

Internal/Brace™ Ligament Augmentation (Ankle Instability) Scientific Update



Coetzee JC,
Ellington JK,
Ronan JA,
Stone RM

“DO YOUR LATERAL ANKLE PROCEDURES ALL DO WELL?” Publications are now highlighting that the Broström repair can be improved using the *Internal/Brace* ligament augmentation. In addition to biomechanical evidence showing time zero strength of the ATFL at ~250 N (native ~150 N), peer-reviewed clinical studies show faster rehabilitation and better outcomes with *Internal/Brace* ligament augmentation.^{1,2} *Internal/Brace* ligament augmentation has been used successfully for years and has even been integrated into the treatment of elite athletes in addition to everyday active patients. Published results continue to demonstrate safety, rapid recovery, and earlier return to sport and activities of daily living.²

Functional results of open Broström ankle ligament repair augmented with a suture tape.

Foot Ankle Int. 2018;39(3):304-310. doi:10.1177/1071100717742363.

- Six- to 24-month follow-up of 81 patients with a Broström and *Internal/Brace* ligament augmentation
- *Internal/Brace* ligament augmentation shows accelerated rehabilitation and mean return to sport of 12 weeks (3 months) and average time to full weightbearing of 16 days (range, 1-64 days)
- Motivated athletes were able to return to play, some as early as 8 weeks after surgery
- Comparison of ankle joint mechanics (dorsiflexion and plantarflexion) between operative and contralateral sides showed no major differences
- Highlights limitations of standard Broström repair where ankle is often immobilized for 6 weeks before rehabilitation starts and usually takes 4-6 months before athlete can return to play

Maffulli N,
Del Buono A,
Maffulli GD,
et al

Isolated anterior talofibular ligament Broström repair for chronic lateral ankle instability: 9-year follow-up. *Am J Sports Med.* 2013;41(4):858-864. doi:10.1177/0363546512474967.

- “All my Broströms do well”... or do they?
- 9-year follow-up of 42 athletes who had ankle ATFL Broström repair
 - 58% returned to preinjury level of activity, 16% returned to a lower level of activity, 26% abandoned athletic activity
 - In addition to 42% stepping down or abandoning activity, of the patients who had no evidence of degenerative changes preoperatively, 30% had radiographic signs of degenerative changes of the ankle at 9 years

Viens NA,
Wijdicks CA,
Campbell KJ,
Laprade RF,
Clanton TO

Anterior talofibular ligament ruptures, part 1: biomechanical comparison of augmented Broström repair techniques with the intact anterior talofibular ligament. *Am J Sports Med.* 2014;42(2):405-411. doi:10.1177/0363546513510141.

- ATFL *Internal/Brace* ligament augmentation cadaveric biomechanical study testing ultimate load of failure at time zero
- Broström and *Internal/Brace* ligament augmentation = ~250 N
- ATFL *Internal/Brace* ligament augmentation is stronger and as stiff as the native ATFL at time zero
- “Adding strength to Broström may be valuable in patients with generalized ligamentous laxity, in large patients or elite athletes, or when graft reconstruction is not feasible”



Boey H,
Verfaillie S,
Natsakis T,
Vander Sloten J,
Jonkers I

[Augmented ligament reconstruction partially restores hindfoot and midfoot kinematics after lateral ligament ruptures.](#) *Am J Sports Med.* 2019;47(8):1921-1930. doi:10.1177/0363546519848421.

- Five fresh-frozen cadaveric specimens were tested in a custom-built gait simulator in 5 different conditions: intact, ATFL rupture, ATFL-CFL rupture, ATFL-CFL reconstruction, and ATFL reconstruction
- The study concludes that *Internal/Brace*™ Ligament Augmentation is successful in restoring hindfoot and midfoot instability
- Additionally, combined ATFL-CFL reconstruction restored motion better than isolated ATFL reconstruction after a combined ATFL-CFL rupture

Kirk KL,
Campbell JT,
Guyton GP,
Parks BG,
Schon LC

[ATFL elongation after Brostrom procedure: a biomechanical investigation.](#) *Foot Ankle Int.* 2008;29(11):1126-1130. doi:10.3113/FAI.2008.1126.

- Cadaveric study showed that unprotected motion after ATFL repair was associated with significant lengthening of ligament
- Need to protect and cast the ATFL during conservative rehab

Waldrop NE III,
Wijdicks CA,
Jansson KS,
LaPrade RF,
Clanton TO

[Anatomic suture anchor versus the Broström technique for anterior talofibular ligament repair: a biomechanical comparison.](#) *Am J Sports Med.* 2012;40(11):2590-2596. doi:10.1177/0363546512458420.

- Ultimate load to failure of the surgically repaired ATFL is only about half that of the intact native ligament: ~74 N of repaired ATFL versus ~150 N native ATFL

Mackay GM,
Blyth MJ,
Anthony I,
Hopper GP,
Ribbans MJ

[A review of ligament augmentation with the *Internal/Brace*™: 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.

- Supports early mobilization of repaired ligament with minimal surgical morbidity
- Review of ligament reconstruction techniques and highlight of the application of *Internal/Brace* ligament augmentation for ATFL Broström and ACL repair
- Highlights change in orthopedics from reconstruction with allograft or autograft to restoration of normal anatomy with *Internal/Brace* ligament augmentation

Watson TS,
Lamour RJ

[Open modified Broström ankle reconstruction with internal brace augmentation: a novel approach.](#) *Orthop Today.* 2015;35(8):28.

- Novel surgical technique overview of Arthrex *Internal/Brace* ligament augmentation repair to augment modified Broström reconstruction
- Discusses how “increased construct strength allows the surgeon to consider implementation of an accelerated rehabilitation program, earlier return to activity and decreased recurrent instability”

Bevilaqua NJ

[Stabilizing the lateral ankle via a Brostrom repair with suture tape augmentation.](#) *Podiatry Today.* 2015;28(5).

- The technique increases the strength of the repair
- Suture tape augmentation serves to protect the repair and allows for earlier rehabilitation



Haytmanek CT,
Williams BT,
James EW,
et al

[Radiographic identification of the primary lateral ankle structures.](#) *Am J Sports Med.* 2015;43(1):79-87. doi:10.1177/0363546514553778.

- Describes and defines the anatomic origins and insertions of the lateral ankle ligaments (ATFL and CFL)
- Supports anatomic repairs such as primary Broström with *Internal/Brace* ligament augmentation

Arthrex Research
and Development

[Internal/Brace™ ligament augmentation: biomechanical testing of an anterior talofibular ligament repair, insertion order vs. swiveLock anchor size.](#) Arthrex, Inc. LA1-0408-EN_A. Naples, FL; 2014.

- ATFL *Internal/Brace* ligament augmentation with all 4 constructs of 3.5 mm and 4.75 mm BioComposite SwiveLock® anchors tested
- All above 150 N (native strength) and range from 181-352 N

Liebler S,
Waldrop N,
Arthrex Research
and Development

[Internal/Brace™ ligament augmentation: biomechanical testing of an anterior talofibular ligament repair as a function of SwiveLock® anchor size, drill bit diameter and bone tap size.](#) Arthrex, Inc. LA1-00015-EN_A. Naples, FL; 2015.

- Tested tensioning from talus to fibula using 3.4 mm drill for 3.5 mm SwiveLock anchor (244 N) and 4.0 mm drill for 4.75 mm SwiveLock anchor (296 N)

References

1. Viens NA, et al. *Am J Sports Med.* 2014;42(2):405-411.
2. Coetzee JC, et al. *Foot Ankle Int.* 2018;39(3):304-310.