Rehabilitation Protocol for Patella/Quad Tendon Repairs

This protocol is intended to guide clinicians through the post-operative course for Patella/Quad Tendon repairs. 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 Patella/Quad Tendon
Many different factors influence the post-operative patella/quad tendon rehabilitation outcomes, including tissue quality and strength of repair. It is recommended that clinicians collaborate closely with the referring physician regarding integrity of repair and any changes to protocol.

Post-operative considerations
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.

PHASE I: IMMEDIATE POST-OP (0-14 DAYS AFTER SURGERY)

Rehabilitation Goals	• Protect repair • Minimize post-operative pain • Minimize post-operative edema • Prevent complications from prolonged immobilization • Prevent and recognize early signs of infection
Precautions	• Hinged knee brace should be locked in extension and worn at all times (ambulating, sleeping, standing, etc.) • No active knee extension • No passive knee flexion beyond 60 degrees- Do not push motion at this point
Weight Bearing	• Weight Bearing as tolerated with hinged knee brace locked in extension
Intervention	*Swelling Management* • Ice, compression, elevation • Retrograde massage • Ankle pumps *Range of motion/Mobility* • PROM • Heel slides with towel • Low intensity, long duration extension stretches: prone hang, heel prop • Seated hamstring/calf stretch • Gentle patellafemoral joint mobilization *Strengthening* • Calf raises • Quad sets • Glute set

Criteria to Progress	• 2 weeks post-op • Knee extension to 0 deg

PHASE II: INTERMEDIATE POST-OP (2-6 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Continued minimization of post-operative pain/edema • Progress knee flexion PROM • Progress to full weight bearing status with use of locked brace • Initiate proximal/distal strengthening (hip, back, abdominals, ankle)
Weight Bearing	• Weight Bearing as tolerated with hinged knee brace locked in extension, should be full weight bearing by 6 weeks

Precautions	• Knee flexion PROM starts at 50 degrees week 2
	  ○ Light overpressure only for PROM
	• Progress 10 degrees/week until 90 degrees achieved
	  ○ 60 degree maximum end of week 2
	  ○ 70 degree maximum end of week 3
	  ○ 80 degree maximum end of week 4
	  ○ 90 degree maximum end of week 5
	• Hinged brace locked in extension for standing/walking/sleeping
	  ○ Brace worn at night until week 6 unless otherwise specified by surgeon
	  ○ Can unlock for sitting/laying (brace angle can be unlocked to available PROM, but not to exceed PROM progression noted above)
	• Assistive device for ambulation as needed

Additional Intervention **Continue with Phase I interventions*	*Range of motion/Mobility* • Patellofemoral Joint Mobilization • Gradual flexion PROM with light overpressure per above • Extension PROM with overpressure as needed • Heel Slide • Sitting knee flexion to above ROM • Heel prop *Cardio* • Upper body ergometer *Strengthening* • Straight leg raise *without lag • Side lying hip abduction and adduction, prone leg extension • Standing hip abduction, adduction and extension • Glute bridge with legs straight elevated on a chair • Calf raise • Core strengthening: Plank as able without discomfort in knee, TA brace progression *Balance/proprioception* • Standing weight shifts
Criteria to Progress	• Full passive knee extension PROM • Passive knee flexion to 90 degrees • FWB in brace with no pain • Active knee extension to 0 degrees with quad set

PHASE III: LATE POST-OP (6-15 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Wean assistive devices if any are still used • Restore full A/PROM of knee flexion • Begin stationary bike when able • Initiate progressive quadriceps loading/resistance exercises • Restore static single leg balance • Continue to progress proximal/distal strengthening

Weight Bearing	• Hinged brace unlocked for ambulation (0-60 degrees) provided patient demonstrates sufficient quad control during stance to prevent buckling
	  ○ Use brace until week 8 unless otherwise specified by surgeon
	  ○ Patient should demonstrate sufficient quad control, weight bearing tolerance and single limb stability prior to discharge of brace.

Precautions	• No weight bearing with flexion >90 deg until after 8 weeks • A/PROM should be cautioned not to progress faster than 10 degrees per week before 12 weeks post-op • Avoid aggressive quad stretching • No maximal voluntary contraction of the quadriceps until week 16 (No manual muscle test or handheld dynamometer testing).
Additional Intervention **Continue with Phase I-II Interventions*	*Range of motion/Mobility* • Patellofemoral Joint Mobilization • Flexion PROM with overpressure • Heel Slide • Sitting knee flexion *Cardio* • Upper body ergometer • Stationary bicycle- Begin with partial rotations minimal resistance and gradually progress time and resistance once full motion is achieved. • Elliptical- may begin once active knee flexion motion reaches at least 120 degrees, able to perform 10 straight leg raises without lag, and gait is normalized without assistive device *Strengthening* *Progress strength gradually as appropriate avoiding anterior knee pain, many of the below exercises will not begin until 8-10 weeks or later • Gym equipment: leg press machine, seated hamstring curl machine and hamstring curl machine, hip abductor and adductor machine, hip extension machine, roman chair, seated calf machine Progress intensity (strength) and duration (endurance) of exercises as appropriate *The following exercises to focus on proper control with emphasis on good proximal stability • Squat to chair • Lateral lunges • Romanian deadlift (single and double leg) • Resisted triple extension in standing • Single leg progression: partial weight bearing single leg press, step ups and step ups with march, slide board lunges: retro and lateral, lateral step-ups, single leg squats, single leg wall slides, lateral step down ○ Knee Extension machine at 16 weeks: If quad strength continues to be significantly limited, limiting further progression, may begin using knee extension machine as long as there is no anterior knee discomfort or pain • Proximal Strengthening: Double leg bridge, bridge with feet on physioball, single leg bridge, lateral band walk, standing clamshell/fire hydrant, hamstring walkout, TA brace with UE and LE progression *Balance/proprioception* • Progress single limb balance including perturbation training

Criteria to Progress	• Good recovery of quadriceps strength
	  ○ Ability to perform 10 single leg squats to 60 degrees
	  ○ Quad strength of at least 70% on handheld dynamometer: If following standard timeline, and timeline not delayed due to integrity of repair, can test quad strength at week 16
	  ○ Or 100% quad set compared to contralateral side (measured by sphygmomanometer in mmHg)[1]
	• Knee flexion PROM to at least 120 degrees
	• Single leg stance to 30 seconds on involved side with no significant compensatory pattern
	• Symmetrical gait pattern without use of assistive device
	• Symmetrical stair negotiation without reliance on UE

PHASE IV: TRANSITIONAL (4-6 MONTHS AFTER SURGERY)

Rehabilitation Goals	• Restore full ROM and muscle length of quadriceps • Restore quadriceps strength (quad index preferred) • Restore single leg dynamic balance/eccentric control (Y balance preferred) • Initiate return to jog/run protocol as tolerated • Restore proximal/distal strength to symmetry with contralateral side
Precautions	• Avoid pain more than delayed onset muscle soreness (DOMS) during or following exercise especially in the anterior knee/extensor mechanism

Additional Interventions **Continue with Phase I-III interventions*	• Begin sub-max sport specific training in the sagittal plane
	• Bilateral PWB plyometrics progressed to FWB plyometrics
	Progress to plyometric and agility program (with functional brace if prescribed)
	  • Agility and Plyometric Program
	Interval running program
	  • Return to Running Program
	  • Must have full ROM, resolved swelling, no pain with walking, at least 80% limb symmetry on handheld dynamometer, and ability to perform SL hop with good form prior to initiating jogging progression

Criteria to Progress	• Quad index of at least 90% (handheld dynamometry preferred, if not sphygmomanometer is acceptable, but consider referring to clinic with dynamometry available for testing) ○ Isokinetic dynamometry should be held until 6 months and reserved for cases where advanced return to sport/activity is needed • Symmetrical strength measures in hamstrings and hip (dynamometry preferred) • Y balance test within 90% of contralateral side • Symmetry in gait while jogging

PHASE V: PROGRESISVE RETURN TO SPORT (6-8 MONTHS AFTER SURGERY)

Rehabilitation Goals	• Progress running/sprinting program • Improve multidirectional dynamic movements and control of acceleration/deceleration • Improve power in plyometrics and landing mechanics • Restore full quadriceps strength • Return to sport/competition with minimal risk of re-injury
Additional Interventions **Continue with Phase II-IV interventions*	• Add sport specific exercises based on patient's desired sport goals ○ If participating in a cutting/sprinting sport, increased focus on rapid acceleration/deceleration activities and change of direction drills gradually increasing demand and predictability of drill
Criteria to Progress	• Pass all criteria of the MGB Lower Extremity Return to Sport Functional Testing • Quad index of at least 90% (measured by dynamometry, isokinetic preferred)

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Contact	Please email MGHSportsPhysicalTherapy@partners.org with questions specific to this protocol

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