

PATIENT INFORMATION SHEET

TYPES OF HIP REPLACEMENTS AND BEARING SURFACES

Hip replacement is a highly successful procedure in the majority of cases, but the artificial joint can wear out and fail. There are two main modes of mechanical failure of a hip replacement:

1. Loss of fixation between the artificial joint and your bone (often called aseptic loosening).
2. Wear of the bearing surfaces which may cause debris that, in turn, may precipitate loosening of the replacement and damage to the bone or soft tissues around the bones. It can also lead to dislocation of the joint.

Research is continuing to help minimise these risks and has led to a number of different types of replacement being available.

There are advantages and disadvantages to each type of replacement. No single type of replacement is better than another in all circumstances, and not all replacements are suitable for all patients. The decision as to which replacement is best for you is complex and dependent on a number of factors - your surgeon will discuss this with you.

Currently there are three main types of replacement, categorised by the way the replacement is fixed to bone. These types may be further categorised by the bearing surfaces that they employ.

TYPES OF HIP REPLACEMENTS

(1) Cemented Hip Replacements

This is the type of hip replacement that first came into common clinical use in the 1960s; they are the most tried and tested with the longest clinical results. The arthritic head of the femur (the 'ball' of the hip joint) is removed and replaced by a metal ball that is fixed by means of a stem inserted into the shaft of the femur. The socket of the hip is lined by a polyethylene cup. Both components are held in place by a plastic cement called polymethylmethacrylate (PMMA).

An example of a Cemented Hip Replacement



The Metal Stem and Plastic Socket



An X-ray showing it in place

There are a number of such cemented hip replacement designs that have clinical results of over 20 years; Exeter, Charnley and Stanmore are just some of the designs you may have heard about.

How long do they last?

It is impossible to guarantee how long an individual's replacement will last, but many studies have shown that in older people:

95% will last 10 years

70-75% will last 20 years

60-70% will last 20-25 years

Thus it is unlikely that older people will require any further surgery. However in younger people, who tend to be more active, there is a greater chance that their hip replacements will wear out; sometimes even before 10 years.

It was initially thought that the polymethylmethacrylate cement was the problem and so uncemented hip replacements were designed.

(2) Uncemented Hip Replacements

The design of these replacements is similar to that of cemented replacements, with the exception that no cement is used. A special coating is applied to the stem that encourages bone to grow onto the replacement and hold it in place. A metal cup that also has a special coating is used for the socket, and a plastic or ceramic socket fits into this to form the bearing surface.

An example of an Uncemented Hip Replacement



The metal stem with coating



An X-ray showing it in place

There is now good long-term follow up data on these types of replacement. Results up to 10 years are almost equivalent to cemented replacements, and there are suggestions that they may be giving better results up to 15 years. Very long-term results over 20 years however, are not yet available.

Despite these good results this type of replacement may not be suitable for all patients. Because they depend on bone ingrowth they may not be indicated in all patients, especially those who have osteoporosis or have rheumatoid arthritis. In these patients a cemented replacement may be more appropriate.

In some people their bone does not grow onto the metal. The hip can become loose at an early stage and would therefore have to be revised.

(3) Hip Resurfacing Replacements

This type of hip replacement uses a metal socket like an uncemented hip replacement socket, but with no plastic liner. Instead of cutting off the femoral head (the 'ball' of the hip) the surface is milled and covered with a metal cap that fits over the head.

The use of this type of prosthesis has declined significantly following problems with allergic reactions to metal in some patients. They may still be used in special circumstances in a selected group of young male patients.

BEARING SURFACES

The ideal bearing for an artificial hip would have the following qualities:

1. It would have a diameter similar to that of the normal hip thereby reducing the risk of dislocation
2. It would have minimal friction
3. It would show no wear with time

Unfortunately there is no manmade bearing that meets all these criteria and compromises have to be made. The available options are as follows:

1. **Metal Head / Polyethylene Socket.** The traditional hip bearing is a metal ball with a plastic socket. To reduce the effect of wear in the socket the ball needs to be made quite small but this increases the chance of the hip dislocating. Furthermore, even with a reduced head diameter there is significant wear of the plastic cup after 10 years. This will cause debris which may lead to a tissue reaction which damages the bone and causes loosening of the hip. Dislocation is more likely in a worn hip. This has prompted the search for better bearing surfaces.
2. **Altered Polyethylene Socket.** The plastic cup may be made stronger by using 'highly cross-linked polyethylene.' Laboratory studies have shown promising results but long term clinical outcomes are awaited.
3. **Ceramic Head / Polyethylene Socket.** The artificial ball may be made of ceramic which reduces both friction and wear when tested in the laboratory. This theoretical advantage has yet to be shown in long term clinical studies. Early models of ceramic head occasionally shattered but new generation ceramic is stronger and does not appear to be prone to this form of failure.
4. **Ceramic Head / Ceramic Socket.** With the ceramic ball and sockets there is very little, if any, debris produced. This means that in theory the joint will not wear out or cause a tissue reaction and so last for a very long time. There is a very rare risk of the ball or liner fracturing leading to immediate hip failure. There is also a small risk of the joint squeaking.
5. **Metal Head / Metal Socket.** This has been used until recently but, because of unexplained reactions / allergy to the metal in some people, it is no longer used.

CONCLUSION

Research continues to try and find an artificial hip that will allow normal activity and will last a lifetime. No available hip replacement is perfect but they all should allow almost normal activity and are likely to last in excess of 10 years. It is hoped that modern replacements will last even longer. However it is unlikely that a hip replacement will ever be quite the same as a normal natural hip joint and it is sensible to take some simple precautions.

Activities that you would be expected to be able to do after hip replacements are:-

- (1) Walking
- (2) Swimming
- (3) Cycling - exercise bike or normal bicycle
- (4) Golf
- (5) Visiting the gym

But patients should **avoid impact activities** such as running and any high impact aerobics (although aqua-aerobics is acceptable). We do not advise badminton or squash, although gentle 'doubles' tennis is possible. People who are experienced skiers can consider skiing again. The use of most gym machines is safe. In fact **exercising in a non-impact way is very important**.

Further Information:

National Joint Registry (NJR) website

<http://www.njrcentre.org.uk>

National Institute for Health and Clinical Excellence (NICE)

<http://www.niceguidance.org.uk>

NHS Website

<http://www.nhs.uk>

British Orthopaedic Association Website

<http://www.boa.ac.uk>

Hampshire Hospitals NHS Foundation Trust

www.northhampshire.nhs.uk