

## HIP ARTHROSCOPY PROTOCOL FOR FEMOROACETABULAR IMPINGEMENT (FAI)

This protocol is intended to provide the clinician with instruction, direction, rehabilitative guidelines and functional goals for hip arthroscopy for femoroacetabular impingement (FAI) with or without a labral tear. It is not intended to be a substitute for clinical decision-making regarding the progression of a patient's post-operative course based on physical exam/findings and individual progress. The physiotherapist must exercise their best professional judgment to determine how to integrate this protocol into an appropriate treatment plan. The general treatment for a variety of hip procedures involves post operative protection for healing, stretching/mobilizing tight or restricted structures, strengthening the hip musculature and most importantly ensuring that there is adequately lumbo-pelvic stability (i.e. core strength).

This protocol divided into 4 phases. Actual progress may be faster or slower depending on the individual. Decisions to advance patients through the phases of rehabilitation should be based on achieving the appropriate level of tissue healing, as well as clinical presentation and response to treatment. As an individual's progress is variable and each will possess various pre-operative deficiencies and possible pathologies, this protocol must be individualized for optimal return to activity. Some exercises may be adapted depending on the equipment availability at each facility. There may be slight variations in this protocol or additional restrictions placed by the surgeon post-operatively depending on findings at the time of the surgery. If a clinician requires assistance in treatment progression please contact the referring physician or the physiotherapy department.

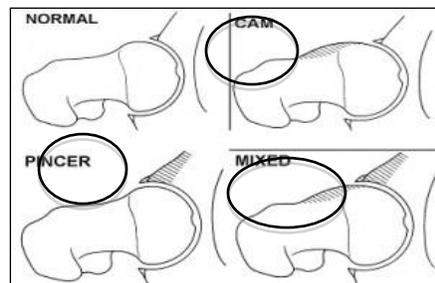
### **FEMOROACETABULAR IMPINGEMENT**

Femoroacetabular impingement is characterized by decreased joint clearance between the femoral head / neck and acetabulum (ball & socket). There are two described types:<sup>9</sup>

- 'Cam' impingement is defined as an abnormality of the anterolateral femoral head/neck junction
- 'Pincer' impingement is described as over coverage of the acetabulum over the femoral head causing increased compressive forces between the rim of the acetabulum and the femoral head/neck.

In the majority of cases (86%)<sup>11</sup>, cam and pincer forms exist together i.e. 'mixed impingement'.

With arthroscopic surgery, the anterior capsule is excised, an *osteoplasty* is performed for the cam impingement at the femoral head/neck junction to shave down the bony abnormality and re-create a more normal shaped femoral head. *Rim trimming* is the procedure used with a pincer impingement to address the bony abnormality of the acetabulum.



### **WEIGHT BEARING AND GAIT RETRAINING**

Weight bearing status must be adhered to based on the surgeon's orders. Most patients will be protected weight-bearing (PWB) as tolerated with crutches post-operatively. If there are additional considerations, found at the time of surgery, partial weight-bearing may be ordered based on the extent of the surgery as well as the healing properties/timelines for the involved tissue (i.e. bone, cartilage, labral tissue, capsuloligamentous structures).

Patients should follow the suggested weight bearing guidelines and be instructed to progress slowly, using pain as a guide.

#### **RANGE OF MOTION (ROM)**

Gentle passive ROM within patient tolerance can be commenced immediately post-operatively for flexion. Extension to neutral and passive internal rotation may also be initiated early post operatively with the goal of preventing joint capsule adhesions. Around the 2-week mark, abduction and external rotation can be added. Generally, a 4-6 week timeline is required to recover from the aspects of surgical intervention including intra-articular swelling. As a result, DO NOT push end ROM during this phase of healing and encourage hip ROM only to tolerance. Rehabilitative exercises should not be painful within the hip joint.

#### **STRENGTHENING EXERCISES**

To optimize post-operative recovery, it is important to assess and address any pre-disposing factors that may have contributed to hip pathology prior to surgery.<sup>10</sup> Altered motor control strategies around the lumbar-pelvic-hip region, hip weakness and postural mal-alignment contribute to various hip pathologies. A thorough assessment of the lumbar-pelvic region, hip and lower extremity is necessary and will need to be continually monitored throughout the rehab process. Generally, motor control retraining is more important than strength or power of individual muscles.

Most weight bearing strengthening exercises have been show to produce significantly higher gluteal muscle activity vs. non-weight bearing exercises as there is a need for greater external torque forces on the pelvic-hip complex.<sup>4</sup> These findings relate to the weight of the leg and lever arm over coming the effect of gravity; three factors that are very important to consider with exercise progression. Post-operatively exercises will commence as ROM and non weight-bearing strengthening exercises (supine and standing). Logical progression is from 2-legged weight bearing (i.e. squats, lunges...) to single limb (i.e. step-ups, step-downs, single leg squat...). An EMG summary sheet is provided for gluteal muscle activation (GMax and GMed) levels for a variety of common therapeutic exercises given in rehabilitation from numerous articles in the literature.<sup>1-8</sup>

#### **QUALITY VS. COMPENSATION**

Physiotherapists often feel compelled to progress patients by giving them new exercises each time they are in for therapy. It cannot be stressed enough that it is **not** beneficial to give patients exercises they are not neuromuscularly ready for. It is very important to observe the *quality* of the exercises that are being performed. Weaknesses in specific muscle groups lead to compensations, which produce faulty movement patterns. These faulty patterns are then integrated into unconscious motor programs, which perpetuate the original weakness. If these are allowed to occur and are not corrected, any joint or structure along the kinetic chain may be exposed to injury.

#### **RETURN TO ACTIVITY/SPORT**

Return to sport will depend on the individual's pre-operative level of activity/function and their ability to control the lumbar-pelvic-hip complex with dynamic single leg transfers. Returning to activities that require change of direction or speed work should be assessed on an individual basis. Gradual resumption of pain-free activities over a 3-6 month period is expected; however, actual progress may be faster or slower depending on the individual. Patients may continue to see gradual improvement in symptoms for up to one-year postoperatively.<sup>10</sup>

## **PHASE I: 0-2 WEEKS**

### **GOALS**

- Protect the surgical repair
- Patient education re: gait
- Protected weight-bearing (PWB): weight bearing as tolerated with crutches
- Ensure heel-toe patterning and pelvic alignment
- Minimise post-operative pain and swelling
- ROM goals: within tolerance

### **EXERCISE SUGGESTIONS**

#### *ROM & Flexibility*

- Active assist supine heel slides with towel/belt +/- slider board
- Therapist assist or active assisted flexion, extension (to neutral), IR log/leg rolling

#### *Muscle Strength & Endurance*

##### Lumbo-Pelvic (core stability):

- Supine Transverse abdominis (TA) and Pelvic floor setting  
\*\*cueing should be specific to lifting pelvic floor and indrawing lower abdominal (effort scale for pelvic floor/abdominal contraction should be 2-4 out of 10 with normal breathing)

##### Hip/Gluteals/Quadriceps:

- Isometric gluteal squeezes supine or standing
- Isometric abd/add supine (bent knees)
- Isometric quadriceps

##### Calves:

- Ankle pumping and toe crunches +/- with leg elevation
- Gastroc/soleus stretches if needed

### **Modalities**

- Ice 15-25 minutes
- Interferential current therapy (pain relief)
- Game Ready

## PHASE II: 2-6 WEEKS

### GOALS

- Patient education re: gait
  - Wean off crutches 2 → 1 → none (i.e. can be discharged from crutches when gait pattern is normalized)
  - Ensure heel-toe patterning and pelvic alignment
- ROM goals: 90° flexion and full extension by end of 6 weeks
- Stretching structures around hip complex i.e. muscles, capsule
- Address motor control deficits around lumbo-pelvic-hip complex and transition from non-weight bearing hip ROM and strengthening to more functional closed chain exercises
- Baseline proprioception

### EXERCISE SUGGESTIONS

#### *ROM & Flexibility*

- PROM stretches:
  - Hip extension / anterior capsule (Thomas stretch), prone heel to bum (Quadriceps)
  - IR at 0° (straight leg), 70° (supine bent knee) and prone knee bent IR
  - Adductors
  - Hip circles / circumduction
- Continue as needed with slider board – progress to FABER heel slides as tolerated
- Quadruped rocking for hip flexion (pain free, ensure neutral spine)
- Scar / soft tissue massage: typically around TFL, ITB, GMed, Hip Flexor/upper Quadriceps
- Stationary bike high seat (to avoid pinching)<sup>10</sup>

#### *Muscle Strength & Endurance*

##### Lumbo-Pelvic (core stability):

- Standing and sitting posture with TA and pelvic floor
- Basic supine TA and pelvic floor:
- Inner range bent knee fall outs → full range
  - \*\*Requires activation of TA and pelvic floor to maintain centralization of the femoral head with lower extremity exercise

##### Hip/Gluteals/Hamstrings/Quadriceps:

- Prone terminal hip/knee extension (pillow / foam roller under anterior ankle)
- Prone hip extension off edge of bed
- Clam shells → isometric side lying hip abduction → isotonic hip abduction
- Supine bridging: double, single, on ball
- Standing hip extension, abduction → progress to pulleys or ankle weights (do not allow trunk shift)
- Quads: Isometrics, quads over roll +/- muscle stimulation or biofeedback
- Shuttle™ 2 → 1 leg as tolerated
- Sit-to-stand: high plinth, lower as tolerated
- Squats: wall, mini, progress to deeper squats as able

##### Pool program (optional):

- Deep-water pool program if incisions are healed for: cardiovascular fitness, ROM, and hip muscle activation (i.e. buoyancy belt in deep water: walking, cycling, hip exercises, knee/ankle ROM...)

**Proprioception:**

- Weight scales: weight shifting, equal weight bearing: forward/backward and side-to-side → progress to single leg weight shift with core activation and hip/pelvic control
- Wobble boards with support: side-to-side, forward/backward
- Standing on ½ foam roller: balance → rocking forward/backward

**Modalities**

- Ice/IFC/Game Ready

**PHASE III: 6-12 WEEKS**

**GOALS**

- Continue stretches as needed
- Progress exercises to include more challenges to lumbo-pelvic-hip control (core stability)
- Progress proprioception

**EXERCISE SUGGESTIONS**

*ROM & Flexibility*

- Quadruped rocking with IR/ER bias
- Stool rotations IR/ER (stand with hip extended-one knee bent with shin on stool, rotate hip in /out)
- Distraction: manual/belt assist in restricted ROM. \*\*only indicated if loss of motion in a particular range
- Stationary bike → Elliptical forward (with TA/pelvic floor setting) → backward
- Treadmill walking forward → backward (for hip extension)

*Muscle Strength & Endurance*

Lumbo-Pelvic (core stability):

- Progression of TA and pelvic floor and functional activation with exercise:
- heel march → march (active hip flexion)
- heel slides → heel slides + hip flexion (assisted with belt under femur → active)
- single leg heel taps as tolerated. \*\*Still requires activation of TA and pelvic floor to maintain centralization of the femoral head with lower extremity exercise
- Walking and WB postures with TA and pelvic floor

Gluteals/Hamstrings/Quadriceps:

- Continue hip strengthening with increased weights/tubing resistance
- Quadruped – alternate arm & leg
- Shuttle™ work on strength & endurance, 2 → 1 leg (increase resistance)
- Shuttle™ side lying leg press (top leg)
- Sit to stand: high seat, low seat, 2 legs
- Single leg stance (affected side), hip abduction/extension (unaffected side)
- Single leg stance with hip hike
- Sahrman single leg wall glut med (both sides)
- Tubing kickbacks/mule kicks (both sides)
- Side stepping with theraband (thigh/ankle)
- Profitter: abduction, extension, side-to-side
- Forward and lateral step-ups 4-6-8" (push body weight up through weight bearing heel slow and with control, also watch for hip hiking or excessive ankle dorsiflexion)
- Lunge: static ¼ - ½ range → full range

### Proprioception

#### 2 legs → 1 leg:

- Wobble boards: without support: side-to-side, forward/backward
- Standing on ½ foam roller: balance → rocking forward/backward
- Single leg stance 5 → 30 → 60 seconds (when full WB without trendelenberg or pelvic rotation)

### Modalities

- Ice/IFC/Game Ready

## PHASE IV: Return to Activity 3-6+ Months

### GOALS

- Lower chain concentric/eccentric strengthening of quadriceps & hamstrings
- Functional movement patterns
- Progress proprioception
- Continue flexibility exercises

### EXERCISE SUGGESTIONS

#### Muscle Strength & Endurance

#### Lumbo-Pelvic (core stability) +Gluteals/Hamstrings/Quadriceps:

- Advanced core: side plank (on elbows/feet), prone plank (on elbows/toes)
- Continue hip strengthening with increased weights/tubing resistance
  - Hip IR/ER with pulleys → theraband in flexed, neutral, extended positions
  - Hamstring curls, eccentrics, deadlifts 2 → 1 leg
- Progress resistance of Shuttle™ working on strength & endurance, 2 → 1 leg
- Shuttle™ standing kick backs (hip/knee extension)
- Lunge walking, forwards/backwards, hand weights
- Sit to stand: high seat, low seat, single leg
- Single leg: wall squat → mini squat → dead lift
- Sahrman single leg wall glut med with single leg mini squat (both sides)
- Side shuffling/hopping with theraband (thighs/ankles)
- Eccentric lateral step down on 2-4-6" step with control (watch for hip hiking or excessive ankle dorsiflexion)
- Hopping: 2-1 leg (if required)
- Activities challenging all planes of motion: 2-1 leg

### Proprioception

- Wobble boards: vision, vision removed, 2 legs, single leg: side to side, forward, backward
- Single leg stance 5 → 30 → 60 seconds on unstable surface i.e. pillow, mini-tramp, BOSU™, Airex™, Dynadisc™ with/without support – progress to no vision
- Single leg stance performing higher end upper body skills specific to patient goal(s)

#### Cardiovascular Fitness

- Stationary bike, Elliptical → Stairmaster with TA/pelvic floor setting and adequate pelvic/hip control (i.e. absent trendelenberg, pelvic rotation)
- Treadmill: walk, side stepping, interval jog → jog, interval run → run as tolerated (if required)

## Hip Arthroscopy for FAI: Guidelines for Manual Therapy and Exercise

EXERCISES	Phase I Week 0-2	Phase II Week 2-6	Phase III Week 6-12	Phase IV Week 12 +
<b>General</b>				
Crutches	●	●		
Gait retraining	●	●		
Hip ROM to tolerance	●	●		
Scar/soft tissue massage	●	●		
Quadruped (neutral spine) rocking, IR/ER bias		●	●	
<b>Stretches (if required):</b>				
Hip Flexors (to neutral), Gastrocs	●			
Quads, Hamstrings, Adductors		●		
<b>TA/Pelvic floor</b>				
Supine activation, progressions, sitting	●	●		
Standing, walking, weight-bearing, functional exs.		●	●	●
Advanced core: quad alternate lifts, plank, side plank			●	●
<b>Functional Exercises:</b> <i>Performed with accurate core activation</i>				
Supine bridging: double, single, ball		●		
S/L: clam shells, long lever hip abduction		●		
Weight transfer		●		
Standing hip abduction, extension		●	●	
Squats: wall, mini, 60°-90°		●	●	
Shuttle: 2 legs, 1leg, ↑resistance/reps		●	●	
Sit to stand: high seat, low seat, 2 legs, single leg			●	
Side-step ankle band, shuffling, hopping			●	●
Lunges: ¼-½-full, forward, backward, walking, hand weights			●	●
Single Leg stance, + hip hike			●	●
Pro-fitter (abduction, extension, side-to-side)			●	●
Tubing kickbacks (mule kicks)			●	●
Step ups 4-6-8": forward, lateral			●	●
Single leg: wall squat, mini-squat, dead lift			●	●
Sahrman single leg wall glut med, + mini squat			●	●
Shuttle standing kick backs (hip/knee extension)				●
Step Downs 4-6-8"				●
Hopping: forward, backward, side-side				●
<b>Proprioception</b>				
Wobble boards, ½ foam roller, double, single leg		●	●	
Squats, Lunges on Dynadisc, Airex, Bosu...			●	●
Single leg balance, ↑time, complexity of skill			●	●
<b>Cardiovascular Fitness</b>				
Bike	●	●	●	●
Pool		●	●	●
Elliptical		●	●	●
Stairmaster			●	●
Treadmill: forward, backward, jog, run			●	●

### Highest % MVIC EMG Exercises for Glut Med and Glut Max Muscles

Exercise	Glut Med ranges	Glut Max ranges
Clam Shell	38-40 <sup>1</sup>	34-39 <sup>1</sup>
Side-lying Hip Abduction	81 <sup>1</sup> , 39 <sup>2</sup> , 42 <sup>4</sup>	39 <sup>1</sup> , 21 <sup>2</sup>
Plank (on elbows/toes)	27 <sup>2</sup>	9 <sup>2</sup>
Quadruped Opp Arm & Leg	42 <sup>2</sup>	56 <sup>2</sup>
Bridge	28 <sup>2</sup>	25 <sup>2</sup>
1 Legged Bridge	47 <sup>2</sup>	40 <sup>2</sup>
Side bridge (on elbows/feet)	74 <sup>2</sup>	21 <sup>2</sup>
Standing Hip Abduction (NWB side)	28-33 <sup>4</sup>	
Standing Hip abduction (WB leg)	42-46 <sup>4</sup>	
Side lunge	39 <sup>1</sup>	41 <sup>1</sup>
Forward Lunge	42 <sup>1</sup> , 29 <sup>2</sup> , 18 <sup>6</sup>	44 <sup>1</sup> / 36 <sup>2</sup> / 22 <sup>6</sup>
Forward Hop	45 <sup>1</sup>	35 <sup>1</sup>
Sideways Hop	57 <sup>1</sup>	30 <sup>1</sup>
Side Step with Ankle Band	61 <sup>1</sup>	27 <sup>1</sup>
Lateral Step Up	43 <sup>2</sup> , 38 <sup>3</sup>	29 <sup>2</sup> , 56 <sup>3</sup>
Forward Step Up	44 <sup>3</sup>	74 <sup>3</sup>
1 Leg Wall squat	52 <sup>3</sup> , 13/25/35 <sup>5</sup> (Ant, Mid, Post GMED)	86 <sup>3</sup>
Single Leg Squat	64 <sup>1</sup> , 36 <sup>3</sup> , 30 <sup>6</sup>	59 <sup>1</sup> , 57 <sup>3</sup> , 35 <sup>6</sup>
Single Limb Dead Lift	58 <sup>1</sup>	59 <sup>1</sup>
Pelvic Drop	57 <sup>4</sup> , 21/28/38 <sup>5</sup> (Ant, Mid, Post GMED)	
Sarhmann Wall Glut Med	28/39/76 <sup>5</sup> (Ant/Mid/Post GMED)	
Walking	16 <sup>8</sup>	13 <sup>8</sup>
Elliptical	18-20 <sup>8</sup>	18-20 <sup>8</sup>
ProFitter:		
Trunk upright ½ way side-to-side	17 <sup>7</sup>	14 <sup>7</sup>
Trunk upright slide end-to-end	30 <sup>7</sup>	15 <sup>7</sup>
Hips flexed slide end-to-end	36 <sup>7</sup>	25 <sup>7</sup>

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