Tarsal tunnel syndrome caused by coalition associated with a ganglion

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We examined seven patients with tarsal tunnel syndrome in one foot caused by talocalcaneal coalition and a ganglion. We excised the coalition and the ganglion in six of them. All the patients had pain, sensory disturbance in the sole, and a positive Tinel's sign. Older patients with a long history showed atrophy and weakness of the plantar muscles.

Talocalcaneal coalition can be diagnosed on a plain lateral radiograph and an anteroposterior radiograph externally rotated 20°, and confirmed by CT. MRI is also useful for diagnosis. The coalitions were medial, and the ganglion had developed from the incomplete part of the coalition; it was multilocular in some patients.

After resection, there was early pain relief but sensory disturbances and Tinel's sign persisted. The postoperative results were excellent in one patient, good in four and fair in one.

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Tarsal tunnel syndrome is an entrapment neuropathy caused by compression of the tibial nerve, between the calcaneum and the medial malleolus under the cover of the flexor retinaculum.^{1,2} In many cases the syndrome is idiopathic and there are no other abnormal findings.^{1,3} There may be a space-occupying lesion in some, such as a ganglion,¹ a bony prominence due to tarsal coalition, a tumour, or bleeding after an injury.^{4,5}

Tarsal coalition is a congenital fibrous, cartilaginous, or

osseous fusion of two or more tarsal bones and is relatively rare. Talocalcaneal and calcaneonavicular coalitions are the most common; talonavicular and calcaneocuboid coalitions are less often reported.⁶ A series of 40 patients with naviculocuneiform coalition has been described recently.⁷ Rarely, a talocalcaneal coalition may compress the tibial nerve and cause tarsal tunnel syndrome.³⁻⁵

We report seven patients with tarsal tunnel syndrome caused by talocalcaneal coalition and a ganglion, an apparently rare combination.

Patients and Methods

Between 1977 and 1995 we saw 85 patients (136 feet) with talocalcaneal coalition. Of these 21 (34 feet) had tarsal tunnel syndrome (25.0%). Seven of these feet in seven patients also had a local ganglion. There were three males and four females with a mean age of 38.6 years (12 to 73); in five the right foot was affected and in two the left. The mean period from the onset of symptoms to resection was 11.7 months (1 month to 2 years 8 months) (Table I).

All seven patients had a palpable swelling behind and below the medial malleolus, with pain localised to that area, a burning pain in the sole and sensory disturbances (Figs 1 and 2). All patients also had a positive Tinel's sign. Loss of sensation was in the distribution of the medial plantar nerve in four patients, in the area of the medial and lateral plantar nerves in two and in the whole plantar region in one. Atrophy and weakness of the plantar muscles were seen in three of the older patients in whom symptoms had been present for some time.

Talocalcaneal coalition was diagnosed from plain lateral radiographs and anteroposterior views in external rotation of 20°. All patients had CT for confirmation. The talocalcaneal coalition was medial in six patients and medial and posterior in one (Figs 1 and 2). Preoperative MRI in five patients showed a ganglion in three (Fig. 2). In the two remaining patients, the ganglion was too small to be seen on MRI, and was eventually detected at operation. Six patients had operations and a ganglion was found in the two patients who did not have preoperative MRI. In the one patient who did not have surgery (case 7) MRI and puncture of the swelling confirmed the presence of a ganglion.

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Table I. Details of seven patients with tarsal coalition and a ganglion

Case	Sex	Age (yr)	Involved foot	Duration of onset	Pain	Tinel sign	Sensory disturb	Muscle atrophy in sole	Type of coalition	Size of ganglion (mm)	Follow-up (mth)	Residual findings	Score		Overall result
													Preop	Postop	
1	M	24	Left	1 mth	+	+	Medial	-	Medial	8×6×5, 5×5×5 Multilocular	98	-	2	9	Good
2	F	12	Right	6 mth	+	+	Medial	-	Medial	8×8×8, 5×4×3 Multilocular	51	-	5	10	Excellent
3	F	50	Right	1yr	+	+	Medial	+	Medial	10×8×5	36	-	1	8	Good
4	M	47	Right	3 mth	+	+	Whole	-	Medial	24×15×10	25	Tinel sign	1	9	Good
5	F	27	Right	2 yr 8 mth	+	+	Medial	-	Medial	5×4×4	21	-	2	8	Good
6	F	73	Left	10 mth	+	+	Medial	+	Mixed	11×7×5	19	Sensory disturb Muscle atrophy Tinel sign	3	6	Fair
7*	M	37	Right	1 yr 6 mth	+	+	Medial	+	Medial	?	(36)†	Sensory disturb Tinel sign	(2)		
Mean ± SD											38.6 ± 20.2	41.7 ± 30.0	2.5 ± 1.5	8.3 ± 1.4	

* nonoperative case

† duration from onset of symptoms to final examination

Fig. 1a

Fig. 1b

Fig. 1c

Fig. 1d

Case 1. Figure 1a – Both feet showing a prominence posteroinferior to the left medial malleolus. Figure 1b – CT shows a bony prominence (arrow) and narrowing of the talocalcaneal joint. Figure 1c – At operation the ganglion lay over the talocalcaneal coalition. The tibial nerve (arrow) has been retracted. Figure 1d – Photomicrograph showing fibrous connective tissue without lining cells (haematoxylin and eosin × 28).

Fig. 2a

Fig. 2b

Figure 2a – A right foot showing a prominence near the posteroinferior part of the medial malleolus. Figure 2b – An anteroposterior radiograph externally rotated 20° shows medial talocalcaneal coalition (arrow). Figure 2c – T2-weighted MRI shows an area of high intensity (arrow) in the tarsal tunnel. Figure 2d – At operation, ganglions were seen over the talocalcaneal coalition. The ganglion under the tibial nerve is seen to originate from the joint space of an incomplete talocalcaneal coalition.

Fig. 2c

Fig. 2d

In two patients the multilocular nature of the ganglion on MRI was not confirmed at operation.

Nerve-conduction studies on five of the patients showed that conduction velocity was reduced; in two the distal motor latency was prolonged.

We devised a simple scale for comparison before and after operation, based on ten points for spontaneous pain, pain on movement, burning pain, Tinel's sign, sensory disturbance and atrophy and weakness of the plantar muscles. On this scale excellent (normal) scored 10 points; good, 8 to 9; fair, 6 to 7; and poor, 5 or less.⁴

Results

The mean follow-up was 42 months (19 to 98) (Table I). At operation, the ganglion was removed and the bony prominence of the coalition resected until normal articular cartilage was seen. The size of the ganglion ranged from 5 × 4 × 3 mm to 20 × 15 × 10 mm; two were multilocular (Fig. 1c). The ganglion was found on the bony

prominence of the coalition in all patients; in four its origin was in the capsule or joint space of an incomplete coalition in the posterior talocalcaneal joint. In the other two, the exact site of the origin could not be identified. In all patients the talocalcaneal coalitions were not completely bony; they also had fibrous and cartilaginous elements.

The spontaneous pain, pain on movement and burning pain disappeared soon after the operation, but Tinel's sign, the sensory disturbances in the sole, and the atrophy and weakness of the plantar muscles persisted for some time although they gradually decreased. One patient (case 6) with a follow-up of only 19 months still has some sensory disturbance in the sole and muscle weakness. In three young patients less than 30 years of age, the range of movement in the hind foot increased and in another three it remained unchanged. The patient who did not have an operation has persistent pain and a sensory disturbance in the sole, and is now considering surgery.

The mean preoperative score on our rating scale was 2.5 ± 1.5 points which increased to 8.3 ± 1.4 points after

operation. One patient had an excellent result, four had good and one a fair result.

Discussion

Only a few series of tarsal tunnel syndrome have been reported and none describe a large number of cases.^{3-6,8}

Tarsal tunnel syndrome due to the bony prominence of a talocalcaneal coalition has only recently been described.³⁻⁶ The prominence appears in early adolescence and increases until bone growth has ceased.⁹ We examined 136 feet in 85 patients with talocalcaneal coalition of which 34 (25.0%) had tarsal tunnel syndrome. Talocalcaneal coalition may be medial or posterior;⁹ the former is more often associated with tarsal tunnel syndrome (Figs 1 and 2) and the medial plantar nerve is predominantly involved. One explanation for the development of a ganglion is that the coalitions were not of a solid bony nature, but were fibrous and cartilaginous.

There have been only three reports of tarsal tunnel syndrome caused by talocalcaneal coalition associated with a ganglion: each described only one Japanese patient.¹⁰⁻¹²

The morphological pattern and extent of the coalition can be confirmed by CT (Fig. 1b). A large ganglion can easily be diagnosed by MRI (Fig. 2c), but if it is smaller than $5 \times 5 \times 5$ mm this is difficult to demonstrate. Patients who have no definite space-occupying lesion need careful

preoperative assessment and a trial of conservative treatment.

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