Rehabilitation Guidelines for Brostrom Repair

What is chronic ankle instability?

Chronic ankle instability (CAI) occurs when individuals have ongoing: ankle pain, episodes of the ankle "giving way," and feelings of instability in the ankle following lateral ankle sprains. There are 2 types of chronic ankle instability: 1) mechanical ankle instability (MAI), and 2) functional ankle instability (FAI). MAI is caused by weakened, lengthened or damaged ankle ligaments, and typically happens as a result of repetitive ankle injuries. FAI is caused by deficits in proprioception and motor control (body awareness), but with minimal or no anatomical involvement of the ankle ligaments. Both functional and mechanical chronic ankle instability can be successfully treated with a non-operative course of physical therapy.[8] If these episodes of pain are found to be associated with structural deficits, this chronic ankle instability may need to be treated with surgery.

Which structures are affected?

The anterior talofibular ligament is the most affected structure. This ligament runs from the front of the fibula (the outside shin bone) to the talus (the ankle bone). The calcaneofibular ligament is injured in 1/3 of lateral ankle sprains. The calcaneofibular ligament attaches the bottom of the fibula to the outside aspect of your calcaneus (heel bone). [6]

Figure 1: Lateral ankle ligaments

Diagnosing chronic ankle instability

There are several methods used to diagnose chronic ankle instability (CAI). Your healthcare provider will assess your ankle through a physical exam, which will include tests to evaluate the stability of the ligaments in your ankle, in addition to the range of motion, strength, balance, and control of your ankle performing functional movements like walking and jumping.[12] Your healthcare provider may also order diagnostic imaging to more directly assess the integrity of your ankle. This may include an X-Ray (radiograph) to rule out any boney abnormalities (such as fractures) – "stress" views may be ordered to further assess your ankle in loaded positions (like standing). An MRI (Magnetic Resonance Imaging) may also be necessary to visualize the soft tissue structures (ligaments, tendons, muscles) at the ankle.[12]

Factors that guide the decision for surgical repair

1) Unsuccessful non-operative treatment, including skilled physical therapy, for at least 3-6 months.

2) Recurring symptoms including pain, feelings of instability / "giving way", or continued ankle sprains.

3) Significant limitations in sport or other physical activity because of ankle deficits.

4) Pain directly at the sight of the injured ankle ligament with physical exam findings of ankle instability.

5) Imaging confirmation of ankle soft tissue injury.[8]

Rehabilitation Guidelines following Brostrom Repair

Surgical treatment

In cases when surgery is indicated, a Brostrom repair procedure is typically performed. This procedure involves shortening / tensioning the injured anterior talofibular ligament, and on occasion the calcaneofibular ligament, and re-attaching these ligaments in this slightly shortened position (Figure 2). The inferior extensor retinaculum (a soft tissue covering for the tendons of the muscles on the top of the foot) is tightly attached to the fibula for additional support. (Figure 3)

Figure 3: Attachment of retinaculum to fibula

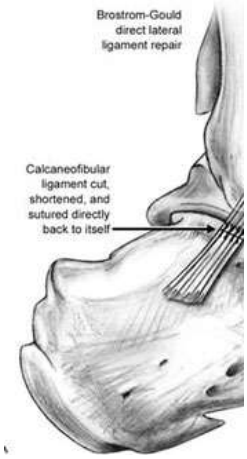
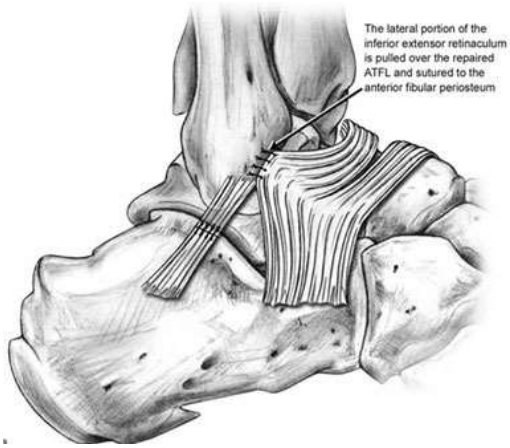


Figure 2: ATFL and CFL repair



Rehabilitation following Brostrom Repair

Following a Brostrom repair, you will participate in about 3.5 – 5 months of post-operative physical therapy to help you progress back to your daily activities, hobbies and sport. This rehabilitation is broken up into 4 major phases. **Phase I**, the early or "protective" phase will include a period of 3 weeks without putting weight through the foot, followed by another 3 weeks of only putting partial body weight through the foot. The goal of **phase II** is to return to normalized walking as your rehabilitation team works to regain the ankle range of motion and strength necessary to walk. Once walking normally, you will initiate **phase III**, during which you will work to normalize functional tasks (stairs, squats, lunges, etc.) as your ankle strength and range of motion progress. Finally, **phase IV** of your rehabilitation will focus on interventions to return you to your prior activity level (ie - running, cutting and sport).

Post-operative Changes Observed following Brostrom Repair

The following functional changes are commonly observed and considered normal following a Brostrom Repair:

- ✓ Limited ankle inversion mobility compared to non-surgical side (Hsu, 2015)
- ✓ Small to moderate ankle eversion strength deficit compared to non-surgical side (Hsu, 2015)
- ✓ Mild reduction in balance and ankle position sense compared to non-surgical side (Han, 2009; Choi, 2021)

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Other deficits commonly treated to Supplement Brostrom Repair

As outlined above, chronic ankle instability (CAI) is often multi-faceted in its cause. As such, your surgeon will likely address any of the following injuries commonly associated with CAI, as they perform the Brostrom Repair.

- ✓ **Osteochondral Defect (OCD):** A tear or lesion of the cartilage that lines the ankle bone (the talus) or of the underlying bone itself. Depending on the size and shape of the lesion, your surgeon will implement one of a handful of surgical techniques to address this lesion.
- ✓ **Synovitis:** When the soft tissue lining surrounding the ankle joint itself becomes inflamed. This can contribute to recurrent pain and swelling at the ankle joint beyond that of CAI. Consult your surgeon regarding treatment options for synovitis as both operative and non-operative treatment options exist.

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Rehabilitation Guidelines following Brostrom Repair

Phase 1: Protective Phase (0-6 weeks)	
Appointments	Surgeon / Physician Assistant follow-up: 2 and/or 6 week(s) post-op **if cast removal is indicated* Physical Therapy appointments: 1-2 visits per week (starting 2+ weeks post-op)
Precautions	Weight-bearing: • Non-weight bearing: 0-3 weeks • Partial weight bearing: 3-6 weeks Range of Motion: • Avoid inversion until 8 weeks post-op
Rehabilitation Goals	1) Protect healing repair in short leg cast, boot, or splint 2) Control inflammation and pain 3) Restore functional range of motion (ROM)
Range of Motion	**No earlier than 2 weeks** • Passive and active ankle plantarflexion (PF) and dorsiflexion (DF) • No inversion until 8 weeks post-op

Therapeutic Interventions
(Examples, but not limited to…)
	Education: post-operative precautions and progressions
	• Management and use of assistive device (crutches, cane, walker)
	• Management of immobilization device (boot, cast, splint)
	• Outline rehabilitation timeline and expectations
	Focal cooling/ice:
	• Prioritize compression and elevation
	  ○ Up to 6x/day (more if needed for pain management)
	Strengthening:
	Weeks 0-4:
	• Submaximal isometrics into ankle DF/PF/eversion
	• Seated intrinsic foot muscle exercise
	Weeks 4-6:
	• Gait training – PWB out of boot in therapy sessions
	  ○ Patient education to begin to transition into hiking boot or above ankle tennis shoe by week 6
	• Active ankle eversion
	• Proprioceptive exercises
	*Consider initiation of the following as tolerated with considerations for post-operative precautions:
	• Upper extremity strength exercise
	• Proximal hip and knee strength exercises
	• Contralateral lower extremity exercises
	• Seated cardiovascular exercise

Criteria for Progression to Next Rehabilitation Phase	✓ Ankle DF ROM ≥ 75% of non-surgical ankle DF ✓ Ankle PF ROM ≥ 50% of non-surgical ankle PF ✓ Tolerance of assisted gait training without reactive pain or effusion

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Phase 2: Return to Walking Phase (6-8 weeks)	
Appointments	Surgeon / Physician Assistant follow-up: 6 week(s) post-op Physical Therapy appointments: 1-2 visits per week
Precautions	Weightbearing: • Progress to full WB (ankle brace if needed for comfort) Range of Motion: • Avoid inversion until 8 weeks post-op
Rehabilitation Goals	1) Progress to full weight bearing without boot 2) Restore normalized gait 3) Progress appropriate range of motion 4) Control swelling and minimize scar tissue adhesion 5) Initiate balance/body awareness training
Range of Motion	• Progress passive and active ankle plantarflexion (PF) and dorsiflexion (DF) ○ Up to 4-6 x/day • No inversion until 8 weeks post-op
Therapeutic Exercises ***(Examples, but not limited to…)***	Walking: • Progressive gait training out of boot Strengthening: • Submaximal, resisted ankle PF/EF/eversion • Bodyweight double leg (DL) functional tasks (ie - squats, heel raises, leg press, deadlifts) • Proximal quadriceps, hamstrings and hip strength/conditioning Proprioceptive Training: • Dual tasking with LE strength tasks Modalities: As needed
Criteria for Progression to Next Rehabilitation Phase	✓ Normalized gait without pain or external support ✓ At least 10 degrees of closed chain dorsiflexion ✓ Tolerance to SL balance exercise

Rehabilitation Guidelines following Brostrom Repair

Phase 3: Functional Recovery Phase (8-12 weeks)	
Appointments	Surgeon / Physician Assistant follow-up: n/a Physical Therapy appointments: 1 visit per week
Precautions	Weight-bearing: Full weight bearing without external support
Rehabilitation Goals	1) Wean from brace/boot (if still in use) 2) Isometric ankle PF strength ≥70% of uninvolved / non-surgical ankle PF 3) Ankle PF AROM ≥ 50º; ankle DF AROM 5-10º 4) Control reactive post-activity swelling
Range of Motion	• Progress passive and active ankle range of motion in all planes ○ Avoid end-range ankle inversion

Therapeutic Exercises
(Examples, but not limited to…)
	Walking:
	• Progressive gait training out of boot
	  ○ Speed and incline progressions
	Strengthening:
	• Seated and standing heel raise progressions
	  ○ Emphasis on developing maximal strength
	• Introduce frontal plane functional movements
	• Progress proximal quadriceps, hamstrings and hip strength/conditioning
	Proprioceptive Training:
	• Introduce reactive LE drills
	• Introduce uneven surfaces with balance training
	Modalities: As needed

Criteria for Progression to Next Rehabilitation Phase	✓ Normalized gait mechanics with no assistive device, all surfaces ✓ Ankle ROM within 80% contralateral/non-operative ankle (except ankle inversion) ✓ 10 SL heel raises with ≥80% heel height and repetition symmetry ✓ No apprehension with rehabilitation exercises

Rehabilitation Guidelines following Brostrom Repair

Phase 4: Return to Prior Activity Level (12+ weeks)	
Appointments	Surgeon / Physician Assistant follow-up: 12 week(s) post-op Physical Therapy appointments: 1 visit ever 1-2 week(s)
Rehabilitation Goals	1) Return to impact (jumping and running), cutting, and sport-specific activity 2) Progress aerobic and anaerobic, sport-specific conditioning 3) Successfully pass return to sport testing
Range of Motion	Progress all planes of motion to full available ROM

Therapeutic Exercises
(Examples, but not limited to…)
	<u>Strengthening:</u>
	• Resistance training with emphasis on developing max power (rate of force production)
	  ○ Ie: seated/standing heel raises, leg press plantar flexion, squats/lunges, step up/downs
	  ▪ Sets of 3-6 reps at 50-80% of 1RM
	  ▪ Emphasis on moving load as quickly as possible
	<u>Plyometrics:</u>
	• DL Jump up → DL Jump in place → DL Landing
	• SL Jump up → SL Jump in place → SL Landing
	  ○ Hop to stabilization exercises (consider performance at rate of ~ 2Hz)[6]
	  ▪ DL → SL
	  ▪ Sagittal plane → Diagonal → Frontal plane → Rotational
	  ▪ Stable surface → unstable surface
	<u>Cardio:</u>
	• Sport specific anaerobic/aerobic training
	  ○ Considerations for sport specific work/rest ratios
	• Re-integration into team-based training drills

Return to Running	<u>Criteria to initiate impact training</u> • At least 12 weeks post-op See **Appendix B**
Criteria for Return to Sport	<u>Criteria to initiate impact training</u> • At least 16 weeks post-op (met criteria for transition to next rehab phase above) See **Appendix B**

***Important to continue participation in ongoing preventative strength, power and motor control exercises at return to sport**

All physical therapy appointment frequencies are recommendations only. Your physical therapy provider will work with you to select an appointment frequency that best fits your individual needs.

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