ANKLE LIGAMENT RECONSTRUCTION POST-OPERATIVE GUIDELINES

The following Ankle Ligament Reconstruction Guidelines were developed by HSS Rehabilitation. These types of surgeries are intended to correct ankle instability. The primary intention is to return to full functional and recreational activities. Returning to impact activities is based on pre-surgical activity and surgeon clearance.

Progression is both criteria-based and patient specific. Phases and time frames are designed to give the clinician a general sense of progression. Progression will be dependent on adequate soft tissue healing time for the involved structures. The program should balance the aspects of tissue healing and appropriate interventions to maximize function.

Patients are typically discharged from the hospital on the day of surgery. The ankle is placed in a splint for the first 2 weeks. At 2 weeks (Post-Operative Phase 2), the splint is removed, and they are placed into a Controlled Ankle Movement (CAM) boot. Patients are encouraged to have one physical therapy session at 2 weeks for patient education and proximal hip and core strengthening. Patients are kept non-weight bearing (NWB) for 4 weeks. During this period, they are encouraged to elevate the leg and control swelling. Patients will begin weight bearing progression with crutches and physical therapy at 4 weeks (see appendix).

The following considerations should be kept in mind:

- For patients with comorbidities such as diabetes, osteoporosis or high body mass index (BMI), healing times and weight bearing (WB) progression may be delayed
- Be mindful that concomitant surgeries such as tendinous repairs or reconstructions may affect treatment choices and rate of progression
- Monitor for plantar fasciitis, metatarsal head pain and wound healing
- Consider removable external shoe lift for the non-operative limb
- Be aware of graft materials used in the surgical procedure

FOLLOW SURGEON MODIFICATIONS AS PRESCRIBED
ANKLE LIGAMENT REPAIR POST-OPERATIVE GUIDELINES

Post-Operative Phase 1: Weeks 0-2

PRECAUTIONS
- Avoid placing lower extremity (LE) in prolonged dependent position
- Non-removable splint must be kept dry at all times
- Contact surgeon if splint is feeling tight or toes are cold/numb

ASSESSMENT
- Mental status (alert and oriented x 3)
- Numeric Pain Rating Scale (NPRS)
- Activity Measure for Post-Acute Care (AM-PAC)
- Dressing check
- Edema
- Post-anesthesia upper extremity (UE) and LE sensory motor screening
- Functional status: bed mobility, transfers, ambulation, stair mobility, if required

TREATMENT RECOMMENDATIONS
- Patient Education:
  - Pain control
  - Maintain NWB status
  - LE must be elevated on at least two pillows for 80%-90% of the time (follow surgeon instructions)
  - Walking is for functional home mobility and short distances only – wheelchair or knee scooter should be used for longer distances
- Transfer training: in and out of bed and sit to stand (e.g., chair, toilet)
- Gait training with appropriate device on level surfaces while maintaining NWB status
- Stair training, if required, NWB with crutch and rail or seated bump up method
- Activities of daily living (ADL) training and home modifications
- Promotion of knee extension while elevated
- Therapeutic exercise with focus on maintaining non-operative LE and bilateral UE motion, flexibility and strength
CRITERIA FOR ADVANCEMENT

- Understanding of elevation protocol and other precautions
- Good pain control
- Safe ambulation/stair negotiation with NWB and appropriate device on level surfaces independently or with assistance of family member/friend if consistently present at home
- Independent with transfers
- Discharge home within 1-2 days when goals have been achieved and with surgeon clearance
- Note that acute care phase 1 protocol is maintained until follow up with surgeon

EMPHASIZE

- Control swelling
- Elevation protocol
- Independent transfers
- Gait training NWB
- Safe stair mobility, if required
ANKLE LIGAMENT REPAIR POST-OPERATIVE GUIDELINES
Post-Operative Phase 2: Single Visit Home Exercise Program (HEP) (Weeks 2-4)

PRECAUTIONS
- Maintain NWB status
- Avoid placing LE in prolonged dependent position

ASSESSMENT
- Foot Ankle Disability Index (FADI)
- Lower Extremity Functional Scale (LEFS)
- NPRS
- Wound status
- Edema
- Screen for deep vein thrombosis
- Sensory screening
- Achilles tendon resting angle
- UE and LE sensory motor screening
- Functional status: bed mobility, transfers, ambulation, stair mobility, if required

TREATMENT RECOMMENDATIONS
- One-time physical therapy HEP visit
  - Patient education
- Active range of motion (AROM), self-mobilization (with surgeon approval)
- Maintain weight bearing restrictions
- Swelling management: maintain 80% elevation schedule
- Skin care education: wound care and infection prevention
- Proximal hip and core strength
  - Abdominal exercises
    - Supine and quadruped
  - 3-way straight leg raise (no forward flexion)
  - Clamshells in 45 degrees and 0 degrees hip flexion with abdominal control
  - Emphasize hip extension strengthening
- Upper body conditioning program

CRITERIA FOR ADVANCEMENT
- Patient understands repair protection recommendations (no weight-bearing, no stretching)
- Edema well controlled
- Independent with core and hip stability program
EMPHASIZE

- Proximal hip strengthening
- Control swelling
- Elevation protocol
- Independent transfers
- Gait training NWB
- Safe stair mobility, if required
- No stress on the ligaments during any exercises
ANKLE LIGAMENT RECONSTRUCTION POST-OPERATIVE GUIDELINES
Post-Operative Phase 3: Weeks 5-8

PRECAUTIONS
- Excessive tensile forces into inversion or eversion based on location of repair – avoid passive motion (See Modifications To Phase 3 below)
- Avoid standing or walking for extended periods of time

CONSIDERATIONS
- History of previous ankle sprains
- Psychosocial involvement/pain sensitization
- Pre-injury condition

ASSESSMENT
- FADI
- LEFS
- NPRS
- Wound/scar status
- Edema
- Screen for deep vein thrombosis
- Sensory screen
- AROM/passive range of motion (PROM) of non-involved LE joints
- Ankle joint mobility
  - Talocrural
- Foot joint mobility
  - Midfoot joints
  - Metatarsophalangeal (MTP) joints
  - Lesser digits
  - First ray plantarflexion (PF)
- Soft tissue extensibility
  - Gastrocnemius-soleus complex
  - Flexor hallucis longus (FHL) and flexor digitorum longus (FDL) tendons
  - Long toe extensors
  - Hip extension
- Palpation focusing on hypertonicity of surrounding muscles
- Manual muscle testing (MMT) focusing on ankles/hips
- Gait and stair training according to weight bearing status with crutches and CAM boot per surgeon recommendations
TREATMENT RECOMMENDATIONS

- Scar mobilization, silicone strips, moisturizing when wound is healed
- Joint mobilizations with focus on talocrural joint
- Progressive gait and stair training
  - Ankle and toe AROM
  - Adjust crutch height if necessary, to accommodate CAM height with external shoe lift
  - Follow weight bearing progression in Appendix
- Desensitization
  - Progressive touch/stroking of the foot
  - Ball massage on sole of foot
- When incisions are fully healed, consider:
  - Contrast baths
  - Compression garments
- Focus on seated and closed chain motion in PF/dorsiflexion (DF)
- Progress to standing flexibility exercises respecting WB status
  - Runner’s gastrocnemius stretch with rear LE within WB restrictions when 25% WB
  - Progress to toe articulation (push off motion with rear foot)
  - Progress to soleus stretch when 50% WB
  - Long toe flexor stretch against wall
  - Bilateral mini-squats when 50% WB
- Progress hip flexibility with emphasis on extension
- Initiate balance/proprrioception exercise training respecting WB status
  - Rocker board in seated with PF/DF
  - Weight shifting (use scale to assess load)
- Strengthening
  - Proximal LE
  - Isometric exercises in neutral inversion/eversion
  - Isotonic PF/DF
  - Bilateral heel raise progression: seated, seated with load, leg press, standing with upper body support, standing unsupported
  - Arch doming progressing from seated to standing
  - Intrinsics
    - Marble toe pick ups
  - Short foot strengthening
  - Bilateral stance with assessment of foot tripod (calcaneus, 1st and 5th metatarsal heads)
- Stationary bicycle when 50% WB
- Aquatic exercise if accessible when incision healed and cleared by surgeon
- Upper body conditioning as tolerated
CRITERIA FOR ADVANCEMENT

- Stable/controlled swelling
- Wound closure
- Bilateral standing heel raises
- Full weight bearing (FWB) in CAM boot with or without assistive device

EMPHASIZE

- Gait training with gradual progression of WB
- LE ROM and flexibility exercises emphasizing ankle and hip while respecting WB and wound status
- Progression to closed chain exercises
- Monitor maintenance of tripod during WB activities
- Continuous monitoring of swelling

MODIFICATIONS TO PHASE 3

- Deltoid ligament reconstruction: avoid passive eversion and aggressive subtalar joint mobilizations; avoid maximal isometric inversion with posterior tibial tendon reconstructions, if present
- Lateral ankle reconstruction: avoid passive inversion, aggressive subtalar and distal tibia-fibula joint mobilizations and forceful PF stretching; avoid maximal isometric eversion with peroneal tendon reconstructions if present
- Autograft: be mindful of donor site healing
  - Limit motions which stress healing tissues
    - Anterior talofibular ligament (ATFL): limit inversion and PF
    - Calcaneofibular ligament (CFL) and posterior talofibular ligament (PTFL): limit inversion
    - Deltoid ligament: limit eversion
    - High ankle sprain: limit WB inversion/eversion
- Cartilage repair: avoid shearing forces to joint surface; avoid aggressive joint mobilizations; weight bearing progression may be delayed
ANKLE LIGAMENT RECONSTRUCTION POST-OPERATIVE GUIDELINES
Post-Operative Phase 4: Weeks 9-12

PRECAUTIONS
- Avoid weaning off assistive device and CAM boot when excessive pain or compensatory movements persist
- Excessive tensile forces into inversion or eversion based on location of repair – avoid passive motion (see Modifications To Phase 4 below)
- Avoid forceful PF stretching

ASSESSMENT
- FADI
- LEFS
- NPRS
- Wound/scar status
- Edema
- Open and closed chain ankle/hallux AROM/PROM
- Palpation to identify pain generators/hypertonicity
- Ankle, mid-foot and MTP joint mobility
  - Distal tibiofibular (tib-fib), talocrural
  - Repair integrity
- Soft tissue extensibility
  - Hip flexors
  - Iliotibial band
  - Gastrocnemius-soleus complex
- Strength of LE
  - Peroneal muscles
  - Posterior tibialis
  - Proximal hip and thigh
  - Single leg stance (SLS) with assessment of foot tripod (calcaneus, 1st and 5th metatarsal heads) and short foot posture
- Functional activities
- Squats and stairs
- Gait quality FWB without assistive device
  - With and without CAM as indicated
TREATMENT RECOMMENDATIONS

- Gait training weaning from CAM boot and assistive device
  - Encourage step through pattern
- Patient education on appropriate footwear
  - Consider supportive sneakers, foam padding, taping, ankle support orthosis
- Edema management
  - Compression garments
  - Patient education on edema management
- Scar mobilization, silicone strips, moisturizing when wound is healed
- AAROM/AROM/PROM progressions: See Modifications to Phase 4 below for specific procedures
  - Half-kneel, step stretching, flat footed squat with knees over toes and UE support, squat on toes
  - Mobilization of 1st MTP, distal tib-fib, talocrural and subtalar joints
  - Progress lower extremity flexibility with emphasis on hip extension
  - Lunging with elastic band or strap for talocrural self-mobilization
  - Foam roller to proximal musculature
  - Maintain tensile integrity of repair (i.e., keep it a little tight compared to opposite side)
- Progress unilateral static and dynamic standing balance/proprioceptive exercises
- Strengthening
  - Proximal hip control
  - Progress from bilateral to unilateral standing exercises (e.g., heel raises with proper eccentric control)
  - Single heel raise work (height x reps) within 80% of unaffected limb
  - Progress to dynamic, closed chain proximal LE strengthening
    - Squats bilateral progressing to unilateral
    - Resisted lateral band walks
    - Lunges
    - Forward step up/down progression
    - Posterior chain
  - Medial/lateral ankle strengthening
    - Active against gravity
    - Isotonic
      - Manual/progressive resisted exercise
      - Aquatic therapy
  - WB intrinsic training
- Dynamic stability and eccentric loading
  - Heel raises with elastic band perturbation
  - Balance trainers
• Progress cardiovascular conditioning and gait
  o Elliptical (forward and backward)
  o Encourage gym program
  o Retro treadmill
  o Core progressions
    ▪ Front planks
    ▪ Side planks

CRITERIA FOR ADVANCEMENT
• Functional ankle/toe ROM to allow for symmetrical gait
• Community ambulation FWB without CAM boot and assistive device, as appropriate
• Ascend/descend 6-inch steps reciprocally
• Manual muscle test grade of 5/5 for DF, inversion, eversion, PF

EMPHASIZE
▪ Wean from crutches to cane/no assistive device and CAM boot to supportive shoe
▪ Functional single LE articulation in WB
▪ Stability with movement

MODIFICATIONS TO PHASE 4
• Deltoid ligament reconstruction: avoid passive eversion and aggressive subtalar joint mobilizations; avoid maximal isometric inversion with posterior tibial tendon reconstructions, if present
• Lateral ankle reconstruction: avoid passive inversion, aggressive subtalar and distal tib-fib joint mobilizations and forceful PF stretching; avoid maximal isometric eversion with peroneal tendon reconstructions if present
• Autograft: be mindful of donor site healing
  o Limit motions which stress healing tissues
    ▪ ATFL: limit inversion and PF
    ▪ CFL and PTFL: limit inversion
    ▪ Deltoid ligament: limit eversion
    ▪ High ankle sprain: limit WB inversion/eversion
• Cartilage repair: avoid shearing forces to joint surface; avoid aggressive joint mobilizations; do not manipulate joint; weight bearing progression may be delayed
PRECAUTIONS

- Avoid premature progression to impact activities (e.g., running, jumping)
- Avoid too much, too soon with high intensity activities and drills

ASSESSMENT

- FADI
- LEFS
- NPRS
- Edema
- Monitor joint mobility throughout the kinetic chain screening for potential distal effects on foot/ankle alignment (i.e., hip version)
  - Premorbid compensatory patterning
- Functional strength of LE
- Squats and stair descent
- SLS with assessment of foot tripod
- Single leg squat
- Star Excursion Test\(^2\)

TREATMENT RECOMMENDATIONS

- Patient education on best activity specific footwear options
- Edema control with a bimalleolar compression device or other compression garments
- Progress gait efficiency and speed (e.g., stride length, cadence, push off, trunk rotation)
- AROM/PROM and mobilization focusing on persistent deficits
- Progress to loaded single leg closed chain activities
- Progress dynamic balance/proprioceptive exercises
  - E.g., cariocas, tandem walking, heel walking, toe walking, single leg balance with multidirectional and multi-surface challenges
  - Challenge with reactive exercises
- Continue to progress functional strengthening
  - Maximize symmetrical movement patterns and encourage healthy compensatory patterns in adjacent joints, as necessary
- Consider starting pre-impact training (e.g., aquatic/anti-gravity treadmill)
  - Eccentric strengthening and end range control
  - Functional lower extremity chain strengthening
  - Hiking, yoga, Pilates, light aerobic classes
CRITERIA FOR DISCHARGE OR ADVANCEMENT TO PHASE 6 RETURN TO SPORT/DYNAMIC ACTIVITIES (IF APPLICABLE)

- Full ankle and hallux ROM (ankle fracture may not achieve full sagittal plane ROM with syndesmotic screw; bunionectomy may not regain full hallux extension ROM)
- Single heel raise work (height x reps) within 90% of unaffected limb
- SLS ≥ 90% of contralateral side with minimal foot, hip or core strategies
- MMT 5/5 of all proximal muscle groups
- Ability to appropriately progress to loaded activities
- Independent management of residual symptoms
- Independent home exercise program

EMPHASIZE

- Symmetry and efficiency in gait cycle without assistive device
- Dynamic stability
- Maximizing ankle and hallux DF and PF ROM
- Monitor for apprehension during activities

MODIFICATIONS TO PHASE 5

- Lateral reconstructions: avoid forceful PF/inversion combined motions
- Deltoid reconstructions: avoid forceful eversion/excessive pronation
- Cartilage repair: minimize activities that increase pain or edema
ANKLE LIGAMENT RECONSTRUCTION POST-OPERATIVE GUIDELINES
Post-Operative Phase 6: Return to Sport/Dynamic Activities (Weeks 19+)

PRECAUTIONS
- Plyometrics and return to run progressions may be initiated at Week 24 pending surgeon approval
- Avoid too much, too soon: monitor volume and load
- Avoid compensatory movement strategies
- Monitor movement strategies during fatigue situations
- Avoid inadequate rest and recovery
- Avoid inadequate strength to meet demands of activity level
- Ensure that underlying pathology is conducive to long term loading and will optimize joint preservation

ASSESSMENT
- FADI
- LEFS
- NPRS
- Edema
- Dynamic single leg alignment and control
- Gait in various conditions
- Movement strategy – squat, forward step up 6-8"/step down 6-8", single leg squat
- Effects of fatigue on movement patterns, quality and/or pain
- Functional strength: as above
- MMT
- PROM/Flexibility assessment
- Address ongoing efficacy of external supports (i.e., compression stockings, brace, rocker sneakers)

TREATMENT RECOMMENDATIONS
- Increase volume and PF load to mimic load necessary for return to activity
- Introduce movement patterns specific to patient’s desired sport or activity
- Introduction of light agility work
  - Hopping patterns
- Increase cardiovascular load to match that of desired activity
  - Return to run progressions
• Consider collaboration with certified athletic trainer (ATC), performance coach/strength and conditioning coach (CSCS), skills coach and or personal trainer for complex sports specific movements, if available

CRITERIA FOR DISCHARGE
• Ensure that there is a plan in place for a graded return to full or modified activity based on patient’s maximal therapeutic activity (e.g., ATC, skills coach, CSCS)

EMPHASIZE
• Progression of pain free loading
• Eccentric gastrocnemius/soleus control
• Quality with functional activities
APPENDIX 1:

Weight bearing:
Use the following weight bearing progression unless otherwise directed by surgeon with walker/crutches and CAM boot.

Week 6: 25% body weight with walker/crutches and CAM boot
Week 7: 50% body weight with walker/crutches and CAM boot
Week 8: 75% body weight, wean off assistive device as indicated, continue CAM boot
Week 9: 100% body weight, wean off assistive device as indicated, continue CAM boot
Week 10+: Transition out of CAM boot utilizing appropriate assistive device as needed to avoid limp

APPENDIX 2:
Single leg heel raise normative values by age and sex\(^3\)

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