already been stressed to a point at which a satisfactory result from excision of the bar is unlikely. Three feet in this series had talar beaks before operation, and in two of them triple arthrodesis was subsequently performed. One foot with a minor beak remained asymptomatic after excision of the calcaneonavicular bar. The patient (Case 8) with bilateral bars who had only the painful one resected later developed some problems on the untreated side and developed a talar beak. The exact nature of this beaking is ill-understood but its relationship to poor results after excision of a calcaneonavicular bar is supported by this study. Fortunately, a triple arthrodesis can afford gratifying relief. Function is obviously affected by fusion, but proper alignment of the heel has given long-term benefit to some of the patients examined for this review.

REFERENCES


