

Prehabilitation

Aims:

Prepare the patient for surgery

Goals:

Full ROM.

Pain free mobile joint.

Teach simple post-op exercises.

- Operate on pain free mobile joints - minimises complications and speeds recovery
- May take many months
- Do not be pressured by patient into early surgery
- Preprogramming post-operative rehabilitation is beneficial at every level
- Patients are better able to manage post-operative exercises if they have learnt them before surgery

Acute Recovery

Day 1 - 14

Aims:

Post-Operative pain relief and management of soft issue trauma.

Progress off crutches and normal gait

Goals:

Wound Healing.

Manage the graft donor site morbidity i.e pain and swelling.

Decrease joint swelling.

Restore full extension (including hyperextension)

Establish muscle control.

- Decrease swelling & pain with ice, elevation, co-contractions and pressure pump
- Partial weight bearing to full weight bearing as pain allows
- Aim for a full range of motion using active and passive techniques
- Patella mobilisations to maintain patella mobility
- Gait retraining with full extension at heel strike
- Return of co-ordinated muscle function encouraged with biofeedback. Active quadriceps strengthening is begun as a static co-contraction with hamstrings emphasising VMO control at various angles of knee flexion and progressed into weight bearing positions
- Gentle hamstring stretching to minimise adhesions in autograft
- Active hamstring strengthening begins with static weight bearing cocontractions and progresses to active free hamstring contractions by day 14
- Resisted hamstring strengthening should be avoided for at least 6 weeks

Hamstrings and Quadriceps Control

Week 2 - 6

Aims:

To return the patient to normal daily function.

Prepare the patient for weeks 6-12.

Goals:

Develop good muscle control and early proprioceptive skills.

If not done sooner, restore a normal gait. reduce any persistent or recurrent effusion.

- Progress co-contractions for muscle control by increasing the repetitions, length of contraction and more dynamic positions, e.g. two leg quarter squats, lunges, stepping, elastic cords
- Gym equipment can be introduced gradually such as exercise bike, stepper, leg press, mini trampoline, cross trainer
- If swelling is persistent, continue with pressure pump and ice
- Hamstring strengthening progresses with the increased complexity and repetitions of co-contractions. Open chain hamstring exercises are commenced although often they are painful
- Care must be taken as hamstring straining may occur
- Low resistance, high repetition weights aim to increase hamstring endurance
- Continue with intensive stretching exercises

Week 6

- Eccentric hamstring strengthening is progressed as pain allows. Hamstring curl equipment can be introduced.
- Consider beyond the knee joint for any deficits, e.g. gluteal control, tight hamstrings, ITB, gastrocs and soleus, etc.

Proprioception

Week 6 - 12

Aims:

Improve neuromuscular control and proprioception.

Goals:

Continue to improve total leg strength.

Improve endurance capacity of muscles.

Improve confidence.

- Progress co-contractions to more dynamic movements, e.g. step lunges, half squats.
- Proprioceptive work more dynamic, e.g. lateral stepping, slide board etc.
- Can begin jogging in straight lines on the flat.
- Progress resistance on gym equipment such as leg press and hamstring curls. Hamstring strengthening programme aims for a progression in both power and speed of contraction.
- Start cycling on normal bicycle
- Consider pelvic and ankle control plus cardiovascular fitness. Solo sports such as cycling, jogging and swimming are usually permitted with little or no restrictions during this stage.
- Open chain exercises commence (if no patellofemoral symptoms) 40°-90° progressing to 10°-90° by 12 weeks.

Sport Specific Week 12 - 5 Months

Aims:

Prepare to return to sport.

Goals:

Incorporate more sport specific activities.

Introduce agility and reaction time into proprioceptive work.

Increase total leg strength.

Develop patient confidence.

- Progressing of strength work, e.g. half squats with resistance, leg press & curls, wall squats, step work on progressively higher steps, stepper & rowing machine.
- Proprioceptive work should include plyometric (hopping and jumping) activities and emphasise a good landing technique. Incorporate lateral movements.
- Agility work may include shuttle runs, ball skills, sideways running, skipping, etc.
- Low impact and step aerobics classes help with proprioception and confidence.
- Pool work can include using flippers.
- Sport specific activities will vary for the individual, e.g. Tennis - lateral step lunges, forward and backwards running drills; Skiing - slide board, lateral box stepping and jumping, zigzag hopping; Volleyball or Basketball - vertical jumps.

Return To Sport 5 - 6 Months

Goal:

Return to sport safely and with confidence.

Continue progression of plyometrics and sport specific drills.

- Return to training and participating in skill exercises.
- Continue to improve power and endurance.
- Advice may be needed as to the need for modifications to be able to return to sport, e.g. Football - start back training in running shoes or short sprigs. Will usually return to lower grades initially; Skiing - stay on groomed slopes and avoid moguls and off piste initially. Racers may initially lower their DIN setting on the bindings.
- Train in PEP program for warm up to reduce further ACL injury
 1. Warm-up (50 yards each):
 - Jog line to line of soccer field (cone to cone)
 - Shuttle run (side to side)
 - Backward running
 2. Stretching (30 s × 2 reps each):
 - Calf stretch
 - Quadricep stretch
 - Figure 4 hamstring stretch
 - Inner thigh stretch
 - Hip flexor stretch
 3. Strengthening:
 - Walking lunges (20yards×2sets)
 - Russian hamstring (3sets×10reps)
 - Single toe-raises (30repsoneachside)
 4. Plyometrics (20 reps each):
 - Lateral hops over 2 to 6 inch cone
 - Forward/backward hops over 2 to 6 inch cone
 - Single leg hops over 2 to 6 inch cone
 - Vertical jumps with headers
 - Scissors jump
 5. Agilities:
 - Shuttle run with forward/backward running (40 yards)
 - Diagonal runs (40 yards)
 - Bounding run (45–50yards)

Ref: Gilchrist et al AJSM 2008

*Supplementary information and exercises can also be seen on the FIFA website: <http://f-marc.com/11plus/home/>

*Patients under 21 years and patients with mildly increased laxity have shown to be at increased risk of re-injury post ACL reconstructive surgery (Pinczewski et al AJSM 2007). For these patients I advise refraining from full competitive sports for the full 12 months.