

ACL Reconstruction + Meniscal Repair Protocol

NB: this protocol is NOT appropriate for the repair of radial or meniscal root tears.

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 (including deep vein thrombosis)

Goals:

- **Protect ACL graft and meniscal repair**
- Control pain and swelling/effusion
- **Preserve/restore ROM; a brace may be provided to limit knee flexion**
- **Muscle activation**
- Normal gait and movement patterns

Initial precautions:

- TTWB for **2 weeks**, WBAT thereafter
- Avoid knee flexion $>90^{\circ}$ until **2 weeks**
- Avoid weight bearing knee flexion $>90^{\circ}$ until **6 weeks** and deep squatting until **12 weeks**
- Restricted OKC knee extension until **12 weeks** (more important for hamstrings grafts)

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 ROM $0-90^{\circ}$ for **2 weeks**, FROM thereafter

Muscle activation and strength:

- SQ's, SLR in brace until able to perform without extension lag
Consider electrostimulation if unable to voluntarily contract quadriceps
- Once FWB: CKC ex's $<90^{\circ}$ until **6 weeks** and avoid deep squatting until **12 weeks**
- OKC knee extension with resistance between $90-45^{\circ}$ from **4 weeks**
- 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
- Encourage explicit learning in the early rehab phases

Cycling:

- Static bike with no resistance from **2 weeks** if sufficient ROM, increasing time as able

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
- Normal FWB gait (from 2 weeks post-op)

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

ACL RECONSTRUCTION + MENISCAL REPAIR PROTOCOL – PHASE 2

Goals:

- **Protect ACL graft and meniscal repair**
- 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**

Precautions:

- Avoid weight bearing knee flexion $>90^\circ$ until **6 weeks** and deep squatting until **12 weeks**
- Restricted OKC knee extension until **12 weeks** (more important for hamstrings grafts)
- Do not commence running until patient has fulfilled return to running criteria

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 and single leg CKC ex's $\leq 90^\circ$ until **week six**, avoiding deep squats until **week 12**
- Full range OKC knee extension with resistance from **12 weeks**
- Add weight/resistance to OKC and CKC ex's as able
- Quadriceps, 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:

- Static bike with resistance from **week 6**
- 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**NB: the median time for return to running after ACL reconstruction is 12 weeks**
- 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)

ACL RECONSTRUCTION + MENISCAL REPAIR PROTOCOL – PHASE 3

Goals:

- Return to sport or physically demanding work

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

Cycling, running and other cardiovascular exercise:

- Build sports specific load regarding energy expenditure (aerobic, anaerobic)
- Build sports specific load regarding surface (grass, court etc.)

Sports-specific training:

- Increase intensity of agility training (e.g. cutting, pivoting)
- 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 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
- Drop test with analysis of movement (trunk, knee valgus and knee flexion when landing)
- Use ACL-RSI to measure patient's psychological readiness/confidence in return to sports
- Patient questionnaires will be automatically emailed to patient
- *Minimum 6 months since surgery

***Returning to sports >9 months post-op, and ensuring the patient has completed the return to sport criteria significantly reduces knee re-injury rate.**

Isometric knee extensor torque values >3Nm/kg are associated with positive outcomes after ACLR.

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Short form ACL-RSI

Instructions: you may prefer to use an app: <https://apps.apple.com/gb/app/acl-rsi/id980148388> OR

Place a mark in the box, which best describes you in relation to the descriptors.

1. Are you confident that you can perform at your previous level of sport participation?

Not at all confident											Fully confident
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	10	20	30	40	50	60	70	80	90	100	

2. Do you think you are likely to re-injury your knee by participating in your sport?

Extremely likely											Not likely at all
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	10	20	30	40	50	60	70	80	90	100	

3. Are you nervous about playing your sport?

Extremely nervous											Not nervous at all
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	10	20	30	40	50	60	70	80	90	100	

4. Are you confident that you could play your sport without concern for your knee?

Not at all confident											Fully confident
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	10	20	30	40	50	60	70	80	90	100	

5. Do you find it frustrating to have to consider your knee with respect to your sport?

Extremely frustrating											Not at all frustrating
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	10	20	30	40	50	60	70	80	90	100	

6. Are you fearful of re-injuring your knee by playing your sport?

Extremely fearful											No fear at all
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	10	20	30	40	50	60	70	80	90	100	