

CHRONIC ANKLE INSTABILITY CLINICAL PRACTICE GUIDELINE

Background

Chronic ankle instability (CAI) is a common clinical condition characterized by the tendency of the ankle to “give way” during normal activity and may occur in the absence of true mechanical instability. It may develop after a single event, or may be part of an ongoing process that leads to functional ankle instability and the subjective feeling of the ankle giving way. Up to 40% of acute ankle sprains will develop CAI, however progression from acute ankle sprains to CAI is not well understood. It becomes termed CAI if instability has persisted for greater than 6 months.

It is hypothesized that CAI may develop due to a loss of mechanoreceptors within the ankle joint. Furthermore, clinical laxity may be a confounding factor in CAI and may not be present in all those with perceived instability. Less than 50% of CAI patients demonstrate true clinical laxity, while 20% of copers demonstrate clinical laxity. CAI likely results from a combination of several factors including poor proprioception, impaired strength and patient perception.

Current literature classifies CAI into two groups: **mechanical** and **functional instability**. Mechanical instability implies loss of normal anatomic restraint to lateral ankle stability, while functional instability results secondary to a loss of proprioception, neuromuscular control, and strength. However, these two classifications may not be completely distinct entities. It has been hypothesized that an interaction of mechanical and functional instability can occur.

Proprioception has been found to be a key management strategy in CAI. Several studies show that patients with CAI demonstrate reduced performance on several proprioceptive and functional tests such as the Y-Balance, single-leg balance and hop testing. Furthermore, literature reveals that the inclusion of proprioceptive and neuromuscular control training strategies result in improved functional performance and improved patient reported outcomes.

Disclaimer

Progression is time and criterion-based, dependent on soft tissue healing, patient demographics, and clinician evaluation. Contact Ohio State Sports Medicine at 614-293-2385 if questions arise.

Definitions

- *Strong level evidence:* supported by systematic review, meta-analysis, or >5 RCT
- *Moderate level evidence:* supported by 3-4 RCT
- *Low level evidence:* supported in 1-2 RCT or clinical case series
- *Expert opinion:* supported by case studies, expert opinions or opinions of the authors



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Summary of Recommendations

Risk Factors	Modifiable Risk Factors (<i>strong level evidence</i>): • Indoor and court sports • High intensity training > 3 days/week • Poor neuromuscular control (impaired proprioception) Non-modifiable risk factors (<i>strong level evidence</i>): • Female • Younger age • Higher BMI and height • Generalized laxity • Hindfoot and midfoot alignment (hindfoot varus, plantarflexed first ray, midfoot cavus)
Examination	• <u>Standing foot alignment</u> • <u>Neurovascular exam</u> (Repeated sprains may propagate peroneal neuropathy) • <u>Beighton Scale for Systemic Hypermobility</u> • <u>ROM:</u> ◦ NWB ◦ Weight Bearing DF lunge • <u>Strength</u> (Dynamometry) • <u>Mechanical Instability Testing:</u> ◦ Anterior Drawer Test ◦ Talar Tilt • <u>Functional Instability Testing</u> ◦ Y-Balance ◦ Foot Lift Test (Appendix A) • <u>Functional Hop Testing</u> (Appendix B)
Differential Diagnosis	• Chronic Ankle Instability • Peroneal Neuropathy • Peroneal Tendinopathy • Peroneal Instability • Syndesmotic Instability • Cuboid Syndrome • Osteochondral Lesion *More than one of the differential diagnoses may be present concurrently.
Manual Therapy	• Talocrural joint mobilizations • Hindfoot, midfoot mobilizations • Soft tissue mobilization PRN
Corrective Interventions	• ROM – emphasis on dorsiflexion • Ankle strength, foot intrinsic strengthening • Hip and core stability • Balance/proprioception progressions into functional movement training
Outcome Tools and Testing	Consider patient reported outcome measures 1. FAAM; TSK-11; The Cumberland Ankle Instability Tool Functional Testing 1. Y-Balance; Foot Lift Test; Functional Hop Testing
Criteria for Return to Sport/Discharge	1. <u>Subjective Outcome Measure</u>: > 90% 2. <u>DF Lunge</u>: > 7.5 cm 3. <u>Y-Balance</u>: > 90% composite 4. <u>Foot Lift Test</u>: < 5 errors 5. <u>Functional Hop Testing</u>: > 90% LSI 6. Physician clearance (if required)



Rehabilitation Phase I: Acute Phase of Rehab and Return to Activity

Neuromuscular Control/Balance Training <i>strong level evidence</i>	Optimize and restore active stability by training with examples such as: • Proprioceptive training • Balance training • BAPS board ◦ Seated → standing • Single leg stance • Wobble Board • De-stabilization device training • Step and Hold • Initiate plyometric progression: ◦ Shuttle press: DL → alternating → SL • Drop jump • Foot intrinsic strengthening: ◦ Splaying ◦ Doming ◦ Great toe extension ◦ Ankle PF with great toe flexion ◦ Toe curls
Therapeutic Exercise <i>low level evidence</i>	Strengthening exercises have been shown to improve strength and perceived instability, but may not have functional benefits for individuals with CAI. The goal of strength training for individuals with CAI is to provide improved dynamic stability of the ankle to reduce potential subsequent episodes. Include proximal stabilization of the hips and core to reduce burden on ankle strategy. Recommended intervention progression includes: • Band strengthening ◦ 4 way ankle ◦ Inversion strengthening most effective • Ankle proprioceptive neuromuscular facilitation diagonals • Heel raise: DL → SL • Hip Abductors • Hip Extensors • Single leg squat • Trampoline training • Hop training
Manual Therapy <i>low level evidence</i>	Manual therapy may have a role in improving joint mobility for ankle dorsiflexion. Considerations should include soft tissue surrounding the ankle (triceps surae), as well as accessory joint mobility of the talocrural, subtalar, and distal tibio-fibular joints. The goal of utilizing manual therapy techniques for individuals with CAI is to promote improved arthrokinematics of the foot and ankle joints, and to facilitate improved dorsiflexion ROM and proprioception of the ankle/foot complex.
Bracing/Taping <i>strong level evidence</i>	No injury prevention benefits of bracing/taping have been recognized in literature. There is evidence indicating that bracing may or may not provide additional therapeutic benefit and can be added at the treating therapist's discretion. However, bracing has been shown to potentially alter muscular recruitment around the ankle, it is NOT recommended that the patient wear bracing during treatments. Recommended bracing/taping techniques to consider: • Low dye taping (modified or standard) • Ankle taping • K-tape (Facilitation of ankle evertors with posterior glide of distal fibula) • Figure 8 brace (lace up with lateral stirrups)
Discharge Criteria/ Criteria to Progress <i>Expert opinion</i>	• DF ROM 90% of uninvolved side • FAAM score ≥ 1 MCID improvement • ≤ 1 incidences of perceived instability with functional activities in a 2 week period



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Rehabilitation Phase II: Return to Sport Considerations

Factors to Consider Prior to Return to Play	• Demands of the athlete's sport and players position • Competition level • Rules on taping/bracing for practice and games
Neuromuscular Control/Balance Training <i>strong level evidence</i>	Interventions can include: • Single leg calf raises ◦ Double leg ◦ Eccentrics (2 up, 1 down) ◦ Single leg • Toe walking • Triple extension exercise • Hop training • SL drop jump • Single leg stance (progress per patient tolerance) ◦ Firm surface ◦ Foam surface ◦ Dynamic surface ◦ Perturbations ◦ Cognitive task ◦ Eyes closed
Therapeutic Exercise <i>low level evidence</i>	Utilize end range strengthening for ankle plantarflexors, evertors, and invertors. Manipulate training to include both endurance and power considerations based on sport. Continue to include proximal stabilization of the hips and core to reduce burden on ankle strategy. Interventions can include: • Resisted inversion and eversion in end range PF (theraband, ankle weight) • DL/SL heel raises with theraband pulls into ankle inversion and eversion • Single leg squat • Hip Abductors • Hip Extensors • RDL's • Planks
Agility Training and Sport Specific Drills <i>low level evidence</i>	Consider periodization (in season v. out of season athlete), power v. endurance and cardiovascular conditioning with these intervention options: • Lateral shuffling • Carioca • Figure 8 drills • Cone drills • Back pedal • Multi-directional hopping • Ladder drills • Resisted jogging (sport cord) • Drop counter jump • Change of direction drills
Criteria for Return to Play <i>moderate level evidence</i>	• <u>Functional Hop Testing (Appendix B)</u> • LSI ≥90% for all tests • <u>Star Excursion Balance Test</u>: within 4 cm in anterior direction • <u>Single leg stance time</u>: 90% of contralateral limb • <u>Foot lift test</u>: < 5 errors (Appendix A) • <u>Strength</u>: 90% of contralateral limb using hand held dynamometry • Pain ≤ 1/10 with activity • No reactive edema in 24 hours post activity • <u>Ankle ROM</u>: within 90% of contralateral limb using standard techniques • DF Lunge > 7.5 cm • <u>Outcome Tool</u> ◦ FAAM with ≤ 1 MCID from full score (9 points) ◦ Consider utilization of TSK-11



Failure of Conservative Management

Definitions

Failure of conservative management for chronic ankle instability can be managed surgically with a Brostrom procedure. Several factors may contribute to failure of conservative treatments, and failure can be identified as the continued presence of mechanical or functional ankle instability for 6 months following injury and 3 months of treatment. There are two variations of Brostrom procedures: The Brostrom-Evans or the Brostrom-Gould procedure. Each procedure seeks to repair or recreate the ATFL to restore ankle stability. Post-operative outcomes are generally rated as excellent, with 90-95% of patients reporting full return to pre-morbid activity. Additionally, 90-95% of high level athletes return to sport within 6 months, although longevity of career and performance level have not been well examined.

Brostrom-Gould Procedure

The ATFL is debrided and repaired, and a portion of the inferior extensor retinaculum is stretched over the ATFL to reinforce the ligament.

Brostrom-Evans Procedure

In addition to the above, 1/3 of the peroneus brevis muscle is split off and threaded through the fibula, anchoring it to the lateral talus.

Operative considerations: Surgical repair is not indicated for individuals with systemic hypermobility. The following symptoms are considered to be a negative prognostic factor for outcomes following a Brostrom repair:

- Osteochondral defects ~20%
- Synovitis ~63%
- Impingement ~10%
- Tendon dysfunction
- Medial ankle instability (MRI)
- Syndesmotic instability (MRI)
- Obesity (BMI $\geq$ 30 kg/m²)

Intra and extra-articular confounders, such as synovitis and OCD, can be managed with arthroscopic repair. This repair is typically performed in conjunction with the primary repair.

Following a Brostrom repair, the following post-operative changes are considered “normal” and are frequently observed:

- Loss of inversion ROM up to 15 degrees
- Ankle eversion strength deficit of 10%
- Decreased balance, with increased postural sway
- Decreased proprioception



Appendix A: Foot Lift Test

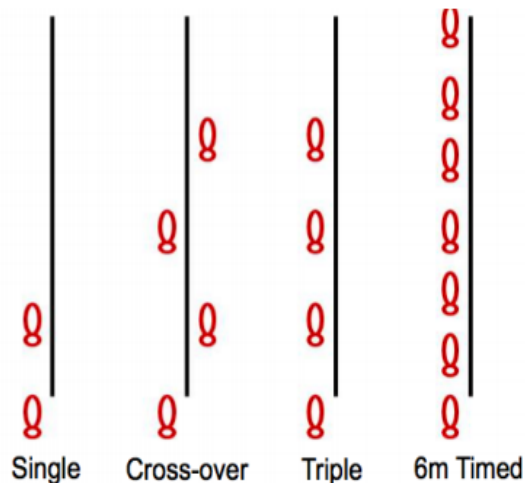
Begin with patient standing on involved limb on a firm surface, hands on iliac crests. The uninvolved limb is slightly flexed at hip and knee. The patient is to maintain this position for 30 seconds with eyes closed. Instruct patient as follows: "Remain as motionless as possible, if you move out of position please return to original position as quickly as possible." The examiner will count the number of foot lifts within the 30 second time period. Each foot lift constitutes as 1 error. A foot lift is considered as any part of the foot that loses contact with the ground (eg. lifting toes from the floor). If the uninvolved limb touches the floor it is counted as an error, 1 error added for every second it is out of position. Patient is allowed 1 practice trial, then an average of 3 trials will be calculated. A 30 second rest should be given between each trial.

Discharge and return to sport criteria: < 5 errors



Appendix B: Single Leg Hop Series

- 1) **Single hop for distance:** Have the subject line their heel up with the zero mark of the tape measure, wearing athletic shoes. The subject then hops as far as he/she can, landing on the same push off leg, for at least 3 seconds. The arms are allowed to move freely during the testing. Allow him/her to perform 2 practice hops on each leg. Then, have the subject perform 2 testing trial, recording each distance from the starting point to the back of the heel. Average the distanced hopped for each limb. The Limb Symmetry Index: Involved limb distance/Uninvolved limb distance X 100%.
- 2) **Cross-over hop for distance:** The subject lines their heel up with the zero mark of the tape measure and hops 3 times on one foot, crossing fully over the center line each time. Each subject should hop as far forward as he/she can on each hop, but only the total distance hopped is recorded. The arms are allowed to move freely during the testing. Allow him/her to perform 2 practice hops on each leg. Then, have the subject perform 2 testing trial, recording each distance from the starting point to the back of the heel. Average the distanced hopped for each limb. The Limb Symmetry Index: Involved limb distance/Uninvolved limb distance X 100%.
- 3) **Triple hop for distance:** The subject lines their heel up with the zero mark of the tape measure and hops 3 times on one foot. Each subject should hop as far forward as he/she can on each hop, but only the total distance hopped is recorded. The arms are allowed to move freely during the testing. Allow him/her to perform 2 practice hops on each leg. Then, have the subject perform 2 testing trial, recording each distance from the starting point to the back of the heel. Average the distanced hopped for each limb. The Limb Symmetry Index: Involved limb distance/Uninvolved limb distance X 100%.
- 4) **Timed 6-meter hop:** The subject lines their heel up at the zero mark of the tape measure and hops, on cue with the tester, as fast as they can the length of the 6-meter tape. The arms are allowed to move freely during the testing. Allow him/her to perform 2 practice hops on each leg. Then, have the subject perform 2 testing trial, recording each distance from the starting point to the back of the heel. Average the distanced hopped for each limb. The Limb Symmetry Index: Involved limb time/Uninvolved limb time X 100%.



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