SURFACE REPLACEMENT

What is surface replacement?

The traditional surgical treatment for arthritis of the hip is a total hip replacement, which implies the replacement of the head and neck of the femur with a metallic device. The stem of the component is inserted into the canal of the femur. The socket portion is replaced with a metal cup. Total hip replacement has been very successful at relieving pain and improving quality of patients’ lives that have hip arthritis. However the implants may not last forever and more surgeries may be needed. It becomes harder and more challenging to replace the hip the 2nd and 3rd time because bone loss may be present.

The concept of surface replacement was brought about in the 1970s in the attempt to preserve bone such that if the implant failed, that the 2nd and 3rd operation would have more bone available for reconstruction. Bone conservation, however, came with a price. Early failure was high in the 1970s and 1980s and it was essentially abandoned due to the high failure rate and the majority of orthopedic surgeons were treating arthritis with a total hip replacement.

The interest in hip resurfacing has been regenerated because of the improvement in the implants and understanding of the failures.
The hip joint forms where the top of the femur (thigh bone) meets the socket of the pelvic bone. The top of the femur is the head; ball-shaped and fits snugly in the socket formed by the acetabulum (The hollow, cuplike portion of the pelvis into which the head of the femur fits). Between the head and femoral shaft is the neck.

**UNDERSTANDING JOINT REPLACEMENT SURGERY**

Replacement of the joint either in total (THR) or as a surface replacement (SR) is a major operation. Both types of procedures require removal of some part of the bone so that the new implants can be placed. During a surface replacement the head is partially ‘shaved’ or shaped to preserve a portion of the head and all of the neck. In contrast, a total hip replacement removes the head and the majority of the neck and a stemmed implant is placed into the canal of the femur. The schematic below outlines the major difference in preparing the femur. The preparation of the socket (acetabulum) is similar and is not discussed.
TOTAL HIP REPLACEMENT

Cone shaped reamer shapes and removes part of the head

Metal 'cap' cemented onto femoral head and neck

Neck and Head is removed, exposing the hollow femoral canal

Femoral implant placed into the canal of the femur

SURFACE REPLACEMENT

4 COMPONENTS FOR A TOTAL HIP REPLACEMENT

STEM

2 COMPONENTS FOR A SURFACE REPLACEMENT

SHELL

LINER

HEAD

SHELL

HEAD
ADVANTAGES AND DISADVANTAGES OF SURFACE REPLACEMENT SURGERY

The most obvious advantage is the preservation of bone on the femoral side. This bone preservation is important for revision (re-do) hip replacement. For young patients concerned with the potential of multiple revision surgeries over their lifetimes, saving normal bone is especially important. Another theoretical advantage is the use of a large head. Some investigators feel that the larger head provides for a greater range of motion and is more stable and therefore will dislocate less. However, with a traditional hip replacement a larger head can be used as well.

Unique disadvantages to surface replacement consist of a femoral neck fracture. The femoral neck is removed with a total hip replacement. With a surface replacement, the majority of the femoral neck is retained. Because the bone of the femur is retained, it is possible to fracture it after surface replacement. Most of the fractures occur early in the post-operative period if too much weight is put on the leg too early. The body needs time to adapt to the new prosthesis. Post-operatively, crutches are used for 3-4 weeks to protect the amount of weight put on the leg. With current techniques and rehabilitation protocol, the risk of fracture is less than 2%.

Osteonecrosis is a condition that can occur after a surface replacement because of disruption of the blood supply. This is a condition that does not cause problems with a total hip replacement since the femoral component is supported inside the canal of the femur. With a surface replacement, the femoral cap is supported only by the neck. If the neck and the residual femoral head do not have an adequate blood supply, the bone will start to lose its structure (resorption) and the femoral cap will loosen early. This would result in pain and require conversion to a total hip replacement.

The current generations of surface replacements are metal-on-metal bearings (see implant options brochure). That means both the ball and the socket are made entirely of metal. Although this cuts down dramatically on the wear and tear of the components, it has been shown to cause metal ions to be dispersed through the body. In about 0.5% of cases, there
may be a metal allergy that causes pain and inflammation. This is rare, but should be considered a risk for anyone undergoing a joint replacement with a metal on metal bearing surface. Cobalt and chromium ions are measurable in the blood stream, but have not been shown to cause cancer or any other disease in humans. Although the metal ions are measurable, no one knows what a safe level is. Generally, people with functioning kidneys are able to excrete the ions in their urine. It should be noted that metal on metal (M-O-M) components are also used in total hip replacement. The metal Ion issue is not unique to surface replacement.

**CAN SR BE PERFORMED THROUGH A MINIMALLY INVASIVE TECHNIQUE?**

Minimally invasive surgery, and the definition of it, is controversial. Some feel that surface replacement is minimally invasive due to the preservation of the bone. Most physicians have been performing a SR through a larger traditional incision. Dr. Matthys uses the Direct Anterior Approach for placement of a SR. **Dr. Matthys is one of the few surgeons in the country doing SR through a minimally invasive surgical technique.**

Improvements in hip implant design as well as materials are frequent in joint replacement. Extensive clinical trials over many years are necessary to determine the long term outcome and the true benefits and risks of new innovations. Should you be a candidate for hip replacement, a discussion regarding your options for treatment with Dr. Matthys is recommended.

This is a procedure that is defined for a certain patient population. The procedure is not recommended in patients with soft or osteoporotic bone. Selection criteria for a surface replacement are quite narrow and require discussion with Dr. Matthys. If the hip SR is not suitable for you, there are a number of great options to choose from.