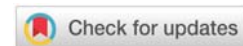


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*Corresponding author: Christophe Vercruyse, MD,
Department of Orthopaedic Surgery, University Hospital
Ghent, Ghent, Belgium,
E-mail: christophe.vercruyse1990@gmail.com

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Research Article

Universal S-shaped Lateral Approach of the Ankle and Hind foot: Technical Tip

Christophe Vercruyse* and Vandeputte Geoffroy

MD, Department of Orthopaedic Surgery, University Hospital Ghent, Ghent, Belgium

Introduction

The operative treatment of the unstable cavovarus foot is a multi-level procedure and comprises of a combination of osteotomies and soft tissue procedures. After correction of the bony deformity the soft tissues are balanced via soft tissue procedures and lastly ancillary procedures can be performed. There is evidence that in patients with cavovarus malalignment in combination with ankle instability due to lateral ligament insufficiency, an isolated lateral ligament reconstruction will fail over time [1-3]. Moreover, degenerative ankle arthritis and peroneal tendon pathology can be associated in patients with chronic ankle instability and cavovarus malalignment [4].

There is however no consensus on the operative technique since more than 80 lateral ligament repair procedures have been described to restore ankle stability [5]. In addition, there is no literature to date that describes a singular approach that combines the reconstruction of the lateral ligaments with a corrective osteotomy of the calcaneus and treatment of peroneal tendon pathology.

In order to avoid multiple lateral hindfoot incisions we propose a universal S-shaped lateral approach of the hindfoot where one incision gives access and a good visualization of the calcaneus, the lateral malleolus, the lateral ankle ligaments, talar neck and peroneal tendons.

In case of a cavovarus foot with lateral ligament instability, a lateralising calcaneal osteotomy, repair of the peroneal tendons and lateral ankle ligament reconstruction-augmentation can be performed using the same incision. If necessary, a peroneus longus to brevis transfer can be done simultaneously.

Operative technique

In our institute a preoperative planning is done with

standing X-ray. Coleman block test is performed to assess hindfoot versus forefoot driven cavovarus. Only patients with a passively correctable deformity are candidates for ligament reconstruction and corrective osteotomies. In cases of severe cavovarus and rigid or arthritic hindfoot an arthrodesis is done.

The patient is given a popliteal block followed by a general anesthesia with the patient in supine position with hip and knee in flexion. A cushion is placed underneath the ipsilateral hip to optimize access of the lateral hindfoot. After administering the prophylactic antibiotics, the extremity is exsanguinated and a thigh tourniquet is inflated to 300mmHg. An S-shaped incision is made from the anterior border of the distal fibula along the lateral malleolus until the tip of the distal fibula, where the incision bends back to anterior to the calcaneus (Figure 1). Two skin flaps are created and provide a good view from the talar neck over the lateral malleolus to the lateral aspect of the calcaneus (Figure2). First of all, the



Figure 1: S-shaped incision: the incision is made from the anterior border of the distal fibula alongside the lateral malleolus and bends back from the tip of the lateral malleolus to anterior to the calcaneus.

sural nerve is visualised and protected. The peroneal tendons are then released under the distal peroneal retinaculum. Most often we find a degenerative rupture of the peroneus brevis tendon. This is debrided and at the end of the procedure a transfer of the peroneus longus to brevis tendon distally is performed. The varus deformity of the calcaneus is corrected via a Dwyer closing wedge lateralising calcaneal steotomy (Figure 2). Translation is performed and two cannulated screws are inserted. In cases with a longstanding lateral ankle instability we prefer to reconstruct the lateral ankle ligaments with a gracilis autograft tendon (Figure 3). The aim is to anatomically reconstruct the anterior talofibular ligament (ATFL) and the calcaneofibular ligament (CFL). This autograft is first fixed in a blunt tunnel in the talar neck (origin of the ATFL), then passed through two fibular tunnels and finally fixated in a blunt tunnel in the calcaneus footprint of the CFL) (Figure 4). The subcutaneous tissue is closed loosely with an absorbable suture. The two skinflaps are realigned and the skin is closed tensionless with staples (Figure 5).

Good wound healing is seen at 6 weeks postoperative consult (Figure 6).

Postoperative X-ray at 6 weeks with consolidation of the osteotomy and remnants of the tunnels of the lateral ligament reconstruction (Figure 7).

Discussion

We propose a universal S-shaped lateral approach of the hindfoot. Our purpose was to create an incision with maximal visualization and good wound healing potential. We performed this incision at our institution in 11 cavovarus cases. With this approach we had maximal visualization of the calcaneus, the lateral malleolus, the lateral ankle ligaments, talar neck and peroneal tendons. We had minimal wound traction and consequently had no wound healing problems, no tender scars and no keloid formation. With this singular approach we avoid multiple incisions in the lateral hindfoot, where wound healing complications are common. In previous studies it is shown that wound complication rate up to 30% is described for intra-articular calcaneal fractures treated with open reduction



Figure 2: Lateral hindfoot access and calcaneal osteotomy: two skin flaps are created and provide a good view from the talar neck over the lateral malleolus to the lateral aspect of the calcaneus. The lateralising Dwyer closing wedge calcaneal osteotomy is fixed with two cannulated screws.

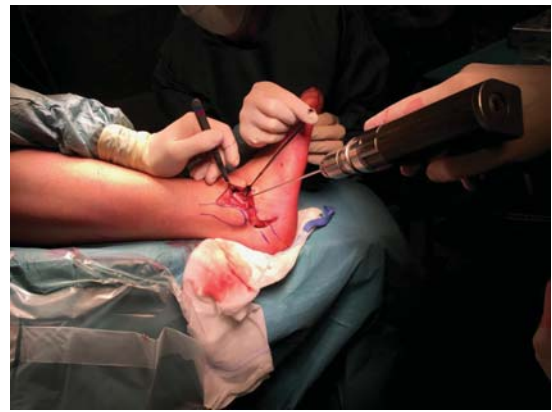


Figure 3: Lateral ligament reconstruction-augmentation: The autograft gracilis tendon is first fixed in a blunt tunnel in the talar neck (origin ATFL), then passed through two fibular tunnels and finally fixated in a blunt tunnel in the calcaneus (footprint of the CFL).

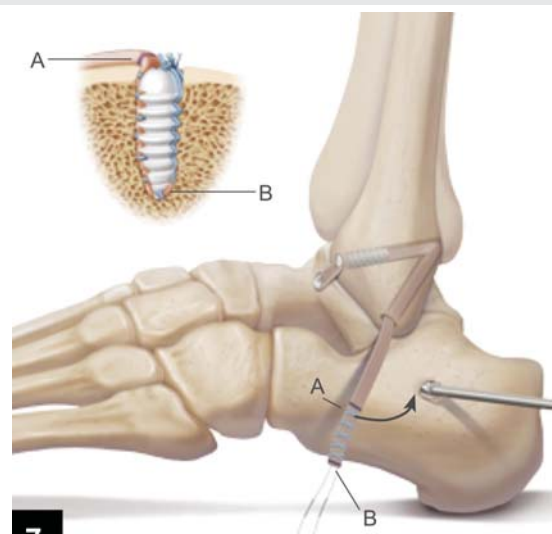


Figure 4: Schematic representation of the lateral ligament reconstruction-augmentation (© Arthrex 2018): an interference screw is used to fixate the autograft tendon in the blunt tunnel of calcaneus as described in figure 3. A: the proper length of the tendon is marked. B: the bottom of the blunt tunnel.



Figure 5: Closure of the wound: the subcutaneous tissue is closed loosely with an absorbable suture, the skin is closed tensionless with staples.

using an extended lateral approach combined with plate osteosynthesis [6,7].

S-shaped incisions are commonly used in hand surgery



Figure 6: Wound healing: good wound healing is seen at 6 weeks postoperative.



Figure 7: X-ray at 6 weeks postoperative: consolidation of the lateralising Dwyer closing wedge osteotomy and remnants of the blunt tunnels.

and have the advantage that a large area can be accessed due to the creation of two flaps that can be retracted. A maximal visualization is obtained and all relevant anatomical structures can be reached to correct hindfoot varus and lateral ankle instability. The described S-shaped incision is

particularly suited for the combination of lateral ankle ligament reconstruction and calcaneal osteotomy as is described in the operative technique. However this approach can potentially be used for other procedures of the calcaneus, the lateral malleolus, the lateral ankle ligaments, talar neck and peroneal tendons.

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