

Biomaterials And Bearing Surfaces

There are several bearing surfaces available for hip replacement surgery today. The original method (prior to 1999) pairs a cobalt-chrome head with a polyethylene socket. The head performs fine, but over time the polyethylene wears, leaving small polyethylene particles in the hip joint. These particles can lead to bone reabsorption and failure of the hip replacement.

There are essentially three alternatives to the traditional bearing coupling.

Metal-on-metal hips pair the same type of cobalt-chrome femoral head with a cobalt chrome socket. There is no plastic bearing to wear out, so no harmful polyethylene debris is generated. However, a small amount of cobalt debris is created, which has been reported to cause allergic-type reactions in some patients. In addition, cobalt levels in the blood and elsewhere in the body are increased by many times in patients with metal-on-metal hips. Cobalt activates the immune system, which can then attack tissue and bone in and around the hip joint.

Ceramic on ceramic hips pair a ceramic head with a ceramic socket. Again, no plastic wear occurs. A small amount of ceramic dust is created which is not a big issue. The main problem with this articulation is that the early ceramics were brittle and prone to fracture. Ceramic on ceramic bearing can squeak.

Cross-linked polyethylene sockets offer the best safety profile and comparable wear rates with metal-on-metal and ceramics. They are generally paired with ceramic or cobalt-chrome heads. These new plastics have been extensively tested and are the most widely-used bearing surface in hip replacements today. They do not have the downsides of metal-on-metal and ceramics. Ceramic heads are currently the favored head substrate, as they minimize the risk of tribocorrosion occurring at the head-neck junction.