Clinical Focus: Orthopaedics

HIP RESURFACING: PATIENTS ARE ASKING FOR IT – SHOULD THEY GET IT?

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Hip resurfacing is promoted as being the best operation for the young and active person with an arthritic hip⁽¹⁾. Consumer-minded patients are taking themselves off to have the operation, not content with our advice or what we have to offer. Therefore, I visited the Midlands this year to investigate further, to see one performed, and to hear the pros and cons from a variety of speakers. This is my report.

DESCRIPTION

The 'resurfacing' is of the femoral head only, in the form of a metal cup with a central peg for extra fixation (Figures 1 and 2). The socket is virtually the same as those in current use by myself (Freeman cementless), except that the bearing is metal (cobalt/chrome) and of large size, ie 40mm or more. Thus the whole bearing is metal on metal, as opposed to the standard metal or ceramic on high density polyethylene.

Figure 1 Image courtesy of Corin Medical

Figure 2 Image courtesy of Corin Medical

HISTORY

The first hip replacement in 1938 was with a metal/metal articulation, and was not dramatically successful because of poor fixation to the skeleton. This problem was overcome in the 1960s by fixation with bone cement, popularised by Sir John Charnley at Wrightington with his classic hip. He first used Teflon for the socket, unsuccessfully as it was too soft, and then high density polyethylene. This was much harder but still with a low coefficient of friction, which he wanted. He used a small head (22.25mm), as trials suggested this caused the least wear of the polythene socket, and also because a small head exerted less torque on the socket, with less tendency to loosen.

Interestingly, Charnley had used resurfacing prior to this, using Teflon for the first time. This was, of course, unsuccessful, but he attributed this to damage to the blood supply of the femoral head as a consequence of resurfacing, rather than to the unsuitable material. We now know that resurfacing does not damage the femoral head blood supply.

The problem with polythene/metal conventional hip replacements is wear of the polythene. Polythene wear particles cause osteolysis and increasing loosening, but this is only a problem if the polythene debris can get between the cement and bone, ie if loosening has already occurred. Well-fixed hip replacements are still seen 20 years and more down the line with massive wear of the sockets but no loosening. A good cemented hip lasts despite wear, a fact ignored by the proponents of resurfacing, who protested that a new implant was needed for the young and active – one that would not produce polythene debris. Thus the metal on metal hip was developed. The resurfacing part of the implant is in order to preserve bone, as failure will not compromise bone stock as much as a failed cemented replacement, and no more than a fractured neck of femur does. So the theory goes. This hip was first used in Birmingham in February 1991.

SOME SCIENCE

The primary factor affecting the wear of bearings is their lubrication. Ideally, the bearing surfaces should be completely separated, effected by a thick enough film of lubricant, so-called full fluid film or hydrodynamic lubrication. The thickness of the film is increased by a faster sliding speed of the surfaces, which is the case with a bigger bearing, and is why large bearings were initially looked at for the 'resurfaced' hip.

High density polythene is too soft and rough to be hydrodynamically lubricated, and wear is therefore related to sliding distance. This is less for a small head, hence the use of the 22mm size with the Charnley hip.

Therefore, the use of the harder, smoother, metal surfaces has allowed the diameter of the bearing to increase, which increases sliding speed and therefore lubrication, without causing the increased wear due to increased sliding distance which happens with polythene.

If head and cup are exactly matched, the bearing is said to be conformed. In this case the viscous synovial fluid is not drawn into the bearing and lubrication suffers. The ideal is for the head to be slightly smaller in diameter than the cup, to draw fluid in. This is polar, high conformity bearing and is used in all resurfaced hips (Figure 3).

Figure 3

Hip simulators have proved that the volume of metal wear is dramatically reduced on increasing the bearing diameter from 22 to 36mm (minimum size of the replacements are 40mm). Metal wear particles are very small (mean 80nm), and are therefore disseminated throughout the body via the lymphatics. This has understandably caused concern about cancer, although studies have not shown an increase associated with metal on metal bearings⁽¹⁾.

I am convinced about the superiority of this large diameter metal on metal bearing, and it comes with the added bonus of a definite decrease in the rate of dislocation.

BONE PRESERVATION?

As explained above, the same amount of bone is removed from the acetabulum as in any other hip replacement. Figure 4 shows the difference between bone removed from the femur in a conventional cemented hip replacement, a Freeman cementless replacement, and a resurfacing. Failure of a resurfaced hip, with a fracture of the neck of the femur or loosening, leaves no more cortical bone than after removal of a Freeman stem, although much more than after removal of a loose cemented stem.

Figure 4 Bones removed with three different types of hip

As I have only revised one of my 82 Freeman stems in 12 years for aseptic loosening, and then with no loss of cortical bone, I am not impressed with the bone preservation claim, and even less with the phrase 'invasion of the medullary canal' (by conventional stems), used by the champions of resurfacing. Medullary bone has never supported anything except haemopoietic tissue.

RESULTS

The results of the Corin McMinn Resurfacing (1994-97) and the Birmingham Hip Resurfacing (1997-99) as reported on the internet⁽²⁾ claim only 11 failures due to non-infective causes, out of 1720 hips. Very good, but since we have stopped using the 3M hips in 1995, we have had no aseptic loosening of our cemented Exeter type hips.

More impressive to me at the meeting I attended was the reported series of 160 done in Coventry over a six- or seven-year period. There were four fractures of the femoral neck, and quite a few x-rays of the femoral components which looked as if they would fail in the not too distant future. The bottom line is that this is still an experimental hip prosthesis, and it is strange that NICE has seen fit to exclude resurfacing from scrutiny in the category of hip replacement, giving it a separate technology appraisal guidance⁽³⁾. It is a hip replacement.

The one consistent and impressive result is the extremely low rate of dislocation, the commonest complication of our conventional small-headed hips.

SPECIFIC PROBLEMS

Squeaking or clicking frequently occurs in the first few months, but settles.

It is at least twice as expensive as a cemented hip, although no more expensive than a Freeman hip.

It is a hip replacement, as I keep on saying, and it therefore has all the same complications, except for the decreased dislocation rate.

PROPOSAL

I have been using a bone-preserving hip replacement for the younger patient, the Freeman hip, for over 12 years here. This had metal/polyethylene bearings initially, but for five years has had ceramic/polyethylene bearings. There have been problems with the cups, but demonstrably not with the stems. I therefore intend to incorporate the large metal on metal bearing with the Freeman stem, to abolish polythene debris and hence improve on the longterm results, and reduce dislocations. The Freeman stem has the advantage over resurfacing that it can be used in avascular necrosis of the femoral head, and can adjust leg length discrepancies.

Suitable patients include those who are as fit as me and whose age is mine plus five, ie the young and active! They must not have rheumatoid arthritis or severe osteoporosis.

REFERENCES

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