Operative reconstruction after transverse rupture of the tendons of both peroneus longus and brevis

SURGICAL RECONSTRUCTION BY TRANSFER OF THE FLEXOR DIGITORUM LONGUS TENDON

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Rupture of the tendons of both peroneus longus and peroneus brevis results in considerable disability. We have performed transfer of flexor digitorum longus (FDL) to peroneus brevis in two patients with lateral instability of the hindfoot due to chronic transverse tears of both tendons for which end-to-end repair was not possible. Both patients had excellent function when reviewed after eight and six years, respectively, with no symptoms. CT showed a normal appearance of the FDL in both patients, but the peroneal muscles looked abnormal. Transfer of the FDL provides a reliable solution to lateral instability of the hindfoot resulting from loss of function of both peronei.

J Bone Joint Surg [Br] 1998;80-B:781-4.
Received 20 April 1998; Accepted 3 June 1998

There is an increased awareness of acute and chronic injuries of the peroneal tendons especially in athletes.¹⁻³ Longitudinal tears have been well documented,^{4,5} while transverse ruptures of peroneus longus may occur in the cuboid tunnel or in association with an os peroneum.

Transverse ruptures of both peroneus longus and brevis are uncommon and have been described only twice.^{6,7} In neither case was tendon transfer performed. We describe two patients in whom rupture of both peroneal tendons occurred with retraction of the tendon leaving a gap of 8 cm. Transfer of flexor digitorum longus (FDL) to peroneus brevis was performed, a procedure not previously described.

Case reports

Case 1. A 60-year-old man presented with pain in the lateral aspect of his right foot and ankle which had lasted

for three years. A feeling of instability had forced him to stop playing golf. He had difficulty in descending hills and stairs with severe pain on exercise. Three years previously while walking downhill on a golf course he had had an acute 'snap' in his ankle which he said had felt as if a golf ball had hit him. The ankle had immediately become weak. Over the next three years he was treated with strapping, anti-inflammatory drugs and three cortisone injections with relief for two to three months after each injection. As he became worse he was referred for an orthopaedic opinion. There was nothing of note in his past medical and surgical history.

On examination, his calf muscles were wasted and there was tenderness over the lateral aspect of the ankle. The peroneal tendons were not palpable adjacent to the lateral malleolus. Eversion was limited to resistance against gravity only. Radiographs showed no abnormality. MRI showed thickening of both the peroneal tendons proximal to the lateral malleolus and their absence below this. It was decided to explore the peroneal region.

Case 2. A 61-year-old retired man presented with pain in the outer side of his left foot and ankle, and instability for seven months. This had a sudden onset when he was rising from a chair and felt a painful 'crack' at the level of the midfoot. He subsequently noted that his ankle tended to invert as he walked and he could not play golf because of pain and instability. He had been treated with orthotics which gave limited relief. His past history included bilateral plantar fasciitis and right-sided sciatica.

On examination he had an antalgic gait. On standing he showed increased inversion of the left hindfoot which was accentuated by plantar flexion. Palpation revealed swelling and tenderness in the peroneal sheath. There was mild wasting of the calf. The peroneal tendons could not be palpated and eversion was limited to resistance against gravity. Radiological examination showed soft-tissue swelling on the lateral aspect of the ankle and early degenerative changes in the adjacent calcaneocuboid joint. A clinical diagnosis of ruptured peroneal tendons was made and surgical exploration recommended.

Operative technique. A longitudinal incision was made in the line of the peroneal tendons from 5 cm proximal to the tip of the lateral malleolus to the base of the fifth metatarsal, taking care to protect the sural nerve. The peroneal

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0301-620X/98/59042 \$2.00

Fig. 1

The transferred FDL tendon is seen posterior to the tip of the fibula and is sutured into the distal stump of peroneus brevis.

Fig. 2

Bilateral heel raise eight years after FDL transfer on the right. There is peroneal wasting on this side.

Fig. 3

Active eversion of the transferred FDL tendon is shown against an inversion force.

sheath was incised in line with the skin incision and the thickened rounded proximal ends of both peroneal tendons were located. In both patients there was a gap of approximately 8 cm between the ruptured ends of the tendons and the distal stump of peroneus brevis at the base of the fifth metatarsal. Direct repair was not possible and it was decided to proceed with transfer of the FDL.

Two small medial incisions were used to obtain the FDL tendon. A longitudinal incision was made over the knot of Henry and the tendon was transected. It was then passed subcutaneously to an incision made 5 cm proximal to the medial malleolus. The tendon was then mobilised and passed without angulation anterior to flexor hallucis longus into the lateral wound. It was sutured to the distal stump of peroneus brevis 2 cm from the base of the fifth metatarsal (Fig. 1), with the foot held in eversion and slight plantar flexion. The proximal end of the tendon was

then attached to the musculotendinous portion of the transferred tendon to preserve any remaining peroneal function. The peroneal sheath was closed with 2/0 vicryl sutures and the wounds with 2/0 vicryl and then 3/0 prolene subcuticular sutures. Both patients had below-knee non-weight-bearing casts for six weeks and then were allowed active movement.

Results

The patients were reviewed at eight and six years, respectively. Neither had symptoms in their ankles, but one (case 2) had mild discomfort under the base of the fifth metatarsal on walking long distances. He continued to wear orthotics for longstanding plantar fasciitis. Both returned to playing competitive golf and did not complain of instability. They walked normally and both feet and ankles were normal in appearance (Fig. 2). There was no tenderness or swelling. On palpation, the transferred tendon of FDL was readily felt on resisted eversion. Eversion was significantly improved and it was not possible to overcome the patients' resisted hindfoot eversion (Fig. 3). One patient (case 1) had wasting of the calf preoperatively and persistence of a 2 cm decrease in maximal circumference of the calf while the other (case 2) had a 1.5 cm increase in circumference. We performed soft-tissue-enhanced CT at eight and six years, respectively, in both patients which showed a normal muscle signal in the transferred FDL muscle with an abnormal signal in the peroneal muscles (Fig. 4).

Discussion

The aetiology of tendon ruptures includes trauma, metabolic disorders, particularly diabetes, rheumatoid disease and the use of drugs (either systemically or locally) for tenosynovitis, bursitis or arthritis. Longitudinal peroneal

Fig. 4

CT showing the muscle bellies of FDL outlined in white. There is a normal muscle signal of the FDL on the side of the tendon transfer and an abnormal signal in the peroneal muscles.

tears^{3-5,8-11} are more common than complete tendon ruptures and occur in areas of high stress.¹ There have been several case reports of rupture of the peroneus longus tendon, usually through an avulsion fracture of the os peroneum¹²⁻¹⁷ or as the tendon turns beneath the cuboid.¹⁻¹⁸ It has also been described at the level of the lateral malleolus.¹⁹ Ruptures are usually treated by direct surgical repair, with or without excision of the os peroneum, or by suture of the proximal and distal ends of the peroneus longus to the intact peroneus brevis.¹⁸ Sammarco⁵ has also described repair of tears of the peroneus longus with a gap by a bridging tendon such as plantaris.⁷

Isolated rupture of peroneus brevis is less common than that of peroneus longus. Two cases have been reported,^{20,21} one of which was associated with congenital absence of peroneus longus.²⁰ These were managed by primary repair or the use of a free tendon graft.²¹

There are only two previous reports of traumatic rupture of both peroneal tendons. The first occurred in a 48-year-old woman with uncontrolled diabetes mellitus and hypothyroidism, who twisted her ankle and complained of recurrent instability. Repair was possible by an end-to-end technique. The second was in a 23-year-old skier who developed pain and swelling below his lateral malleolus after a 50 km ski race. Reconstruction involved connecting the proximal stump of peroneus longus to the distal part of peroneus brevis by interposing a tendon graft from the fascia lata.⁷ Both patients were initially misdiagnosed with a lengthy delay before operative treatment. Our patients also had long delays between the time of injury and surgery because of the initial misdiagnosis and failure to recognise that the instability and pain were due to tendon ruptures. Diagnosis is difficult unless a careful history is taken and a full examination performed. Both patients gave descriptive histories of a 'snap' or 'crack' with acute pain and swelling followed progressively by a feeling of instability. Examination

showed loss of continuity of the peroneal tendon and weakness of eversion of the hindfoot. Radiographs revealed early degenerative changes in the calcaneocuboid joint in one (case 2), but neither patient had an os peroneum. In one patient (case 1) the diagnosis was confirmed using MRI and, in the other, a clinical impression was confirmed at operation.

A high index of suspicion is necessary. The diagnosis should be confirmed by ultrasound²² or MRI.²³ In our study, CT was used²⁴ to assess the bony anatomy and the appearance of the muscle belly, but we recommend MRI as the preferred mode of imaging.

Active eversion and resistance to inversion stress are essential for normal walking and function. Loss of function of the peroneal muscles can lead to difficulty in walking and to instability of the hindfoot, most notably on uneven ground such as a golf course. The decision to opt for an active tendon transfer was based on the impression that an interposition graft of plantaris or gracilis would be unlikely to provide satisfactory function, given the delay in diagnosis and appearance of the relatively contracted peroneal musculature. The aim was to provide active eversion and resistance to inversion thus preventing instability. The FDL tendon was considered to be suitable since the excursion and work percentage of peroneus brevis and FDL are similar.²⁵

The symptoms resolved in these two patients and both were free from pain except for some mild lateral ache in one after extensive walking, probably due to calcaneocuboid degeneration which had been noted on preoperative radiographs. Both patients had no instability of the hindfoot and were able to return to their previous level of activity, including golf. Each had normal movement of the hindfoot and resistance to maximum manual inversion stress.

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.

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