



Patella/Quad Tendon Repair Protocol Phase 1

Purpose		Precautions
Maximum Protection	<ul style="list-style-type: none">• WBAT w/ crutches• Knee brace locked in full extension (worn at all times)• 0-2 weeks 0°-60° of PROM & AAROM• After 2 weeks 0°-90° of PROM & AAROM• No active knee extension• No loaded closed kinetic chain quad strengthening	
Typical Time Frame		
0-6 Weeks		
Criteria to Pass		
<ul style="list-style-type: none">• 0°-90° of knee AROM• 30 consecutive SLR without lag		
Priority List & Suggested Exercises		
<ol style="list-style-type: none">1. Knee Flexion ROM<ol style="list-style-type: none">a. PROM: Seated knee bend off table, Physioball knee flexion (supine), Heel slides, Wall slidesb. Manual Techniques: Patella mobs (gentle inferior glides)2. Knee Extension ROM<ol style="list-style-type: none">a. Low Load Long Duration: Extension prop, Prone hangs, Foot on Ottoman (add weight or ice to all)b. Patella mobs (gentle superior glides)c. Stretches: Hamstring and Slantboard3. Quad Activation<ol style="list-style-type: none">a. Quad sets with NMES (towel roll, 10sec hold)b. SLR with NMES (towel roll > quad set > into SLR > reset)c. Kicking into physio ball isometric holds (maintain ROM between 90° and 60° of knee flexion)4. Lower Extremity Strength<ol style="list-style-type: none">a. 4-way SLR with (NMES only for forward)b. Clamshellsc. Straight leg bridge on ball		
Special Considerations		
<ul style="list-style-type: none">• Manage pain with meds• Swelling: compression, elevation, ice, retrograde massage• NMES: Use with all quad exercises in this phase• BFR: use as soon as patient able to get a good quad contraction• Incision: inspect frequently to ensure healing and closing• Consider aerobic conditioning for HEP throughout all phases to maintain aerobic capacity		

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Patella/Quad Tendon Repair Protocol Phase 2

Purpose		Precautions
Protection		<ul style="list-style-type: none"> • WBAT to full WB with no AD by 8 weeks • Closed Kinetic chain exercises limited to 90° of knee flexion • Avoid aggressive quad stretching
Typical Time Frame		
6-10 Weeks		
Criteria to Pass		
<ul style="list-style-type: none"> • Knee ROM is restored to 80% of the uninvolved knee • SLS x 30sec without LOB • Normal gait pattern without AD and with full terminal knee extension 		
Priority List & Suggested Exercises		
<ol style="list-style-type: none"> Knee Flexion ROM <ol style="list-style-type: none"> Continue Phase 1 exercises (adding sets and reps per discretion) Nu-step & bike (½ revolutions progressing to full) Flexion on step Knee Extension ROM <ol style="list-style-type: none"> Continue Phase 1 exercises Quad Activation (at least 10 minutes of NMES with at least 2 exercises) <ol style="list-style-type: none"> 4-way SLR with (NMES only for forward) TKEs with NMES (banded, ball behind knee, big ball behind knee, prone) Leg press into physioball with NMES Kicking into physio ball isometric holds (maintain ROM between 90° and 60° of knee flexion) LAQ with NMES (don't start until after performing multi angle isometrics without pain) Gait Training <ol style="list-style-type: none"> SLS no UE support > SL balance reaches Gait training without crutches (forward and retro) > progress to sled (pulling and pushing) Low hurdle (reciprocal pattern) > high hurdle (step to) > high hurdle (reciprocal pattern) Calf Raises 		
Special Considerations		
<ul style="list-style-type: none"> • Swelling: compression, elevation, ice, retrograde massage • BFR: use as soon as patient able to get a good quad contraction (start at 50% and progress to 80% per patient tolerance and use most of session) • Incision: Should be closed by 6 weeks • Programming: High volume for exercises 2-3 sets of 12-15 reps • Consider aerobic conditioning for HEP throughout all phases to maintain aerobic capacity 		

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Patella/Quad Tendon Repair Protocol Phase 3

Purpose	Precautions
Functional Restoration	<ul style="list-style-type: none"> • Open Kinetic Chain exercises are introduced gradual and slow • Still avoid aggressive PROM into knee flexion
Typical Time Frame	
8-14 Weeks	

Criteria to Pass

- Knee ROM is restored to 90% of the uninvolved knee
- Ascend/descend stairs reciprocal pattern without pain or UE assist
- 5 steps ups (10" step)
- 5 lateral step downs (8" step)
- Squat symmetrically to 90°
- Y balance reach 80% of uninvolved side without hip strategy

Priority List & Suggested Exercises

1. Knee Flexion ROM

- Continue Phase 2 exercises (adding sets and reps per discretion)
- Manual: Knee flexion with manual tibial internal rotation
- Mobility: Prone quad stretch, Knee circles
- AAROM: Shuttle press, TRX squat

2. Anterior Chain Strength

- Continue SAQ and/or LAQ with NMES and isometric knee extension at 60 degrees
- LAQ (ankle weight > cable resistance)
- Wall sit progression
- Heavy banded TKEs/Shuttle Press TKEs
- SL Shuttle press

3. Functional Strength

- Squat progression
- Step ups progression
- LSD progression

4. Posterior Chain Strength

- Bridge progression
- Hamstring curls progression
- Quadruped hip extension over bench holds
- Double leg hip thruster holds
- SL RDL reaches
- Calf raise variations

5. Lateral Chain Strength

- Clamshells > Sidelying Hip Abduction
- Stork stance holds
- Sidelying shuttle press
- Hip hike holds > hip hike reps

Special Considerations

- BFR: Continue to use in the earlier part of PT session
- NMES: Use for at least 10 minutes until patient can perform unweighted SAQ and LAQ = ROM to uninvolved LE
- Motor Control: If there is still a difference between AROM/PROM focus on end range strengthening and isometrics
- Programming:
 - High Volume Exercises 2-3 sets of 12-15 reps
 - 3:1:1 anterior chain to posterior chain to lateral chain strengthening ratio
 - Complete 1x25 reps on uninvolved leg for anterior chain exercises and same sets/reps for posterior and lateral chain

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Patella/Quad Tendon Repair Protocol Phase 4

Purpose	Precautions
Progressive Overload	<ul style="list-style-type: none"> • Avoid exercises that are painful and cause swelling • Don't initiate running
Typical Time Frame	
12-20 Weeks	

Criteria to Pass

- Knee ROM is restored to 95% of the uninvolved knee
- Y balance reach 95% of uninvolved side without hip strategy
- 30 LSD (8" step), back flat against wall with no hip compensation
- 15 forward step downs (8")
- 25 SL bridges on bench (knee bent at 20°)
- 25 SL calf raises (10° incline to 60bpm metronome)
- 25 SL squats to box (20") with minimal trunk flexion

Priority List & Suggested Exercises

1. Knee Flexion ROM

- Continue previous PROM & AAROM exercises; More aggressive PROM if necessary
- Manual Techniques: Cupping, IASTM, Tibial rotations with knee flexion
- Tibial rotations w/ slider
- Mobility: Couch stretch progression, prone quad stretch

2. Anterior Chain Strength

- Double leg extension holds at 0° > Double leg extension machine reps > Single leg extension holds at 0° > Single leg extension machine reps
- Sled Pulls/Pushes
- Kickstand Squat at wall > Goblet squat
- Eccentric Shuttle press (up with 2, down with 1)

3. Functional Strength

- LSD progression
- Forward step down progression
- SL squat progression

4. Posterior Chain Strength

- Hip thruster progression
- RDL progression
- Hamstring curl progression
- Calf raise variations

5. Lateral Chain Strength

- Lateral squat progression
- Stork stance banded reps
- Lateral band walks/skaters
- Side plank progression

Special Considerations

- BFR: Continue to use in the earlier part of PT session if atrophy remains
- NMES: Use for at least 10 minutes until patient can perform unweighted SAQ and LAQ = ROM to uninvolved LE
- Motor Control: If there is still a difference between AROM/PROM focus on end range strengthening and isometrics
- Programming:
 - 3 sets of 6-12 reps for anterior and functional exercises with focus on strength
 - 3:1:1 anterior chain to posterior chain to lateral chain strengthening ratio
 - Complete 1x25 reps on uninvolved leg for anterior chain exercises and same sets/reps for posterior and lateral chain
 - Tempo: 4-1-2 w/ emphasis on eccentric control

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Patella/Quad Tendon Repair Protocol Phase 5

Purpose

Intro to Impact

Typical Time Frame

16-24 Weeks

Precautions

- Avoid exercises that are painful and cause swelling
- Don't initiate running until patient has passed the criteria below for return to jogging

Criteria to Pass

To Begin Jogging: (Use Strengthlevel.com)

- 12 reps at 70% of Novice Goblet Squats
- 12 reps at 70% of Novice Forward Lunges
- 12 reps at 70% of Novice DB RDLs
- <30% quad strength deficit for average force with Isometric testing at 90° knee flexion
- 15 SL hops in place w/ good load acceptance & landing in same spot

To Move Onto Phase 6:

- ATHLETES: Run 1mi w/o limping
- GENERAL POP: Jog 5min w/o limping
- Sprint w/o compensation
- Land symmetrical <10% difference w/ 5 squat jumps on Force Plates
- Decel efficiently in the sagittal plane

Priority List & Suggested Exercises

1. Anterior Chain Mobility

- a. Dip Bar Assisted Slant Board Squat > Slant Board Squat > Dip Bar Assisted exaggerated Split Squat on step > No step > No Dip Bar Assist
- b. Prone quad stretch and couch stretch

2. Anterior Chain Strength

- a. Split Squat Isometric Hold (Yoga Block Cue)
- b. Slantboard Step Downs
- c. SL machine extensions holds at 0° > SL machine extensions
- d. Shuttle Press variations

3. Functional Strength

- a. Lunge progression
- b. Loaded step up variations
- c. Loaded goblet squat progression
- d. Loaded LSD & Forward step downs

3. Agility/Impact

- a. Agility ladder (basic coordination)
- b. Mini hops > Jogging progression > hop & stop > UE assisted treadmill intervals
- c. Deceleration: snap down progression > cable decels > multiplanar hops > ladder decels > change of pace > stop & goes
- d. Jump progression

4. Posterior Chain Strength

- a. Hamstring curl progression
- b. Hip thruster progression
- c. Deadlift/RDL variations
- d. Nordic progression
- e. Calf raise variations

5. Lateral Chain Strength

- a. Lateral squat variations
- b. Copenhagens
- c. Anti-rotation and balance training

Special Considerations

- Stretching: Continue quad stretching (prone quad and couch stretch)
- Quad Strength: Constant focus to improve quad strength and decrease quad deficit
- Isometric Testing: Quad strength testing at 90° knee flexion after 16 weeks
- Programming:
 - 2:1:1 anterior chain to posterior chain to impact exercises
 - Increase sets to 4 with reps 6-12 specifically for anterior and functional exercises
 - No > 2-3 sets of 3-5 reps for agility/impact exercises
 - Once patient has started to jog begin same sets/reps for all exercises on uninvolved LE



Patella/Quad Tendon Repair Protocol Phase 6

Purpose	Precautions
Deceleration	<ul style="list-style-type: none"> Don't initiate cutting until patient has passed the criteria below for return to cutting
Typical Time Frame	
6-8 Months	

Criteria to Pass

To Begin Cutting: (Use Strengthlevel.com)

- 8 reps at 80% of Intermediate Goblet Squats
- 8 reps at 80% of Intermediate Forward Lunges
- 8 reps at 80% of Intermediate DB RDLs
- <20% quad strength deficit for average force with isometric testing at 90° knee flexion

To Move Onto Phase 7:

- SL hop test >80% LSI with average of 3 trials
- <20% deficit for Deceleration RFD and Peak Force with landing w/ SL Counter Movement Jump on Force Plates

Priority List & Suggested Exercises

1. Agility/Impact

- Medicine ball drops
- 3-way hurdle hop
- Hop over hurdle in sagittal plane > hurdle hop into lateral plane
- Hop over hurdle (lateral plane) > transition hops
- Lateral shuffles, reactive cutting, pro agility drill, T-test drill
- Cutting footwork drill > cone cutting > reactive cone cutting

2. Anterior Chain Strength

- Heavy SL machine extension
- Shuttle Press variations
- Leg Extensions on Excentric
- Squat Variations

3. Functional Strength

- Continue with Phase 5 exercises
- Add more load to functional movements
- Excentric: squat, split squat, bulgarian split squats

4. Posterior Chain Strength

- Hamstring curl progression
- Hip thruster progression
- Deadlift/RDL variations
- Nordic progression
- KB swings
- Calf raise variations

5. Lateral Chain Strength

- Lateral step ups
- Lateral squat progression
- Excentric: lateral lunges
- Rotational deadlifts

Special Considerations

- Icing & Stretching: At the end of session or at home; Continue prone quad & couch stretch)
- Programming:
 - No > 3-4 sets of 3-5 reps agility
 - 2:1 Power to Strength ratio
 - Undulated Loading Model: Example: Mon - Mod intensity; Wed - High intensity; Fri - High volume
 - Rest Days: At least 3 days off
 - Tempo: 0-0-0 Decelerate the load and transition to acceleration as fast as possible
 - Plyometrics should be done prior to strengthening in order to avoid fatigue
 - Once patient can tolerate advanced plyometrics for multiple sets/reps without pain and with good form you can begin supersetting strength with power
- Conditioning: Begin through cross training on elliptical, bike, rower, jogging



Patella/Quad Tendon Repair Protocol Phase 7

Purpose		Precautions		
Return to Sport		<ul style="list-style-type: none"> • Patient should remain non-contact until at least 9 months post op or until they get through the criteria to pass (whichever comes last) 		
Typical Time Frame				
7.5 Months +				
Criteria to Pass				
<ul style="list-style-type: none"> • SL hop test >95% LSI with average of 3 trials • Triple hop test >95% LSI with average of 3 trials • <10% quad strength deficit for average force with isometric testing at 90° knee flexion • Girth measurements of the quad within 1 cm of non-surgical limb • Score of 48 or > on the Injury-Psychological Readiness to Return to Sport (I-PRRS) Questionnaire 				
Priority List & Suggested Exercises				
<table border="0"> <tr> <td style="vertical-align: top;"> <p>1. Agility/Impact</p> <ul style="list-style-type: none"> a. Continue with phase 6 agility/impact exercises until performing proficiently b. Depth jump progression <p>2. Complex Training: Compound Exercise at 80% 1RM (4 reps) followed by a plyometric jump exercise that mimic the same motor pattern (3 reps); 3-6 sets</p> <ul style="list-style-type: none"> a. Anterior Chain Complex Example: Front Squats followed by Squat Jumps b. Posterior Chain Complex Example: Barbell RDLs followed by KB Swings c. Lateral Chain Complex Example: Lateral Lunges > Skaters </td> <td style="vertical-align: top;"> <p>3. Contrast Training</p> <ul style="list-style-type: none"> a. Perform a maximal or near maximal lift (90-97% 1RM) followed by a drop set performed at 50-70% 1RM. Perform at maximal velocity. <p>4. French Contrast Training</p> <ul style="list-style-type: none"> a. 4 exercises performed in succession b. Heavy compound exercise (80-90% 1RM) 1-4 reps c. Plyometric jump 3 reps d. Drop set or weighted jump (30% 1RM) 3 reps e. Accelerated jump (usually band assisted) 2-3 reps </td> </tr> </table>			<p>1. Agility/Impact</p> <ul style="list-style-type: none"> a. Continue with phase 6 agility/impact exercises until performing proficiently b. Depth jump progression <p>2. Complex Training: Compound Exercise at 80% 1RM (4 reps) followed by a plyometric jump exercise that mimic the same motor pattern (3 reps); 3-6 sets</p> <ul style="list-style-type: none"> a. Anterior Chain Complex Example: Front Squats followed by Squat Jumps b. Posterior Chain Complex Example: Barbell RDLs followed by KB Swings c. Lateral Chain Complex Example: Lateral Lunges > Skaters 	<p>3. Contrast Training</p> <ul style="list-style-type: none"> a. Perform a maximal or near maximal lift (90-97% 1RM) followed by a drop set performed at 50-70% 1RM. Perform at maximal velocity. <p>4. French Contrast Training</p> <ul style="list-style-type: none"> a. 4 exercises performed in succession b. Heavy compound exercise (80-90% 1RM) 1-4 reps c. Plyometric jump 3 reps d. Drop set or weighted jump (30% 1RM) 3 reps e. Accelerated jump (usually band assisted) 2-3 reps
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Special Considerations				
<ul style="list-style-type: none"> • Icing: At the end of session or at home • Prioritize Recovery: 2-3 days off/wk • Training Scheme: Master complex training > contrast training > french contrast training • Patients should have about 1 month of sport specific movements before beginning contact. Build confidence with stopping, cutting, training, game like movements/plays, etc. • Contact should be progressed per therapist discretion during practice. Basketball Example: Contact Drills > 3v3 > 2v2 > 1v1 > 5v5 • Continue building isolated quad strength and explosive movements • Ramp up conditioning specific to sport 				

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