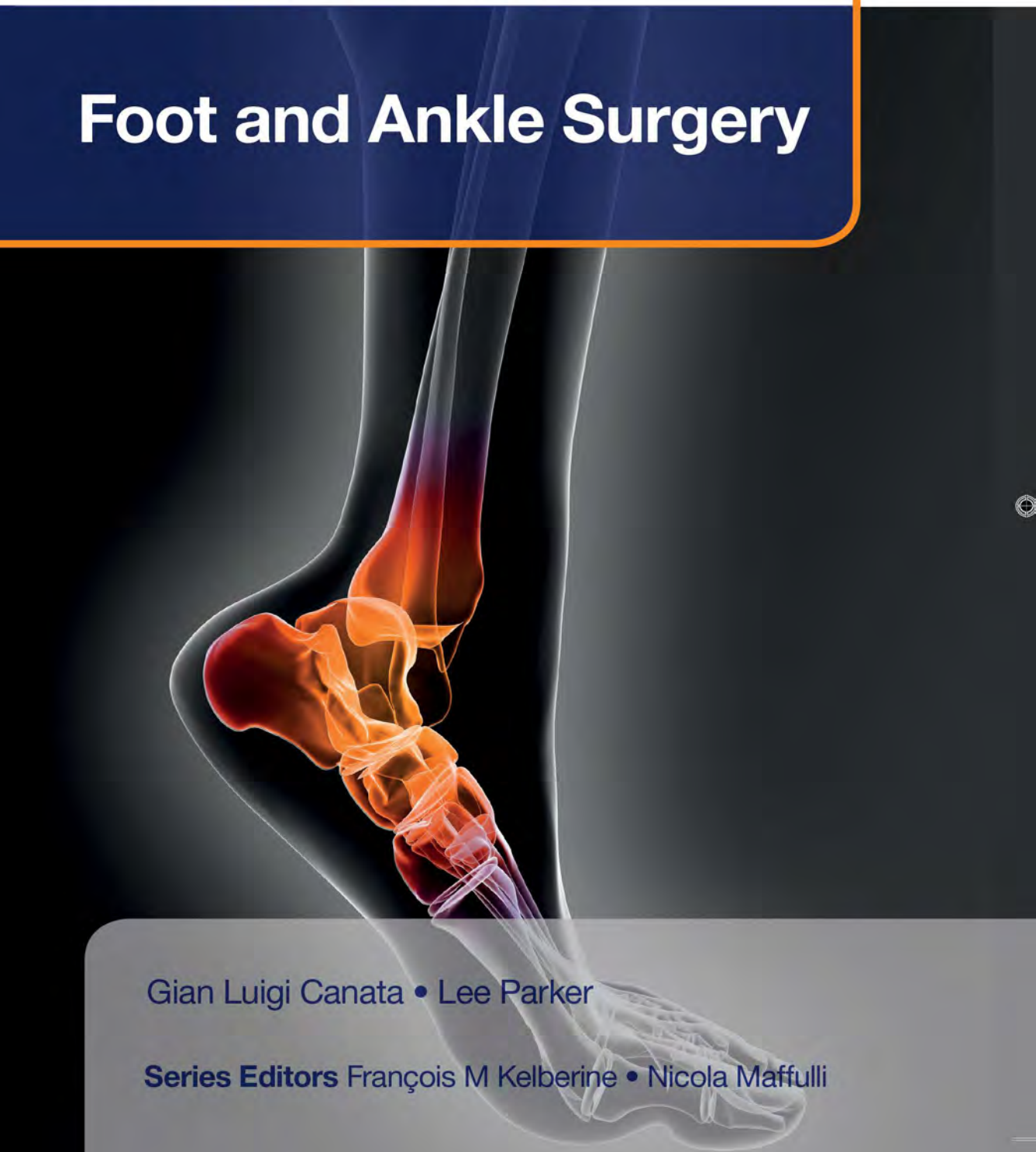
Surgical Techniques in Sports Medicine

Foot and Ankle Surgery



Gian Luigi Canata • Lee Parker

Series Editors François M Kelberine • Nicola Maffulli

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2 Lateral ligament reconstruction with fibular periosteal flap in chronic ankle instability

Indications

Inversion sprains of the ankle are one of the most common injuries in sport. Therefore anterolateral ligament complex injury can occur. In the majority of cases, conservative treatment is effective (Petersen et al, 2013) with a specific rehabilitation program focused on obtaining stability and proprioception to achieve a complete recovery for sporting activity, even with a low grade of ligaments insufficency. Occasionally this injury, especially in the case of ankle sprain, relapses or combines high-grade injuries of anterior talofibular ligament and calcaneofibular ligament and may cause chronic ankle instability. It can cause limitation in sporting activity, functional loss, and eventually can be associated with cartilage damage and chronic synovitis. In these particular settings surgery is the treatment of choice to recreate stability structures. Lateral ligament complex reconstruction is achievable using a fibular periosteal flap: a strong tissue with appropriate mechanical and physical features to reinforce or substitute the floppy or damaged ligaments (Rudert et al, 1997; Benazzo et al, 2013). This surgery is indicated in the following cases:

- Patients with chronic ankle instability due to traumatic anterior talofibular ligament (ATFL) injury associated with thinning or tear of the calcaneofibular ligament (CFL)
- Patients of any age complaining of ankle instability during sport or those with a history of ankle sprain
- Patients with chronic ankle instability despite at least 6 months of rehabilitation, propriocepive activity, and ankle strengthening

Preoperative assessment

Clinical assessment

- Patients report recurring ankle sprain regardless of symptoms
- Patients complain of ankle instability, often associated with pain and swelling
- The examiner assesses for the presence of anterior and lateral laxity with a positive anterior drawer test and talar tilt test
- Clinical assessment also pays attention to the range of motion and clinical signs of synovitis or cartilage damage
- To perform the anterior drawer test the examiner stabilizes the distal leg with the patient seated on the table or supine with the foot over the end of the table. With the other hand, the examiner pulls the foot anteriorly; if there is laxity compared with other side, it reveals a damaged ATFL
- To perform the talar tilt test, the examiner stabilizes the distal leg in a neutral position and inverts the ankle. The examiner then determines how much inversion is present. A positive test is pathognomonic of CFL injury

Imaging assessment

Radiographs

- Anteroposterior and lateral views identify any previous fractures or bony avulsion
- Stress radiographs may detect the ankle laxity grade
- Radiograph identifies signs of impingement or early post-traumatic osteoarthritis, secondary to a chronic instability

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Magnetic resonance imaging (MRI)

- MRI identifies ligament injury as thinning and disorganization of fibers or their absence (**Figures 2.1** and **2.2**)

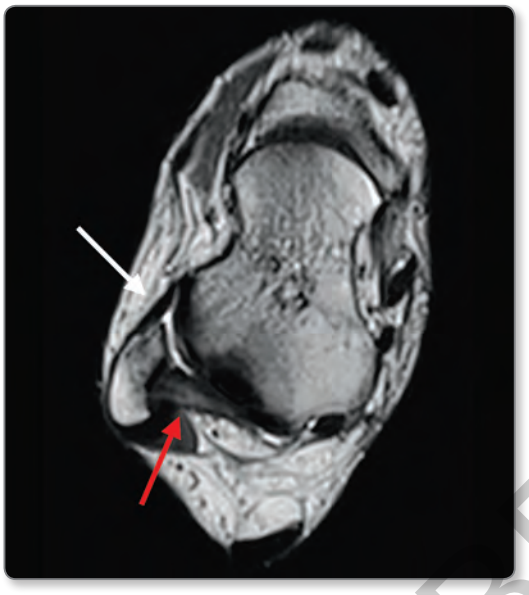


Figure 2.1 T1-weighted axial MRI shows normal anterior talofibular (white arrow) and posterior talofibular (red arrow) ligaments.

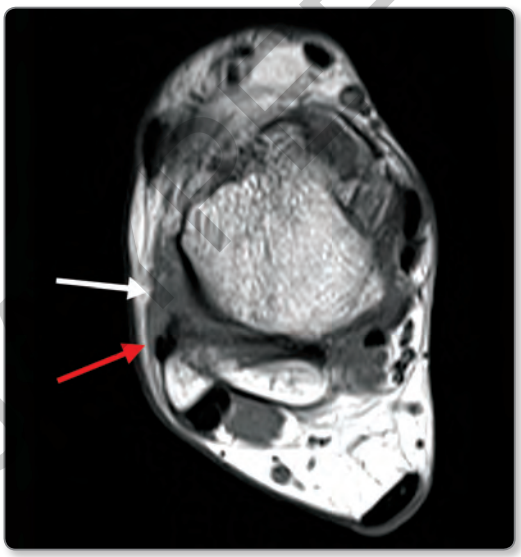


Figure 2.2 T1-weighted axial MRI shows the absence of the anterior talofibular ligament (white arrow). It is possible to identify some residual fibers (red arrow).

- MRI is also useful for detecting associated osteochondral lesions and/or synovitis, and can be helpful in planning an associated surgery
- It confirms the presence of ATFL tear associated with CFL partial injury or tear

Timing of surgery

- Surgery takes place when conservative treatment fails to improve symptoms, after at least six months of specific physiotherapy
- The instability must be assessed objectively, with clinical assessment and imaging
- No edema or any sign of recent sprain should be present at the time of surgery and the ankle must have a complete range of motion
- Acute surgery is possible in selected cases in athletes with MRI findings of ligament injuries associated with capsular laceration, considering also the level of sport and singular functional requests

Surgical preparation

Surgical equipment

- 2.8 mm titanium suture anchors (1 or 2 anchors depending on which ligaments are damaged)

Equipment positioning

- Two surgeons, seated side by side, next to the operated foot

Patient positioning

- Lay the patient supine, with a gel pad under the ipsilateral gluteus, to allow a slight internal rotation of the leg
- A tourniquet is applied to the upper thigh in order to avoid bleeding

Further preparation

- Antibiotic prophylaxis: we use cefazolin 2 g EV, half an hour before the surgery

Surgical technique

Exposure

- Inflate the tourniquet to 320 mmHg
- Make a lateral, curved, L-shaped incision with anterior concavity, from 6 cm proximally over the tip of lateral malleolus ending 3 cm

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distally from it (**Figure 2.3**), just posterior to the malleolus, to allow better exposure of the grafting site and of the ankle joint (**Figure 2.4**)
- Check the residual ATFL and CFL ligaments, if present, to evaluate which is to be restored; and so we know if it is necessary to split the periosteal flap or not
- Do not detach residual ligaments if present; use them as a guide to overlap the periosteal neo-ligaments



Figure 2.3 Lateral, curved, L-shaped incision.

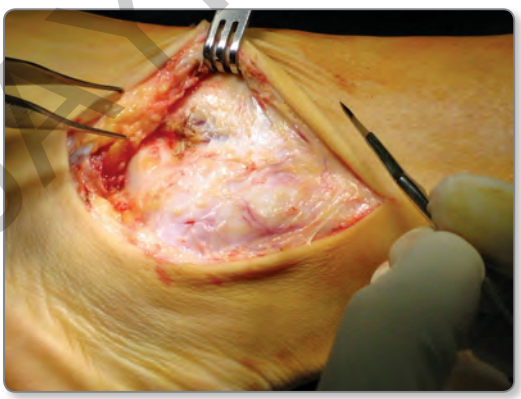


Figure 2.4 Exposure of the lateral ankle joint

- Evaluate possible laxity or discontinuity of the capsule (often in acute cases) to suture it

Ligament reconstruction

- After the exposure of the peroneal malleolus, starting from about 5 cm proximal to the malleolar summit, isolate the periosteal flap (**Figure 2.5**), making it as large as possible, especially when splitting of the flap into two is required
- Gently detach the periosteal flap from the bone with a detacher. Do not carve and snap the flap
- Turn the fibular flap and suture it using an absorbable stich to the fibular insertion, in order to avoid tearing when in tension (**Figure 2.6**)
- In the case of splitting of the flap, some sutures are required at the level of the splitting point in order to reinforce the structure and avoid tearing when in tension (**Figure 2.7**)



Figure 2.5 Isolate the periosteal flap.

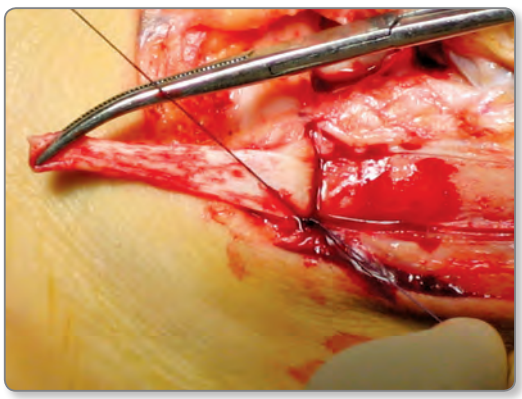


Figure 2.6 Suture the flap's fibular insertion with an absorbable stich, in order to avoid tearing when in tension.

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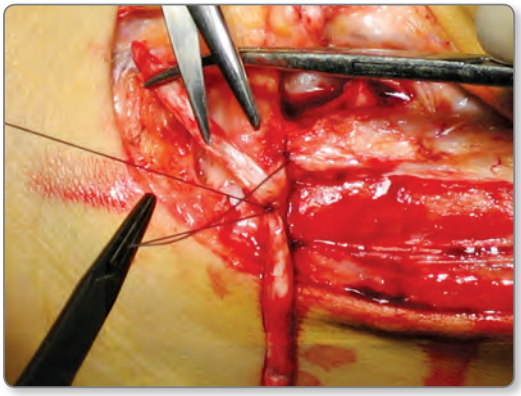


Figure 2.7 Suture the split flap at the base, to reinforce it and avoid tear propagation.

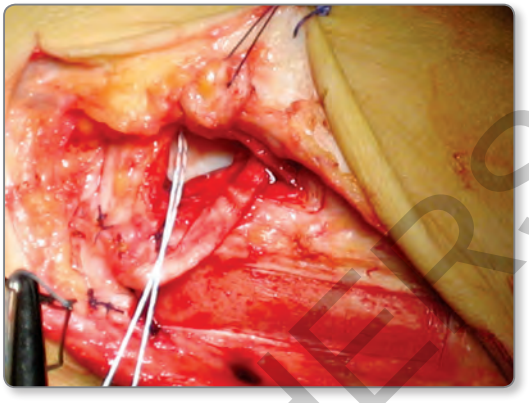


Figure 2.8 Fix the flap at the talus with a 2.8 mm titanium anchor.

- Once the periosteal flap is folded, re-evaluate the length to decide the fixing point to get a neo-ligament with proper tension
- Fix the flap onto the talus at the anatomic AFTL insertion point with a 2.8 mm titanium suture anchor (**Figure 2.8**)
- If the neoligament is long enough, it can be doubled by fixing it to the talus at half its length and then turning the distal half back on the fibula (**Figure 2.9**)
- When a residual ligament is present, it can be overlapped by the periosteal flap, and they can be sutured together with a thin absorbable wire after anchoring the flap at the talus (**Figure 2.10**)
- In both cases the ligament fixation on the talus must be performed with the foot in slight eversion to avoid excessive tension which would cause stiffness
- If the CFL is injured, the periosteal flap must be split in two parts, and the posterior half of doubled flap is fixed onto the calcaneus with an additional 2.8 mm titanium anchor (**Figure 2.11**)

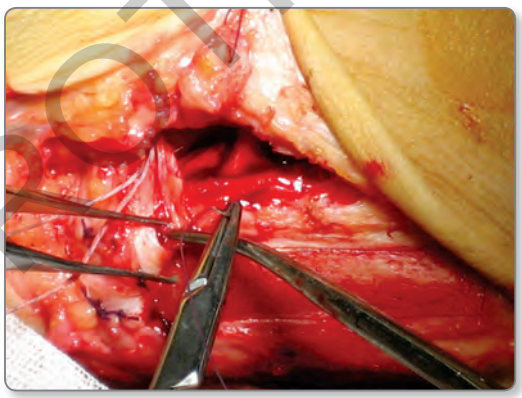


Figure 2.9 The flap length is enough to double it.

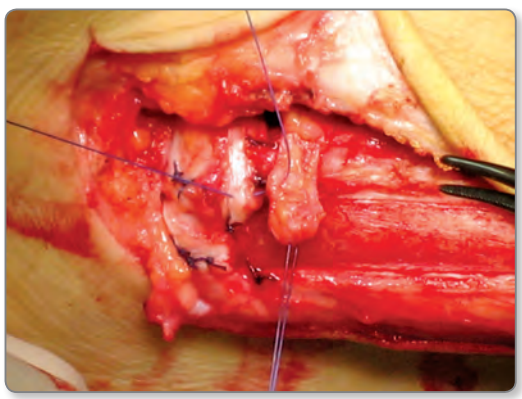


Figure 2.10 Overlap and suture the residual ligament above the neoligament.

Possible perioperative complications

- Rupture of the flap
- Occurs when the flap is too thin. In this case you have to suture the flap
- Dis-insertion from the fibula: anchor the flap at the fibula with another 2.8 mm anchor. To

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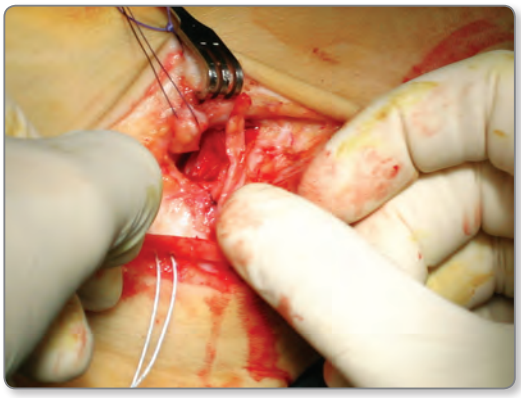


Figure 2.11 in case of a calcaneofibular ligament tear, split the flap and fix the posterior part at the calcaneus.

avoid disinsertion, apply sutures on the basis of the flap

Closure

- Close the subcutaneous and cutaneous layers with standard sutures
- In case of capsular tear, close the tear with absorbable sutures
- Apply one drain proximally to the wound and remove it 24 hours later

Postoperative management

- Place a short fiberglass leg cast to immobilize the ankle for 3 weeks
- Avoid weight bearing for 3 weeks; patients can use crutches
- After 3 weeks place a reinforced fiberglass leg cast (a walker cast) allowing progressive full weight bearing
- After 6 weeks, it is possible to recover the mobility starting passively
- Continue with proprioceptive exercises and ankle strengthening, with isometric contractions first
- Advance with eccentric strengthening exercises from day 65 postoperatively
- Progressively increase the training load, clinically assessing joint stability, swelling, and pain. If everything looks satisfactory, the patient can cautiously start with sport activities, but not before 4 months from surgery

Outpatient follow-up

- Wound evaluations at 7 and 14 days
- Change of plaster cast at 21 days to a full weight-bearing plaster cast
- Remove the second plaster cast after 42 days and assess the stability for permission to start with FKT
- Medications: nonsteroidal anti-inflammatory drugs, if pain is present, and thromboembolism prophylaxis until full weight-bearing is achieved

Further reading

Benazzo F, Zanon G, Marullo M, Rossi SM. Lateral ankle instability in high-demand athletes: reconstruction with fibular periosteal flap. Int Orthop 2013; 37:1839–1844.

Petersen W, Rembitzki IV, Koppenburg AG, et al. Treatment of acute ankle ligament injuries: a systematic review. Arch Orthop Trauma Surg 2013; 133:1129–1141.

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Foot and Ankle Surgery

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