Faculty Forum
Virtual Roundtable

Moderator

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Participating Panelists

J. Chris Coetzee, MD, MB, ChB
Minnesota Orthopedic
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In an effort to address the concerns and limitations of traditional Brostrom repairs, Arthrex® organized a faculty forum virtual roundtable with thought leaders discussing their experiences with Internal Brace for lateral ankle instability.

*reference:
Why have Brostroms been considered the Gold standard when some of the literature indicates that patients have to step down in their activities? Shouldn’t this be considered a failure or complication?

Dr. Clanton
The Maffulli article in AJSM, April 2013 is one of the only articles that includes a long-term outcomes analysis of the Brostrom procedure and suggests such a reduction in activity (42%). Most other studies, which look at shorter term results, generally have reported success rates ranging from 85-95% with the Brostrom procedure or with the Gould modification of this procedure.

Dr. Ellington
I would not call it a complication, but could be considered a failure. Patients want their instability corrected. The Brostrom does this well; however, if patients have improved stability yet cannot return to their previous level of activity/function, then the gold standard seems “tarnished”.

Why do you feel it is important to utilize InternalBrace to augment your Brostrom procedure?

Dr. Clanton
I treat a high percentage of athletes and very athletic individuals who want to return to their activities. Sometimes this results in such individuals pushing the limits on their rehabilitation, which may be detrimental to the Brostrom procedure.

Dr. Gates
Its greatest value to me is its ability to show very consistent strength of repair, despite the quality of original ATFL and capsule.

What are your concerns with current Brostrom repairs?

Dr. Clanton
With lateral ankle sprains being the most common time-loss injury in sports, one can expect that patients who undergo lateral ankle ligament reconstructions will be subjected to the probability of a re-injury once they return to sports. I am concerned that this will lead to recurrent problems particularly in younger patients and higher level athletes who have Brostrom repairs. I think that this is potentially more likely in cases such as those reported by Maffulli et al., where only the anterior talofibular ligament (ATFL) is repaired.

Dr. Ellington
Laxity over time, especially with inversion injuries. I’m concerned that the repair stretches and cannot allow patients to return to previous level. Also, with current Brostroms, my rehab is slower and patients have a lot of catching up to do when they are ready to return to sport because of the deconditioning with the restrictions of the current Brostrom repair.

Its greatest value to me is its ability to show very consistent strength of repair, despite the quality of original ATFL and capsule.

-Dr. Gates

SwiveLock cannulation and vents allow blood and bone marrow to flow through the anchor.
Dr. Coetzee
My main concern is that it really takes a long time for the tissue to mature. In a true chronic grade 3 tear you essentially suture scar tissue back to the fibula. For that to organize into good tissue takes a long time, therefore the number of failures we see. A standard Brostrom is also not great for patients with underlying tissue abnormalities, i.e. Marfan’s etc.

Dr. Gates
Again, my biggest concern over many years was encountering poor tissue quality, and at times less than optimal retinacular tissue. This could lead to a hesitancy to rehab early and longer periods of post-op protection.

What compelled you to use the InternalBrace™ construct to augment your Brostroms?

Dr. Clanton
After hearing Gordon Mackay’s presentation on the InternalBrace concept, we performed biomechanical testing that confirmed the improved strength of the augmentation. This was published in the February 2014 issue of The American Journal of Sports Medicine.¹

Dr. Ellington
I needed an augment (because of the stated failures above). I traditionally used the Evans procedure (split transfer of the brevis to the fibula). I never really liked this; it wasn’t anatomic, it sacrificed a tendon and you can make patients too tight. I decided to first use it in my worker’s compensation and revision Brostroms and when I experienced great success in these patients (more difficult patients) I was actually surprised. From there, I have now adapted to using InternalBrace in all my cases.

Dr. Gates
It was a new technique that actually solved a problem I was encountering. Too often new devices or techniques are presented that are different in approach or implant, but propose to solve a problem that I don’t really have.

Dr. Mackay
It’s easy and minimally invasive, and I sleep easy.

Dr. Coetzee
My first few cases were in patients that failed a Brostrom as well as an anatomic reconstruction using a semitendinosus graft. The options were to do another reconstruction with a graft or use the InternalBrace. This turned out to be much less surgery and very simple post-op recovery.

Q: We often hear “I never met a Brostrom that needed augmentation” or “My Brostroms all do fine”. Knowing the clinical value, what would be your response to those conversations?

Dr. Clanton
The Brostrom procedure has been an excellent procedure over the short-term, but does not work in all situations. For example, it is not appropriate for patients who are re-injured and have instability following prior ankle reconstructions. I also do not favor the Brostrom technique in patients who are hyperflexible. In my opinion, we should always be vigilant for methods by which we can improve the results of what we do for our patients.

Dr. Ellington
The literature doesn’t support such claims and once, I thought the same. These patients rarely come back after initial followup. However, I strongly believe that although their instability has improved, some are not happy with their outcome because of inability to return to previous level. These patients likely choose not to return to see their doctor.

Dr. Gates
I would remind them that one of the first modifications of the Brostrom was actually an “augmentation” using the extensor retinaculum. Someone saw the need for augmentation then, as I still see it today. Unfortunately the retinaculum is a non-anatomic augmentation, while the InternalBrace is placed to mimic anatomy. I think that surgeons who are looking to advance their confidence will see that we have an opportunity to move past “fine”.

Lateral Ankle InternalBrace

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-Dr. Gates
Dr. Mackay
Patients often have poor tissue quality and I am only too happy to augment with the InternalBrace. Every other area of orthopaedics: hand, shoulder, knee surgery, etc. recognizes the dangers of prolonged and unnecessary immobilization. Even simply to reduce the risk of DVT would justify it in my practice.

Dr. Coetzee
Well, I was one of those who said exactly that. I still believe most standard Brostroms do very well, but if you are totally objective the failure rate, or at least, suboptimal functional outcome, is much higher than what we believe.

Dr. Clanton
While the procedure is relatively new for the ankle, the implants and technique have been used in other are as such as the shoulder and the Achilles tendon.

Dr. Mackay
I have over three years experience and I am delighted at how it has changed my practice. Patients are impressed by their recovery.

Dr. Gates
The confidence I have in the repair is conveyed directly to the patient as they embark on a rehab protocol. I draw the analogy with my knee colleagues who perform ACL reconstructions; because I now find myself motivating and challenging my patients to take the responsibility to regain strength and motion, just like my knee partners have been doing for ACL patients for years.

Dr. Mackay
Athletes like the idea that they have some internal support which may minimize the risk of further injury.

Dr. Coetzee
I believe the ideal situation to use it now is for a case where you ran out of options. You will be pleasantly surprised at the ease of use and the simplified post-op course.

Surgeons often speak of clinical studies before trying something new. Why try the InternalBrace now? What are the minimum expectations you have?

Dr. Clanton
Fortunately, there are now biomechanical studies that support the use of the InternalBrace and there are individuals such as Drs. Mackay, Coetzee, Gates and Ellington who have extensive experience with the technique in the lateral ankle as well as other locations.

Dr. Ellington
It should be tried because the standard Brostrom has solid evidence that it is not as good as we think. The minimum expectations from using the InternalBrace is easy application of the system.

Dr. Gates
I consider this in some ways to be doing the same procedure I have been doing for 16 years, only with a much better “anchor” if you will. Since the beginning of the lateral ligament anatomic repair timeline, there has been an evolution of technique from simply soft tissue repair, to using drill holes in the fibula, and then to anchors. The InternalBrace represents the next step in that evolution, rather than a brand new procedure.

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-Dr. Gates

Dr. Mackay
The components have an excellent track record of safety and I have been happy with their biocompatibility in my shoulder practice for years. The collagen has been shown to grow over the inert scaffold as the ligament heals. It is an easy step to take.
Dr. Clanton
It is important to follow the recommendations for exactly how to perform the technique, and to understand the anatomy and biomechanical function that one wishes to restore. It is certainly possible to place the augmentation in an incorrect position and overconstrain the joint. Gordon’s technique of keeping a hemostat under the FiberTape® during the insertion of the second SwiveLock® anchor seems to help in avoiding this.

Dr. Ellington
The talus is a hard bone. When I tap the talus, I leave the tap in while I insert the system into the fibula. This allows the talus to “stretch” a little, making the placement of the talus implant a little easier.

Dr. Gates
1. Expose and prepare the fibula first to determine optimal location of your anchors for the capsule and the location of your fibular SwiveLock.
2. Reflect the capsule back to visualize the intra-articular lateral talar anatomy, while your assistant holds the ankle in neutral position. This allows for more confidence after capsular repair, when placing the talar SwiveLock through the capsule to gain an extra-articular position of your InternalBrace™.

Dr. Mackay
The ATFL fixation is usually sufficient to support your soft tissue repair. Balance in neutral and, if concerned about tensioning, fix the talus SwiveLock first and after soft tissue repair fix the fibula SwiveLock (Using larger drill but with 3.4 mm, which allows space for tape). Extremely easy and quick.

Dr. Coetzee
1. I drill and prepare all the holes before doing the Brostrom. That way I know the anchors will be close to the anatomic positions. The InternalBrace should be extra-articular, therefore on the outside of the Brostrom.
2. It is sometimes difficult to find the direction of the talar drill hole. After tapping the hole I place a blunt tipped wire in the hole to remind me where it goes.
3. Never over tighten the InternalBrace. I place a Freer under the InternalBrace when inserting it into the fibula or calcaneus to ensure it has some slack.
Describe the optimal technique for tensioning the final construct.

Dr. Gates
I utilize a marker to mark the top and bottom of the second SwiveLock®, and use a hemostat to palpate the tension of the InternalBrace. I find it helpful to do this with the ankle in neutral and free from any upward pressure on the heel. There is no need to apply aggressive eversion nor posterior drawer, just make sure there is no accidental anterior drawer force from a heel bump. It is the same technique I use for a standard Brostrom, other than monitoring the InternalBrace with the hemostat. I find I can make the tension on the InternalBrace lay down similar to the tension I placed on the capsular repair, which I like.

Dr. Mackay
As described above, in neutral without excessive tension.

Dr. Coetzee
This is the hardest part of the procedure. I measure distance from the fibula hole to the talar hole. Then add the depth of the drill hole and add 2-3 mm not to over tighten the repair. I also place a Freer under the Brace when screwing it down to make sure it is not too tight.

Describe your post-op rehab protocol? What is your post-op rehab protocol for your lateral ankle repairs without InternalBrace?

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Dr. Ellington
InternalBrace: two weeks non-weightbearing splint; at two weeks, go into boot, begin range of motion except inversion; at four weeks weight bearing as tolerated in boot; at eight weeks transition to brace and advance based on comfort.

Reference footnote below but for my personal standard Brostrom without InternalBrace Ligament Augmentation the rehab is as follows: two weeks non weight-bearing splint; at two weeks cast for one month; at six weeks weight-bearing as tolerated in boot, at ten weeks transition to brace, at three months run and at four months cutting allowed.

Q

Dr. Clanton
InternalBrace: Patients are splinted for 7-14 days to allow the inflammation of surgery to resolve. During this time, they can ambulate with toe touch on crutches. At the first postoperative visit when the splint and sutures are removed, they begin a physical therapy program working on motion and strength with the goal of returning them to activity as soon as they develop balance, strength, motion, and endurance suitable for their sport or occupation.

Reference footnote below but for my personal standard Brostrom without InternalBrace Ligament Augmentation the rehab is as follows: The rehabilitation is similar, but I limit the patient’s inversion and forced plantar flexion movement for 4-6 weeks following the Brostrom and tend to protect these patients longer in a walking boot.

Dr. Gates
InternalBrace:
1. Immediate partial weight-bearing
2. At two weeks go full weight-bearing in boot and start physical therapy for range of motion and calf strength.
3. At four weeks convert to brace and advance physical therapy.
4. At six weeks advance to jog, run, and non-lateralizing agility.
5. At 8-10 weeks consider return to agility and progress to sports as proprioception and strength testing is passed.

Reference footnote below but for my personal standard Brostrom without InternalBrace Ligament Augmentation the rehab is as follows:
1. Immediate partial weight-bearing
2. At two weeks full weight-bearing in boot
3. At six weeks begin physical therapy for range of motion and calf strength
4. At 8-10 weeks advance physical therapy to non-lateralizing agility
5. At 12-16 weeks consider return to agility and sports as tolerated.
Dr. Mackay
InternalBrace: Soft boot for 10 to 12 days to allow wound to heal but can weight bear as able and mobilization out of boot is encouraged at rest.
Reference footnote on previous page but for my personal standard Brostrom without InternalBrace Ligament Augmentation the rehab is as follows: can no longer justify this approach to my patients. Former management involved two weeks cast followed by four to six weeks in boot with progressive weight bearing.

Q When would you use InternalBrace™ in your lateral ankle instability cases? Do you incorporate a calcaneofibular ligament (CFL) limb, if so how often (what percent of the time)?

Dr. Clanton
I use it with the Brostrom procedure. I do not use a calcaneofibular limb (at least not so far). For those indications I use allograft and tenodesis fixation.

Dr. Ellington
I incorporate InternalBrace every case. Do not use CFL.

Dr. Gates
I am using the InternalBrace augmentation of a Brostrom for all of my primary and some revision instability cases. I agree with the literature that states a separate CFL reconstruction is not necessary, so I do not do it. I do reach as posterior in my capsular reefing as I can, but without any aggressive mobilization of the peroneal tendons. SwiveLock® cannulation and vents allow blood and bone marrow to flow through the anchor.

Dr. Coetzee
I use it for all revision cases. Also for people with known generalized ligamentous laxity. Third group now are high level athletes. I augment the CFL limb in all revisions. I personally like it and it makes sense to me. Most of these cases have an anterior drawer and a talar tilt positive. Repairing only one of the two might lead to the kinematic issues we discussed before. I will do the CFL limb in all primaries that have a positive talar tilt. So far that amounts to about 50%.

Q What are your thoughts on indications of InternalBrace versus when to do a full allograft reconstruction with tenodesis screw fixation?

Dr. Gates
Though I typically have great confidence in using the InternalBrace Augmentation in some revision cases, I will be ready to convert to an allograft with tenodesis screw fixation for those individuals with failed previous peroneal tendon rerouting procedures, cavus foot alignment, and those with more than one previous procedure.

Dr. Coetzee
Interesting question. I will use an allograft with tenodesis screws when the native tissue is not of good enough quality to function as a true lateral repair. On occasion you see a case where the tissue is very thin and atrophic, and no matter how you fix it to the fibula, it will not provide strength. The unanswered question for me is if I then should protect my allograft with an InternalBrace to provide strength?

Q Have you ever considered InternalBrace for other indications (Spring Ligament and/or Lateral Ankle with Arthroplasty)?

Dr. Clanton
I have used the InternalBrace in both of those situations and it has been very effective.

Dr. Ellington
Yes, I have done it for spring ligament Spring: intraop - I place one limb plantar to dorsal with the FDL and the other dorsal to plantar. I hold the foot in slight plantar flexion/inversion as I tension. Placing the calcaneus 3.5 mm SwiveLock is verified first by finding the sustentaculum tali directly, then confirming by placing a small guidewire and checking a lateral and axial heel view. Then I remove the wire and drill. I now do this on all flatfoot recons. I’m starting to believe that this could replace the need for a lateral column lengthening (evans) in some cases. It really improves talonavicular uncoverage.

Dr. Gates
I have done Spring ligament cases in conjunction with stage two flatfoot reconstructions in some patients, but my surgical practice is weighted toward a more active population as a whole.

Dr. Coetzee
I have utilized it with the Spring ligament. I think it might be a great augmentation of a PTT repair, and also allow your repair to mature while the InternalBrace protects it.
Please scan QR code for Surgical Technique Animation

Please scan QR code for MN defensive back with bilateral Brostrom with InternalBrace™, seven weeks post-op.

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**InternalBrace™ Ligament Augmentation Repair Kit**

The Broström lateral ankle ligament secondary repair is a proven method for treating a chronic lateral ligament disruption with instability. Since its original description in 1966, certain problematic issues have stimulated the use of augmentation techniques such as the use of the inferior extensor retinaculum, periosteum, and/or tendon transfer for lateral ankle ligament pathologies. The issues for which these augmentations have been designed include the fact that (1) the Broström repair needs a fairly extensive period of immobilization and protection to allow the tissue to mature adequately; (2) it does not work well in ligamentous lax patients; (3) patients with associated subtalar instability may require more substantial stabilization; (4) concerns exist regarding the adequacy of the secondary repair in especially large individuals; (5) questionable tissue for repair is often encountered; and (6) there are 10-20% recorded failure rate over time.

Since all of the described augmentations to date utilize normal tissues in a non-anatomical fashion, we describe a simple augmentation technique that exceeds the native ATFL strength, does not violate normal tissue, and protects the ligament repair while it matures.

**Internal Brace Ligament Augmentation Repair with Kit (AR-1678-CP) includes:**
- BioComposite SwiveLock w/#2 FiberTape, 3.5 mm
- BioComposite SwiveLock, 4.75 mm
- Guidewire w/ Trocar Tip, 1.35 mm
- Drill Bit, cannulated, 2.7 mm
- Drill Bit, 2.7 mm
- Punch/Tap for 3.5 mm SwiveLock
- Drill Bit, 3.4 mm
- Punch/Tap for 4.75 SwiveLock
- Drill Guide
- Two Free Needles
- Suture Passing Wire

**Internal Brace Ligament Augmentation Repair with Collagen Coated FiberTape Kit (AR-1688-CP) includes:**
- BioComposite SwiveLock w/#2 Collagen Coated FiberTape, 3.5 mm
- BioComposite SwiveLock, 4.75 mm
- Guidewire w/ Trocar Tip, 1.35 mm
- Drill Bit, cannulated, 2.7 mm
- Drill Bit, 2.7 mm
- Punch/Tap for 3.5 mm SwiveLock
- Drill Bit, 3.4 mm
- Punch/Tap for 4.75 mm SwiveLock
- Drill Guide
- Two Free Needles
- Suture Passing Wire
- InternalBrace PEEK

**Multimedia:**
- InternalBrace Ligament Augmentation for Lateral Ankle Instability VID1-00448-EN
- InternalBrace Ligament Augmentation Repair in Conjunction with Open Brostrom Surgical Technique VID1-0492-EN
- InternalBrace ATFL Ligament Augmentation Repair Cadaver Model, May, 2012 VID1-0408-EN
- InternalBrace Ligament Augmentation Repair: Verification of Benefit and Strength of Lateral Ankle Repair VID1-00011-EN
- Flatfoot Reconstruction with Spring Ligament InternalBrace Augmentation and Calcaneal Osteotomy Step Plate Surgical Technique Video VID1-00018-EN
- InternalBrace Ligament Augmentation Repair Presentation: Spring Ligament Surgical Technique, by Jorge Acevedo, MD VID1-0405-EN
- ATFL Talus to Fibula Animation AN1-00145-EN
- ATFL Fibula to Talus Animation AN1-00146-EN
- InternalBrace ATFL Fibula to Talus Surgical Technique Animation AN1-0003-EN
- InternalBrace Ligament Augmentation Repair: Spring Ligament Animation AN1-00146-EN

**Literature:**
- InternalBrace Rountable Brochure LB1-0022-EN
- InternalBrace Ligament Augmentation Repair Product and Technique Highlights LS1-0408-EN
- InternalBrace Ligament Augmentation Repair for Spring Ligament Repair Product and Technique Highlights LS1-0405-EN
- InternalBrace Ligament Augmentation Repair for Deltoid Ligament Repair Product and Technique Highlights LS1-0407-EN
References:


11. Mackay GM, Blyth MJG, Hopper GP, Anthony I, Ribbans WJ. A review of ligament augmentation with the InternalBrace: the surgical principle is described for the lateral ankle ligament and ACL repair in particular, and a comprehensive review of other surgical applications and techniques is presented. Surg Technol Int. 2015;26:239-255.


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