Mr. Eden Raleigh
FRACS (Orth) M.B. B.S. (Mon) FAOA
Specialising in Shoulder & Knee Surgery

Mr. Eden Raleigh
FRACS (Orth) M.B. B.S. (Mon), FAOA

Orthopaedic Surgeon
Specialising in Shoulder & Knee Surgery

All Enquiries & Bookings
Tel: 9421 1900 | Fax: 9421 1788
dredenraleigh@gmail.com www.cityorthopaedics.com.au

Main Rooms & All Correspondence:
89 Erin St. Richmond, 3121, Vic

Also Consulting at:
St. John of God, 75 Kangan Dr, Berwick, 3806
SportsMed Biologic,1G 116-118 Thames St, Box Hill, 3128

Anterior Cruciate Ligament Protocol

0-2 WEEKS

GOALS

- Patient education re: weight-bearing status; changes to rehab guidelines with any concurrent pathologies (i.e. PF pain, MCL injury, meniscal repair vs debridement, etc.)
- Decrease pain and swelling
- Increase range of motion & restore full extension*
- Maintain flexibility of hamstrings, calves
- Quadriceps activation
- Proprioceptive/balance re-education
- Maintain cardiovascular fitness

EXERCISE SUGGESTIONS

ROM & Flexibility

**Remember - It is important to restore and maintain range of motion early, especially full extension. This is not detrimental to the graft or its stability.*

- Supine with legs up wall – heels slides with gravity assisted
- Bike pendulums: high seat 1⁄2 circles forward/backward " full circles – lower seat
- Sitting passive leg extension with roll under heel OR prone leg hangs off end of bed/plinth . Heel slides (+/– slider board)
- Seated calf stretch with towel - knee bent (soleus), knee straight (gastrocnemius)
- Seated hamstring stretch (back straight)

Muscle Strength & Endurance

Quadriceps/Hamstrings:

- Quadriceps and hamstring co-contraction
- Quadriceps isometrics in standing/sitting/lying +/– muscle stimulation or biofeedback
- Sit to stand – progress by gradually decreasing height of seat
- Static lunge forward/side Mini wall squat (30°)
- Shuttle: (one bungee cord) – 2 leg squat (1⁄4 - 1⁄2 range) and 2 leg calf raises

Hip/Gluteals:

- Side lying abduction/adduction
- Gluteal squeezes supine or standing
- Prone hip extension
- Standing hip flexion/extension, abduction/adduction

Calves:

- Ankle pumping +/– with leg elevation
- Standing calf raises with/without support

Mr. Eden Raleigh
FRACS (Orth) M.B. B.S. (Mon) FAOA
Specialising in Shoulder & Knee Surgery

Proprioception

With balance drills on unstable surfaces, be aware of and correct poor balance responses such as hip hiking with INV/EVER and trunk extension with DF/PF.
GOAL: maintain stance on board regardless of ability to control board position.

- ❑ Single leg stance 30-60 seconds
- ❑ Wobble boards with support (table, bars, poles) through full ROM: side-to-side, forward/backward

Gait

If patient has an antalgic gait pattern with use of 1 crutch, keep patient on 2 crutches until they can exhibit normal gait with 1 crutch.

- ❑ Weight shifting: side-to-side and forward/backward
- ❑ Progress from 2 crutches to 1, always maintaining normal walking pattern

3-6 WEEKS

GOALS

- ❑ Achieve near or full ROM in knee flexion and extension
- ❑ Continue flexibility exercises of other joints
- ❑ Continue strengthening exercises with control: hip, hamstrings, quadriceps, calves
- ❑ Strengthen non injured leg (documented strength losses in unaffected limb)
- ❑ Progress proprioception
- ❑ Normal WB gait
- ❑ Maintain cardiovascular fitness

EXERCISE SUGGESTIONS

ROM & Flexibility

- ❑ Continue as needed with slider board
- ❑ Continue on the bike full with circles forward/backward - begin to lower seat
- ❑ Prone assisted knee flexion (belt, opposite leg)
- ❑ Progress to standing stretches for gastrocnemius (knee straight) and soleus (knee bent), ensure back foot is straight
- ❑ Progress to a standing hamstring stretch (keep back straight)
- ❑ Assisted quadriceps stretch in prone or in standing
- ❑ Patellar and/or tibial-femoral joint mobilizations if needed to achieve terminal ROM (no ACL strain with passive movement)(

Muscle Strength & Endurance

Quadriceps

- ❑ Progress on Shuttle from 2-1 leg squats/calf raises, increase range of motion and resistance as tolerated
- ❑ Sit-to-stand with muscle stimulation(
- ❑ Leg press machine: low weight 2 legs (1⁄2 – 3⁄4 range)
- ❑ Wall squats with feet 12” from wall (45°-60°)
- ❑ Forward and lateral step-ups 2-4" (push body weight up through weight bearing heel slow and with control, also watch for hip hiking or excessive ankle dorsiflexion)

Hamstrings/Gluteals

- ❑ Prone assisted hamstrings (with belt, opposite leg)

- ❑ Hip strengthening with pulleys or ankle weights - all directions (do not allow a lot of trunk swaying)
- ❑ Supine on floor legs on swiss ball: isometric hamstrings/gluteals - progress to bridging (if pain free at donor site)

Calves

- ❑ Standing calf raises 2-1 foot

Proprioception

Progression of balance retraining should be from: looking forward " looking away, eyes open " eyes closed, on a stable base " on an unstable base

- ❑ Continue with full ROM on wobble boards with decreased support - progress to maintaining balance on board
- ❑ Standing 747 eyes open/closed – progress to mini trampoline
- ❑ Dynadisc or BOSU (round) 2 leg balance " weight shift forward/backward, side-to- side, eyes open/closed " progress to mini squats (0-30°)
- ❑ Standing on 1⁄2 foam roller: balance" rocking forward/backward

Gait

- ❑ "Cup walking": forced exaggeration of knee and hip flexion during the swing phase of gait rather than a rigid knee with a compensatory hip hike (may use plastic cups/mini pylons/foam rollers to walk over to accentuate hip/knee flexion)
- ❑ Progress from a single crutch to full weight bearing. Ensure NO antalgic gait pattern

Cardiovascular Fitness

- ❑ Bike with increasing time parameters
- ❑ May start elliptical trainer

6-9 WEEKS

GOALS

- ❑ Full and pain free knee range of motion
- ❑ Functional quadriceps strength
- ❑ Initiate isokinetic quadriceps strengthening in a **specific & limited** range

***only if*: ROM is full, no swelling, adequate muscle control, and no meniscal or patellofemoral pathology

- ❑ Address documented quadriceps strength deficits (high and low velocity, concentric and eccentric, 0-95°)
- ❑ Continue strengthening lower extremity muscle groups, specifically through full range hamstrings/quadriceps (without pain at donor site)
- ❑ Advance proprioception exercises
- ❑ Increase cardiovascular fitness

EXERCISE SUGGESTIONS

ROM & Flexibility

- ❑ Mobilizations if needed to achieve end ranges

Muscle Strength & Endurance

Quadriceps

- ❑ Terminal extension with tubing – forward and backward facing
- ❑ Shuttle: full and inner range squats, 2 " 1 leg, increasing resistance

Mr. Eden Raleigh
FRACS (Orth) M.B. B.S. (Mon) FAOA
Specialising in Shoulder & Knee Surgery

- ❑ Walking in Bungee cord forward/backward/side step with slow control on return
- ❑ Lunging in Bungee – forward/backward/diagonal
- ❑ Step-ups 6-8"step forward/lateral (vertical trunk, watch for hip hiking or excessive ankle dorsiflexion)
- ❑ Eccentric lateral step down on 2 " 4 " 6" step with control (watch for hip hiking or excessive ankle dorsiflexion)(15)
- ❑ Static Lunge (1⁄4 - 1⁄2 range) " progress to dynamic lunge step (1⁄4 - 1⁄2 range) with proper trunk and leg alignment
- ❑ Full wall squats to 90°
- ❑ Initiate isokinetic program if patient is appropriate and equipment is available

Hamstrings/Gluteals

- ❑ Continue hip strengthening with increased weights/tubing resistance
- ❑ Supine on floor legs on swiss ball: bridging plus knee flexion (heels to buttocks)
- ❑ Prone active hamstring curls – progress with 1-2 lb weights
- ❑ Standing hamstrings curls – when able to attain 90° ROM against gravity add 1-2 lb weights
- ❑ Sitting hamstring curls with light tubing/pulley system for resistance
- ❑ Fitter: hip abduction and extension (poles for support)
- ❑ Shuttle standing kick backs (hip/knee extension)
- ❑ Tubing kickback (mule kicks)

Calves

- ❑ Shuttle heel drops 2 "1 leg
- ❑ Mini trampoline: weight shift heel drops/bouncing

Proprioception

- ❑ Continue on wobble boards and begin to add basic upper body skills (i.e. throwing)
- ❑ Mini trampoline: single leg stance, +/– Bodyblade above/below head
- ❑ BOSU marching: progress with high knees
- ❑ Progress Dynadisc or BOSU 1 leg balance with/without support
- ❑ Dynadisc or BOSU squats (60-90°)
- ❑ Dynadisc or BOSU stand on 2 legs, with throwing to ReboundерTM

Hydrotherapy / Pool

- ❑ Knee ROM
- ❑ Walking forward/backward, static lunge, lunge walking, squats, side shuffles, step up/down, calf raises (2-1 foot)
- ❑ Hip extension/flexion, adduction/abduction . Deep water: stride walking, cycling,

Cardiovascular Fitness

- ❑ Bike, Treadmill - increasing time or resistance
- ❑ Stairmaster: forward/backward – progress to no hand support
- ❑ Swim - Flutter kick only
- ❑ Pool jogging – deep water jogging

9-12 WEEKS

GOALS

- ❑ Continue flexibility exercises
- ❑ Quadriceps strength progression

Mr. Eden Raleigh
FRACS (Orth) M.B. B.S. (Mon) FAOA
Specialising in Shoulder & Knee Surgery

- ❑ Address documented hamstring strength deficits (high speed, eccentric 95-60°)
- ❑ Continue lower chain concentric/eccentric strengthening of quadriceps & hamstrings, both inner range (60–95°) & full range
- ❑ Proprioceptive progression
- ❑ Sport specific cardiovascular fitness

EXERCISE SUGGESTIONS

Muscle Strength & Endurance

Quadriceps

- ❑ Progress resistance of Shuttle full ROM and inner range (60-95°), working on strength & endurance, 2 " 1 leg
- ❑ Static Lunge (full range) " dynamic lunge " lunge walking all with proper trunk and leg alignment
- ❑ Backward step up 4-6-8”step
- ❑ Clock face lunges with Bungee using mini pylon markers
- ❑ Quick walk forward/backward with Bungee
- ❑ Quick side stepping with Bungee
- ❑ Quick lunge forward with control (upright trunk, no forward thrust, no hip hiking)
- ❑ Eccentric Bungee
- ❑ Eccentric step down with control on 6 " 8” step
- ❑ Shuttle jumping (low resistance) 2 legs "alternate legs (jogging) "single leg
- ❑ Shuttle ski hops (side-to-side)
- ❑ Continue / progress isokinetic program if patient is appropriate and equipment is available (see reference for timelines and ROM restrictions)

Hamstrings/Gluteals

- ❑ Prone/standing pulley knee flexion
- ❑ Chair walking
- ❑ Prone eccentric hamstrings with pulleys/tubing, alternating inner range and full range
- ❑ Hydrafitness (hamstrings & quadriceps): 90-30°, resistance 1-3
- ❑ Continue hip strengthening with increased weights/tubing resistance
- ❑ Sitting and standing hamstring curls – Bungee/pulleys/ weights sitting and standing positions - address full range concentrically and inner range from 95-60° eccentrically and high velocity (if pain free & without difficulty)
- ❑ Supine eccentric hamstrings with knee in extension

Calves:

- ❑ Eccentric heel drops

Proprioception

- ❑ On boards/Dynadisc/BOSU/foam roller/mini trampoline: catch and throw (2 hands/1hand) at varying angles and directions with partner or using rebounder
- ❑ Dynadisc or BOSU throwing on rebounder feet side-to-side, forward/backward, 2-1 foot
- ❑ Perturbation drills(8,42) with tubing on boards/ Dynadisc/BOSU/foam roller/mini trampoline
- ❑ Single leg stance on Dynadisc or BOSU with unaffected leg performing kicking drills +/– tubing/pulleys
- ❑ Single leg stance on Dynadisc or BOSU performing kicking drills +/– tubing/pulleys
  - Single leg stance on Dynadisc or BOSU performing higher end upper body skill

Mr. Eden Raleigh
FRACS (Orth) M.B. B.S. (Mon) FAOA
Specialising in Shoulder & Knee Surgery

Hydrotherapy / Pool
- ❑ Increase time, speed, repetitions of exercises
- ❑ Pool running

Cardiovascular Fitness
- ❑ Bike: increased resistance and time parameters
- ❑ Fitter slalom skiing without ski pole support
- ❑ Treadmill walk +/– incline " quick walk

12-16 WEEKS

GOALS
- ❑ Continue with flexibility exercises for the lower chain
- ❑ Continue strengthening of the lower chain
- ❑ Sport specific quadriceps & hamstrings strengthening
- ❑ Sport specific proprioception training
- ❑ Sport specific cardiovascular fitness

EXERCISE SUGGESTIONS

Muscle Strength & Endurance
- ❑ Continue with concentric and eccentric strengthening of hamstrings and quadriceps, working through full & inner range
- ❑ Backward lunge – progress to backward lunge walking (with proper trunk and leg alignment)
- ❑ Bungee□ □jogging - progress to running
- ❑ Split squat jumps – progress to BOSU
- ❑ Single leg drop landing 2" step

Agility
- ❑ Ladder drills – forward/backward, side-to-side (focus on footwork/speed/timing)
- ❑ 2 legged lateral and forward jumping
- ❑ Side step-overs (hurdle) – progress to side hop-overs
- ❑ Carioca patterning
- ❑ Tuck jumps
- ❑ Skipping
- ❑ Initiate 2 legged hop tests (hop for distance, 6-m timed hop, triple hop, crossover hop) prior to single leg hop tests in next stage - ensure patterning and landing is proficient prior to 1 leg progression

Proprioception
- ❑ Mini trampoline: 2 feet jump & land "jogging "1 leg hopping (1L/1R, 2L/2R, 3L/3R...)
- ❑ Continue progressing skill difficulty
- ❑ Single leg stance – tap down clock drill with mini pylons
- ❑ Dynadisc□ □or BOSU□: 1 leg balance with upper body or opposite leg skill i.e.throwing, phantom kicking with Bungee□ □resistance, hockey shot....

Hydrotherapy / Pool
- ❑ Progress to plyometrics: 2 leg hopping, forward/backward/side-to-side
- ❑ Split squat jumping

Mr. Eden Raleigh
FRACS (Orth) M.B. B.S. (Mon) FAOA
Specialising in Shoulder & Knee Surgery

Cardiovascular Fitness

- Bike – standing with interval training
- Sport specific cardiovascular training: aerobic vs. anaerobic training
- Jogging – straight on flat ground, no cuts/no downhill
- Treadmill – jog " interval running" running

**Note: Progression to running may only occur once a symmetric and proficient pattern has been attained to prevent abnormal tissue/joint loading in the lower extremity. Running should NOT be initiated if swelling, loss of motion or patello-femoral pain is present.*

16-20 WEEKS

GOALS

- Sport specific quadriceps, hamstrings and lower chain strengthening progressing to plyometrics
- Proprioception training
- Sport specific cardiovascular fitness

EXERCISE SUGGESTIONS

Muscle Strength & Endurance

- Continue with lower extremity strengthening with specific emphasis on client–specific deficits
- 2 " 1 leg progression for all exercises

Plyometrics and Agility

Plyometrics are exercises that enable a group of muscles to reach maximal strength in as short a time as possible. They help bridge the gap between speed and strength training. Adequate concentric & eccentric strength is essential before initiating plyometrics. If needed, start them in the pool in shallow water to decrease stress on the tibiofemoral and patellofemoral joints; otherwise initiate on land as tolerated.
Agility drills should commence by introducing proper footwork, timing and speed. Once the client is able to successfully and appropriately run in a straight line,without difficult, non-linear activities may be initiated, such as cutting and pivoting. These drills should commence by introducing large angles and low speeds (ie. large figure 8s) and progress to more advanced drills with sharper angles and increasing speeds

- Ladder drills – incorporate lateral movements/diagonals, adding single leg and crossover patterns
- Running/lunging/vertical jump/ run-plant-sidestep with Bungee- may incorporate upper/lower body skill – kicking, jumping, catching, pass & shoot
- Shuttle hopping 2 – alt – 1 (high resistance, increased speed)
- Shuttle Ski hops (high resistance, increased speed)
- Carioca ¾ jog
- Mini trampoline: 2 leg jump off – 2 leg land with progression to one leg land on/off balance pad/BOSU (watch for proper landing mechanics)
- Single leg forward and lateral hopping
- Hop tests: single hop, 6-m timed hop, triple hop, crossover hop
- Vertical jumps – single leg Box hop up /down
- Box jump down with sprint forward
- Box drop jump 2 legs with proper form may progress to drop jump with vertical hop for maximum height
- Single leg drop landing 4-6-8-10” step

Proprioception

- Continue progressions e.g. mini trampoline with upper skills
- Forward hop and lateral hop – maintain balance for 5 sec on landing

- ❑ Cutting drills with quick stop and maintain balance
- ❑ Bungee run plant/push off L&R

Cardiovascular Fitness

- ❑ Increase distance, duration or intensity with bike, Stairmaster□, treadmill, outdoor running/cycling depending on the demands of the particular sport
- ❑ Treadmill: running " sprinting: assess sprinting form - should have normal pain-free rhythmic stride (audible monitoring of foot contact)
- ❑ Jogging and running on an uneven surface
- ❑ Jogging with turns 90/180/360°
- ❑ Jogging and cutting with 45° change of direction
- ❑ Acceleration and deceleration running, add on tight turns and hills as tolerated
- ❑ Cycling outdoors
- ❑ Swimming - no whipkick

20-24 WEEKS

GOALS

- ❑ Adequate cardiovascular fitness, strength, power, agility neuromuscular control, symmetry and stability
- ❑ Continue with upper body strengthening
- ❑ Back to sport practice for upper skills (as able)
- ❑ Return to sport skills on own at practice with minimal risk of re-injury

EXERCISE SUGGESTIONS

Plyometrics and Agility

- ❑ Single leg drop jump 6” step
- ❑ Large Figure 8's
- ❑ 2 and 1 foot hopping with control
- ❑ Forward and lateral hop with control and comparable distance L&R
- ❑ Triple jump and landing with control and comparable distances L&R
- ❑ Single limb hop for distance (within 15% of uninvolved side)
- ❑ Single-limb crossover triple hop for distance (within 15% of uninvolved side)
- ❑ Single-limb timed hop over 6 m (within 15% of uninvolved side)
- ❑ Single limb vertical power hop (within 15% of uninvolved side)
- ❑ Single limb drop landing (within 15% of uninvolved side)
- ❑ Single limb drop-jump
- ❑ 10 second single limb maximum vertical hop (both sides)