Tarsal tunnel syndrome caused by ganglia

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We describe in 30 feet the occurrence of a tarsal tunnel syndrome caused by a ganglion. The presenting symptom was numbness or pain in the toes and the sole with paraesthesiae in the distribution of the medial plantar nerve in 63% of the patients. Swellings which were not palpable were detected by ultrasonography. Twenty-nine patients were treated by operation. Most ganglia originated from the talocalcaneal joint, and five were associated with a talocalcaneal coalition. The surgical outcome was satisfactory in all patients except one who had a further operation for a recurrence of the ganglion.

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Tarsal tunnel syndrome was first described by Keck¹ and Lam² in 1962. The aetiology has been considered to be idiopathic or post-traumatic,³⁻⁹ with some cases due to a space-occupying lesion.¹⁰⁻¹⁴ There are a number of reports which describe a tarsal tunnel syndrome caused by a ganglion, of which only a few give an adequate number of cases.^{4,7,15-24}

We have reviewed 30 patients with a tarsal tunnel syndrome diagnosed and treated in our department, and have analysed the clinical presentation, diagnosis, and the outcome of surgery.

Patients and Methods

Between January 1978 and December 1997 we treated 30 patients (30 feet) for tarsal tunnel syndrome caused by ganglia. There were 16 men and 14 women, with a mean age of 40.5 years (12 to 70). The right foot was affected in 16 patients and the left in 14.

The syndrome presented with numbness or pain in the toes and sole in 29 patients (97%) and pain in 17 (57%). Only two complained of a burning pain in the foot. Hypoaesthesia was found in 25 patients (83%). Paraesthesiae and pain were localised to the distribution of the medial plantar nerve in 19 patients, over the distribution of both medial and lateral plantar nerves in three, over the distribution of the medial plantar nerve and the medial calcaneal branch in two, and involved the whole plantar aspect innervated by both medial and lateral plantar nerves as well as the medial calcaneal branch in six (Fig. 1). Thus

Fig. 1

Diagram of the distribution of sensory disturbance associated with the tarsal tunnel syndrome caused by a ganglion. All patients presented with numbness along the distribution of the medial plantar nerve (M, medial plantar nerve; L, lateral plantar nerve; C, medial calcaneal branch).

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all patients had paraesthesiae in the distribution of the medial plantar nerve. A positive Tinel sign was elicited by percussion in the tarsal tunnel in all affected feet. The abductor hallucis muscle was atrophic in eight patients (27%); only a few complained of weakness of the foot. A mass was palpable below the medial malleolus of the tibia in 28 patients, but not in the remaining two.

Fig. 2

Ultrasonogram of a 51-year-old man showing a round hypoechoic area (arrowheads) in the tarsal tunnel.

Fig. 3

Ultrasonogram of a 43-year-old woman showing a multilobular hypoechoic area in the tarsal tunnel.

A mechanical sector scanner containing a 10MHz ultrasound transducer and an Aloka SSD650CL echograph were used to examine 12 feet by short- and long-axis cross-sectional ultrasonography. The ganglion was depicted as an echo-free or hypoechoic area in all affected feet. Some of the ganglia were round, but others were multilobular (Figs 2 and 3); some of those associated with talocalcaneal coalitions were gourd-shaped and found on the bridge of the coalition (Fig. 4). Ultrasonography was very useful in planning surgical management and in two patients the presence of two separate ganglia, which were not palpable, was demonstrated by preoperative ultrasonography.

The results of operation were evaluated on a four-point scale; excellent (normal, without numbness, with or without persistent slight hypoaesthesia and cold intolerance), good (the presence of hypoaesthesia, not causing discomfort during daily activities, without numbness or pain), fair (persistence of hypoaesthesia which produces discomfort in daily life and pain in the standing position or during walking, despite symptomatic improvement) and poor (lack of symptomatic improvement or aggravation compared with the preoperative condition).

Results

Electrodiagnostic studies were carried out on 26 feet. In 17 the action potentials of the tibial sensory nerve were absent between the big toe and the area proximal to the tarsal tunnel. The conduction velocity of sensory nerves was reduced in six feet. The distal motor latencies, measured from the abductor hallucis muscle, were prolonged in 11 feet, although the compound muscle action potential was recorded in all affected feet studied.

The ganglion disappeared spontaneously in one patient. The remaining 29 were treated surgically. At operation, the ganglia were identified as swellings of various forms and shapes. Some lifted or encircled the tibial nerve while

Fig. 4

Ultrasonogram of a 35-year-old man showing a hypoechoic area over the beak-shaped talocalcaneal coalition (asterisk).

others moved on to the tibial nerve when the ankle was dorsiflexed. All ganglia compressed the medial plantar branch of the posterior tibial nerve and large lesions compressed the tibial nerve more proximally. In 15 feet the ganglion originated from the talocalcaneal joint in 14 and the talocrural joint in one. In the remaining 15 the origin could not be identified.

The ganglion was excised in 25 feet; five of the lesions were large and adhered to the adjacent nerves, resulting in incomplete excision. Four were treated by drainage alone. The cause of the tarsal tunnel syndrome was a ganglion alone in 23 feet, a ganglion associated with a talocalcaneal coalition in five, and a ganglion associated with varicosities in one. Postoperative follow-up ranged from eight to 114 months (mean, 27.5). Of the 29 feet treated surgically, numbness and pain disappeared immediately after operation in six and, in the others, pain was relieved within three months. A revision operation was carried out on one

Fig. 5

Most patients presented with sensory disturbances limited to the distribution of the medial plantar nerve. This reflects the high prevalence of ganglia arising from the talocalcaneal joint.

patient, a 44-year-old woman, in whom the ganglion was associated with a talocalcaneal coalition. The ganglion compressed the medial plantar nerve and was excised during the first operation, leaving the coalition untreated. Ten months later, the ganglion recurred and produced numbness. The patient had a second procedure to treat the coalition, as well as the recurrent ganglion. Other associated ganglia were resected together with the coalition at the same operation. Ganglia recurred in four other patients at sites other than the original but caused no neurological symptoms.

Overall, the surgical outcome was excellent in 21 feet and good in eight. The average vertical and horizontal diameters of the ganglia measured in 20 feet were 11.9 ± 5.3 and 16.6 ± 7.9 mm, respectively. The surgical outcome did not correlate with the size of the lesion nor was there any association with the electrophysiological findings.

Discussion

Various space-occupying lesions can cause a tarsal tunnel syndrome. In addition to ganglia and talocalcaneal coalition, it has been described in association with neurofibroma, an intraneural ganglion, the flexor digitorum accessorius longus muscle, or a lipoma.^{4-6,10-14}

The clinical manifestations of tarsal tunnel syndrome are diagnostic.^{3,20} A careful physical examination will demonstrate the presence of a palpable or diffuse swelling in the tarsal tunnel. Aspiration may be useful for the diagnosis of a ganglion. Puncture is not recommended because branches of the tibial nerve in the tarsal tunnel may be injured, particularly since they may cross over the swelling. In one of our cases, the diagnosis was made by puncture; pain in the plantar aspect was alleviated but intense irritation persisted at the site of the puncture. Imaging is a better method of diagnosis and we found ultrasonography to be useful. Since ganglia are depicted as hypoechoic or echo-free areas, they can be identified easily and the site, form and size assessed. Some occult ganglia which are not palpable can be detected by ultrasonography. Many ganglia are

associated with a talocalcaneal coalition, and we recommend that diagnosis should not only be based on radiography, but also on ultrasonography.²⁵

Paraesthesiae developed along the distribution of nerves compressed in the tarsal tunnel. In this region, the posterior tibial nerve gives rise to three branches.²⁶ They are the medial and lateral plantar nerves, and the medial calcaneal branch. If the ganglion is located proximal to the bifurcation of the tibial nerve, paraesthesiae will be present in the whole plantar aspect of the foot. When the distal part of the medial plantar nerve is compressed, numbness develops only in the medial aspect of the sole near the big toe. Of the 30 patients reviewed in our study, 19 had sensory disturbances limited to the medial distribution of the plantar nerve reflecting the high prevalence of ganglia arising from the talocalcaneal joint (Fig. 5).

Operation is usually considered to be more successful in the treatment of tarsal tunnel syndrome caused by a space-occupying rather than other lesions.^{20,23} Our results were satisfactory. Recurrence was not associated with neurological symptoms and was attributed to incomplete excision of large ganglia.

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