



## ***Percutaneous Tenotomy, Bone Marrow Aspirate Concentrate and Soft Tissue Platelet-Rich Plasma***

### *Rehabilitation Guideline - Lower Extremity*

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This rehabilitation program is designed to return the individual to their activities as quickly and safely as possible. It is designed for rehabilitation following the percutaneous tenotomy procedure, bone marrow aspirate concentrate (BMAC) injection or a soft tissue platelet-rich plasma (PRP) injection. Modifications to this guideline may be necessary dependent on physician specific instruction, location of injection, concomitant injuries or procedures performed. This evidence-based percutaneous tenotomy, BMAC and PRP 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 or activity participation. The therapist may modify the program appropriately depending on the individual's goals for activity following the percutaneous tenotomy procedure or PRP injection.

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-procedure care based on exam/treatment findings, individual progress and/or the presence of concomitant procedures or post-procedure complications. If the clinician should have questions regarding post-procedure progression, they should contact the referring physician.

## General Guidelines/Precautions:

- No icing or direct massage over injected area first 4 weeks
- No NSAIDs 5 days prior and 10 days after procedure — see physician orders
- Immobilization expected first 7-10 days per physician
- Bracing dependent upon limb and procedure
  - Site specific, duration per physician
- Weight bearing modified based on procedure
  - Site specific, may have period of limited weight bearing per physician
- High-rep, low-load strengthening initiated around 2 weeks
- Eccentric exercise and plyometrics initiated around 6 weeks
- Return to sport timeframe expected 12-16 weeks per physician and patient goals
  - Criteria to be met for return to sport
    1. Excellent neuromuscular control and pain free with multiplanar movements
    2. Less than 10% strength deficit on isokinetic strength testing
    3. Meet all prior return to activity criteria (return to running and movement progressions, etc.)

# Percutaneous Tenotomy, BMAC or PRP Rehabilitation Guideline (12-16 weeks dependent upon goals and progress)

PHASE	SUGGESTED INTERVENTIONS	GOALS/MILESTONES FOR PROGRESSION
<p><b>Phase I</b> Protection Phase Weeks 0-1</p>	<p><b>Discuss:</b> Anatomy, existing pathology, rehab schedule, bracing, weight bearing and expected progressions</p> <p><b>Specific Instructions:</b></p> <ul style="list-style-type: none"> <li>• Weight-bearing status per physician and site specific</li> <li>• No icing</li> <li>• No IASTM over area</li> <li>• No NSAIDs 10 days post procedure</li> </ul> <p><b>Immediate Post-Injection instructions:</b></p> <ul style="list-style-type: none"> <li>• Gentle active ROM of joint</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Protection of tissue for proper inflammatory response</li> <li>2. Control post-procedure pain</li> <li>3. Maintain range of motion</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. One week after procedure</li> </ol>
<p><b>Phase II</b> Protected Motion Phase Weeks 1-2 Expected visits: 0-2</p>	<p><b>Specific Instructions:</b></p> <ul style="list-style-type: none"> <li>• Progress weight-bearing status</li> <li>• Avoid loading affected area heavily</li> <li>• Load adjacent regions</li> </ul> <p><b>Suggested Treatments:</b></p> <p><b>ROM:</b> Continue with active motion exercises</p> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>• Begin light strengthening of adjacent regions dependent on area injected and per physician</li> </ul> <p><b>Other Activities:</b></p> <ul style="list-style-type: none"> <li>• Cardiovascular endurance exercise, dependent upon area injection and per physician</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Provide environment of proper healing of injury site</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Control of post-operative pain (0-1/10 with ADLs)</li> <li>2. Proper gait/joint mechanics</li> <li>3. Two weeks after procedure</li> </ol>

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# Percutaneous Tenotomy, BMAC or PRP Rehabilitation Guideline (12-16 weeks dependent upon goals and progress)

<p><b>Phase III</b> <i>Motion and Muscle Activation Phase</i></p> <p>Weeks 2-6</p> <p>Expected visits: 4-8</p>	<p><b>Specific Instructions:</b></p> <ul style="list-style-type: none"> <li>• Continue with previous exercise program</li> <li>• Initiate stretching and light strengthening</li> <li>• No eccentrics or plyometrics</li> <li>• If locked, unlock brace at 4 weeks, discontinue at 6 weeks, site specific, progressed by physician</li> </ul> <p><b>Suggested Treatments:</b></p> <ul style="list-style-type: none"> <li>• Initiate strength training with low load and high repetitions</li> </ul> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>• Lower extremity</li> </ul> <p><b>Weeks 2-4</b></p> <ul style="list-style-type: none"> <li>- Clamshells, Fire hydrants, SDLY hip abduction</li> <li>- Multi-angle quad/hamstring isometrics</li> <li>- Open chain knee extensions (90-0 degrees) with no resistance</li> <li>- Straight leg raise</li> <li>- Prone hamstring curl</li> <li>- Leg Press (double leg - light weight)</li> </ul> <p><b>Week 4</b></p> <ul style="list-style-type: none"> <li>- Step-up progression, lateral step down</li> <li>- DL and SL leg press to tolerance</li> <li>- Mini-squat to table, wall squats</li> <li>- Goblet and offset squat</li> <li>- Plank progression</li> </ul> <p><b>Other Activities:</b></p> <ul style="list-style-type: none"> <li>• Cardiovascular endurance exercises including biking, elliptical</li> <li>• Static proprioception training (double to single leg) with perturbation on variable surfaces (rocker board, airex pads, air discs, etc.) &amp; emphasis on proper hip/knee stability and hip strategy.</li> <li>• Aquatic program (if available) — including pool walking, and closed chain strengthening/balance consistent with restrictions above — no running/jumping, swimming allowed</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Improve muscular strength and endurance</li> <li>2. Improve neuromuscular control</li> <li>3. Achieve full active ROM</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Full range of motion</li> <li>2. No pain with activities</li> <li>3. Strength testing at 5/5 with MMT</li> </ol>
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# Percutaneous Tenotomy, BMAC or PRP Rehabilitation Guideline (12-16 weeks dependent upon goals and progress)

<p><b>Phase IV</b> <i>Advanced Strengthening and Eccentric Control Phase</i></p> <p>Weeks 6-12+</p> <p>Expected visits: 6-12+</p>	<p><b>Specific Instructions:</b></p> <ul style="list-style-type: none"> <li>• Progression to eccentric strengthening</li> <li>• Progression to running program (with appropriate bracing) with training to improve/normalize form and shock absorption <b>(as cleared by MD)</b></li> <li>• Progression to higher level activities and sports specific activities as strength and control dictate <b>(as cleared by MD)</b></li> </ul> <p><b>Suggested Treatments:</b> <i>Depending on specific demands of the patient's goal for an activity level:</i></p> <p>May utilize specific power, strength, hypertrophy guidelines, if appropriate:</p> <ul style="list-style-type: none"> <li>- 3-4 sets of 2-8 reps for strength (heavy weight, 2-3 min. rest)</li> <li>- 3-4 sets of 8-15 reps for hypertrophy (moderate weight, 45-60 sec. rest)</li> <li>- 3-4 sets of 1-5 reps for power (lighter weight, 5-10 min. rest)</li> </ul> <p><b>Exercise Examples:</b></p> <ul style="list-style-type: none"> <li>• Lower extremity <ul style="list-style-type: none"> <li>- Progress previous exercises, include eccentric training</li> <li>- Initiate return to running program</li> <li>- Initiate plyometric activities; DL to SL</li> <li>- Initiate deceleration, cutting, and agility activities</li> </ul> </li> </ul> <p><b>Other Activities:</b></p> <ul style="list-style-type: none"> <li>• Continue with previous core, cardiovascular, proprioceptive, and aquatic programs as pain allows</li> </ul>	<p><b>Goals of Phase:</b></p> <ol style="list-style-type: none"> <li>1. Full PROM expected by week 10 (90-100 deg. of ER at 90 degrees of abduction)</li> <li>2. Preserve the integrity of the surgical repair</li> <li>3. Increase functional activity without soft tissue irritation</li> <li>4. Decrease pain and inflammation</li> </ol> <p><b>Criteria to Advance to Next Phase:</b></p> <ol style="list-style-type: none"> <li>1. Full and non-painful PROM</li> <li>2. No pain or tenderness</li> <li>3. No increased shoulder irritability with progressive resistive strength training program.</li> <li>4. Clearance by MD to full activity and/or Throwers Program</li> </ol>
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## REFERENCES:

1. Mautner K, Malanga G, Colberg R. Optimization of ingredients, procedures, and rehabilitation for platelet-rich plasma injections for chronic tendinopathy. *Pain manage.* 2011; 1(6): 523-532.
2. Nguyen RT, Borg-Stein J, McInnis K. Applications of platelet-rich plasma in musculoskeletal and sports medicine: an evidence-based approach. *PM&R.* 2011;3:226-250.
3. Kaux JF, Forthomme B, Namurois M, et al. Description of a standardized rehabilitation program based on sub-maximal eccentric following a platelet-rich plasma infiltration for jumpers knee. *Muscles Ligaments Tendons J.* 2014;4(1):85-89.
4. Mckay J, Frantzen K, Vercruyssen N, et al. Rehabilitation following regenerative medicine treatment for knee osteoarthritis: current concept review. *J Orthop Traum.* 2019;10:59-66.
5. Mishra A, Woodall J, Vieira A. Treatment of tendon and muscle using platelet-rich plasma. *Clin J Sport Med.* 2009;28:113-125.

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# Plyometric Progressions

## Guidelines

- ✓ Must be able to perform full, free-weight squat 1.5-2.5 times body weight or squat 60% of body weight five times in five seconds.<sup>3</sup>
- ✓ Add to sessions 1-2x/wk. — 3 days between sessions.
- ✓ Begin with 30-40 foot contacts per session and increase as able.
- ✓ No more than 80-120 foot contacts per session.

## Step 1

- *Jumping **TO** box (decreased landing forces)*
- 2 legs to 2 legs
- 2 legs to 1 leg
- 1 leg to opposite leg
- 1 leg to same leg

## Step 2

- *Jumping **FROM** box*
- Landing on 2

## Step 3

- Squat jumps
- 1 leg jump → 2 leg land
- 2 leg jump → 1 leg land
- Split squat jumps → scissor jumps
- 1 leg jump → opposite leg land
- 1 leg jump → same leg land

## Step 4

- Progress to various planes of movement as able.
- i.e.: Double leg broad jumps, single leg lateral hops, skater lateral jumps, bounding, drop jumps to jumps over hurdles forward or lateral, etc.

## REFERENCES

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2. Performance Enhancement in Rehabilitation: "Bridging the Gap," Dan Lorenz, DPT, PT, LAT, CSCS, USAW: March 5-6, 2016.
3. Davies G, Riemann BL, Manske R. Current concepts of plyometric exercise. Int J Sports Phys Ther. 2015; 10(6): 760-86.
4. Chmielewski TL, George SZ, Tillman SM, et al. Low- Versus High-Intensity Plyometric Exercise During Rehabilitation After Anterior Cruciate Ligament Reconstruction. Am J Sports Med. 2016; 44(3): 609-17.

# Return to Running Program

## Guidelines

- ✓ Running program is completed in addition to rehab program and other cardiovascular exercise.
- ✓ A dynamic warmup and 3-5 minute walk should precede each run.
- ✓ Run only every other day (increase rest days as needed).
- ✓ If pain is not sharp, is present during warmup but improves with running, or does not increase as you run, you may continue run and stay at that level until pain free.
- ✓ Each level should be completed 3x without pain prior to moving on to next level; repeat sequence as needed.
- ✓ If pain increases as you run, creates soreness that disrupts sleep or rest after run, causes swelling, or alters mechanics, stop running and take next day off.
- ✓ Consult with your physical therapist throughout return to running process for individualized recommendations.

	Date Completed	Run	Walk	Reps
<b>Level 1</b>	1 _____ 2 _____ 3 _____	3 minutes	5 minutes	3
<b>Level 2</b>	1 _____ 2 _____ 3 _____	3 minutes	3 minutes	4
<b>Level 3</b>	1 _____ 2 _____ 3 _____	4 minutes	3 minutes	3
<b>Level 4</b>	1 _____ 2 _____ 3 _____	5 minutes	3 minutes	3
<b>Level 5</b>	1 _____ 2 _____ 3 _____	7 minutes	3 minutes	2
<b>Level 6</b>	1 _____ 2 _____ 3 _____	1 mile	2 minutes	1
<b>Level 7</b>	1 _____ 2 _____ 3 _____	1 mile → walk → ½ mile	2 minutes	1
<b>Level 8</b>	1 _____ 2 _____ 3 _____	1.5 miles	—	1

