Rehabilitation Guidelines for Surgical Hip Dislocation

The hip joint is composed of the femur (the thigh bone) and the acetabulum (the socket which is from the three pelvic bones). The hip joint is a ball and socket joint that not only allows flexion and extension, but also rotation of the thigh and leg (Figure 1). The head of the femur is encased by the bony socket in addition to a strong, non-compliant joint capsule, making the hip an extremely stable joint. Because the hip is responsible for transmitting the weight of the upper body to the lower extremities and the forces of weight bearing from the foot back up through the pelvis, the joint is subjected to substantial forces. Walking transmits 1.3 to 5.8 times body weight through the joint, and running and jumping can generate forces across the joint equal to 6 to 8 times body weight.

Both the head of the femur and the bony acetabulum are covered with articular cartilage to aide in absorbing weightbearing forces through the joint (the gray material in Figure 1).

The acetabular labrum is a circular, fibrocartilaginous structure that surrounds the socket. It functions to seal the joint enhance stability, and provide proprioceptive feedback (a sense of joint position) to the brain and central nervous system. The labrum acts as a suction seal or gasket for the hip joint. This helps to maintain the hydrostatic pressure that protects the articular cartilage

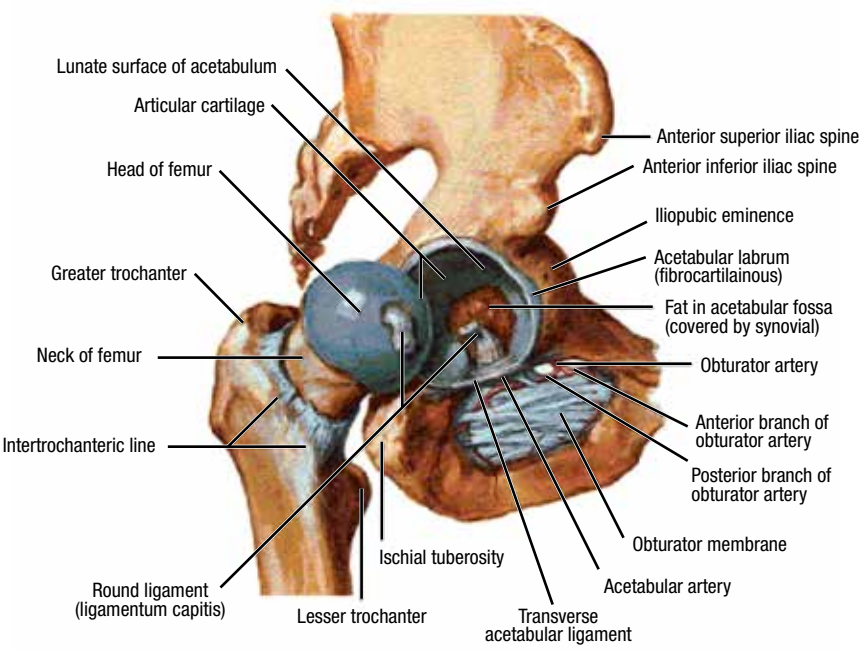

Figure 1 *Hip joint (opened) lateral view*

Figure 2: *Frog leg radiograph: The thin arrow on your left indicates the area of "flattening" of the right femoral head and lack of the normal femoral head-neck offset. The thick arrow on the right indicates the more normal, rounded contour of the left femoral head.*

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Figure 3: *A defect in the subchondral bone was too large for microfracture so it was reshaped allowing a bone plug to be placed*

Figure 4: *A harvest bone plug with overlying articular cartilage fit into the cartilage defect*

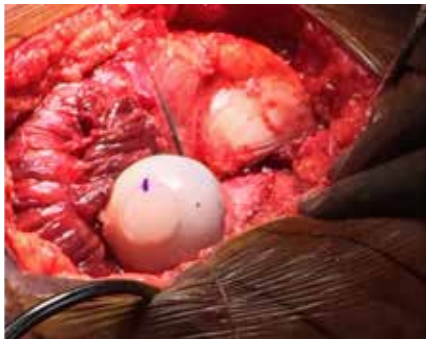

Figure 5: *The plug has been brought even with the rest of the articular surface*

on the head of the femur and the acetabulum.

Hip joints of athletes are exposed to extremes of motion. These forces are absorbed by and can injure the labrum by impingement of the hip. This is referred to as femoroacetabular Impingement (FAI). FAI can occur from changes in the shape of the acetabulum or the femoral head and neck. FAI due to "over-coverage" of the acetabulum is referred to as pincer impingement. FAI due to a lack of the normal femoral head-neck off-set, or "lack of femoral head roundness", is referred to as cam impingement. Figure 2 demonstrates the boney abnormality associated with cam impingement of the right hip; note the difference in the shape of the femoral head. Often cam and pincer impingement can co-exist. When the normal convex on concave (or ball and socket) geometry is lost, impingement may occur as the hip is flexed toward its end range. Repetitive impingement can cause labral tears and delamination of the acetabular articular cartilage.

Some patients have complicating factors and other problems of the hip that cannot be adequately addressed by hip arthroscopy, which is performed through small portals using long arthroscopic instruments inserted in to the hip. This includes labral tearing where some of the labrum has been absorbed or broken off so there is not enough tissue for a repair. These patients may need a labral reconstruction that is best done if the hip is surgically dislocated first.

When the defect in the articular cartilage, or osteochondral lesions, are too large to expect that a microfracture would be helpful (Figure 3). These patients may need an osteochondral allograft or autograft transplantation to sufficiently address the defect (Figures 4 and 5). This is essentially a small piece of bone with attached cartilage harvested to fill a specific defect. This group of patients would also be best addressed with a surgical hip dislocation.

If a person has anatomical changes of the femoral head and neck (ball part of the joint) or the acetabulum (socket part of the joint) making a hip arthroscopy too challenging or not allowing room to make appropriate surgical corrections, the hip will need to be dislocated to do the operation. Examples of this would be protrusio acetabuli (Figure 6), coxa profunda (a deep socket) or a retroverted acetabulum (a socket turned somewhat backward).

The surgical hip dislocation involves separating a piece of bone from the greater trochanter (the upper part of the thigh bone) which is referred to as a greater trochanteric osteotomy (figure 8). By using this approach, the surgeon can safely dislocate the hip while protecting its blood supply and preserving key muscle attachments around the joint. The surgeon is then able to fully visualize and correct abnormalities of bone and soft tissues about the hip joint. Before closing the incision, the separated bone fragment is reattached with screws to maintain alignment and stability as healing occurs. (Figure 8)

Part of determining if a patient might benefit from a procedure that involved surgical hip dislocation involves imaging. Radiographs (x-rays) give a good initial view of bony alignment and help diagnose the hip dysplasia. Magnetic resonance imaging (MRI) shows the soft tissue such as the labrum or cartilage that covers the bony surfaces of the hip joint. A hip CT scan provides excellent 3-dimensional anatomy of the pelvis and femur for surgical planning and a better understanding of hip joint mechanics.

Your surgeon may recommend anesthetic or corticosteroid injections

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Figure 6: *Protrusio acetabuli makes the socket so deep that it would be too difficult to do anything arthroscopically due to the reduced space to maneuver surgical instruments*

Figure 7: *Typical hip joint appropriate for arthroscopic management*

Figure 8: *Coxa profunda is another example of a socket that is too deep for hip arthroscopy*

to identify and treat pain which can help determine if surgery could be helpful. Physical therapy with a provider who is experienced in treating hip conditions is usually recommended as this can help patients avoid surgery or at least strengthen their hip and core muscles to make the post-surgical recovery a little bit easier.

Following surgery, a patient spends 2-3 days in the hospital. They will learn to walk with crutches or a walker, usually the second day after surgery, with reduced weight bearing on the leg until the newly positioned socket heals. They will have to maintain this partial weight bearing status for about six weeks.

Post-operatively the patient will begin outpatient physical therapy at about three weeks and eventually be able to return to full weight bearing, walking without crutches and even athletics. Physical therapy will help strengthen the muscles around the hip and pelvis, restore range of motion of the hip joint and integrate the hip into a patient's overall daily function.

The rehabilitation guidelines are presented in a criterion-based progression. The patient may also have post-operative hip and thigh pain and numbness of the groin, thigh and/or pelvis near and around incision. These symptoms usually resolve over time.

Basic Rehabilitation Principals:

1. Post-operative recovery begins with preoperative rehabilitation. Preoperative hip and core strengthening, review of gait training with assistive device and discussion of post-operative equipment needs such as an elevated toilet seat, wheelchair and long handled reachers will be discussed.

2. A continuous passive motion (CPM) machine will be issued at the preoperative workup appointment, taken home and used with settings of 0° extension and 30° flexion for 8 hours per day or until the first post-operative appointment at 2-3 weeks. After the first week, the flexion range of motion (ROM) can be increased gradually to 90° if patient is pain-free.

3. Patients will be limited in weightbearing for the first 6 weeks, no more than 30% of body weight for 4 weeks and need to use crutches or a walker for all walking. Patients should avoid prolonged sitting or lying on the operative side for the first 4-6 weeks.

4. There are precautions that need to be followed to reduce chances of dislocation of the hip during the early recovery phase. No hip rotation or excessively turning toes either outwards or inwards by rotating the entire leg. Hip flexion needs to be limited to 75° for the first 4 weeks, then can be 90° until 6 weeks out.

5. Additional precautions need to be followed due to the greater trochanteric osteotomy: no active abduction for 6 weeks, no passive adduction past midline for 6 weeks.

6. Many patients will be able to return to an active lifestyle after surgical hip dislocation, but the presence of mild arthritic changes would indicate that safer activities after the procedure include biking and swimming. For those patients without arthritic changes return to impact activities such as running is guided in a criterion-based fashion by the rehab provider and physician.

Rehabilitation Guidelines for Surgical Hip Dislocation

PHASE I (surgery to 6 weeks after surgery)

Appointments	• The hospital stay will be 2-3 days for a procedure involving surgical hip dislocation. Inpatient rehabilitation begins post-op day one with an emphasis on gait training and protection of the surgical limb • A medical appointment will be scheduled about 3 weeks after discharge from the hospital • First outpatient rehabilitation appointment should be 7-14 days after discharge. The second postoperative rehab appointment should be 6 weeks after discharge at which point the patient is likely ready to move into phase II
Rehabilitation Goals	• Protect the post-surgical hip through limited weight bearing and education on avoiding pain • Reduce pain to 0/10 at rest and with walking • Normalize gait with assistive device • Full knee range of motion (ROM) and able to sit comfortably at less than 90° of hip flexion
Precautions	• Avoid prolonged sitting • Avoid walking distances to point of fatigue • No hip rotation or hip flexion past 75° for 4 weeks; limit hip flexion to 90° for 4-6 weeks • No active hip flexion with long lever arm, such as active straight leg raises (SLR) • No open chain isolated muscle activation: isometrics only • Greater trochanteric precautions: no active abduction. Do not lift leg out away from body when standing or getting out of bed. No passive adduction past midline • CPM for 8 hours per day, ROM set from 0° of extension to 30° of flexion, at speed of one. This can be increased after 1 week gradually up to 90° as the patient tolerates. This will typically be discharged at the first post-operative appointment • Protective weightbearing, no more than 30% of body weight with axillary crutches for 4 weeks. Can progress to 75% of body weight until 6 weeks
Suggested therapeutic exercise	• Supine abdominal setting, prone abdominal setting with pillow under hips, quad sets, ankle pumps • Isometric hip exercises: abduction, adduction, internal rotation, external rotation, bridge without lifting hips • Short arc quads, long arc quads, standing hamstring curls • Use of CPM as outlined above. • Can begin chest deep pool walking at 4 weeks
Cardiovascular Exercise	• Upper body circuit training or upper body ergometer (UBE)
Progression Criteria	• Normal gait with assistive device and minimal to no pain • May be advanced to phase II prior to 6 weeks per physician

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PHASE II (6 weeks after surgery to 12 weeks)

Appointments	• Rehabilitation based on patient progress, 1 time every 1-2 weeks
Rehabilitation Goals	• Normalize gait without device, progressing to weight bearing as tolerated (WBAT), then from 2 crutches to 1 crutch, to no device • Demonstrate good core control, adequate pelvic stability and no pain with activities of daily living (ADLs) • Ascend/descend an 8" step with good control and no pain - Full hip ROM - Demonstrate good control of active hip abduction
Precautions	• Use assistive device until gait is non-antalgic • Symptom provocation during ADLs and therapeutic exercise • Active hip flexion if symptomatic • Faulty movement patterns and postures
Suggested Therapeutic Exercise	• Hip active range of motion (AROM) with stable pelvis: bent knee fall out, heel slides, prone windshield wiper • Closed chain work: squats, step ups, step downs, static lunge stance, leg press • Balance and proprioceptive work: narrow stance double leg work, single leg, single leg with contralateral lower extremity resistance, Romanian deadlift, upper extremity reaches • Upper extremity resistance training in lunge stance: single arm rows, single arm punches with and without pelvic rotation • Open chain strengthening of hip extension and abduction
Cardiovascular Exercise	• UBE, swimming laps with pull buoy, walking in the pool (chest height water is 75% unweighted, waist height is 50% unweighted)
Progression Criteria	• Normal gait on all surfaces without device • ROM that allows for carrying out functional movements without unloading affected leg or pain, while demonstrating good control • Able to ascend/descend 8" step with good pelvic control • Good pelvic control while maintaining single leg balance for 15 seconds

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PHASE III (12 weeks after surgery to 16 weeks)

Appointments	• Rehabilitation based on patient progress, 1 time every 2-3 weeks
Rehabilitation Goals	• Optimize ROM - Improve core strength, adequate performance of level III on Sahrmann core test - Improve lower extremity strength, particularly proximally to 5/5 • Pain-free ADLs - Demonstrate symmetry to uninvolved side with higher level single leg balance tests, such as y-balance test
Precautions	• No ballistic or forced stretching • Symptom provocation with end ROM • Avoid lumbar and pelvic compensations with functional movement • No impact activities until patient is at least 3 months out from surgery and demonstrates adequate hip and lower extremity control
Suggested Therapeutic Exercises	• Gait and functional movement drills • Non-impact LE and core strength work, with progression from quadruped to standing, double leg to single leg and single plane to multiplane/diagonal patterns • Focus on hip abduction strengthening: sidelying and functional closed chain • Continue aggressive hip rotator strengthening, lunge stance single arm rows and punches with and without pelvic rotation • Balance and proprioceptive training • Maximize hip ROM, progressing to end range as able without pain. • When strength is adequate, impact control exercises beginning 2 feet to 2 feet, progressing from 1 foot to other and then 1 foot to same foot then progress from single plane drills to multi-plane drills • Sport/work specific balance and proprioceptive drills • Stretching for patient specific muscle imbalances
Cardiovascular Exercise	• Cycling, elliptical, deep water running. Avoid pelvic compensation
Progression Criteria	• Level III on Sahrmann core test • 5/5 lower extremity strength • Good pelvic control with single limb activities • Hip ROM adequately meets demands of all ADLs

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PHASE IV (16 weeks after surgery to 20 weeks)

Appointments	• Rehabilitation based on patient progress, 1 time every 3-4 weeks
Rehabilitation Goals	• Independence with exercise program • Eliminate post exercise soreness • Able to walk long distances, > 1 mile, without limp • Pass appropriate functional tests prior to return to sport
Precautions	• Maintain adequate strength base • Symptom provocation
Suggested Therapeutic Exercises	• Continue aggressive hip and core strength work • High level balance and proprioceptive training • Maximize ROM • Introduce plyometrics, running and cutting • Sport/work specific balance and proprioceptive drills • Stretching for patient specific muscle imbalances
Cardiovascular Exercise	• Specific to sport
Progression Criteria	• Pain-free with rehab • Perform adequately on progressive return to sport testing

These rehabilitation guidelines were developed collaboratively between UW Health Sports Rehabilitation and the UW Health Sports Medicine physician group.

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