
Hip Replacement

Hip Anatomy

The hip is your body's largest weight-bearing joint. This joint is also called a ball-and-socket joint. The ball is the upper end of the thigh bone (or femur), which fits into the socket (or acetabulum) at your pelvis. In a normal hip, cartilage covers the ends of these bones and cushions the hip joint for smooth, pain free movement. When a hip is arthritic, the cartilage wears away, causing the bones to grind together. This produces pain and loss of motion. Total hip replacement surgery involves removing the diseased portion of the hip joint. An artificial hip, known as a prosthesis, replaces it. The worn hip socket is replaced by a cup, and the worn head of the thigh bone is replaced by a ball on a stem that is inserted into the thigh bone. These parts are made of metal and plastic and come in various sizes and designs.

History of Hip Replacements

Attempts at joint replacement for arthritic, painful hips date back to the 19th century. However, it was in the 1920's that the first realistic operation was developed that laid the foundation for what we know today as modern total hip replacement. These early operations used glass, and then a metal known as vitallium, to cap the arthritic femoral head or ball. This was known as mold arthroplasty. In these early days, no implants were placed in the acetabulum or socket. The patient then maintained non-weight bearing for weeks with range of motion exercises, and the intent was for this cap to "mold" a layer of fibrous tissue in the socket, effectively covering the arthritic surface, and hopefully relieving pain. This operation was very technique dependent, not very reproducible from surgeon to surgeon and required an extended rehabilitation after surgery. Subsequent surface replacement designs attempted to improve on this basic theory, all with limited success.

The real breakthrough came in the 1960's with the invention of Sir John Charnley's low friction arthroplasty. These were the first modern total hip replacements utilizing a fixed acetabular socket with an inner bearing, and a cobalt chrome femoral stem and ball that articulated with the socket. The initial choice for inner bearing surface of the socket was Teflon, which had a very low co-efficient of friction, but damaged and scratched easily. This wear couple did not last long. The breakthrough came when they began using a polymer, known as polyethylene, for the socket bearing surface. This provided durability, low friction and excellent pain relief.

In the early days of total hip replacement, if a surgeon wanted to begin performing total hip replacement, he had to travel to England and study with Dr. Charnley, learn the technique and then get Dr. Charnley's blessing to begin using his hip replacement design. Bone cement was used for both the femoral and acetabular components in this system. In the late 60's and early 70's, to use acrylic bone cement in the USA one had to obtain an FDA license to use bone cement in practice. As more surgeons learned this technique and American surgeons began training others, this requirement was dropped. During the 80's and 90's, the development of bony ingrowth technologies led to diminished use of cement. As fixation improved, more focus was placed on the actual bearing couple. The plastic cup liners could wear, in some cases causing an enzymatic reaction which could destroy bone and cause a prosthesis to loosen, requiring revision. This process typically began around year 8 to 10, leading to the belief that hips "only last about 10 years."

We have been through several cycles of new bearing technology introduction, including the squeaking ceramic on ceramic, and the disastrous metal on metal bearings. Fortunately, polyethylene plastic technology has dramatically improved to the point now that there is really no need for hard bearings such as ceramic or metal. Modern day titanium, cementless hip replacements, with third generation crosslinked polyethylene cup liners, placed appropriately, should likely last 25 to 30 years. Hip replacement, like knee replacement, has come a long way. Hip replacement is safe, reliable, durable and can provide many years of pain free service.