

Tibial tuberosity transfer (+/- MPFL Rconstruction) Protocol

TIBIAL TUBEROSITY TRANSFER PROTOCOL – PHASE 1 (± MPFL RECONSTRUCTION)

Monitor for evidence of:

- Infection: if patient develops a temperature $>38^{\circ}$, refer urgently to the operating surgeon. If the surgeon is unavailable, advise patient to attend A&E to exclude wound infection or septic arthritis
- Distal neurovascular deficit (including deep vein thrombosis)

Goals:

- **Protect osteotomy site ± MPFL graft; a brace will be provided to limit knee flexion**
- **Control pain and swelling/effusion**
- **Terminal extension ASAP, preserve/restore patella ROM**
- **Knee flexion $\geq 30^{\circ}$ by 2 weeks, $\geq 90^{\circ}$ by 6 weeks**
- **Muscle activation**

Initial precautions:

- PWB for **3 weeks**
- Brace locked in full extension to weight bear for **6 weeks**
- Avoid knee flexion $>100^{\circ}$ until **6 weeks** using brace to guide ROM
- FWB without brace if evidence of bone union at osteotomy site on 6-week X-ray

Pain, effusion and ROM:

- *PEACE protocol for the management of pain and swelling/effusion
NB: cryotherapy only influences pain, not drainage
- Terminal extension **ASAP**, patella mobilisation if required
- Non-weight bearing flexion $\leq 100^{\circ}$ until **6 weeks**
- FROM flexion if evidence of bone union at osteotomy site on 6-week X-ray

Muscle activation and strength:

- SQ's, SLR in brace until able to perform without extension lag
Consider electrostimulation if unable to voluntarily contract quadriceps
- OKC strengthening of the gluteal, hamstrings and calf muscles
- Add resistance to strengthening ex's as symptoms/signs allow

Criteria for progressing to Phase 2:

- Closed wound
- No/minimal pain with phase 1 exercises
- No/minimal synovitis/effusion
- Normal patellofemoral mobility, tibiofemoral ROM $\geq 0-90^{\circ}$
- Voluntary quadriceps contraction
- Minimum **6 weeks** since surgery
- X-ray evidence of bone union at osteotomy site

*PEACE: Protection, Elevation, Avoid anti-inflammatories, Compression, Education.

TIBIAL TUBEROSITY TRANSFER PROTOCOL – PHASE 2 (± MPFL RECONSTRUCTION)

Goals:

- **Protect osteotomy ± MPFL graft**
- **Wean off brace from week 6**
- **Full/symmetrical knee flexion by 12 weeks**
- **Normal gait and movement patterns**
- **Introduce CKC strengthening ex's**
- **Increase difficulty of neuromuscular and perturbation training**

Precautions:

- Wean off brace as confidence and symptoms/signs allow
- Avoid weight bearing knee flexion >90° until **4 months**

Pain, effusion and ROM:

- Monitor for increasing pain, effusion or localised temperature and modify rehabilitation accordingly
If required, consider hydrotherapy
- Maintain full extension, patella mobility and regain full/symmetrical flexion by **week 12**

Strength:

- Double leg, small arc CKC ex's, avoiding weight bearing knee flexion >90° until **4 months**
- OKC and CKC hamstrings, gluteal and calf muscle strengthening
- Body weight OKC knee extension
- Progressively increase resistance and decrease repetitions for all strengthening exercises

Cycling:

- Static bike with no resistance

Neuromuscular training:

- Weight bearing proprioceptive ex's (e.g. Bosu balance trainer)
- Increase difficulty of double leg proprioceptive ex's (e.g. perturbations, two motoric tasks)
- Increase intensity of perturbation, progressing to single leg once able
- Correct alignment of trunk and lower limb during exercises and walking

Criteria for progressing to Phase 3:

- No/minimal pain with phase 2 exercises
- No/minimal synovitis/effusion
- Full/symmetrical knee ROM
- FWB with normal gait pattern on even surfaces without brace
- Able to tolerate 25 minutes standing/walking without brace
- Correct qualitative performance of phase 2 exercise
- Minimum **12 weeks** since surgery

TIBIAL TUBEROSITY TRANSFER PROTOCOL – PHASE 3 (± MPFL RECONSTRUCTION)

Goals:

- **Protect osteotomy ± MPFL graft**
- **Progressive resistance training**
- **Return to running, sport or physically demanding work**

Precautions:

- Do not commence running until patient has fulfilled return to running criteria
- Avoid weight bearing knee flexion >90° until **4 months**
- Do not commence jumping/landing exercises until **4 months**

Pain, effusion and ROM:

- Monitor for increasing pain, effusion or localised temperature and modify rehabilitation accordingly
If required, consider hydrotherapy

Strength:

- Double and single leg CKC ex's, avoiding flexion >90° until **4 months**
- Quadriceps, hamstrings, gluteal and calf muscle strengthening
- Progressively increase resistance and decrease repetitions for all strengthening exercises

Cycling, running and other cardiovascular exercise:

- Static bike with resistance

Running:

- Start running if:
 - full ROM
 - pain ≤2 VAS and no effusion despite adequate loading
 - limb symmetry index (LSI) ≥70% for quadriceps and hamstrings strength
- Graduated running programme: start with 4-minute walk, 1-minute run (4:1) for 20 minutes
Decrease walking time and increase running time by 1 minute each week (3:2, 2:3, 1:4, 0:5)
Patient should be able to run for 20 minutes after 5 weeks
- Once running programme complete, introduce backwards and sideways running
- Progress running from single to multi-plane specific agility drills

Neuromuscular training:

- Increase difficulty of neuromuscular and perturbation training
- Introduce jumping/landing ex's, if required based on patient's goals, from **week 16**
- Emphasise sports specific movements
- Maintain quality of movement/performance during strength and sports exercises

Criteria for progressing to Phase 4:

- No/minimal pain with phase 3 exercises
- No/minimal synovitis/effusion
- Limb symmetry index (LSI) >80% for quads and hamstrings strength
- LSI >80% for hop battery tests

TIBIAL TUBEROSITY TRANSFER PROTOCOL – PHASE 4 (± MPFL RECONSTRUCTION)

Goals:

- Sports-specific drills and gradual return to play program
- Return to sport or physically demanding work

Strength/power:

- Sports-specific progressions e.g. power development, jumping and landing

Neuromuscular training:

- Increase difficulty of neuromuscular and perturbation training (e.g. single legged jumps)
- Introduce reactive/unanticipated movements
- Emphasise sports-specific movements
- Maintain quality of movement/performance during strength and sports exercises

Sports-specific training

- Increase intensity of agility training (e.g. cutting, pivoting)
- Build sports-specific load regarding energy expenditure (aerobic, anaerobic)
- Build sports-specific load regarding surface (grass, court etc.)
- Restart training with patient's team

Criteria for returning to play:

- No knee pain with sports-specific activities
- No giving way or fear of giving way during sports-specific activities
- Active dynamic gait pattern and symmetrical jogging pattern
- Correct quality of performance with all sports-specific activities
- Limb symmetry index (LSI) >90% for quads and hamstrings strength
- LSI >90% for hop battery tests
- Patient psychologically ready/confident to return to sports
- Expected return between 6-9 months since surgery

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References:

1. Dubois B, Esculier JF. Soft-tissue injuries simply need PEACE and LOVE. Br J Sports Med. 2020;54(2):72-3.
2. Fisher, B. et al (2010) Medial patellofemoral ligament reconstruction for recurrent patellar dislocation: a systematic review including rehabilitation and return-to-sports efficacy, Arthroscopy. Vol; 26 (10), pp 1384-1394.
3. DeJour et al (2013) The Lyon's sulcus-deepening trochleoplasty in previous unsuccessful patellofemoral surgery, International Orthopaedics (SICOT). Vol 37; pp 433–439.