McNicholasKneeClinic

Patellofemoral Microfracture Protocol

PATELLOFEMORAL MICROFRACTURE PROTOCOL – PHASE 1

Monitor for evidence of:

- Infection: if patient develops a temperature >38°, 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 microfracture site**
- Control pain and swelling/effusion
- **Preserve/restore ROM; patient may be placed on a CPM machine**
- **Muscle activation**
- **Aim for 45 minutes pain-free cycling on static bike, 5-7 days per week by 8 weeks**

Initial precautions:

- Use post-op notes to determine the size of the lesion, as this impacts upon rehabilitation
- PWB (30-40% body weight) for **2 weeks,** WBAT thereafter
  For larger lesions (>4cm^2) PWB for **4-6 weeks**
- Brace locked at 0° when weight bearing for **8 weeks**
- Do not perform OKC quadriceps until **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
- CPM immediately after surgery set at 0-50° and progressed as tolerated by 10-20°
  Use CPM for up to 8 hours per day as tolerated by the patient
  If CPM not available or tolerated, perform 500 repetitions of flexion/extension ex's three times daily

Muscle activation and strength:

- SQ's, SLR in brace until able to perform without extension lag
  Consider electrostimulation if unable to voluntarily contract quadriceps
- Concentric and eccentric training of the hamstrings and calf muscles within WB restrictions
- Open chain hip maintenance ex's (e.g. side lying abduction, prone extension)

Neuromuscular training:

- Balance ex's once able to FWB (with brace on)

Cycling:

- Static bike with no resistance from **1 week** if sufficient ROM
  For larger lesions (>4cm^2) do not start until **4 weeks**

Criteria for progressing to Phase 2:

- Closed wound
- No/minimal pain with phase 1 exercises
- No/minimal synovitis/effusion
- Normal patellofemoral mobility, tibiofemoral ROM ≥0-120°
- Voluntary quadriceps contraction
- Minimum **8 weeks** since surgery

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

PATELLOFEMORAL MICROFRACTURE PROTOCOL – PHASE 2

Goals:

- **Protect microfracture site**
- Full patellofemoral and tibiofemoral ROM
- **Open brace intermittently whilst weight bearing**
- **Protected weight bearing strengthening exercises**
- **Progress neuromuscular and perturbation training**
- **Maintain good quality movement patterns**

Precautions:

- Weight bearing exercises to be performed within range that does not engage the lesion
- Do not perform OKC quadriceps until **12 weeks**

Pain, effusion and ROM:

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

Strength:

- Double leg CKC within range that does not engage the lesion
- Hamstrings, gluteal and calf muscle strengthening
- Progressively increase resistance and decrease repetitions for all strength exercises

Neuromuscular training:

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

Cycling, running and other cardiovascular exercise:

- Static bike with resistance if patient can cycle pain-free for 45 minutes without resistance
  Decrease cycling time as resistance increases

Criteria for progressing to Phase 3:

- Trace/no effusion
- No/minimal pain with phase 1 exercises
- Normal patellofemoral mobility, full/symmetrical tibiofemoral ROM
- FWB with normal gait pattern on even surfaces
- Able to tolerate 25 minutes standing/walking without brace
- Minimum **12 weeks** since surgery

PATELLOFEMORAL MICROFRACTURE PROTOCOL – PHASE 3

Goals:

- Protect microfracture site
- **Progressive increase in weight bearing exercises/activity**
- **Initiate OKC quadriceps**

Strength

- Continue progressive loading for CKC ex's within range that does not engage the lesion
- Single leg CKC ex's as comfort allows within range that does not engage the lesion
- OKC quadriceps ex's
- Hamstrings, gluteal and calf muscle strengthening
- Progressively increase resistance and decrease repetitions for all strength 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 and walking

Cycling and other cardiovascular exercise

- Increase cycling duration and intensity
- Treadmill walking with 7% incline for 5-10 minutes
  Increase walking time by 5 minutes as tolerated
- Elliptical trainer using same guidelines as treadmill walking

Criteria for progressing to phase 4:

- Trace/no effusion
- No/minimal knee pain with phase 3 ex's
- Correct qualitative performance of phase 3 ex's
- Able to walk briskly 3-5km over changing terrains without pain
- Minimum **4 months** since surgery

PATELLOFEMORAL MICROFRACTURE PROTOCOL – PHASE 4

Goals:

- Maintain good quality movement patterns
- Develop strength and power/rate of force development
- Increase difficulty of neuromuscular and perturbation training
- Start jogging and sports specific training

Precautions:

- Do not commence running until patient has fulfilled return to running criteria
- For larger lesions (>4cm²) continue with low impact exercises

Strength/power:

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

Neuromuscular training:

- Increase difficulty of neuromuscular and perturbation training
- Emphasise sports specific movements
- Maintain quality of movement/performance during strength and sports exercises

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

Cardiovascular exercise:

- Increase intensity and duration of cardiovascular exercise
- Build sports specific load regarding energy expenditure (aerobic, anaerobic)

Criteria for progressing to Phase 5:

- No/minimal pain with phase 4 rehabilitation
- Correct qualitative performance of phase 4 exercises
- Limb symmetry index (LSI) >80% for quads and hamstrings strength
- LSI >80% for hop battery tests

PATELLOFEMORAL MICROFRACTURE PROTOCOL – PHASE 5

Goals:

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

Precautions

- Persistent effusion, return of localised pain or loss of ROM indicate that the patient is not ready to return and should continue with rehabilitation

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:

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2. Hurst, J.M., Steadman, J.R., O'Brien, L., Rodkey, W.G. & Briggs, K.K. (2010) Rehabilitation following microfracture for chondral injury of the knee, Clinical Sports Medicine. Vol: 29, pp. 257-265.