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REHABILITATION PROTOCOL: Ankle Fracture ORIF

This protocol is intended to guide clinicians through the post-operative course for an ankle fracture with ORIF. 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 a post-operative patient, they should consult with the referring surgeon.

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

Considerations for the Post-operative Ankle Fracture ORIF

Many different factors influence the post-operative ankle ORIF rehabilitation outcomes, including rate of healing, complexity of the fracture and/or need for hardware removal. It is recommended that clinicians collaborate closely with the referring physician regarding the timeframes for progression. Patients with less complex fractures may progress more quickly through the phases of these guidelines.

Post-operative considerations

If you develop a fever, intense calf pain, excessive drainage from the incision, uncontrolled pain or any other symptoms you have concerns about you should call your doctor.

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PHASE I: IMMEDIATE POST-OP (0-6 WEEKS AFTER SURGERY)

Rehab Goals	<ul style="list-style-type: none"> ▪ Demonstrate safe ambulation with prescribed weight bearing precautions ▪ Able to maintain weight bearing status per surgeon with transfers and stairs ▪ Manage swelling ▪ Perform ADLs in a modified independent manner or with minimal assistance ▪ Increase range of motion of foot and ankle ▪ Minimize the loss of strength in the core, hips, knees, and upper extremities ▪ Patient Education: <ul style="list-style-type: none"> ○ Modifications for ADLs
Weight Bearing	<ul style="list-style-type: none"> ▪ Non-weight bearing ▪ Boot/cast per surgeon
Precautions	<ul style="list-style-type: none"> ▪ No joint mobilizations near fracture site or that require stabilizing over the fracture site ▪ NO instrument assisted soft tissue mobilization (IASTM) over fracture sites until at least 6 weeks post-op
Interventions	<p>Swelling Management</p> <ul style="list-style-type: none"> ▪ Ice, compression, elevation ▪ Retrograde massage (avoid pressure on healing fracture sites) <p>Gait Training</p> <ul style="list-style-type: none"> ▪ Gait training on level surfaces and stairs with emphasis on weight bearing precautions <p>Range of Motion/Mobility</p> <ul style="list-style-type: none"> ▪ Initiate ankle passive range of motion (PROM), active assisted range of motion (AAROM) and active range of motion (AROM) <ul style="list-style-type: none"> ○ Ankle pumps ○ Ankle circles ▪ Ankle inversion <ul style="list-style-type: none"> ○ Ankle eversion ○ Seated heel-slides for ankle DF ROM ▪ If stiff from boot immobilization, initiate toe stretching (by patient or by therapist) ▪ Foot joint mobilizations may be performed if indicated during this time per therapist discretion - AVOID pressure on healing fracture sites or hardware. ▪ May begin gentle scar mobilization once incisions are healed <p>Cardio</p> <ul style="list-style-type: none"> ▪ Upper body ergometer <p>Strengthening (in boot/splint)</p>

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	<ul style="list-style-type: none"> ▪ May perform upper body strengthening with weights if modified for weight bearing precautions ▪ Lower extremity gym equipment (Ex: hip abductor and adductor machine, hip extension machine, roman chair) ▪ Proximal/core strengthening (maintain precautions) <ul style="list-style-type: none"> ○ Quad sets ○ Straight leg raise ○ Abdominal bracing ○ Hip abduction ○ Clamshells ○ Prone hip extension ○ Prone hamstring curls ▪ Ankle: <ul style="list-style-type: none"> ○ Seated heel raises ○ Seated toe raises ○ Seated arch doming ○ Exercises for foot intrinsic muscles to minimize atrophy while in boot <p>Proprioception</p> <ul style="list-style-type: none"> ▪ Joint position re-training
Criteria to Progress	<ul style="list-style-type: none"> ▪ Pain < 3/10 ▪ Minimal swelling (recommend water displacement volumetry or circumference measures such as Figure 8). ▪ Increased ankle ROM ▪ Cleared by surgeon to progress to weight bearing as tolerated (WBAT) or full weight bearing (FWB) ▪ Independence with daily home exercise program

PHASE II: INTERMEDIATE POST-OP (7-12 WEEKS AFTER SURGERY)

Rehab Goals	<ul style="list-style-type: none"> ▪ Manage swelling ▪ Full range of motion of foot and ankle ▪ Safely progress strengthening ▪ A normalized gait pattern on all surfaces (wean from boot/brace when healing is adequate) ▪ Minimize the loss of strength in the upper extremities, core, hips, and knees ▪ Gradually return to regular activities if ROM, strength, and gait pattern are sufficient
Weight Bearing	<ul style="list-style-type: none"> ▪ Progress to FWB
Precautions	<ul style="list-style-type: none"> ▪ No joint mobilizations near fracture site or that require stabilizing over the fracture site

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Range of Motion	<ul style="list-style-type: none"> ▪ Active-assisted and passive hip and knee flexion
Additional Interventions *Continue with Phase I interventions	<p>Range of Motion/Mobility</p> <ul style="list-style-type: none"> ▪ Continue ankle AROM/PROM exercises and toe stretching as needed ▪ Progress to standing ankle dorsiflexion stretch on step ▪ Gentle stretching of proximal muscle groups as indicated: (Ex: standing quad stretch, standing hamstrings stretch, Thomas hip flexor stretch, piriformis stretch) ▪ Standing gastrocnemius and standing soleus stretching once weaned from boot and talocrural joint mobility is normalized ▪ May begin gentle ankle mobilizations at the discretion of the therapist once fracture is radiographically healed or clearance is given by surgeon. <p>Cardio</p> <ul style="list-style-type: none"> ▪ Stationary bicycle (in boot if not yet weaned) ▪ Treadmill walking once boot is weaned and gait normalized <p>Strengthening</p> <ul style="list-style-type: none"> ▪ Continue Phase I exercises ▪ Isometrics for ankle planes that are not near full active range of motion (AROM). ▪ Ankle exercise with resistance bands once near full ankle AROM: <ul style="list-style-type: none"> ○ Ankle dorsiflexion with resistance ○ Ankle plantar flexion with resistance ○ Ankle eversion with resistance ○ Ankle inversion with resistance ▪ Once boot is weaned begin standing calf raise progression: <ul style="list-style-type: none"> ○ Bilateral standing heel raises (25% body weight thru involved leg) ○ Bilateral standing heel raises (50% equal weight through both legs) ○ Bilateral standing heel raises (75% body weight thru the involved leg) ▪ Knee Exercises for additional exercises and descriptions ▪ Gym equipment (ex: seated hamstring curl machine and hamstring curl machine, leg press machine, hip abductor and adductor machine, hip extension machine, roman chair) ▪ Lumbopelvic strengthening: (ex: bridges on physioball, bridge on physioball with roll-in, bridge on physioball alternating) ▪ Progress intensity (strength) and duration (endurance) of exercises <p>Proprioception</p> <ul style="list-style-type: none"> ▪ Double limb standing balance utilizing uneven surface (wobble board) ▪ Single limb balance - progress to uneven surface as able

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Criteria to Progress	<ul style="list-style-type: none"> ▪ No swelling/pain after exercise ▪ Normalized gait in supportive sneaker ▪ AROM equal to contralateral side ▪ Progressing strength of lower extremities ▪ Return to all activities (except sports) ▪ Joint position sense symmetrical (< 5° margin of error)
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PHASE III: LATE POST-OP (13-16 WEEKS AFTER SURGERY)

Rehab Goals	<ul style="list-style-type: none"> ▪ Good balance and control on the involved leg in all planes ▪ Safely progress strengthening ▪ Promote proper movement patterns ▪ Avoid post exercise pain/swelling
Precautions	<ul style="list-style-type: none"> ▪ None if healing is complete
Additional Interventions *Continue with Phase I-II interventions	<p>Range of Motion/Mobility</p> <ul style="list-style-type: none"> ▪ Joint mobilizations as indicated <p>Cardio</p> <ul style="list-style-type: none"> ▪ Stationary bicycle, treadmill walking <p>Strengthening</p> <ul style="list-style-type: none"> ▪ Seated calf machine or wall sit with bilateral calf raises ▪ Unilateral heel raises (once heel raise progression in Phase II completed) ▪ **The following exercises are to focus on proper pelvis and lower extremity control with emphasis on good proximal stability: <ul style="list-style-type: none"> ○ Hip hike ○ Forward lunges ○ Bilateral squats progressing to single leg progression (below) ○ Single leg progression: partial weight bearing single leg press, slide board lunges: retro and lateral, step ups and step ups with march, lateral step-ups, step downs, single leg squats, single leg wall slides <p>Proprioception</p> <ul style="list-style-type: none"> ▪ Single limb balance on uneven surfaces (ex: balance disc, Bosu, ½ foam roll)
Criteria to Progress	<ul style="list-style-type: none"> ▪ Good balance and control of the involved leg in all planes with single and double leg exercises

PHASE IV: TRANSITIONAL (17-20 WEEKS AFTER SURGERY)

Rehab Goals	<ul style="list-style-type: none"> ▪ Progress to plyometrics and sports specific movement patterns ▪ Progress to low impact fitness activities
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Additional Interventions *Continue with Phase II-III interventions	Cardio <ul style="list-style-type: none"> ▪ Elliptical, stair climber, treadmill walking Plyometrics <ul style="list-style-type: none"> ▪ Initiate Beginner Level plyometrics: <ul style="list-style-type: none"> ○ Once able to perform 3 sets of 15 of bilateral standing heel-raises with equal weight bearing progress to rebounding heel raises bilateral stance. ○ 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 hopping in place bilateral stance. Progress as able to unilateral hopping in place.
Criteria to Progress	<ul style="list-style-type: none"> ▪ No swelling/pain after exercise ▪ Standing Heel Rise test > 90% of uninvolved ▪ No swelling/pain with 30 minutes of fast-paced walking ▪ Good tolerance and performance of Beginner Level plyometrics ▪ Psych Readiness to Return to Sport (PRRS)

PHASE V: EARLY to UNRESTRICTED RETURN TO SPORT (5+ MONTHS AFTER SURGERY)

Rehab Goals	<ul style="list-style-type: none"> ▪ Gradual return to higher impact activities (jogging, running, jumping) ▪ Gradual return to activities with multi-planar on uneven surfaces (hiking) ▪ Safely initiate sport specific training program ▪ Symmetrical performance with sport specific drills ▪ Good lower extremity mechanics with plyometrics, agility, and running gait ▪ Safely progress to full sport
Additional Interventions *Continue with Phase II-IV interventions	Running <ul style="list-style-type: none"> ▪ Interval walk/jog program - Return to Running Program (Phase 1) ▪ Return to Running Program (Phase 2) Plyometric and Agility <ul style="list-style-type: none"> ▪ Criteria to progress to the Agility and Plyometrics Program: <ul style="list-style-type: none"> ○ Good tolerance/performance of Beginner Level Plyometrics in Phase VI above ○ Completion of Phase 1 Return to Running Program (walk/jog intervals) with good tolerance.
Criteria to Progress	<ul style="list-style-type: none"> ▪ Clearance from MD and ALL milestone criteria below have been met. <ul style="list-style-type: none"> ○ Completion of the Return to Running Program without pain/swelling. ○ Functional Assessment ○ Lower Extremity Functional Tests should be ≥90% compared to contralateral side for unilateral tests.

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**Acknowledgement: This rehab protocol was largely adopted from the protocols at MGH Sports Medicine Physical Therapy, which can be found at <https://www.massgeneral.org/orthopaedics/sports-medicine/physical-therapy/sports-rehab-protocols>*

Return to Running Program

This program is designed as a guide for clinicians and patients through a progressive return-to-run program. Patients should demonstrate > 80% on the Functional Assessment prior to initiating this program (after a knee ligament or meniscus repair). Specific recommendations should be based on the needs of the individual and should consider clinical decision making. If you have questions, contact the referring physician.

PHASE I: WARM UP WALK 15 MINUTES, COOL DOWN WALK 10 MINUTES Day 1 2 3 4 5 6

Day	1	2	3	4	5	6	7
Week 1	Walk 5 min, Jog 1 min x 5 reps		Walk 5 min, Jog 1 min x 5 reps		Walk 4 min, Jog 2 min x 5 reps		Walk 4 min, Jog 2 min x 5 reps
Week 2		Walk 3 min, Jog 3 min x 5 reps		Walk 3 min, Jog 3 min x 5 reps		Walk 2 min, Jog 4 min x 5 reps	
Week 3	Walk 2 min, Jog 4 min x 5 reps		Walk 1 min, Jog 5 min x 5 reps		Walk 1 min, Jog 5 min x 5 reps		Return to Run

****Only progress if there is no pain or swelling during or after the run**

PHASE II: WARM UP WALK 15 MINUTES, COOL DOWN WALK 10 MINUTES

Day	1	2	3	4	5	6	7
Week 1	20 min		20 min		20 min		25 min
Week 2		25 min		25 min		30 min	

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Week 3	30 min		30 min		35 min		35 min
Week 4		35 min		40 min		40 min	
Week 5	40 min		45 min		45 min		45 min
Week 6		50 min		50 min		50 min	
Week 7	55 min		55 min		55 min		60 min
Week 8		60 min		60 min			

Recommendations

- Runs should occur on softer surfaces during Phase I
- Non-impact activity on off days
- Goal is to increase mileage and then increase pace; avoid increasing two variables at once
- 10% rule: no more than 10% increase in mileage per week

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Agility and Plyometric Program

This program is designed as a guide for clinicians and patients through a progressive series of agility and plyometric exercises to promote successful return to sport and reduce injury risk. Patients should demonstrate > 80% on the Functional Assessment prior to initiating this program. Specific intervention should be based on the needs of the individual and should consider clinical decision making. If you have questions, contact the referring physician.

PHASE I: ANTERIOR PROGRESSION

Rehab Goals	<ul style="list-style-type: none"> ▪ Safely recondition the knee ▪ Provide a logical sequence of progressive drills for pre-sports conditioning
Agility	<ul style="list-style-type: none"> ▪ Forward run ▪ Backward run ▪ Forward lean in to a run ▪ Forward run with 3-step deceleration ▪ Figure 8 run ▪ Circle run ▪ Ladder
Plyometrics	<ul style="list-style-type: none"> ▪ Shuttle press: Double leg alternating leg single leg jumps ▪ Double leg: <ul style="list-style-type: none"> ○ Jumps on to a box jump off of a box jumps on/off box ○ Forward jumps, forward jump to broad jump ○ Tuck jumps ○ Backward/forward hops over line/cone ▪ Single leg (these exercises are challenging and should be considered for more advanced athletes): <ul style="list-style-type: none"> ○ Progressive single leg jump tasks ○ Bounding run ○ Scissor jumps ○ Backward/forward hops over line/cone
Criteria to Progress	<ul style="list-style-type: none"> ▪ No increase in pain or swelling ▪ Pain-free during loading activities ▪ Demonstrates proper movement patterns

PHASE II: LATERAL PROGRESSION

Rehab Goals	<ul style="list-style-type: none"> ▪ Safely recondition the knee ▪ Provide a logical sequence of progressive drills for the Level 1 sport athlete
Agility *Continue with Phase I interventions	<ul style="list-style-type: none"> ▪ Side shuffle ▪ Carioca ▪ Crossover steps ▪ Shuttle run

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	<ul style="list-style-type: none"> ▪ Zig-zag run ▪ Ladder
Plyometrics *Continue with Phase I interventions	<ul style="list-style-type: none"> ▪ Double leg: <ul style="list-style-type: none"> ○ Lateral jumps over line/cone ○ Lateral tuck jumps over cone ▪ Single leg (these exercises are challenging and should be considered for more advanced athletes): <ul style="list-style-type: none"> ○ Lateral jumps over line/cone ○ Lateral jumps with sport cord
Criteria to Progress	<ul style="list-style-type: none"> ▪ No increase in pain or swelling ▪ Pain-free during loading activities ▪ Demonstrates proper movement patterns

PHASE III: MULTIPLANAR PROGRESSION

Rehab Goals	<ul style="list-style-type: none"> ▪ Challenge the Level 1 sport athlete in preparation for final clearance for return to sport
Agility *Continue with Phase I-II interventions	<ul style="list-style-type: none"> ▪ Box drill ▪ Star drill ▪ Side shuffle with hurdles
Plyometrics *Continue with Phase I-II interventions	<ul style="list-style-type: none"> ▪ Box jumps with quick change of direction ▪ 90 and 180 degree jumps
Criteria to Progress	<ul style="list-style-type: none"> ▪ Clearance from MD ▪ Functional Assessment <ul style="list-style-type: none"> ○ Quad/HS/glut index $\geq 90\%$ contra lateral side (isokinetic testing if available) ○ Hamstring/Quad ratio $\geq 70\%$ ○ Hop Testing $\geq 90\%$ contralateral side ▪ KOOS-sports questionnaire $>90\%$ ▪ International Knee Committee Subjective Knee Evaluation >93 ▪ Psych Readiness to Return to Sport (PRRS)