

# Surgical Pearls

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## HOW TO USE THE BROSTROM ANKLE STABILIZATION PROCEDURE

Chances are, you've treated athletic individuals or patients with an active lifestyle who complain that their ankle is constantly "giving out" on them. This is a fairly typical scenario of chronic ankle instability. If conservative strengthening and balance/proprioception exercises fail to resolve the problem, surgical intervention may be the next step.

With that in mind, let's take a look at the surgical strategies and techniques you can use to enhance the postoperative outcome of the modified Brostrom ankle stabilization procedure.

First things first: consider the varying indications for surgery. Some patients may come in with an ankle sprain that never completely healed. When patients do have an injury history and experience pain during the examination, be sure to check for any associated pathology in addition to the anticipated stretching or torn lateral ankle ligaments. It has been estimated that five to seven percent of all ankle sprains will eventually require surgery due to associated tissue injury. Besides ligament damage, injuries frequently include a tear of the peroneal tendons or retinaculum, cartilage and bone injuries.

Other patients may have no significant injury history, but they come in complaining about multiple buckling of the ankles. This may be due to inherent ligament laxity. When these patients say there isn't much pain and that they've been able to resume activities with minimal soreness, that is a *clear warning sign*.

Why aren't these frequent sprains severely painful? There are simply no more ligaments to be torn or stretched. In effect, the soft tissues and ligaments have already stretched past their elastic range. What's left is bone upon bone, which stops the ankle from inverting any further. Here, the medial shoulder of the talus abuts against the tibial plafond, causing a compression injury of the cartilage. This may

eventually lead to wear and tear, and ensuing arthritic problems. In addition, the lateral shoulder of the talus abuts against the fibula malleolus, which again predisposes the patient to osteochondral injury.

If your patient wakes up with ankle stiffness, this also may indicate surgery. Indeed, this can be an early sign of traumatic arthritis of the ankle. You should address this with an ankle arthroscopy or open arthrotomy in addition to a ligament stabilization procedure.

### What Stress X-Rays Can Reveal

Use stress X-rays for both the anterior drawer and talar tilt. Perform a common peroneal nerve block, using 1% or 2% lidocaine plain near the head of the

fibula. A positive anterior drawer and normal talar tilt are usually indicative of an anterior talofibular ligament injury only. A positive anterior drawer and grade II or III talar tilt are indicative of anterior talofibular ligament as well as calcaneal fibular ligament injuries.

A positive anterior talar drawer is considered greater than 2mm of displacement of the talus anteriorly when you compare it to a normal lateral view of the ankle. Grade I talar tilt (mild) has zero to four degrees of inversion, grade II (moderate) has four to 12 degrees, and grade III (severe) has greater than 12 degrees. Comparing the affected ankle to the opposing asymptomatic ankle can help you differentiate inherent ligament laxity and determine what is normal for the patient. When you combine these X-rays with manual testing and clinical history, it's a lot easier to determine which surgery to perform.

### Choosing The Correct Ligament Reconstruction Procedure

Now it's time to decide between the Brostrom procedure or one of the peroneal tendon graft augmentation procedures. To choose the most effective procedure, consider the degree of instability, the patient's activity level and the amount of postoperative recuperation time.



It has been estimated that five to seven percent of all ankle sprains will eventually require surgery due to associated tissue injury. An acute lateral ankle sprain is shown above.



In the midst of a deep dissection of the modified Brostrom procedure, take note of the lateral gutter of the talar-fibular joint and visualization of the peroneal tendons.

For an active patient who has severe talar tilt, I prefer to perform the ankle stabilization procedure, using a split peroneus brevis tendon graft. This may include the Chrisman/Snook or Modified Evans-type procedures. However, in the majority of cases in which the instability is moderate or on the lower end of severe (*i.e.*, a talar tilt of less than 20 degrees), I typically perform the modified Brostrom ankle ligament reconstruction procedure. What follows is a step-by-step description of this procedure.

### Important Incision Insights

Apply a well-padded thigh tourniquet and use a bolster or bean bag under the hip. This allows you to direct the lateral ankle toward the top of the surgical field. After taking the usual sterile preparations, proceed to mark the bony and soft tissue landmarks with a skin pen, and make a modified Kocher incision. Start the incision just lateral to the extensor tendon and directly over the palpated lateral ankle joint gutter at the level of the tibia-talar articulation. Proceed distally and curve around the inferior aspect of the fibular malleolus ending before reaching the peroneal tendons.

Your incision is critical to the entire procedure. Make sure your incision is approximately 5mm. to 8mm. away from

the palpated edges of the fibular bone. This will enable a cuff of tissue to remain attached to the fibular bone, which will help you repair and tighten the ligaments and soft tissues. During dissection, be careful to avoid the intermediate dorsal cutaneous nerve, which courses anterior to the lateral malleolus.

Proceed with deeper dissection by using a Metzenbaum scissor to mobilize and cut the inferior extensor retinaculum. Cut it in line with the skin incision and tag each end for future repair.

At this time, use your finger to make sure the area is carefully palpated. This will ensure that you're not cutting directly over bone. You want to leave a rim of joint capsule attached to the distal aspect of the fibular malleolus. This will enable you to tighten up opposing tissues against this capsule. If the joint capsule is torn off of the fibular malleolus, you will have to use a metal anchor fixation device to tighten the ligament back to the bone.

Next, you should identify the anterior fibular ligament but be aware that it is often scarred within the capsule. Stopping short of the peroneal tendons,

extend the incision posteriorly. Retract the peroneal tendons with penrose drains and examine them for tears and other defects. Once you've retracted the tendons, you can see a cord-like structure which is the calcaneal fibular ligament. You should also examine the fibular malleolus for any avulsion fragments or rough areas, and inspect the lateral ankle joint gutter and the lateral shoulder of the talus.

### Repairing The Ligaments

Tighten the calcaneal fibular ligament by transversely cutting the ligament approximately 5mm. to 8 mm. from the insertion into the fibula. Cut away a small area of the free end of the ligament and re-suture the ends using a 2-0 non-absorbable suture in a simple, interrupted and/or figure 8 suturing technique. Make sure the foot is mildly everted during this procedure. Tighten the calcaneal fibular ligament accordingly to the amount of excessive talar tilt/inversion present on preoperative stress films and clinical measurements.

Proceed to tighten the anterior talo-fibular ligament and/or joint capsule in a similar manner by removing the redundant tissue. Then reunite the two ends of the capsule with the edges everted and sewn much like a hem. Use the suturing techniques I described above.

At this time, advance the distal portion of the extensor retinaculum toward



Take note of the incision placement of the modified Brostrom procedure.

the fibular malleolus and tighten it to the soft tissues and the periosteum overlying the distal aspect of the malleolus. If there is a thin retinaculum, you can fashion a flap of the periosteal tissue by cutting an inverted "U" lengthwise over the fibular malleolus. Advance the flap downward and tighten this to the retinaculum and/or joint capsule.

Use a 3-0 absorbable suture for this closure as well as the closure of the ankle joint capsule. For the subcutaneous closure, use 4-0 absorbable suture in a simple interrupted suturing technique. For skin closure, use 4-0 polypropylene in a running subcuticular suturing technique.

### Other Key Points

When you're tightening the ligaments, make sure the ankle remains mildly everted at 90 degrees. Experience has shown that, after the rehabilitation process is completed, the soft tissues tend to stretch a few degrees. Part of this procedure involves creating scar tissue, which is less elastic than normal tissue. This helps stiffen a "loose" ankle.

If the anterior talo-fibular ligament is avulsed from the talus, then you can place a small bone anchor into the talus.

Tighten up this ligament to the bone. Also, you can use a penrose drain to retract and examine the peroneal tendons for repair. If there is a tear, sew it with a 4-0 vicryl in an inverted running suturing technique.

If there is an abrasion or defect within the talus, drill it with a K-wire or abrade it with a burr to promote new cartilage formation. Make sure all rough areas of the fibular malleolus are rasped smooth. Before repairing the ligaments, do a vigorous irrigation to remove excessive synovial fluids and/or unwanted joint substances, including possible osteochondral fragments.

### Final Notes

As far as the postoperative course goes, make sure the patient is non-weightbearing with a below knee cast. This cast should be worn in a neutral position for three weeks. Proceed to a walking boot cast and physical therapy as you shift the patient from partial weightbearing to full weightbearing status.

Once you've achieved full weightbearing with the patient (usually about six weeks), proceed to the ankle stirrup brace. It usually takes about three months before the patient can resume sporting activities, although each patient is different.

Whether the modified Brostrom ankle stabilization procedure is performed solely or concurrently with ankle arthroscopy or the repair of other pathologies, it has proven to be well-tolerated and extremely successful over time. ■

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