

Avascular Necrosis of the Hip, and the “Metal on Metal”: Total Hip Replacement By Philip R. Hardy, M.D.

Avascular necrosis means death due to lack of blood supply. In this context, it refers to the death of the bone that makes up the ball part of the ball and socket hip joint. This may occur in young or old people due to disease or from injuries whereby the hip is dislocated or broken; although, in many cases there is no identified cause. Either way, there is an interruption of the blood supply to the ball end of the thighbone. As a result of this process, the bone of the ball becomes softer and collapses under the person's own weight. This causes the ball to become out of round, which leads to arthritis. Once this has happened, there is no good way of curing this problem without resorting to a major operation called total hip replacement (arthroplasty). In this operation, the dead ball is cut off from the rest of the hip bone and replaced with a metal ball on a stem that fits inside the hollow thigh bone. At the same time, the socket is replaced with a plastic socket, and the new joint is thus formed of the metal ball fitting into the plastic socket. This operation is very effective at alleviating pain due to arthritis of the hip joint, and is a very successful surgery in elderly patients. However, physicians have always had more concern about performing total hip replacements in younger patients.



The artificial joint does wear over time due to the metal ball rubbing against the plastic socket. This leads to microscopic pieces of ground up plastic, in the surrounding tissue, that cause the body's defense mechanisms to produce those cells whose job it is to remove foreign material. In

this case however, the plastic cannot be digested, whereas the tissues around the implant can. This leads to progressive loss of bone and eventually to loosening of the implant. As a result, the operation has to be redone. The redo operation is always more technically difficult than doing the operation the first time and has higher risks such as infection, breakage of the bone during the operation, nerve injury and recurrent dislocation. Additionally, the bone stock is of poorer quality and the redo total joint replacement typically lasts less time than the previous one. At some point, the situation becomes unsalvageable and the patient is left with no satisfactory options.

This problem is obviously more serious in younger patients because not only is the patient going to live longer, but they are also going to be more active than the older patients, and thus wear the joint at an accelerated rate. This is particularly true in situations where no other joints are involved, such as in avascular necrosis. Once the painful hip joint is replaced, there is nothing to stop the patient from returning to any activity they want to, except the knowledge that they will eventually wear out their new joint. As a result, they may have to replace the first joint replacement with another, and if that one wears out, they have a long road ahead of them with no long-term solution in sight. That was, however, until the development of the 'metal on metal' total hip arthroplasty.

This most recent development in total hip arthroplasty is a potential answer to the problem of plastic wear debris. There is no plastic socket in this replacement. Instead, the socket is made of metal where the ball fits against it. The promise here is that with today's engineering capabilities and quality control, the weight bearing surfaces can be made with such accuracy that only the most minute amount of wear particles are generated. Thus, the problem of subsequent loosening of the implants can be avoided or, at the very least, substantially delayed. If the decrease in wear rates does indeed translate into the anticipated increase in longevity by a factor of ten or more, then it is possible for these implants to last the lifetime of the patient, even in the especially demanding circumstances of the young patient.

Not all metal on metal replacements are created equally, however. There is currently only one manufacturer in the U. S. whose metal on metal replacement does not include any plastic parts at all. The concern as to the future of these implants is the fact that even though they appear from the laboratory tests to possibly last 40 years or more, the only way to prove that they last that long in patients is to wait that long after they have been implanted. At least, however, as of this time, that hope now exists.