

Pediatric Rehabilitation Protocol for Medial Tibial Stress Fracture

This protocol is intended to guide clinicians through the post-operative course for medial tibial stress injury. This protocol is time based (dependent on tissue healing) as well as criterion based. Specific intervention should be based on the needs of the individual and should consider exam findings and clinical decision making. The timeframes for expected outcomes contained within this guideline may vary based on surgeon's preference, additional procedures performed, and/or complications. If a clinician requires assistance in the progression of this patient, they should consult with the referring physician.

The interventions included within this protocol are not intended to be an inclusive list of exercises. Therapeutic interventions should be included and modified based on the progress of the patient and under the discretion of the clinician.

PHASE I: ACUTE PHASE (0-8 WEEKS AFTER INJURY)

Rehabilitation Goals	• Ensure adequate signs of healing as per MD • Remove stress from the injured area to prevent exacerbation • Prevent muscular and cardiovascular deconditioning • Educate on activity modification to prevent recurrence • Maintain flexibility and range of motion away from the injury site
Precautions	• WBAT with use of boot/splint as directed by MD
Intervention	<i>Pain management</i> • Cryotherapy • Pneumatic compression <i>Manual therapy</i> • Mobilization of joints of the hip, knee, ankle and foot as needed <i>Range of motion/stretching</i> • Gentle and pain-free stretching of proximal muscle groups as indicated ○ Calf stretch with strap ○ Hip flexor stretch ○ Hamstring stretch ○ Piriformis stretch ○ Quad stretch • Pain-free ankle ROM ○ Ankle pumps ○ Ankle inversion ○ Ankle eversion ○ Ankle circles ○ Ankle alphabet ○ Seated windshield wipers <i>Strengthening</i> • Non-weight bearing hip strengthening ○ SLR flexion ○ SLR abduction

	○ SLR extension ○ Sidelying clamshells ○ Sidelying hydrants ○ Bridging ● Intrinsic muscle recruitment ○ Towel crunches ○ Toe yoga ○ Foot doming ● Open chain foot strengthening ○ Ankle 4-way with resistance band ● Core strengthening progression <i>Cardio</i> ● Upper body ergometer
Criteria to Progress	● Confirmation via imaging (e.g., X-ray) of adequate signs of healing ● No pain to palpation at the site of fracture ● Pain-free during non-weight bearing activities of daily living

PHASE II: SUBACUTE PHASE (9-12 WEEKS AFTER INJURY)

Rehabilitation Goals	● Restore full ankle and foot mobility ● Begin weight bearing exercise ● Initiate full return to functional activity ● Weaning out of cast or boot and into supportive footwear ● Normalize gait pattern in supportive sneaker
Precautions	● Monitor for any sign of recurring pain during exercise ● Avoid impact activities
Additional Interventions <i>*Continue with Phase I interventions</i>	<i>Pain management</i> ● Application of compression garments ● Use of shock-absorbing insoles ● Application of taping methods <i>Manual therapy</i> ● Mobilization of tibio-fibular joints ● Myofascial release of lower leg muscles <i>Range of motion/Stretching</i> ● Begin in weight bearing as tolerated ○ Gastroc stretch ○ Soleus stretch ○ Plantar fascia stretch ○ Kneeling plantarflexion stretch <i>Strengthening</i> ● Bilateral heel raises with increasing weight progressing to standing bilateral heel raises with increasing weight ● Standing hip abduction with resistance band ● Standing hip extension with resistance band ● Wall sits with resistance band ● Forward step ups ● Forward step downs ● Gym equipment: hamstring curl machine, leg extension machine, leg press machine <i>Balance/Proprioception</i> ● Double limb standing balance utilizing uneven surface (i.e. wobble board, foam) with progression to single limb balance on uneven ground

	<i>Cardio</i> - Swimming or cycling - Alter-G walking program with progression to land walking program as tolerated
Criteria to Progress	- Pain should be significantly reduced or absent - Ability to perform activities of daily living without pain - Dorsiflexion PROM symmetrical to contralateral side - Complete a 30-minute walk with minimal to no increase in pain

PHASE III: STRENGTHENING PHASE (13-18 WEEKS AFTER INJURY)

Rehabilitation Goals	- Achieve normal lower extremity kinetic chain strength and muscle length - Enhance endurance of the muscles of the foot and lower extremity - Promote proper movement patterns - Gradually increase exercise intensity (no more than 15% increase of distance per week)
Precautions	- Avoid activities that cause pain - Continue to avoid impact activities
Additional Intervention <i>*Continue with Phase I-II Interventions</i>	<i>Stretching</i> - Maintain stretching program focused on mobility throughout the kinetic chain <i>Strengthening</i> - Gradually increase load as tolerated Bilateral squats progressing to single leg squats Bilateral deadlifts progressing to single leg deadlifts Split squats Lateral step downs Forward lunges Backward lunges Standing clamshells with resistance band Side steps with resistance band Monster walks with resistance band <i>Balance/Proprioception</i> Single limb balance on uneven surface including perturbation training <i>Plyometrics</i> - Initiate Beginner Level plyometrics: - Once able to perform 3 sets of 15 of bilateral standing heel-raises with equal weight bearing progress to bilateral rebounding heel raises. - Once able to perform 3 sets of 15 unilateral heel raises progress to rebounding unilateral heel raises. - Once able to demonstrate good performance/tolerance with rebounding heel raises then initiate bilateral hopping and progress to unilateral hopping in place. <i>Cardio</i> - Cycling or elliptical - Alter-G reduced weight-bearing running program when able to perform bilateral hopping without pain
Criteria to Progress	- No pain during or after exercise - Able to perform 25 single leg heel raises without pain 80% LSI of quad, hamstring, and gluteus medius strength with HHD - Negative hop test/satisfactory performance in double and single leg hopping tasks - No swelling/pain with 30 minutes of fast-paced walking

PHASE IV: RETURN TO RUNNING/SPORT (4-6 MONTHS AFTER INJURY)

Rehabilitation Goals	- Resume full, unrestricted participation in sports and activities - Symmetrical performance with sport specific drills - Initiate return to ground running program - Continue proper load management and progression to full activity
Precautions	Avoid painful running and impact related activity
Additional Intervention <i>*Continue with Phase I-III interventions</i>	<i>Running</i> - Interval running program (Return to running program) - Start at 50% of pre-injury running intensity and increase no more than 10-15% each week <i>Plyometrics and Agility:</i> - Criteria to progress to the agility and plyometrics program: - Good tolerance/performance of beginner level plyometrics in previous phase - Completion of Phase 1 return to running program with good tolerance - Multi-plane sport specific plyometrics program - Multi-plane sport specific agility program - Include hard cutting and pivoting depending on the individuals' goals - Non-contact practice→ Full practice→ Full play
Criteria to Progress	95% LSI of quad, hamstring, and gluteus medius strength with HHD - Hop Testing ≥95% compared to contralateral side, demonstrating good landing mechanics - Participate in running, plyometrics, and sports and activities without pain or swelling
Contact	Please email MGHSportsPhysicalTherapy@partners.org with questions specific to this protocol

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