Connecticut Orthopaedics

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Stress Fracture Rehabilitation
Guidelines and Protocol

This rehabilitation program is designed to return the individual to their activities as quickly and safely as possible. It is designed for rehabilitation following a stress fracture. A stress fracture is a partial or incomplete fracture caused by the accumulation of stress to a localized area of bone[1]. Modifications to this guideline may be necessary dependent on physician specific instruction, specific tissue healing timeline, chronicity of injury and other contributing impairments that need to be addressed. This evidence-based stress fracture rehabilitation guideline is criterion-based; time frames and visits in each phase will vary depending on many factors including patient demographics, goals, and individual progress. This guideline is designed to progress the individual through rehabilitation to full sport/activity participation. The therapist may modify the program appropriately depending on the individual's goals for activity following stress fractures.

This guideline is intended to provide the treating clinician a frame of reference for rehabilitation. It is not intended to substitute clinical judgment regarding the patient's post injury care, based on exam/treatment findings, individual progress, and/or the presence of concomitant injuries or complications. IF the clinician should have questions regarding progressions, they should contact the referring physician.

General Guidelines/Precautions

- Rest from pain-provoking activities remains the most effective, if often prolonged, intervention approach at this time.
- Excessive foot pronation if found should be addressed, focus on entire lower extremity kinetic chain
- General healing timeline varies depending on severity and chronicity (between 4-12 weeks)
- Assess and treat lower extremity kinetic chain from lumbopelvic region to the foot
- Severity/irritability/nature/chronicity of symptoms may affect progressions

Phase 1: Acute Phase
Weeks: 7-21 Days (up to 4 weeks depending on chronicity)
Expected visits: 1-4

- Discuss: anatomy, existing pathology, rehab schedule and expected progressions
- Specific instructions: the use of a cast boot or pneumatic leg splint for 2-4 weeks
- Suggested Treatments:
    - Modalities as indicated: cryotherapy, low intensity pulsed ultrasound[2], soft tissue mobilization, electrical stimulation
    - **ROM:** gastrocnemius, soleus, flexor digitorum, tibialis posterior
    - **Manual therapy:** soft tissue mobilization lower extremity kinetic chain, joint mobilization to joints of the lower extremity kinetic chain where impairments are present (i.e. talocrural joint). Consider forefoot mobilization
    - **Exercise Examples:**
        - NWB lower body strengthening focusing on gluteals: clams, sidelying straight leg raise, fire hydrants
        - Core strengthening: plants, side planks, Pallof holds progressing from standing to half kneeling, to kneeling
        - Stretching: hip flexors/quadriceps, hamstrings, gastrocnemius and soleus
        - Ankle inverter and evertor, foot intrinsic strengthening
        - May continue with upper body strengthening
        - *Other Activities:* cycling or upper body ergometry

- Goals of Phase:
    1. Removal of stress from injured areas
    2. Pain management
    3. Prevent deconditioning
    4. Educate on activity modification
    5. Improved flexibility /range of motion if found to be limited
    6. Reestablished dynamic muscle control, balance, and proprioception
- Criteria to Advance to Next Phase
    1. No pain to palpation of involved bone
    2. Pain free ADL's
    3. Dorsiflexion within 5 degrees or less of non-involved side

Phase II: Subacute Phase
Weeks 4-6
Expected visits: 4-8

- Specific Instructions: establish gradual return to prior level of function. Start at <50% prior training volume. Abide by soreness rules (*see appendix*)
- Suggested Treatments:
    - Modalities as indicated. Edema controlling treatments
    - **ROM**: ankle DF ROM
    - **Manual Therapy:**
        - Manual therapy: continue as needed for joint and soft tissue limitations throughout the lower extremity kinetic chain
    - **Exercise Examples:**
        - *Foot/ankle strengthening*
            - Progress balance activities, emphasize single limb stability
            - Single leg heel raises
            - Foot intrinsic strengthening in weight bearing position
        - *Lower extremity mobility*
            - Gastrocnemius/soleus stretching
            - Continue to address lower extremity kinetic chain mobility deficits
        - *Hip strengthening*
            - Double and single limb proximal stability exercise, may include:
                - Squats, single leg squats, lunges with forward trunk lean, step ups, step downs, lateral band walks
        - *Other Activities*
            - Swimming, deep water/pool running, Alter G, if available at pain-free level, encourage shock absorption strategies such as increasing step rate, step width, and/or forward trunk lean[3]
- Goals of Phase:
    1. Initiation of return to activity
- Criteria to Advance to Next Phase:
    1. Ability to single leg hop 15 times without pain or discomfort
    2. 30 minute walk with minimal to no increase in pain
    3. 6 repetitions, 6 seconds @ 60% body weight squat
    4. >25 single leg heel raises bilaterally

Phase III: Advanced Strengthening
Weeks 6-10
Expected visits: 4-9

- Specific Instructions:
  - Continue with previous exercise program
  - Good guideline is to increase activity no more than 15-20% per week
  - Consider Return to Running program[4] (see appendix)
- Suggested Treatments:
  - Modalities Indicated: continue as needed for pain control
  - **Manual therapy:** continue as needed for joint and soft tissue limitations throughout the lower extremity kinetic chain
  - **Exercise Examples:**
    - *Plyometrics:* emphasize soft landing and hip strategy
      - Double limb: box jumps, drop jumps, forward jumps, tuck jumps
      - Single limb: lunge hop, single box hop, drop with single leg land, single forward hop
    - *Foot/ankle strengthening*
      - Continue balance and foot intrinsic strengthening in single imb weight bearing position
    - *Lower extremity mobility*
      - Continue to address lower extremity kinetic chain mobility deficits
    - *Hip strengthening*
      - Continue single limb proximal stability exercises
    - *Other Activities:* begin return to running program[4] using soreness rules (see appendix)
- Goals of Phase:
  1. Return to running
  2. Return to recreational/sporting activity
  3. Normal lower extremity kinetic chain strength
  4. Normal lower extremity kinetic chain muscle length
- Criteria to Advance to Next Phase
  1. Pain-free completion of interval running program

Phase IV: Return to Full Activity

- Specific Instructions:
  - Continue with proper load management and progression to full activity

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APPENDIX

Return to Running Program

This program is to be used for return to continuous running following injury. It should be started once you are able to walk 30 min consecutively without pain/injury. If pain should return with running, you may continue as long as:

1. The pain is not sharp
2. The pain lessens or remains unchanged as the running session continues
3. The presence of pain does not alter your normal pattern of motion (no limping)

Begin each session with a warm-up consisting of a 2-5 min brisk walk *followed by your specific stretching exercises.* Perform the appropriate walk/run combination based on the tabl below. Be sure to follow the walk/run with your stretching exercises.

Week	Day 1	Day 2	Day 3
1	6x: Walk—4.5 min Run—0.5 min	6x: Walk—4.0 min Run—1.0 min	6x: Walk—3.5 min Run—1.5 min
2	6x: Walk—3.0 min Run—2.0 min	6x: Walk—2.5 min Run—2.5 min	6x: Walk—2.0 min Run—3.0 min
3	6x: Walk—1.5 min Run—3.5 min	6x: Walk—1.0 min Run—4.0 min	6x: Walk—0.5 min Run—4.5 min
4	Run—30 min	Run—30 min	Run—30 min

Upon completing Week 4, you may resume a gradual transition back to continuous running following a 2 min warm-up walk and stretching. As you return to your pre-injury running level, training duration or intensity should be increased by *no more than 10-20% per week* to minimize risk for injury recurrence. Be sure to continue your stretching program as instructed.

Soreness Rules

Criterion	Action
1. Soreness during warm-up that continues	2 days off, drop down 1 step
2. Soreness during warm-up that goes away	Say at step that led to soreness
3. Soreness during warm-up that goes away but redevelops during session	2 days off, drop down 1 step
4. Soreness the day after lifting (Not muscle soreness)	1 day off, do not advance program to the next step
5. No soreness	Advance 1 step per week or as instructed by healthcare professional

REFERENCES

1. Romani WA, Gieck JH, Perrin DH, Saliba EN, Kahler DM. Mechanisms and management of stress fractures in physically active persons. J Athl Train. 2002; 37(3):306-14.
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3. Warden SJ, Davis IS, Fredericson M. Management and prevention of bone stress injuries in long-distance runners. J Orthop Sports Phys Ther. 2014; 44(10):749-65.
4. Heiderscheit, B. (2012). Examination and Treatment of Running Injuries [Lecture Notes]