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ACHILLES REPAIR REHABILITATION PROTOCOL

The following Post-Operative Achilles Repair Guidelines were developed for patients undergoing open achilles repair. Progression is both criteria-based and patient specific. Phases and time frames are designed to give the clinician a general sense of progression and will be dependent on adequate soft tissue healing time. The program should balance the aspects of tissue healing and appropriate interventions to maximize function.

Partial weight bearing (PWB) progression increases approximately 25% per week unless there are specific MD requests. If surgeon uses plantarflexion wedges, remove as per their recommendations. For patients with comorbidities such as diabetes, osteoporosis or high Body Mass Index (BMI), healing times and weight bearing (WB) progressions may be delayed. Monitor for plantar fasciitis and metatarsal head pain. Consider a removable external shoe lift for the non-operative limb.

Typically, patients are discharged from the hospital on the day of surgery. The ankle is placed in a splint in full plantar flexion 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 with heel wedges. 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 as tolerated (WBAT) with crutches and physical therapy at 4 weeks.

Phase I, 0-1 weeks. No weight bearing (i.e. walking); control pain and swelling

PRECAUTIONS	- Maintain NWB status (use crutches, knee scooter, etc) - Prevent swelling; keep lower extremity (LE) elevated - Non-removable splint must be kept dry at all times
Emphasize	- Control swelling; Elevation protocol - Independent transfers; Safe stair mobility if required - Gait training NWB
Treatment Recommendations	- Pain and edema control education (“toes above nose”) - Transfer and gait training while maintaining NWB status - Promotion of knee extension while elevated - Therapeutic exercise with focus on maintaining non-operative LE and bilateral UE motion, flexibility, and strength - Active range of motion, self-mobilization (with MD approval)
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 assist as needed - Note that acute care phase 1 protocol is maintained until follow up

Phase II, 2-3 weeks. Transition to CAM walker boot; control pain and swelling

PRECAUTIONS	- No walking, must use crutches or a knee scooter - Maintain NWB status - Avoid having LE in prolonged dependent position - No active or passive dorsiflexion (DF) stretching
Emphasize	- Pain and edema control; Cryotherapy and elevation - Independent transfers, ambulation, and stair negotiation - Proximal hip strengthening - No stress on the tendon during any exercises
Assessment	- Foot Ankle Disability Index (FADI) - Numeric Pain Rating Scale (NPRS) - Wound status and Edema - Screen for deep vein thrombosis - Sensory screening - Resting Achilles tension - NWB gait and stair ambulation patterns
Treatment Recommendations	- May shower if incisions are healing well, avoid soaks - One-time physical therapy home exercise program (HEP) visit - Active range of motion, self-mobilization (with MD approval) - Maintain weight bearing precautions - Swelling management: maintain elevation - No stretching of the Achilles tendon - Skin care education: wound care and infection prevention - Adjust crutch height if necessary to accommodate CAM height - Proximal hip and core strength o Abdominal exercises Supine and quadruped o 3 way straight leg raise (no forward flexion) o Clamshells x 2 with abdominal control o Emphasize hip extension strengthening o 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

Phase III, 4-8 weeks. Begin partial weight bearing in CAM boot; control pain and swelling

PRECAUTIONS	- Must use crutches and CAM boot to begin walking - Do not bear full weight initially - Keep the foot elevated as much as possible - Wear the boot at all times (even to sleep) except when bathing or doing exercises	
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 Continuous monitoring of swelling	
Weight Bearing	- Week 4: Begin partial progressive weight-bearing on crutches in an Achilles boot with 3 wedges (~1" in height each). Suggest gradually progress weight-bearing by 25% of body weight per week as tolerated until Full Weight-bearing (FWB) through the surgical side without pain. - Week 5: Remove one heel wedge (2 wedges remaining) - Week 6: Remove 2nd heel wedge (1 wedge remaining) - Week 7: Remove final heel wedge; progressive weight bearing	
Assessment	- FADI and NPRS - Wound status and Edema - Screen for DVT - Sensory screening - Resting Achilles tension **LE AROM/PROM** o Inversion/eversion o Plantarflexion o Dorsiflexion: active only o Hallux mobility o Hip extension/rotation o Hamstrings **Ankle joint mobility** o Talocrural o Distal tibiofibular joint o Subtalar joint	**Foot joint mobility** o 1st metatarsal phalangeal (MTP) joint mobility o Lesser digits **Soft tissue extensibility** o Flexor hallucis longus (FHL) and Achilles tendon o Long toe extensors o Soleus o Plantar fascia - Strength: manual muscle testing (MMT) focusing on ankles and hips - Palpation of repair and scars o Scar adhesions
Treatment Recommendations	- Compression stocking 20-30 mmHg, closed toe, knee length when wound is closed. **Desensitization** o Progressive touch/stroking of the foot o Ball massage on sole of foot o When incisions are fully healed, consider contrast baths - Scar mobilization, silicone strips, moisturizing when wound is healed	- **Progress to standing flexibility exercises respecting WB status** o Progress toe articulation through hallux (push off motion) o Bilateral mini-squats when 50% WB - Progress hip flexibility with emphasis on extension - Progressive gait and stair training

	-Bend the repair to limit peri and intra-tendinous hardening/scarring -**Seated and closed chain ROM** o Ankle and toe AROM/PROM o Seated inversion/eversion o Toe articulation o Seated heel raise- emphasize rolling through hallux -**Intrinsics** o Marble pick ups o Arching/doming progressing from seated to standing - **Joint mobilizations** o Talocrural and tibiofibular joints o 1st MTP dorsiflexion o Subtalar joint inversion/eversion o Stretch and release FHL	- **Initiate balance/proprioception exercise training respecting WB status** o Multidirectional wobble board o Bilateral stance on a cushion shod/unshod o Weight shifting (use scale to assess load) o Tandem stance when 75% WB Strengthening - **Bilateral heel raise progression**: seated, seated with load, leg press, standing with upper body support - Bike when 50% WB - Aquatic exercise if accessible when incision healed
Criteria for Advancement	- Stable/controlled swelling - Wound closure - Bilateral standing heel raises - Full weight bearing (FWB) in CAM boot, no wedges, with or without assistive device - DF to neutral	

<u>Phase IV, 9-12 weeks</u>. Wean out of CAM boot. Restore regular gait.

PRECAUTIONS	- Avoid weaning off assistive device and CAM boot too early - No passive DF stretching of the Achilles
Emphasize	- Wean from crutches to cane to no assistive device or CAM boot - Functional single LE articulation in weight bearing - Plantar flexion strength through full ROM prior to progressing load -Talocrural joint mobility - Hip abductor/extensor strengthening
Assessment	- FADI and 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 - Resting Achilles tension - Functional strength of LE - Squats and stairs - Single leg stance (SLS) with assessment of foot tripod (calcaneus, 1st and 5th metatarsal heads) - Gait quality full weight bearing (FWB) without assistive device

Treatment Recommendations	**Gait training weaning from CAM boot and assistive device** o Encourage step through pattern o Emphasize push-off at terminal stance **Patient education on appropriate footwear** o Consider supportive sneakers, foam padding, heel lift, taping, rocker bottom shoe if difficulty with rollover/push off phase of gait **Edema management** o Compression garments o Patient education on edema management o Scar mobilization, silicone strips, moisturizing when wound is healed **AROM/PROM and mobilizations of ankle and toes** o Flat footed squat with knees over toes and UE support o Mobilization of 1st MTP, distal tibiofibular, talocrural and subtalar joints o Lunging with elastic band or strap for talocrural self-mobilization o Foam roller to anterior tibialis, calves and distal tibiofibular joint **Progress unilateral static and dynamic standing balance/proprioceptive exercises** o Unstable surfaces e.g. foam, rocker board o Single leg activities with attention to equal weight bearing on 3 points of foot tripod: Windmills, lawnmowers **Strengthening** o Progress plantar flexor strengthening o Bilateral plantarflexion o Leg press or standing leaning on elbows, fully upright o Heel raises with proper eccentric control o Forward step up/down and lateral step up progressions o Two up/one down o Unilateral exercises o Core strengthening; Front and side planks **Progress to dynamic, closed chain proximal LE strengthening** Squats, gluteus medius band exercises, leg press, hip extension **Progress cardiovascular conditioning** o Encourage gym program o Retro treadmill o Swimming: avoid pushing off the wall during turns o If pain or gait deviations are persistent, consider aquatic exercises or antigravity treadmill (if available)
Criteria for Advancement	- Functional ankle/toe ROM to allow for symmetrical gait - Dorsiflexion to 75% of non-operative side - Full MTP joint mobility - Community ambulation FWB without CAM boot and assistive device - Ascend 6-inch steps reciprocally - Single leg stance without Trendelenburg - Ability to perform symmetrical bilateral heel raises

Phase V, 13-20 weeks. Resume regular activities, begin progressive strengthening.

PRECAUTIONS	- Avoid premature progression to impact activities, e.g., running, jumping
Emphasize	- Symmetry and efficiency in gait cycle without assistive device - Dynamic stability - Maximizing ankle and hallux dorsiflexion and plantarflexion ROM
Assessment	- FADI and NPRS - Edema - Open and closed chain ankle/hallux - AROM/PROM Ankle, mid-foot, and MTP joint mobility - Kinetic chain and potential distal effects on foot/ankle alignment, i.e., hip version - Premorbid compensatory patterning - Functional strength of LE - Single leg stance (SLS) with assessment of foot tripod - Gait quality FWB without assistive device
Treatment Recommendations	- Patient education on alternative footwear options - Edema control with ankle compression garment as needed - Maximize gait symmetry, efficiency, and speed e.g. stride length, cadence, push off, trunk rotation - Forward step down progression - **AROM/PROM and mobilization focusing on persistent deficits** o Sitting on dorsum of feet for PF ROM o Progress lower extremity flexibility with emphasis on hip extension - **Progress dynamic balance/proprioceptive and loading exercises** o E.g. cariocas, tandem walking, heel walking, toe walking, single leg balance with multidirectional challenges o Progress to unstable surfaces and perturbations - **Continue to progress functional strengthening** o Maximize symmetrical movement patterns and encourage healthy compensatory patterns in adjacent joints as necessary o Progress single leg closed chain activities, e.g. single leg squat, loaded forward lunge - Consider starting pre-impact training (i.e. aquatic/anti-gravity treadmill) - Eccentric strengthening and control - End range control - 3-point heel lowering exercise - Functional lower extremity chain strengthening o Hiking, yoga, Pilates, light aerobic classes
Criteria for Advancement	- Ankle DF within 10% of uninvolved side - SLS = 90% of uninvolved side with minimal foot, hip, or core strategies - 5/5 strength of all muscle groups o At least 90% closed chain, heel raise strength compared to other side - Ability to appropriately progress to loaded activities - Independent management of residual symptoms - Independent gym program - Progress to sport specific training as indicated

Phase VI, 20+ weeks. Return to sports and high-demand activities.

PRECAUTIONS	- 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
Emphasize	- Progression of pain free loading - Eccentric gastroc/soleus control - Quality with functional activities
Assessment	- FADI and NPRS - Effusion - 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 (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 o Hopping patterns - Increase cardiovascular load to match that of desired activity o Return to run progressions - Consider collaboration with ATC, performance coach/strength and conditioning coach, skills coach, and/or personal trainer for complex sports specific movements if available - Begin gentle passive dorsiflexion stretching at 6 months if less than 90% DF of non- op side
Criteria for Return to All Activities	- 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)