

Tibial Tubercle Transfer

Phase 1 – Maximum Protection Phase (0-6 weeks)

Goals for Phase 1

- Protect tibial tubercle transfer
- Minimize effusion
- ROM per guidelines listed, emphasis on extension
- Encourage quadriceps function
- Scar tissue mobility

Precautions

- Avoid open/resisted knee extension
- Avoid open and closed kinetic chain hip strength (including SLR)
- Avoid ambulation without brace locked at 0 degrees for first 4 weeks (pending WB)

Immobilization/Weight bearing

- TTWB with brace locked in full extension (Dr Kurcz)
- WBAT with brace locked in full extension (Dr Henry)

Range of Motion

- 0-90 degrees, emphasis on extension

Brace

- Brace locked in full extension
- Progression of opening brace is dependent upon controlled pain, appropriate quad strength, and controlled effusion per physician discretion

Manual Therapy

- Scar mobilization
- Patellar mobility drills
- Soft tissue mobilization to hamstrings, quadriceps, gastrocnemius-soleus, IT Band
- PROM/AROM knee flexion per ROM guidelines listed above

Strengthening

- Quadriceps strengthening
 - Week 0-6: Quadriceps setting
 - Week 2-6: Terminal knee extension in prone (and standing once WBAT)
- Hip strengthening:
 - Initiate isometrics
- Core strengthening
- Upper body ergometer

Modalities

- Cryotherapy 3 x per day for 20 minutes each with knee elevated above heart
- Issue compression and kinesiotape appropriate for edema
- NMES for quadriceps function
 - Home NMES unit recommended for first 8 weeks following surgery, per MD and therapist discretion
 - NMES to be used at home, 3 x a day for 20 minutes each

Phase 2 – Progressive Range of Motion and Early Strengthening (Weeks 6 to 12)

Goals for Phase 2

- Minimize effusion
- Gently increase ROM to full
- Normalize gait with heel-toe pattern
- Wean from knee brace
- Open and closed kinetic chain strengthening

Precautions

- Avoid lunges
- Avoid overloading surgical site
- Avoid deep squatting for 16 weeks (greater than 90°)

Immobilization/Weight bearing

- WBAT with crutches but can wean from crutches as appropriate

Range of Motion

- Gradual return to full ROM, emphasis on extension, per physician discretion

Brace

- Progression of opening brace is dependent upon controlled pain, appropriate quad strength, and controlled effusion per physician discretion

Manual Therapy

- Scar mobilization
- Patellar mobilization
- Soft tissue mobilization to hamstrings, quadriceps, gastrocnemius-soleus, IT Band
- PROM/AROM knee flexion per ROM guidelines listed above

Strengthening

- Quadriceps strengthening
 - Weeks 6-8: Begin multi-plane straight leg raising and closed kinetic chain strengthening program
 - Weeks 8-10: Progress open and closed kinetic chain program from bilateral to unilateral
- Hip strengthening:
 - Initiate open kinetic chain progressing to closed kinetic chain multi-plane hip strengthening
- Core strengthening
- Begin stationary bike
- Initiate proprioception drills (week 10)
- Blood flow restriction training as appropriate at 10 weeks (sooner with surgeon clearance)

Modalities

- NMES for quadriceps function as indicated per phase I

Phase 3 – Progressive Strengthening (Weeks 12 to 16)

Goals for Phase 3

- Progress muscle strength, endurance, and balance

Precautions

- No kicking in pool for 12 weeks
- Avoid twisting and pivoting for 12 weeks
- Avoidance of impact activity until able to pass functional testing

Stretching

- Continue stretching of all lower extremity musculature, as appropriate

Manual Therapy

- As needed to maintain range of motion and flexibility

Strengthening

- Advance open and closed kinetic chain strengthening (avoid knee extensions)
- Increased intensity on bike, treadmill, and elliptical trainer
- Begin gym strengthening leg press, hamstring curls, ab/adduction

Neuromuscular control

- Increase difficulty and intensity on proprioception drills

Aquatics

- Initiate pool running program

Phase 4 – Advanced Strengthening and Functional Drills (Weeks 16 to 24)

Goals for Phase 4

- Minimize pain and inflammation
- Restore strength and endurance
- Restore neuromuscular control
- Initiate impact activity and begin sport and/or work specific tasks

Week 16:

- Continue pool running program advancing to land as tolerated

Week 20:

- Advance gym strengthening
- Progress running/sprinting program –see return to run protocol
- Begin multi-directional field/court drills
- Begin bilateral progressing to unilateral plyometric drills
- Follow-up appointment with physician

*Sports test for return to competition 6 months post-op per physician's release

This protocol was updated and reviewed by Lisa Lorrigan, PT, PDT, Pamela Sines, PT, DPT and David Propson, PT, DPT and Orthopedics & Sports Medicine BayCare Clinic Manitowoc on May 2024.

References:

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- 3) Brockmeier, S., Carson, E., Diduch, D., Gwathmey, W., Miller, M., Werner, B., UVA SPORTS MEDICINE, Denny, C., Hart, J., & Post, M. (n.d.). *Rehabilitation Following Medial Patellofemoral Ligament (MPFL) Reconstruction with Tibial Tubercle Osteotomy*. <https://med.virginia.edu/orthopaedic-surgery/wp-content/uploads/sites/242/2015/11/MPFL-TTO.pdf> Reference
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