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Modified Evans Peroneus Brevis Lateral Ankle Stabilization for Balancing Varus Ankle Contracture during Total Ankle Replacement

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ABSTRACT

Lateral ankle instability is frequently encountered when performing total ankle replacement and remains a challenge. In the present techniques report, I have described a modification of the Evans peroneus brevis tendon lateral ankle stabilization harvested through limited incisions using simple topographic anatomic landmarks. The harvested peroneus brevis is then transferred either to the anterior distal tibia concomitantly with total ankle replacement or through the tibia when performed after total ankle replacement and secured with plate and screw fixation. This modified Evans peroneus brevis tendon is useful in providing lateral ankle stability during or after primary and revision total ankle replacement.

Lateral ankle instability is commonly encountered with end-stage degenerative joint disease of the ankle (1,2) and can be problematic when encountered during or after primary or revision total ankle replacement (3–5). The tenet of soft tissue balancing during or after total ankle replacement involves release of the contracted soft tissue on the concave side and reinforcement on the convex side of the ankle (3–5).

Varus malalignment correction during primary and revision total ankle replacement has historically involved the following (3–9):

1. Removal of the periarticular osteophyte formation and debridement of the medial, lateral, and posterior gutters
2. Circumferential release of the deltoid ligament complex off the distal medial tibia/medial malleolus and/or the medial talus or lengthening osteotomy of the medial malleolus
3. Transection, fractional lengthening, or recession of the posterior tibial tendon as visualized posterior to the medial malleolus
4. Correction of pedal deformities with dorsiflexory first metatarsal osteotomy and lateralizing calcaneal osteotomy
5. Lateral ankle ligamentous plication and/or tendon transfer to reinforce lateral soft tissue restraint

One simple lateral ankle stabilization procedure was described by David L. Evans, MD, in 1953 as release of the peroneus brevis tendon at the musculotendinous junction, followed by retrieval at the distal

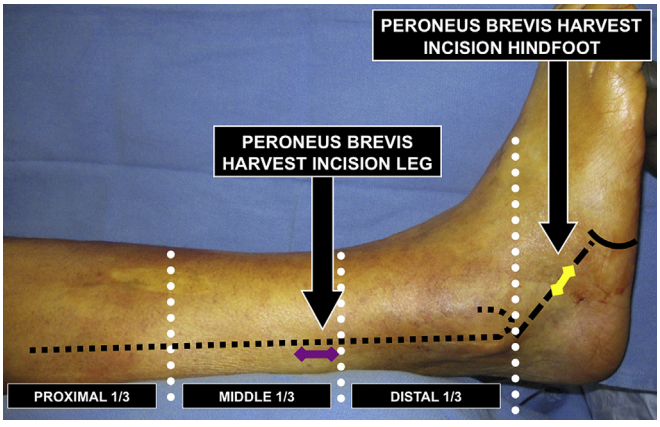

Fig. 1. Intraoperative photograph of the lateral aspect of the lower leg demonstrating the topographic anatomic landmarks used to identify the proper location for the incisions to harvest the peroneus brevis tendon. First, the lateral aspect of the lower leg is divided into thirds between the knee joint and lateral malleolus (*dotted white lines*). The incision (*purple line*) is placed just proximal to the junction between the distal and middle one thirds of the lower leg 1 cm posterior to the posterior edge of the fibula (*hashed black line*). Next, a line is drawn connecting the posterior–inferior edge of the lateral malleolus and superior border of the fifth metatarsal base (*dashed black line*). The incision is placed just distal to midway between these points (*yellow line*).

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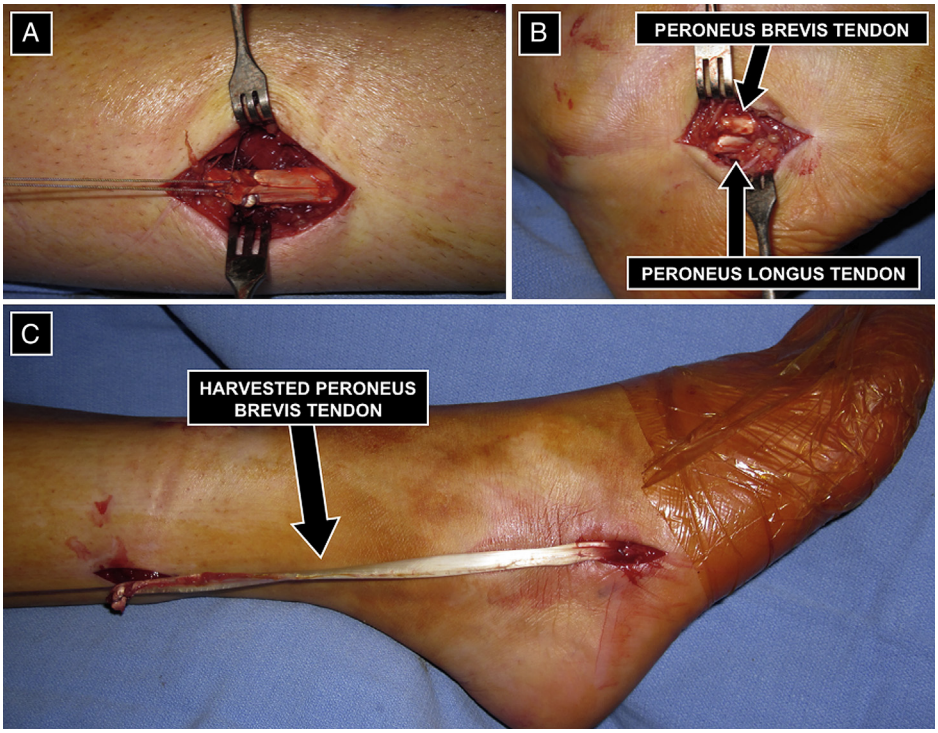

Fig. 2. Intraoperative photograph demonstrating identification of the peroneus brevis tendon in the lower leg (*A*) and hindfoot (*B*), followed by retrieval through the distal incision and preparation for transfer (*C*).

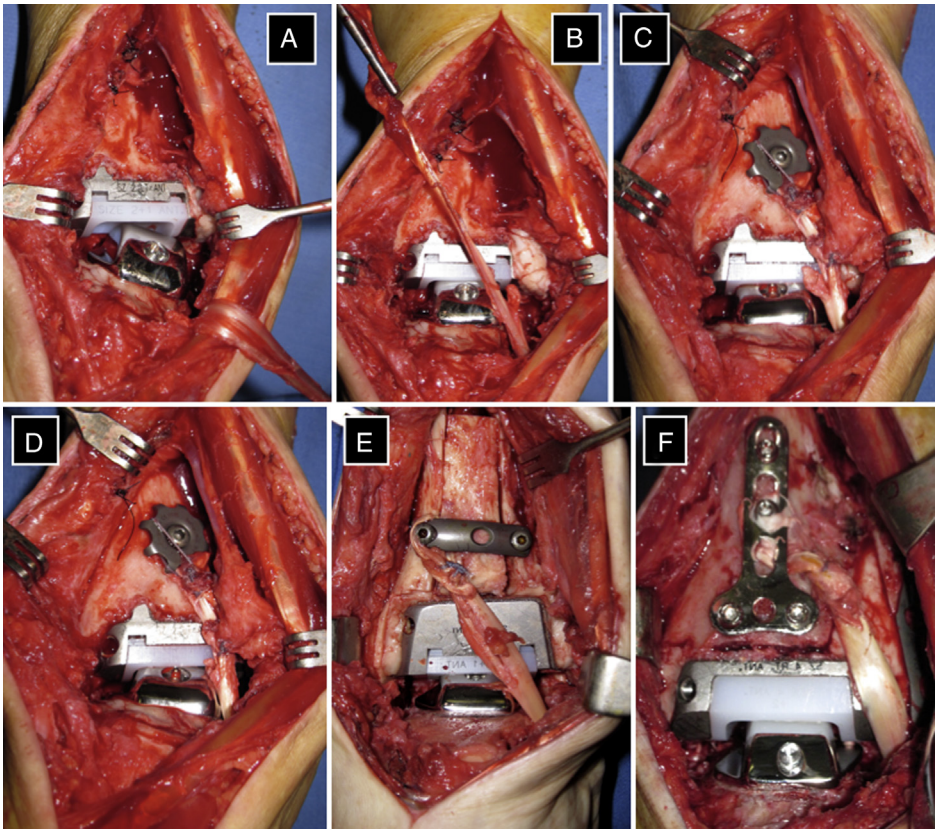

Fig. 3. Intraoperative photograph after revision of failed Agility® total ankle replacement (DePuy Orthopaedics) demonstrating persistent lateral ankle instability (*A*). The peroneus brevis tendon has been harvested as described and transferred into the anterior incision (*B*) and secured to the distal-central tibia with a serrated plate and screw construct (*C*). Stress inversion after the modified Evans peroneus brevis transfer revealed creation of lateral ankle stability (*D*). Additional metallic fixative constructs consisted of a horizontal plate when a stemmed tibial component was present (*E*) and an inverted T-plate when additional support to the distal tibial component was required (*F*).