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Responsible Innovation

Patient optimised hip replacement

A guide for patients

Contents

Important

Please be aware that the information and guidance provided within this booklet is general in nature and should not be considered as medical advice in any way. You should always seek detailed advice from a qualified medical practitioner.

Contents

Anatomy of the hip joint

The hip is one of the largest weight bearing joints in the body and consists of two main parts:

- The ball (femoral head) at the top of your thigh bone (femur)
- The rounded socket (acetabulum) in your pelvis

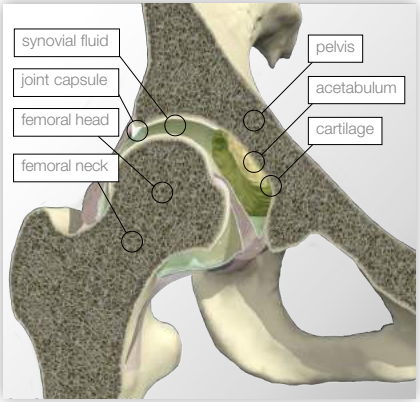
In a healthy joint, the hip allows rotation and movement of the upper leg from side to side and back to front, enabling a high level of pain-free mobility during walking, sitting, bending, turning, etc. The joint is comprised of bones, muscles, ligaments, cartilage and tendons, with each part working harmoniously within a complex structural relationship in order to support the smooth and painless functioning of the joint.

The hip is a very stable joint with the ball fitting into the rounded socket or cup like cavity.

Ligaments (tough cords of tissue) form a capsule connecting the ball to the socket, keeping the bones in position and helping to stabilise and control motion.

The surfaces of the ball and socket are covered by a smooth, tough material called articular cartilage, which cushions the bones and helps them to rotate more easily within the socket. Bursae, fluid filled sacs, cushion the area where muscles or tendons glide across bone. The rest of the surfaces of the hip joint are covered by a thin, smooth tissue liner called a synovial membrane. This secretes a small amount of synovial fluid which lubricates the joint, further reducing friction and facilitating movement.

Normal body movements rely on joints working smoothly and without pain. Maintaining maximum joint function allows us to enjoy an active and fulfilling life.



Why do people need hip replacements?

The hip is one of the most stressed joints in our body, although one which we often take for granted. It is in constant use in everyday movements such as walking, sitting, turning and even driving a car. As soon as the joint starts to stiffen or to cause pain, it becomes evident just how much we rely on it. The pain can become worse if you try to avoid using the joint, as the muscles become weak, making movement more difficult. Injury or disease can damage your hip in several ways, resulting in a broken or deteriorated bone, irritated bursae or worn cartilage.

Arthritis

Arthritis is the wearing-out or erosion of a joint arising from the wearing away of cartilage. Without this protection, the bones rub together causing severe pain and stiffness. Patients who have early stage arthritis often notice pain at the beginning of a movement or during the first few minutes of exercise before the joints are given a chance to warm up. Once activity gets underway, the pain usually diminishes, although it is likely to increase again after resting for several minutes. As the condition worsens, pain may be present even at rest. Symptoms are generally aggravated even further in cold or wet weather conditions.

The most common form of arthritis is osteoarthritis. Other forms are rheumatoid arthritis and post-traumatic arthritis.

X-ray showing a healthy hip

X-ray showing osteoarthritis

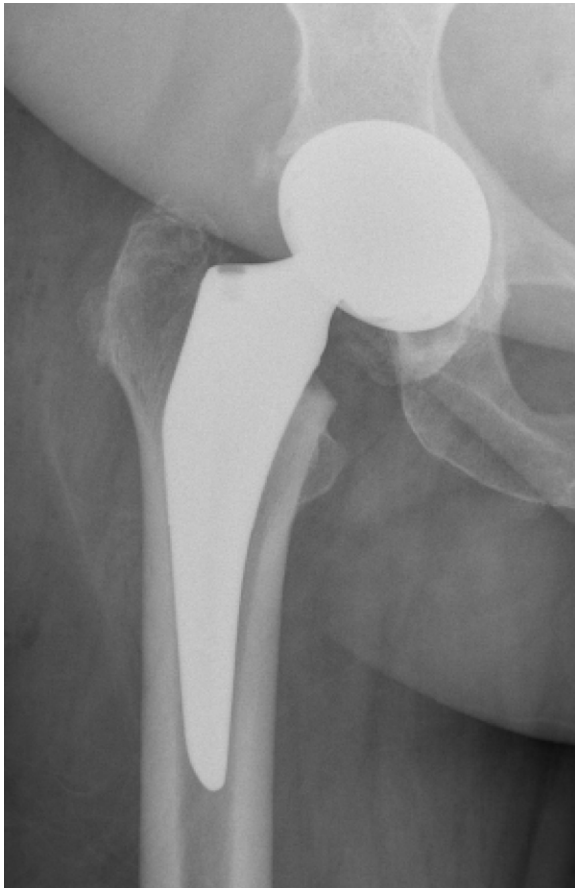
What is a hip replacement?

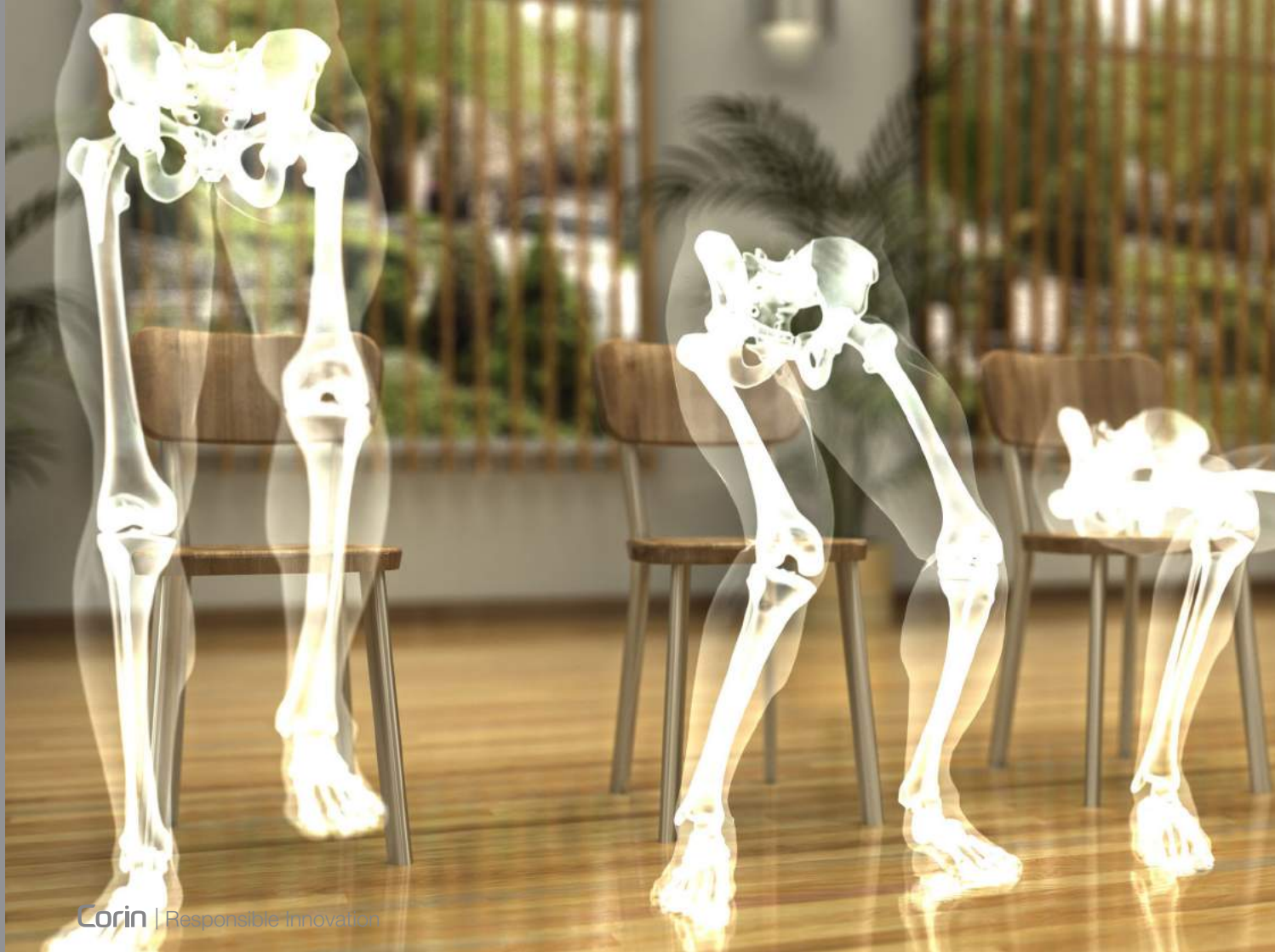
During a total hip replacement, the head of the femur (upper part of the thigh bone) is removed and the acetabulum (hip socket) is hollowed out.

The new artificial titanium cup is fitted into the acetabulum and an artificial liner made of ceramic or polyethylene (a durable, wear resistant plastic) is placed inside the cup. These surfaces are known as ‘bearings’.

The titanium stem of the new hip is implanted into the femur and a new artificial head, typically made of specialised metal or ceramic, is attached to the stem.

The new head is then placed inside the liner, relocating the hip. The layers of tissue are stitched back together and dressings are then applied to the wound.





Patient optimised hip replacement

After seeing your surgeon, you will be referred for specific functional imaging. This consists of a low dose CT scan and four X-rays, two in the standing position, one in the flexed seated position and one in the step up position.

This information is then used to create a high tech computerised simulation of the way your hip moves during different daily activities. This simulation gives your surgeon more information on how to optimise the position of the components of your new hip replacement to suit the unique way in which your body moves.

During your operation, your surgeon will position your new hip replacement using a patient specific guide, precisely designed to fit with the anatomy of your hip. This instrument is attached to a laser guided system which accurately aligns with the components into the planned position. This process may help to increase the longevity of your hip replacement.

The head of your femur (thigh bone) will then be replaced using the TriFit TS™ prosthesis. This implant has a porous coating that is designed to encourage your bone to naturally grow into it. As a result cement does not need to be used to keep it in position. The TriFit TS™ implant is designed to address modern day clinical problems to provide patient matched solutions.

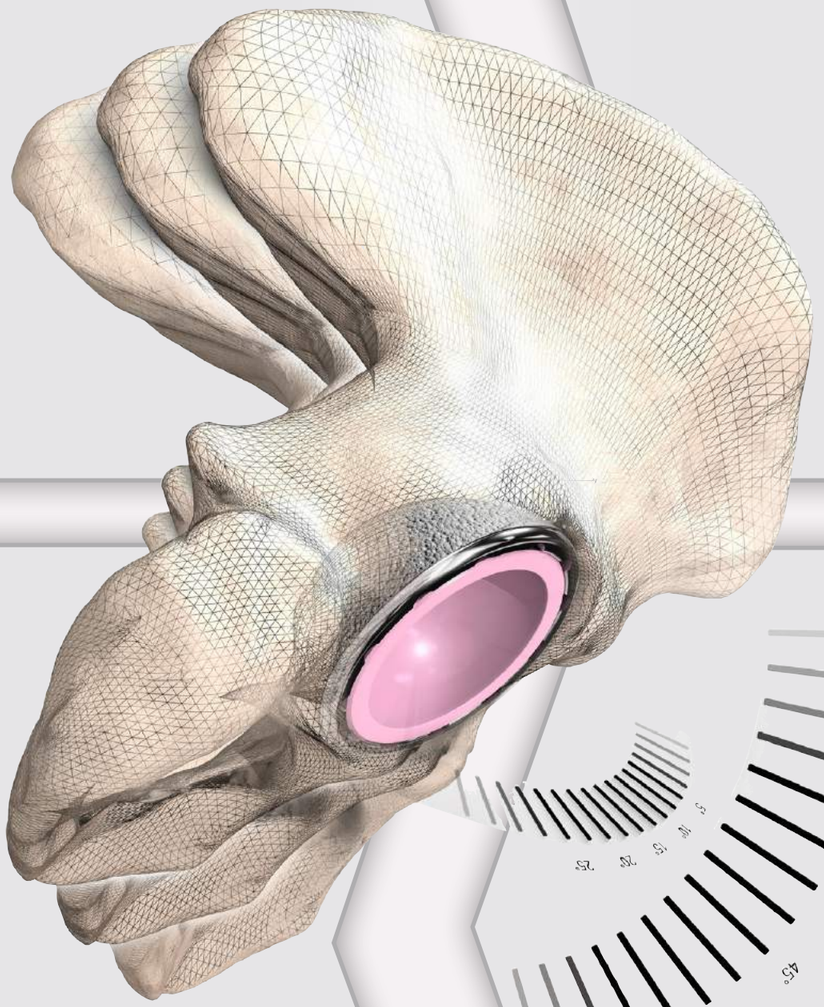
Technology in motion

Step 1 - Imaging

Refer your patient for the OPS™ imaging protocol at any of our validated radiology sites or contact your local representative to have your preferred imaging centre set up. See back page for full details of currently approved imaging centres in Victoria.

Imaging includes

- Low-dose CT scan
- Four functional X-rays

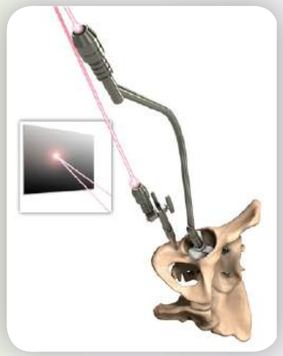


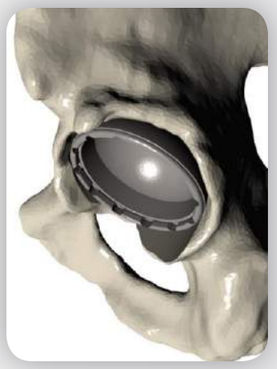
Step 2 - Analysis and reporting

OPS™ incorporates an evaluation of functional pelvic dynamics throughout a range of daily activities in order to optimize component selection and orientation.

Step 4 - Delivery

3D printed guides and a simple compact instrument kit facilitate accurate[1,2] and efficient delivery of the planned component placement without the need for complex intra-operative surgical registration.





References:

1. Spencer-Gardner L, Pierrepont JW, Topham M, Baré JV, McMahon SJ, Shimmin AJ, Patient-Specific Instrumentation Leads to Accurate Acetabular Component Placement in Total Hip Arthroplasty. Japanese Society for Replacement Arthroplasty (Poster) 2016.
2. Riddell W, Baré JV, Pierrepont JW, Stambouzou CZ, Marel E, Shimmin AJ, Clinical Accuracy of a Patient Specific Femoral Neck Osteotomy Guide. ICJR Paris (Poster) 2015

Step 3 - Build patient specific guides

Planned resection and orientation are delivered with custom 3D printed guides, built to suit the surgical approach.

A 3D model of the acetabulum is provided to indicate guide fit and key planes of reference.

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