Tarsal tunnel syndrome after total ankle replacement—a report of 3 cases

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Case 1

A 67-year-old man presented with a 3-year history of ankle pain and long duration lateral ankle instability. A plain radiograph showed 11 degrees of ankle-congruent varus deformity. For ligamentous posttraumatic osteoarthritis, we performed total ankle replacement (TAR) combined with deltoid ligament release and a modified Broström procedure.

6 months after TAR, the patient experienced numbness at the plantar surface of the forefoot and sometimes shooting pain. On physical examination, dorsiflexion-eversion test and Tinel sign were positive for the tibial nerve behind the medial malleolus. An electromyographic study showed prolonged posterior tibial nerve latency of the abductor hallucis and abductor digiti quinti muscle, consistent with tarsal tunnel syndrome. 3 months of treatment with a non-steroidal anti-inflammatory drug and physiotherapy failed.

Tarsal tunnel release and neurolysis were performed 9 months after TAR. Intraoperatively, the posterior tibial nerve seemed compressed and thinned under the flexor retinaculum, whereas it was swollen and hyperemic proximal of the flexor retinaculum (Figure 1A). After tarsal tunnel release, the pain was completely relieved and the intermittent numbness partially improved over the 4 years of follow-up.

Case 2

A 65-year-old woman presented with a 4-year history of ankle pain and a long history of lateral ankle instability. Her left ankle showed 14 degrees of ankle-incongruent valgus deformity. We performed a TAR combined with deltoid ligament release and a modified Broström procedure for ligamentous posttraumatic osteoarthritis. 3 months after TAR, the patient presented with paresthesia and a burning sensation on the plantar aspect of the forefoot. 3 months of nonoperative treatment failed, and a tarsal tunnel release and neurolysis were performed. Intraoperatively, there were similar findings to case 1 (Figure 1B). Her symptoms were completely relieved over the 5 years of follow-up.

Case 3

A 49-year-old man underwent TAR for end-stage posttraumatic osteoarthritis due to a severe pilon fracture. A plain radiograph showed 13 degrees of ankle-congruent valgus deformity and 6 mm of shortening of the distal tibia due to a collapsed anterior portion of the tibial plafond. A TAR was conducted in the typical manner, trying to restore the ankle mortise. The patient complained of a sense of plantar tingling, dorsomedial foot numbness, and reduced power of dorsiflexion of the great toe 1 month postoperatively. An electromyographic study showed incomplete tibial nerve and peroneal nerve neuropathy. Tarsal tunnel release and neurolysis were performed 6 months after TAR. Focal swelling and hyperemia of the posterior tibial nerve at the proximal portion of the flexor retinaculum were observed (Figure 1C). Despite the tarsal tunnel release, the patient continued to complain of pain and numbness during the 5 years of follow-up.

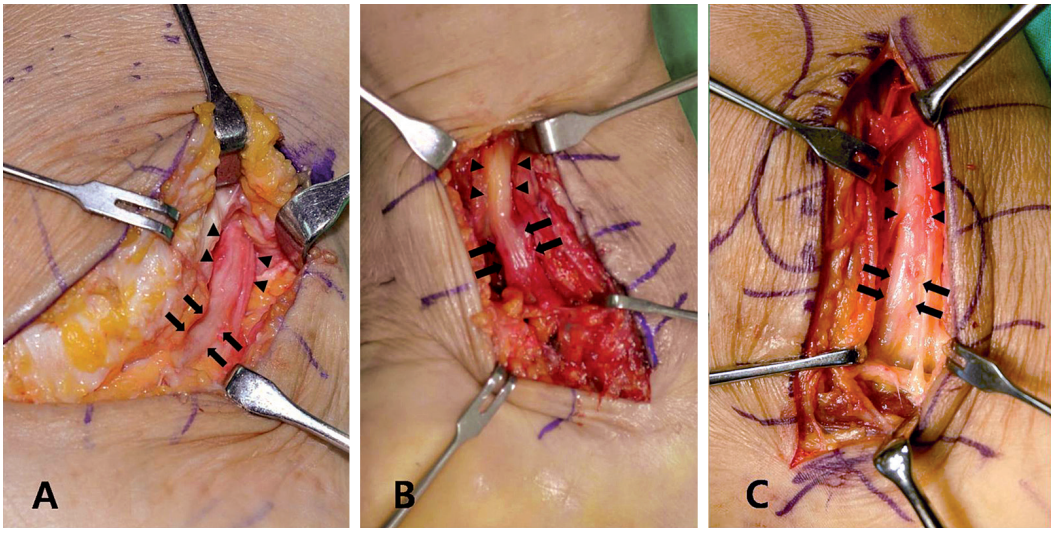

Figure 1. A and B. Compression of the tibial nerve (arrows) under the flexor retinaculum and swelling of the tibial nerve (arrowheads) close to the flexor retinaculum. C. Thinning of the tibial nerve (arrows) and swelling of the proximal portion of the nerve (arrowheads).

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Discussion

Tarsal tunnel syndrome is an entrapment neuropathy of the tibial nerve and its branches within the tunnel formed by the flexor retinaculum on the medial side of the ankle. The possible etiologies include trauma, space-occupying lesions, metabolic disorders, and ankle deformities, but in many cases tarsal tunnel syndrome is idiopathic.

We have found some particular situations that tend to lead to tarsal tunnel syndrome, i.e. posterior tibial nerve strain due to anatomical change after TAR surgery. Coronal plane deformity of the ankle joint of over 10 degrees was observed in case 1 (varus deformity) and in case 2 (valgus deformity). These 2 cases suffered from instability for many years prior to TAR, which may have altered the soft tissue including the tarsal tunnel and its contents. The operation may have caused increased tension on the tibial nerve. Postoperative changes in alignment after TAR may cause entrapment of the tibial nerve. Trepman et al. (1999) reported the effects of foot and ankle position on tarsal tunnel compartmental pressure. Bracilovic et al. (2006) used MRI to measure mean tarsal tunnel volume and found reduction of tarsal tunnel volume with inversion or eversion of the ankle, compared to neutral positioning.

Case 3 had a poor clinical outcome after tarsal tunnel release. In this case, the tarsal tunnel syndrome may have occurred due to distraction injury of the tibial nerve that probably took place during correction of the shortening deformity. Alshami et al. (2008) have shown that excess strain on a tibial nerve results in reduced intraneural blood flow and abnormal action potential patterns, which may cause tarsal tunnel syndrome. Even slight compression, possibly caused by edema following a minor strain, could produce local vascular insufficiency and make a nerve lesion more likely.

We suspect that correction of ankle coronal plane deformity of more than 10 degrees and distraction of shortening deformity may cause tarsal tunnel syndrome after TAR. Thus, surgeons should perhaps inform the patients about the small risk of—and the symptoms of—tarsal tunnel syndrome and its operative treatment.

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