

High Tibial Osteotomy Tomofix Protocol

OPENING WEDGE HIGH TIBIAL OSTEOTOMY – PHASE 1

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 (*AECS*, *CPN* or *SN* involvement, *DVT*)

Goals:

- **Protect osteotomy site**
- Control pain and swelling/effusion
- **Preserve/restore ROM**
- **Muscle activation**
- Normal gait and movement patterns; a brace may be provided if unable to SLR on discharge

Weight bearing:

- WBAT using crutches until able to walk without a limp
Patient may need to use crutches for up to **12 weeks**

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
- Full knee flexion as symptoms/signs allow

Muscle activation and strength:

- SQ's, IRQ, SLR
If a brace is provided, perform SLR in brace until able to perform without extension lag
Consider electrostimulation if unable to voluntarily contract quadriceps
- Once FWB, initiate CKC ex's (e.g. leg press, squats)
- Concentric and eccentric training of the gluteal, hamstrings and calf muscles
- Add resistance to strengthening ex's as symptoms and signs allow

Neuromuscular training:

- Proprioceptive ex's (e.g. Bosu balance trainer)
- Correct alignment of trunk and lower limb during exercises and gait

Cycling:

- Static bike with no resistance once sufficient ROM

Criteria for progressing to Phase 2:

- Closed wound
- No/minimal pain with phase 1 exercises
- No/minimal synovitis/effusion
- Normal patellofemoral mobility, tibiofemoral ROM $\geq 0-120^{\circ}$
- Voluntary quadriceps contraction
- FWB with normal gait

AECS: acute extremity compartment syndrome

CPN: common peroneal nerve

DVT: deep vein thrombosis

PEACE: Protection, Elevation, Avoid anti-inflammatories, Compression, Elevation

SN: Saphenous nerve

OPENING WEDGE HIGH TIBIAL OSTEOTOMY – PHASE 2

Goals:

- **Protect osteotomy site**
- Full patellofemoral and tibiofemoral ROM
- **Increase strength progressively**
- **Increase difficulty of neuromuscular and perturbation training**
- **Maintain good quality movement patterns**
- **Start running and sports specific training dependent on patient's goals**

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

Strength:

- Double and single leg CKC ex's
- OKC quadriceps and hamstrings ex's
- Add weight/resistance to OKC and CKC ex's as able
- Gluteal and calf muscle strengthening
- Progressively increase resistance and decrease repetitions for all strengthening exercises

Neuromuscular training:

- 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, walking and running.

Cycling, running and other cardiovascular exercise:

- Add resistance to static bike once able to FWB
- Cyclic exercises (e.g. cross trainer or rower)
- Start running if:
 - full ROM
 - pain ≤ 2 VAS and no effusion despite adequate loading
 - limb symmetry index (LSI) $\geq 70\%$ for quadriceps and hamstrings strength
 - clearance given by orthopaedic team
- Increase cardiovascular training (mainly aerobic)
- Introduce backwards and sideways running once competent with forward running
- Introduce multi-plane, sports specific agility movements once competent with linear running

Criteria for progressing to Phase 3:

- Correct qualitative performance of phase 2 exercise
- LSI $\geq 80\%$ for quadriceps and hamstrings strength
- LSI $\geq 80\%$ for hop battery test (e.g. hop for distance, vertical jump, side hop)

OPENING WEDGE HIGH TIBIAL OSTEOTOMY – PHASE 3

Goals:

- Return to physically demanding work or sport, depending on patient's goals

Strength/power:

- Continue progressive loading for strengthening exercises
- Sports-specific progressions e.g. power development, jumping/landing

Neuromuscular training:

- Increase difficulty of neuromuscular and perturbation training (e.g. single leg jumping)
- Introduce reactive/unanticipated movements
- Emphasise sports specific movements based on patient's goals
- 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:

- Tolerable knee pain with sports specific activities
- No giving way or fear of giving way during sports-specific activities
- Active dynamic gait pattern and symmetrical running 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
- Patient cleared to return to play by orthopaedic team

Originator: Richard Norris, Orthopaedic Physiotherapy Specialist.

Ratified by: Mr M McNicholas, Consultant Orthopaedic Surgeon.

Date last reviewed: October, 2020

References:

1. Dubois B, Esculier JF. Soft-tissue injuries simply need PEACE and LOVE. *Br J Sports Med.* 2020;54(2):72-3.
2. Staubli, A. et al (2003) TomoFix: a new LCP-concept for open wedge osteotomy of the medial proximal tibia – early results in 92 cases, *Injury Int. J. Care Injured*, Vol 34, S-B55–S-B62.