ORTHOPEDIC ASSOCIATES of HARTFORD

Achilles Tendon Rupture Repair
Return to Sport Protocol

Keys for Achilles Tendon Rehabilitation:

- Calf girth, Plantar Flexor strength and ankle ROM are all keys to full recovery. The ideal is to achieve full symmetry in all 3 areas.
  - ROM should be measure in both Open and Closed-Chain methods
  - Strength can be measured through use of the Single Heel Rise test and MMT should be scored using the criteria below:

Testing Plantar Flexion in Standing:

- Grading:
  - **5/5 (N)=** Patient successfully raises heel from floor through entire ROM of plantar flexion. Patient should complete a minimum of 20 repetitions in good form and without apparent fatigue. (tibialis posterior and the peroneus (fibularis) longus and brevis muscles must be between a 4/5 and 5/5 to stabilize the forefoot and provide counter pressure against the floor).
    - *20 heel rises represents over 60% of maximum electromyographic activity of the plantar flexors
  - **4/5 (G)=** Patient can complete 10-19 repetitions of heel rises with full ROM and then has difficulty completing the movement.
  - **3/5 (F)=** Full ROM for 1-9 repetitions of heel rises, and becomes fatigued.
  - **2+/5 (P)=** Patient can just clear the heel from the floor and cannot get up on the toes for full ROM.
  - **No grade for 2/5 in the standing position, all others tested in prone position with feet off the edge of the table.**
  - **2+/5 (P+)=** patient is able to plantar flex through available ROM against maximal resistance.
  - **2/5 (P)=** Patient is able to complete plantar flexion full ROM however cannot tolerate resistance.
  - **2-/5 (P-)=** Patient is able to complete only partial ROM.
  - **1/5 (T)=** Their tendon reflects some contractile activity in the muscle, however, no joint motion occurs. Contractile activity may be palpated in the muscle bellies. (The Gastrocnemius at mid-calf with thumb and finger on either side of the midline, above the soleus. Soleus is best palpated distally on the posterolateral surface).
  - **0/5 (ZERO)=** no contractile activity
    - * If the patient is unable to lie prone, alternate test position is supine, clinician cupping the heel, with their forearm against the plantar surface of the patient's foot, and a force applied into Dorsiflexion, **after full ROM was assessed.**

    ***Taken from Daniels and Worthington (2002) Muscle Testing: Techniques of Manual Examination, 5th edition.**

Postoperative Achilles Tendon Rupture Repair Return to Sport Protocol

Immediately Post-Op- Protection Phase (0-4 weeks Post-Op)

Goals:

- Protect healing tissue
- Decrease/eliminate inflammation and edema, while controlling pain
- Prevent muscle atrophy and wound infection (to minimize scar formation)

Patient Education:

- Posterior Splint or Boot must be worn day and night.
- Incision must be kept clean and dry.
- Non-Weight-Bearing for 3 weeks post-op, ambulation with bilateral crutches
- Cold Packs /Cryocuff should be used multiple times through the day with the leg elevated for first 1-2 weeks, then PRN

Treatments:

- Splint/Brace:
  - Posterior splint in 10°-20° plantar flexion 24 hours/day for first 3 weeks, Progressing to boot at ~week 3 post-op (to be wore awake and while sleeping) with heel wedge to keep at ~10° plantar flexion.
- Weight-Bearing:
  - Non-Weight-Bearing for first 3 weeks Post-op, then patient may begin partial Weight-Bearing with Bilateral crutch in the boot with heel lift, (depending on MD Assessment).
- Modalities:
  - Cold Packs post treatment to control pain, swelling, and inflammation
  - Moist Hot Packs are not to be utilized until 2 weeks post-op
- Gait Training:
  - Gait and stair training with crutches, for proper technique
- Manual Therapies & ROM:
  - PROM: Clinician administered PROM is not to be performed for 8 Weeks post-op, Patient should perform Gravity-Assisted PROM into plantar flexion in a seated position (once incision is healed).
  - AROM: ~3 weeks post-op patient may begin AROM exercises of the ankle, **DF to neutral only with bent knee position, no active PF**
- Proximal LE and Upper Body Kinetic Chain Strengthening Exercises:
  - **No Ankle Strengthening** for 1st 2 weeks, Sub-max. after 2 weeks no PF
  - 4-Way Hip SLR (Flex, Ext, Abd, Add), H/S curls
  - Foot Intrinsic Strengthening: Towel crutches, marbles, toe extension, etc.
  - Any UE and Core exercises in a LE non-weight-bearing position
  - Stationary Bicycle in the Boot

Intermediate Protection Phase: (4-8 Weeks)

Goals:

- Continue to protect the healing Achilles repair
- Continue to decrease/eliminate pain and inflammation
- Continue to control/prevent muscular atrophy
- Progress to full weight-bearing
- Regain ankle range of motion (0°/neutral DF)

Patient Education:

- Educate patient on necessity to continue to wear the walking boot and adhere to restrictions to continue to protect the Achilles repair while early motion and weight-bearing is initiate/progressed.
- Brace must be worn whenever patient is in weight-bearing, it may be removed for shower/bath and to perform exercises.

Treatments:

- Weight-Bearing:
  - Progress WBAT with Boot and 1-inch heel lift for 2 weeks, and then decrease to ½ inch heel lift, D/C crutches when full weight-bearing in boot is achieved.
- Modalities:
  - Continue all modalities PRN for pain, inflammation, and swelling
- Gait Training:
  - Gait Training progression from PWB/WBAT→FWB as tolerated.
- Manual Therapies:
  - Gentle scar mobilization to Achilles
  - PROM may be initiated at 8 weeks post-op, gentle into DF initially
- Exercises:
  - Continue foot strengthening, SLR exercises, leg press (no PF movement)
  - Seated Baps Board, Ankle gentle AROM- (alphabets, rotations, pumping)
  - End-range Isometrics, supine/ seated calf raises (low/no resist)
  - **Weight Shifting:** Towel roll under heels @ 4 weeks (no boot)
    - Bilateral stance with boot, progress to stagger stance –week 5
      - Continue Stationary Bicycle with boot
      - Continue Upper Body& Core exer. (seated/lying/CKC w/boot/LE on ball)

Criteria for progression to Initial Strengthening phase:

- Full Weight-Bearing with Boot out of home, No Boot in home and clinic
- No Increased symptoms with current AROM & PROM exercises
- 0°-5° Dorsiflexion/ Neutral ankle ROM achieved- to be able to D/C boot
- Swelling/Edema controlled

Initial Strengthening Phase (~8-12 Weeks)

Goals:

- Increase ROM to 10° Dorsiflexion, Achieve full ankle ROM INV, EV, PF
- Continue to progress weight bearing tolerance, D/C Walking Boot all surfaces (~10 weeks)
- Normalized Gait
- Restore normal joint arthrokinematics of all foot and ankle joints
- Continue to protect healing tissues
- Decrease calf atrophy

Patient Education:

- Education on progressing weight-bearing slowly, based on ROM and tolerance.
- Patient should continue to wear the boot, brace and/or heel lift until MD D/C's

Treatments:

- Weight Bearing:
  - Continue to progress weight bearing to FWB'ing out of boot (with 1/4-1/2 inch heel lift in shoe/sneaker)~ 10 weeks post-op
- Gait Training: (MD may prescribe an ankle brace once boot is D/C'd).
  - ~10 Weeks taper out of boot in the home and clinic, continue to wear out of the home. ~12 weeks D/C boot if appropriate **(MD will D/C boot)**.
- Manual Therapies:
  - Manual Mobilization of foot & Midfoot, gentle Subtalar & Talo-Crural mobilization- to help restore foot and ankle ROM
  - PROM all planes to improve foot and ankle mobility
- Exercises:
  - Light resistance band 4- way ankle exercise- gradually increase resistance
  - Seated (light resist), Standing (PWB) BAPS & decline boards- all planes
  - Forward, Retro and Lateral step up & downs- low step height
  - Progress DL heel raises supine, seated & add standing as tol. (~12 weeks)
  - Continue LE, Foot intrinsic, Hip, Core, & UE exercises, & Leg Press
  - Continue LE bicycle, can begin Retro Treadmill walking

End of Phase Testing:

- Core Testing: **(See attached sheets for description):** 1-Segmental Multifidus Test, 2-Trunk Curl Up Test, 3-Double-Leg Lowering Test, 4-Side Bridge Test, 5-Prone Bridge Test, 6-Supine Single-Leg Bridge Test, 7-Extensor Endurance Test

Criteria for progression to Advanced Strengthening phase:

- ≥ 10° Ankle Dorsiflexion, all other planes in normal ROM
- No pain, inflammation or swelling
- Normal Gait
- No increased symptoms with any of the current exercises

Advanced Strengthening Phase (~12-22 Weeks)

Goals:

- Progress to full ankle ROM in all planes
- Increase strength and balance to be able to begin advanced activity skills
- No calf/muscle atrophy
- D/C brace if still being used **(by MD only)**
- Get Achilles Tendon Total Rupture Score (ATRS)- Self -Reported Patient Evaluation
- Good proprioception/balance in single-leg stance
- Gradually introduce sub-maximal agility & reaction drills (~18-20 weeks post-op), and sport-like activities (20-22 weeks post-op)
- Get baseline FMS™ Assessment Screen & Y-Balance Test™ (~12-14 weeks)
- Initiate Walk-to Run (~16-18 weeks post-op), LE Plyometric Protocols (~18-20 weeks post-op)

Treatments:

- Continue to progress Dorsiflexion to normal ROM
- Continue to increase repetitions and resistance: As tolerated
  - 4-way ankle resistance band exercises
  - Standing DL calf raises, add eccentric lowering; SL toward end of phase
    - Begin Heel Raise progression protocol **(See Attached Sheet)**
  - Anterior, Lateral, Retro step-ups & downs- increasing step height
- Continue to advance Core, Hip, and UE stabilization exercises
- Teach Injury Prevention/ Athletic Dynamics Stretching exercises- (See Sheets)
- Squats: DL (week 12), SL (~week 16)
  - 0-35° 12 weeks post-op
  - 0-60° 14 weeks post-op
- Retro treadmill walking
- Continue leg press and add calf press raises- DL and SL
- Anterior posterior and lateral lunges
- Begin Walk-to Run Protocol (~16-18 weeks post-op)- when SL Squat to 60° knee flexion with no knee valgus or pain in LE, especially Achilles
- Begin LE Plyometric Protocol (~week18 post-op)
- Begin light sub-maximal Agility and Reaction drills, Sport-like activities (~18-20 weeks post-op)
  - Straight line drills, ladder drills, step over cone drills, skipping, hopping

End of Phase Testing:

- <u>FMS™ and Y-Balance Test™ LE score</u>
  - FMS® (goal of ≥14/21 points with no 0/3, 1/3, or asymmetries) and Y-Balance™ score (Goal- Statistically symmetrical to non-injured leg)
- <u>Perform hop testing</u>: **See Attached Sheets**
  - 2 practice trials, 2 timed/measured trials; average injured to non-injured
  - 1- Single-leg hop for distance
  - 2- Triple hop for distance
  - 3- Single-Leg Crossover triple hop
  - 4- 6-Metered timed hop
  - Hop-To-Stop Jump Tests: SL and SL with Opposite Landing- 3 trials of each bilateral
  - Tuck Jump- 2 trials for 10 seconds each **(See Scoring Criteria)**
  - DL Jump Test- Modified with hands behind back- **(See Scoring Criteria)**
- <u>SL Squat Test: (0°-60°):</u>
  - No knee valgus or ankle instability noted
- <u>Dorsiflexion Lunge Test (bilateral)</u>
- <u>Core Testing:</u> Re-Test (Goal- No major dysfunction/ strength deficits noted)
  - Segmental Multifidus Test
  - Trunk Curl Up Test
  - Double-Leg Lowering Test
  - Side Bridge Test
  - Prone Bridge Test

- Supine Single-Leg Bridge Test
- Extensor Endurance Test

Criteria to progress to Return to Activity Phase

1- Full ROM
2- No pain or inflammation
3- A score of ≥14/21 on the FMS™ Assessment Screen, with **No** 0/3= pain on any of the 7 fundamental movement patterns
4- No statistical asymmetries and on the Y-Balance Test™
5- Hop Tests (90% or higher compared to non-injured leg)
6- Limb Symmetry Index (LSI) of 90% or greater on hop tests
7- No major deficits noted with Core and SL Squat testing
8- ≥ 25° Dorsiflexion Lunge Test

Return to Activity Phase (~22-32 weeks)

***** Patient may not still be in Rehab at this point on a regular basis, so home exercises program needs to be demonstrated, and explained in detailed (pictures and written).

- If Patient is continuing PT at home, it is expected that they are to be re-evaluated every 4-6 weeks for advancement of exercises as well as determining progression.

Goals:

- Continue to increase to full LE strength
- Continue to increase power, endurance, agility, coordination, and balance
- Gradual return to sport activities
- Get Achilles Tendon Total Rupture Score (ATRS)- Self -Reported Patient Evaluation

Treatment:

- Continue advanced strengthening, core, proprioceptive, and mobility exercises
- Continue/Finish Heel Raise Progression Protocol **(See Attached Sheet)**
- Continue Walk-to-Run Protocol- if not completed to running 2 miles
- Teach Sport Specific Dynamic Stretching routine/Warm-up **(See Sheets)**
- Complete LE Plyometric Protocol
  - Progress to Box Jumps
- Progress agility and reaction exercises- increase speed, distance, and perturbations
- Begin Interval Running Protocol- when cleared by MD to perform cutting and sprinting activities
- Begin Interval Sport Protocol (ex. Kicking, Throwing, etc.) based on the sport patient will be returning- (See Sheets)

Functional Testing: for progression to sport-specific training/Return to Sport-*Can be perform over multiple days- See Attached Sheets for descriptions of tests and norms for data

Strength and Power Testing:

- Sargent Vertical Jump Test
- Figure-8 Hop Test
- Up-Down Test
- Hexagon Test (DL), Modified Hexagon Hop Test (SL)

Speed, Agility, and Quickness Testing:

- Agility T-Test, or Modified Agility T-Test (MAT)
- Three-Cone Drill Test
- Slalom Test
- Backward Movement Agility Test
- Zigzag Run Test
- Lower Extremity Functional Test (LEFT)

Core Testing:

- Segmental Multifidus Test
- Trunk Curl Up Test
- Double-Leg Lowering Test
- Side Bridge Test
- Prone Bridge Test
- Supine Single-Leg Bridge Test
- Extensor Endurance Test

Hop/Jump Testing:

- 2 practice trials, 2 timed/measured trials; average injured to non-injured
- 1- Single-leg hop for distance
- 2- Triple hop for distance
- 3- Single-Leg Crossover triple hop
- 4- 6-Metered timed hop
- Hop-To-Stop Jump Tests: SL and SL with Opposite Landing- 3 trials of each bilateral
- Tuck Jump- 2 trials for 10 seconds each **(See Scoring Criteria Sheets)**
- DL Jump Test- Modified with hands behind back- 2 trials **(See Scoring Criteria Sheets)**

Function, Balance, and Endurance Testing:

- FMS® Assessment Screen
- Y-Balance Test™
- Vail Sport Test

***Return-to-Sport Activities**

Criteria for Return-to-Specific Sport Activities:

- ***Ultimate decision is made by MD**
- Achilles Tendon Total Rupture Score (ATRS): ≥ 95/100
- A score of ≥16/21 on the FMS® Assessment Screen, with no pain or asymmetries, **especially with Inline-lunge**, and 2 or greater on all 7 fundamental movement patterns
- Y-Balance Test™- No asymmetries and a composite score as close to 100 as possible
- Limb Symmetry Index (LSI) of ≥95% on SL hop tests compared to Uninjured Leg
- LEFT Score: ≤117 seconds (females), ≥105 seconds (males)
- Vail Sport Test™: ≥ 46/54 points
- Isokinetic testing: **(if available)**
    - Quadriceps (90% or greater) compared to non-injured leg
    - Hamstring (100%-110%) compared to non-injured leg
    - Hamstring-Quadriceps Ratio (80% or greater)
- DL Jump and Tuck Jump: meets scoring criteria

- Sargent Vertical Jump: **See chart** for norms based on age of athlete
- Agility T-Test: Adults: ≤ 8.9-13.5 seconds, Adolescents: ≤
- Dorsiflexion Lunge Test: distance of foot to wall ≥ 9 cm, & tibial shaft angle ≥35°
- No discomfort or swelling, and passing/statistically equal to normative values (if available) with above Functional Tests

Heel Raise Progression Protocol

- **Phase 1:** Performed by patient **Daily- 3X/ Day**
  - 20 Repetitions per session
  - Technique: Double-Leg Heel Raises- Both heel Up and Down simultaneously
  - Duration 2-4 weeks
- **Phase 2:** Performed **5 days/ Week (2 days on, 1 Day off)- 1-2X/ Day**
  - Technique:
    - DL Heel Raise Up and Down together X 10 Repetitions
    - DL Heel Raise Up together, Raise Unaffected Leg and Down/Lower Affected Leg Only X 10 Repetitions
    - DL Heel Raise Up and Down Together X 10 Repetitions
  - Duration 2 weeks
- **Phase 3:** Performed **5 days/ Week (2 days on, 1 Day off)- 1-2X/ Day**
  - Technique:
    - DL Heel Raise Up and Down together X 10 Repetitions
    - DL Heel Raise Up together, Raise Unaffected Leg and Down/Lower Affected Leg Only X 10 Repetitions
    - DL Heel Raise Up and Down Together X 10 Repetitions
  - Duration 2 weeks
- **Phase 4:** Performed **5 days/ Week (2 days on, 1 Day off)- 1X/ Day**
  - Technique:
    - DL Heel Raise Up and Down together X 10 Repetitions
    - DL Heel Raise Up together, Raise Unaffected Leg and Down/Lower Affected Leg Only X 10 Repetitions
    - SL Heel Raise Affected Leg Only Up and Down X 10 Repetitions
    - DL Heel Raise Up and Down Together X 10 Repetitions
  - Duration 2 weeks
- **Phase 5:** Performed **4 days/ Week (2 days on, 2 Day off)- 1X/ Day**
  - Technique:
    - DL Heel Raise Up and Down together X 10 Repetitions
    - DL Heel Raise Up together, Raise Unaffected Leg and Down/Lower Affected Leg Only X 10 Repetitions
    - SL Heel Raise Affected Leg Only Up and Down X 10 Repetitions, 2 sets per session
    - DL Heel Raise Up and Down Together X 10 Repetitions
  - Duration 2 weeks
- **Phase 6:** Performed **3-4 days/ Week (1 days on, 1 Day off)- 1X/ Day**
  - Technique:
    - DL Heel Raise Up and Down together X 10 Repetitions
    - DL Heel Raise Up together, Raise Unaffected Leg and Down/Lower Affected Leg Only X 10 Repetitions
    - SL- Affected Leg Only Up and Down X 10 Repetitions, 3 sets
    - DL Heel Raise Up and Down Together X 10 Repetitions
  - Duration 1 month

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