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Dr. Laith M. Jazrawi

Chief, Division of Sports Medicine
Associate Professor Department of Orthopaedic Surgery

Rehabilitation Protocol After 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 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.

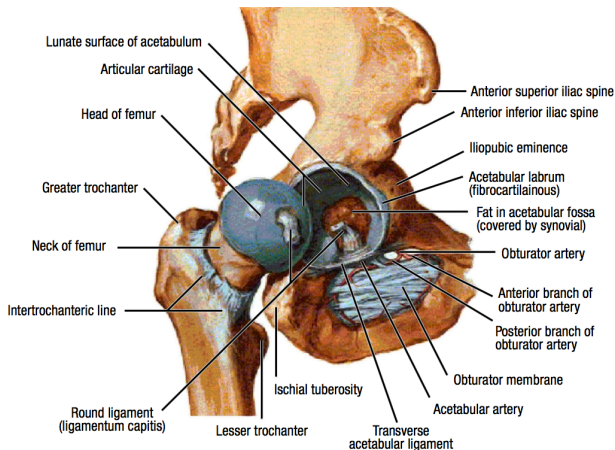


Figure 1 Anatomy of the hip joint (opened), lateral view
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Figure 2 Radiograph demonstrating right hip (circle) osteoarthritis with decreased joint space and abnormal shape of the articulating surface of the femoral head.

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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 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 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 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.)

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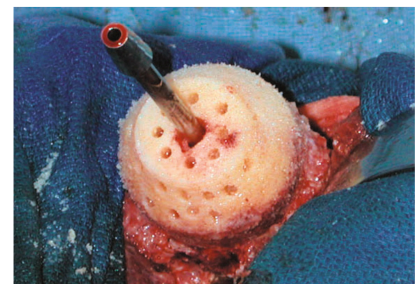


Figure 6 Prepared femoral head for hip resurfacing. Only the outer surface of the femoral head is removed, and the femoral neck is preserved. (Amstutz et al.)

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Figure 1 reference: Netter, Frank H. Atlas of Human Anatomy. Third Edition. Totterboro, New Jersey: Icon Learning Systems, 2003.

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Phase III (6 weeks to 12 weeks following surgery)

Appointments	○ Rehabilitation appointments are 1-2 times per week
Goals	○ Progress to full AROM without discomfort
Range of Motion Exercises	○ Active assistive range of motion (AAROM) → active range of motion (AROM) ○ Restrict motion to 140° of Forward Flexion, 40° of External Rotation and Internal Rotation to stomach ○ No Internal Rotation up the back ○ No External Rotation behind the head
Therapeutic Exercises	○ Advance Theraband exercises to light weights (1-5 lbs) ○ 8-12 repetitions/2-3 sets for Rotator Cuff, Deltoid and Scapular Stabilizers ○ Continue and progress with Phase II exercises ○ Begin UE ergometer
Other Suggestions	○ Modalities per PT discretion

Phase IV (3 months to 6 months following surgery)

Goals	○ Full range of motion without discomfort
Therapeutic Exercises	○ Advance exercises in Phase III (strengthening 3x per week) ○ Sport/Work specific rehabilitation ○ Return to throwing at 4.5 months ○ Return to sports at 6 months if approved
Other Suggestions	○ Modalities per PT discretion

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