

Rehabilitation Guidelines for Surface Replacement Arthroplasty (SRA)

The hip joint (Figure 1) is composed of the femur (thigh bone) and the acetabulum (the socket composed of the three pelvic bones). It is a synovial joint, which means both the femur and acetabulum are lined with articular cartilage. The hip joint is a ball and socket joint which allows many movements, including rotation. The articular cartilage forms a smooth surface for gliding movement to occur between the femur and acetabulum. The articular cartilage has a very low coefficient of friction, creating one-fifth the friction of ice on ice. Breakdown of this articular cartilage is called degenerative joint disease or osteoarthritis. This can occur as a result of previous injury, abnormal alignment or repeated physical stress (wear and tear). When the cartilage between the femur and acetabulum wears away, there is a decrease in the joint space and increased stress to the subchondral bone which can make many daily activities very painful (Figure 2). A hip replacement, or Total Hip Arthroplasty (THA), is a long term treatment for the painful osteoarthritic hip (Figure 3).

Another type of hip replacement is Surface Replacement Arthroplasty (SRA), also called hip resurfacing (Figure 4). The main difference between hip resurfacing and other modern types of hip replacement is the conservation of femoral bone. Other types of hip replacement require removal of the

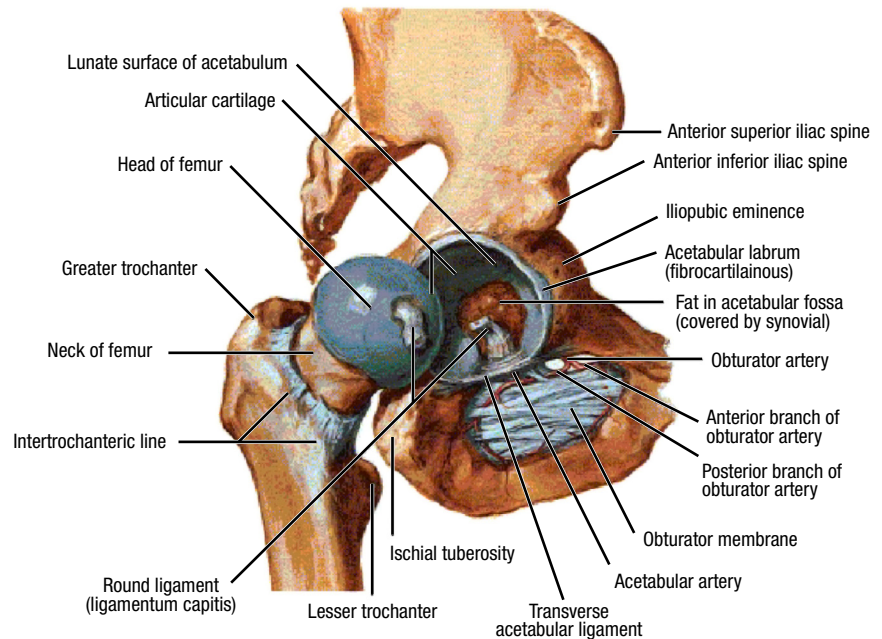


Figure 1 Anatomy of the hip joint (opened), lateral view

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Figure 2 Radiograph demonstrating right hip (circle) osteoarthritis with decreased joint space and abnormal shape of the articulating surface of the femoral head.

entire ball of the femur (femoral head) as well as the top portion of the femur (femoral neck). This section of the femur is then replaced with a metal or ceramic cap connected to a long stem which is inserted into the remaining femoral shaft (Figure 5). These types of hip replacement are very successful for decreasing pain and improving function in the majority of cases. However, in many cases a total hip replacement will only last about 15-20 years before wear or loosening causes the prosthesis to fail. This requires a revision surgery, which can be difficult to perform due to the decreased femoral bone remaining after the original hip replacement.

The advantages of hip resurfacing are that it: preserves more of the femoral bone; maintains a patient's normal femoral neck angle; and decreases the risk of dislocation in comparison to a traditional THA. Since SRAs preserve more femoral bone, revision surgeries, including THAs, are easier to perform, if needed. With SRA, the surgeon removes only the outer surface of the femoral head (Figure 6) and places the metal cap over the remaining bone. The metal cap is centered over the femoral head using a short stem and cemented in place with special bone cement. The acetabular surface is replaced with a metal socket. Since the metal cap on the femoral head is close to the size of the original femoral head, the risk of dislocation is considerably lower compared to a traditional THA with a smaller metal ball. However, there are other types of



Figure 3 Left hip large head metal-on-metal total hip arthroplasty (THA).



Figure 4 Post-operative radiograph demonstrating right hip resurfacing prosthesis. The metal cap is placed over the femoral head and a long stem is placed down the remaining femoral shaft, while a metal liner is placed in the acetabulum (socket).

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Figure 5 A hip resurfacing prosthesis consists of a metal cap with a short stem which articulates with a metal socket. (Amstutz et al.¹)

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THA which also use a larger ball and have similarly low dislocation risks.

One possible post-operative complication with hip resurfacing is femoral neck fracture. This is a fracture across the femur adjacent to the femoral head (Figure 7). These fractures occur very infrequently, with the rate of fracture reported from zero to 4%,² but the risk of a femoral neck fracture is an important consideration when making a decision about hip resurfacing. There are a few other reasons why hip resurfacing could fail early, but in general the post-operative prosthesis “survivorship” is reported to be in the 95% range or better

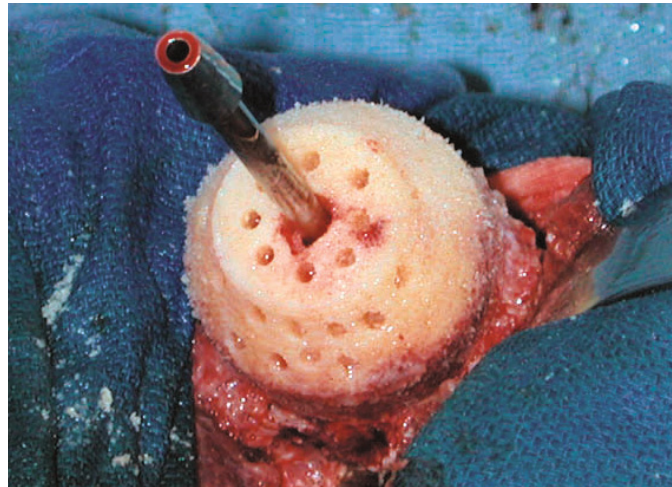


Figure 6 Prepared femoral head for hip resurfacing. Only the outer surface of the femoral head is removed, and the femoral neck is preserved. (Amstutz et al.¹)

with follow-up of three to five years.^{3, 4, 5} Since hip resurfacing is a relatively new procedure, long-term outcomes data is unavailable.

Not everyone is a candidate for hip resurfacing. The key reason to perform hip resurfacing is to preserve femoral bone in patients who will likely need a revision surgery during their lifetime. These patients are typically younger and more active. Patients who have poor bone quality may not be candidates due to the increased risk of femoral neck fracture. Other conditions such as Legg-Calve Perthes, hip dysplasia, or avascular necrosis may decrease the likelihood of success with hip resurfacing.³ Each situation is different and the surgeon and patient will consider the options carefully.

People who have a hip resurfacing may be able to return to an active

lifestyle post-operatively. The safest recommendation is to return to non-impact sports such as swimming and biking.⁴ It may be possible to return to impact activities including some running following adequate time for healing and a comprehensive rehabilitation program. Post-operative rehabilitation is important for regaining full strength and mobility in order to have a successful functional outcome. Patients should be aware that during the first six weeks after hip resurfacing surgery, they will need to follow certain precautions to protect the hip and avoid complications. These include avoiding hip flexion beyond 90°, crossing the legs, turning the operative leg inward past a neutral position, and lifting more than 30 pounds. Patients usually will be allowed to bear some weight through the operative leg right away, but it is important to use crutches

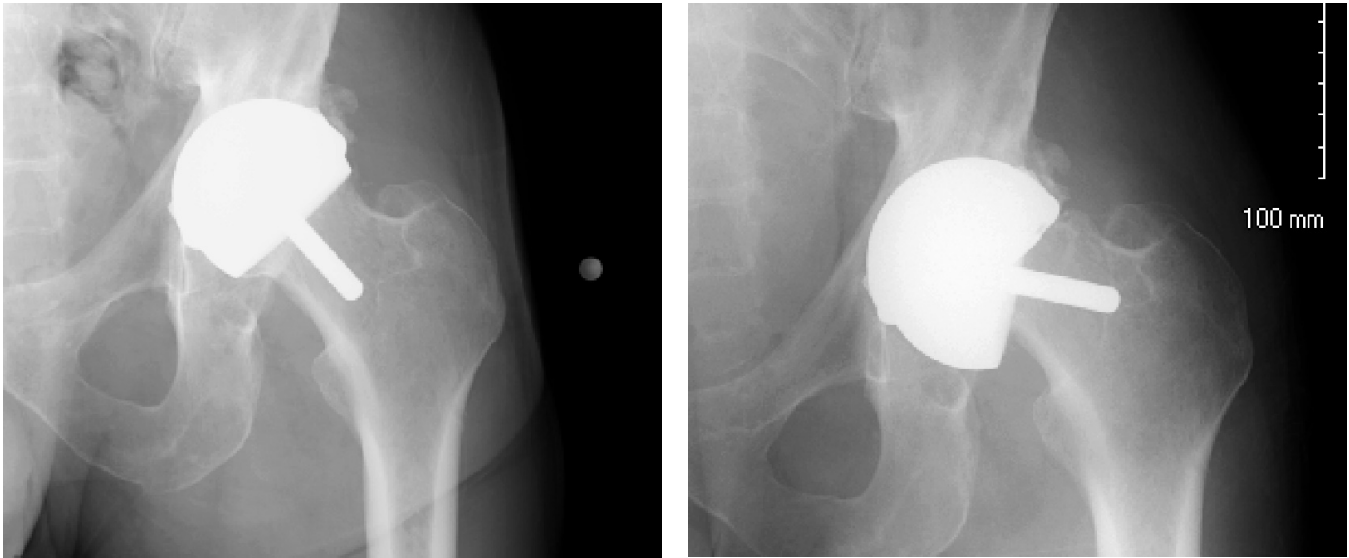


Figure 7 Radiographs of a left hip resurfacing before and after femoral neck fracture. Note the change in the angle of the femoral head component.

for at least two to three weeks. Crutch use will be decreased gradually under the supervision of a physical therapist/athletic trainer. Patients typically will continue to work with their therapist/trainer intermittently for several months after surgery. During this period the patient's activity will progress.

We recommend waiting at least six months before attempting impact activities. It is very important to be aware of the risk of femoral neck fracture and the possibility of prosthetic failure when considering return to impact sports.

Patients should discuss their expectations and goals candidly with the surgeon and the physical therapist/athletic trainer.

The UW Health Sports Medicine rehabilitation guidelines are presented in a criterion based progression. Specific time frames, restrictions and precautions are given to protect healing tissues and the surgical repair/reconstruction. General time frames are also given to reference the average rehabilitation time, but individual patients will progress at different rates depending on their age, associated injuries, pre-injury health

status, rehabilitation compliance and injury severity. Injury severity with SRA refers to the severity of hip osteoarthritis prior to the surgery. A more severe or longer history of hip osteoarthritis may result in adaptive tightening of muscles and ligaments around the hip joint as well as strength deficits that may be present pre-operatively and affect the post-operative rehabilitation course. Therefore, attention will be given to posture, alignment, and muscle imbalances unique to each patient.

Rehabilitation Guidelines for Surface Replacement Arthroplasty (SRA)

PHASE I (Surgery to 6–8 weeks)

Appointments	<ul style="list-style-type: none"> • First rehabilitation appointment should be about 7 days after surgery, 2 times per week thereafter
Rehabilitation Goals	<ul style="list-style-type: none"> • Protection of the post-surgical hip through weight bearing as tolerated and education on avoiding pain (greater than 3 out of 10 by patient self-report) with range of motion exercises • Restore hip range of motion within the precautions (Flexion less than 90°, no internal rotation, and no adduction past midline until 6 weeks post-op) • Normalize gait with assistive device: based on patient progress, between post-operative weeks 2 and 6, patients should be able to transition to one crutch or use of cane and begin walking short distances without an assistive device • Restore leg control: Patients should be able to perform 3 sets of 20 repetitions with standing hip abduction bilaterally
Precautions	<ul style="list-style-type: none"> • Use assistive device(s) for normal gait • Weight bear as tolerated • No lifting more than 30 pounds for at least 6 weeks • Maintain traditional Total Hip Arthroplasty precautions (flexion less than 90°, no internal rotation, and no adduction past midline) for at least 6 weeks after surgery • Passive stretching and joint mobilizations should be avoided secondary to potential for hip dislocation/subluxation
Range of Motion Exercises	<ul style="list-style-type: none"> • Active assist range of motion and gentle passive range of motion of hip in all planes, within the range of motion restrictions
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Gait activities (marching, heel-toe rocking, side-stepping) • Aquatics for gait activities once the suture sites are healed without drainage or scabbing (3 weeks after surgery unless otherwise indicated by the surgeon) • Isometric hip flexion, extension, abduction, adduction, internal rotation, and external rotation • Weight shifting – progressing to balance exercises • Active hip abduction, adduction, flexion, and extension without resistance and within precautions • Begin with short arc movements and progress to full arc • Begin in gravity minimized positions and progress to anti-gravity positions (i.e. hip abduction in side-lying using bolster or wedge to ensure that hip adduction does not cross midline)
Cardiovascular	<ul style="list-style-type: none"> • Upper body circuit training or upper body ergometer if patient desires
Progression Criteria	<ul style="list-style-type: none"> • Normal gait with assistive device on level indoor surfaces • Good leg control at low velocity of movement • Restored hip range of motion without pain and within precautions

Rehabilitation Guidelines for Surface Replacement Arthroplasty (SRA)

PHASE II (begin after meeting Phase I criteria, about 6–8 weeks)

Appointments	<ul style="list-style-type: none"> • Rehabilitation appointments based on patient progress, 1 to 2 times per week
Rehabilitation Goals	<ul style="list-style-type: none"> • Regain muscular strength (focus on abduction) • Progress off assistive device for all surfaces and distances, demonstrating normal gait pattern • Single leg stand control • Good control and no pain with functional movements, including step up/down and squat • Regain full functional active range of motion at controlled speeds
Precautions	<ul style="list-style-type: none"> • Discharge crutch/cane when gait is normalized and pain free • Post-activity soreness should resolve within 24 hours • Continue to maintain traditional Total Hip Arthroplasty precautions until patient is 6 weeks after surgery then slowly progress into active, controlled movements past the initial range of motion restrictions, dependent on patient tolerance • Avoid passive/forced movements • Continue to avoid end range combinations of hip flexion, adduction, and internal rotation • Begin with single-plane, non-weight bearing movements • Avoid multi-planar weight bearing movements past the range of motion restrictions until patient demonstrates good control with single-plane movements
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Stationary bike (10-20 minutes) • Gait and functional movement drills • Non-impact lower extremity and core strengthening • Non-impact balance and proprioception training • Hip active range of motion with slow progression past range of motion restrictions • Progressive hip abduction strengthening is the focus of this phase • Standing/side-lying abduction exercises • Functional closed chain abduction strengthening
Cardiovascular Exercise	<ul style="list-style-type: none"> • Non-impact endurance training, including stationary bike, Nordic track, flutter kick with kickboard, deep water run, and elliptical trainer
Progression Criteria	<ul style="list-style-type: none"> • Normal gait on all surfaces without assistive device • Ability to carry out functional movements without unloading affected leg or reporting pain, while demonstrating good control • Three sets of 20 repetitions with side-lying hip abduction without compensation • Single leg balance greater than 15 seconds

Rehabilitation Guidelines for Surface Replacement Arthroplasty (SRA)

PHASE III (begin after meeting Phase II criteria, about 10–12 weeks)

Appointments	<ul style="list-style-type: none"> • Rehabilitation appointments based on patient progress, 1 time every 1 to 3 weeks
Rehabilitation Goals	<ul style="list-style-type: none"> • Improve muscular strength and endurance • Good control and no pain with all activities of daily living as well as sport and work specific movements • Able to walk longer distances (1 mile) without a limp
Precautions	<ul style="list-style-type: none"> • Post-activity soreness should resolve within 24 hours • No impact activities until patient is 6 months after surgery and demonstrates good multiplanar strength and balance
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Strength and balance exercises with progression from double leg to single leg and single-plane drills to multi-plane drills • Dynamic control exercise beginning with low velocity, single-plane activities and progressing to higher velocity, multi-plane activities • Sport/work-specific balance and proprioceptive drills • Progression of hip and core strengthening • Stretching for patient-specific muscle imbalances • For patients who desire to return to impact activities, a home exercise program emphasizing preparation for impact control is recommended. Primary therapist may wish to establish independent home program as patient reaches the end of Phase III, with follow up visits for progression of program every 2 to 4 weeks prior to advancing into Phase IV at 6 months post-operative
Cardiovascular Exercise	<ul style="list-style-type: none"> • Replicate sport or work-specific energy demands (non-impact)
Return To Non-Impact Sport/ Work Criteria	<ul style="list-style-type: none"> • Normal gait on all surfaces, including longer distances (one mile) • Dynamic neuromuscular control with multi-plane activities, without pain or swelling

PHASE IV (begin after meeting Phase III criteria and 6 months after surgery)

Only patients wishing to return to impact activities will progress into Phase IV

Appointments	<ul style="list-style-type: none"> • Rehabilitation appointments based on patient progress, 1 time every 2 to 4 weeks
Rehabilitation Goals	<ul style="list-style-type: none"> • Improve muscular strength and endurance • Good control and no pain with sport and work-specific movements, including impact

Rehabilitation Guidelines for Surface Replacement Arthroplasty (SRA)

Precautions	<ul style="list-style-type: none"> • Post-activity soreness should resolve within 24 hours • No impact activities until patient is 6 months post-surgery and demonstrates good multi-planar strength and balance • It is important to provide adequate patient education on the potential risk of acute fracture or stress fracture of the femoral neck with aggressive impact activities since the long-term effects of impact sports following SRA are unknown
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Impact control exercises beginning 2 feet to 2 feet, progressing from 1 foot to other and then 1 foot to same foot. Progress from single-plane drills to multi-plane drills • Progress to running program once patient is able to demonstrate good single leg landing control in a repetitive fashion without pain. Progression of running program must be done slowly because of the risk of femoral neck fracture • Begin sport specific rehabilitation drills once patient demonstrates good control with the impact and multi-plane exercises and can tolerate running program without pain • Sport/work-specific balance and proprioceptive drills • Progression of hip and core strengthening • Stretching for patient-specific muscle imbalances
Cardiovascular Exercise	<ul style="list-style-type: none"> • Replicate sport or work specific energy demands
Return To Sport/Work Criteria	<ul style="list-style-type: none"> • Normal gait on all surfaces, including running gait if applicable • Dynamic neuromuscular control with multi-plane sport-specific activities without pain or swelling

These rehabilitation guidelines were developed collaboratively by Katy O'Leary, PT (koleary@uwhealth.org) and the UW Health Sports Medicine physician group.

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