

+ Robotics-assisted total knee replacement

A patient's guide

Smith+Nephew



+ Contents

The knee and osteoarthritis	4
Treatment for knee osteoarthritis	5
Reasons for surgery	6
Total knee replacement	7
Total knee replacement with robotic assistance	8
Preparation for surgery	10
What to expect in surgery	12
Postoperative	14
Rehabilitation following surgery	14
Complications	16
Disclaimer	17



Please note: the information in this booklet is for educational purposes only and is not meant as medical advice. Every patient's case is unique. You should consult with your surgeon on the specific treatment plan designed for you. Remember to always follow your surgeon's instructions.



Real Intelligence

There's nothing artificial
about our intelligence

Learning that you have knee pain caused by osteoarthritis can be discouraging. Fortunately, there are many treatment options to address knee pain. After reading this booklet, we hope that you have a better understanding of knee pain caused by osteoarthritis, the current treatment options, and what to expect from a robotics-assisted total knee replacement procedure.

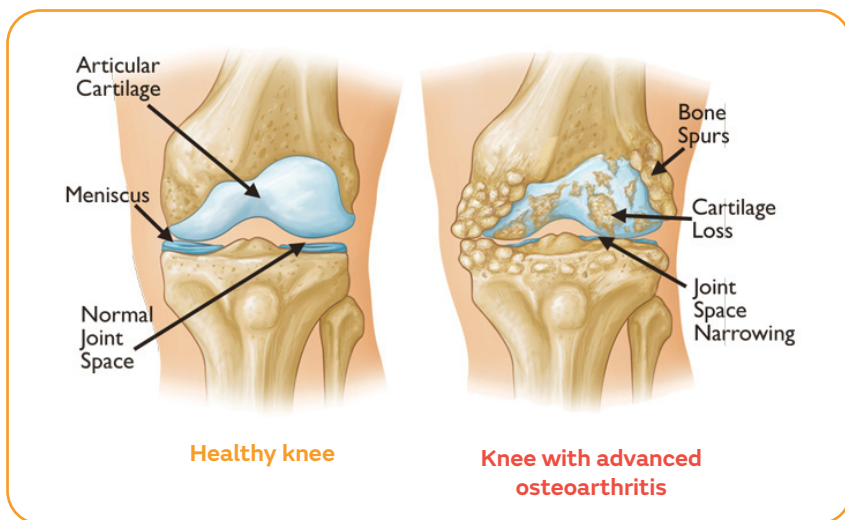
The knee and osteoarthritis

The knee is a hinge-like joint made up of the femur (thighbone), tibia (shinbone), and patella (kneecap) held together by muscles, ligaments and other important soft tissue.

In between the knee is a natural cushioning called meniscus that is made up of cartilage.

This material provides shock absorption during weight bearing activities such as walking or climbing stairs. Through wear and tear, the cartilage in your knee can break down causing a disease known as osteoarthritis.

Age, obesity, heredity, gender and other factors can lead to the progression of osteoarthritis. Common symptoms include pain, swelling and stiffness.



Treatment for knee osteoarthritis

While there is no cure for osteoarthritis, there are multiple treatment options to manage the pain and potentially delay progression of the disease.

Non surgical treatment options

- **Lifestyle changes:** lose weight and avoid aggravating activities to reduce the stress on your knee.
- **Exercises:** surgeon prescribed low impact exercises designed to improve strength and flexibility.
- **Anti-inflammatory medications:** intended to decrease swelling in the joint and provide temporary pain relief.
- **Cortisone/steroid injection:** powerful anti-inflammatory agent injected directly into the joint.
- **Joint fluid therapy:** a series of injections directly into your knee, designed to improve lubrication in the joint.
- **Glucosamine/chondroitin:** dietary supplements intended to support joint health.
- **Bracing:** used to provide external stability to the knee.

Surgical treatment options

- **Arthroscopic surgery:** a minimally invasive procedure that removes debris or repairs torn cartilage. Arthroscopic surgery is often less effective as osteoarthritis progresses.
- **Partial knee replacement surgery:** a procedure that replaces the single damaged compartment of the knee, generally reserved for early to mid-stage osteoarthritis.
- **Total knee replacement surgery:** a procedure that replaces all three compartments of the knee, when osteoarthritis reaches an advanced stage.

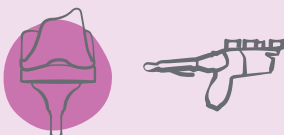
Reasons for surgery

Knee replacement surgery should be considered when all conservative measures fail to provide relief. Surgery may be performed for the following reasons:

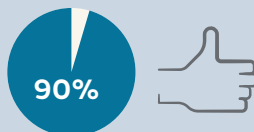
- Relieve pain
- Improve joint stability
- Improve alignment and correct bone deformity
- Maximise quality of life
- Optimise activities of daily living



Total knee replacement



Total knee replacement is one of the most common surgical procedures performed in all of medicine; there are over 50,000 performed every year in Australia and New Zealand.



More than 90% of people who undergo total knee replacement experience dramatic relief in knee pain and are better able to perform common activities.¹

Total knee replacement removes and replaces the damaged knee surface with an implant.

A total knee implant is made up of three parts: a metal femoral component (thighbone), a metal tibial component (shinbone), and a plastic spacer that is placed in between.

A fourth component made of plastic is sometimes used to cover the back of the patella (knee cap).

Femoral Component

Plastic Spacer

Tibial Component

Total knee implant

Total knee replacement with robotic assistance

Your surgeon will size and position the total knee implant with computer and robotic assistance.

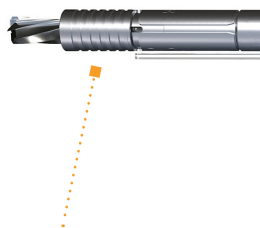


Robotic system

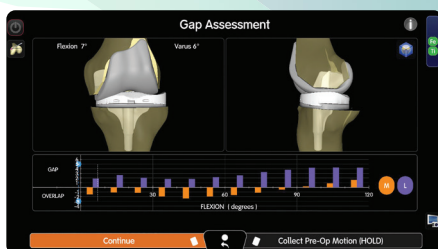
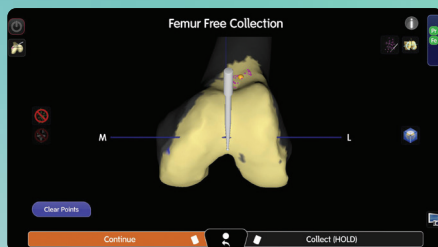
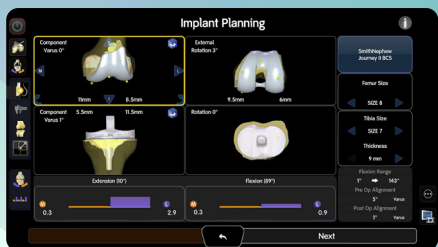
Computer assistance is used to collect the unique shape and motion of your knee to virtually plan the procedure. Robotic assistance is used to accurately perform the procedure.

The extra layer of planning and precision provided by the system aims to ensure the procedure is performed exactly as your surgeon intends.

The robotics system does not perform the procedure; rather it assists your surgeon by providing accuracy and precision² – crucial to the success of the surgery.

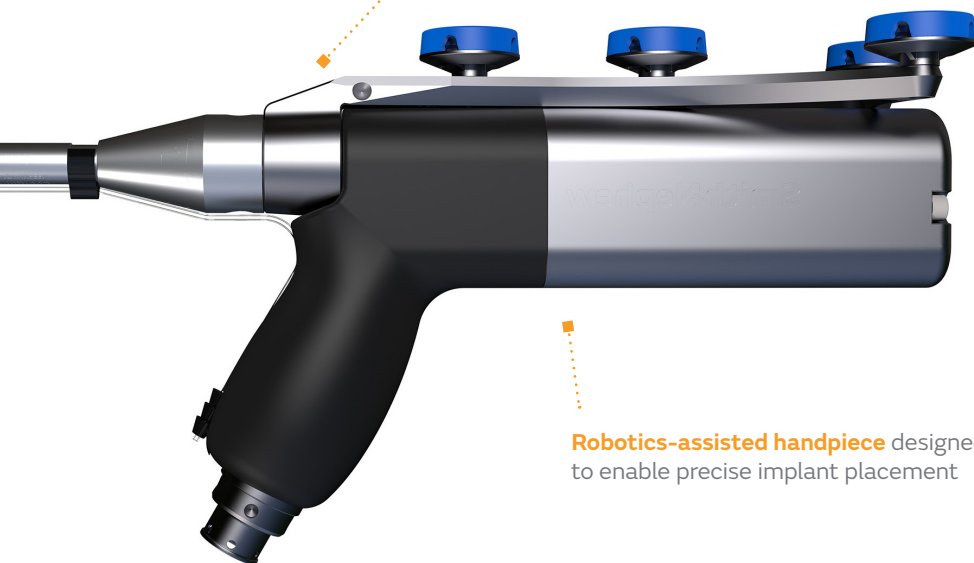


Computer assistance
designed to ensure
consistent results



Advanced planning software allows the surgeon to tailor the procedure to each patient.

Advanced instrumentation designed to enforce the surgeon-defined plan



Robotics-assisted handpiece designed to enable precise implant placement

Preparation for surgery

There are several activities that you should plan for once you decide to have surgery:

Initial surgical consultation: Preoperative x-rays, complete past medical history, complete past surgical history, complete list of all medications and allergies (prescription, over-the-counter, vitamin supplements).

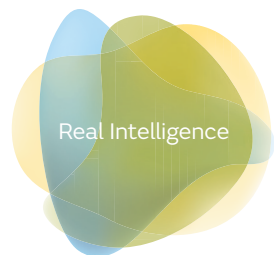
Complete physical examination: Your doctor may determine if you are in the best possible condition to undergo surgery.

Blood donation: A transfusion may be necessary after surgery, therefore you may wish to donate blood prior to surgery.

Physiotherapy: Instruction in an exercise program to begin prior to surgery and an overview of the rehabilitation process after surgery will better prepare you for post-operative care.

Preparation for the hospital: You may want to bring the following items:

- **Clothing:** underwear, socks, t-shirts, exercise shorts for rehabilitation.
- **Footwear:** walking or tennis shoes for rehab; slippers for hospital room.
- **Walking Aids:** walker, cane, wheelchair or crutches if used prior to surgery.
- **Insurance Information**



Preparation for after surgery:

- Follow your surgeon's instructions for preparation the evening before surgery.
- You may be advised not eat or drink after midnight.
- Shower (with five minute scrub to surgical area with special soap provided).
- Prepare your belongings and review total knee booklet.

Preparation for after surgery:

- Move items and furniture in your home so they are easier to access while your mobility is limited.
- Remove clutter and obstacles that could be tripping hazards.
- Have a plan; preparing meals ahead of time and arranging visitors to help with everyday chores will make your recovery smoother.



What to expect in surgery

You will first be placed under anaesthetic to relax your body for surgery and block pain. The correct form of anaesthetic will be discussed and determined prior to surgery with your surgeon and anaesthetist.

Your surgeon will then make an incision that extends several centimetres above the knee cap to several centimetres below the knee cap. Using the robotic system, special trackers are secured to both the thigh bone (femur) and shin bone (tibia) with four small surgical pins placed through tiny incisions in the skin.

These trackers are crucial to the precision of the system as they provide a constant reference point to the surgeon throughout the procedure.

Using computer assistance, the unique shape and motion of your knee are collected by the surgeon. This allows for a three-dimensional model of your knee to be generated and used by the surgeon to plan the procedure. Proper implant size and position will be determined at this time.



Incision made on knee



The implant is positioned virtually using advanced planning software

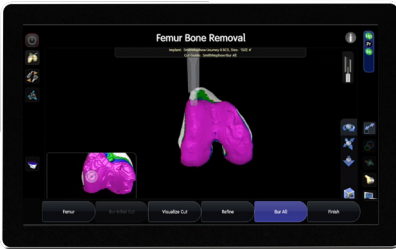


Once your surgeon virtually determines the correct implant size and positioning, a handheld robotics-assisted tool is used to accurately position bone removal cut guides.

These cut guides enable the surgeon to use a surgical saw to remove your damaged knee bone, making room for the implant. The extra layer of precision provided by the robotic system is designed to enable accurate cut guide placement.

The system does not perform the procedure; rather it assists your surgeon by providing accuracy and precision² – crucial to the success of the surgery.

Once the implant is in the final position, the incision is thoroughly cleaned and closed, completing the procedure.



Robotic-assisted precision milling to accurately execute plan



Bone surface prepared for the implant.



Knee implant in final position

Postoperative

Immediately after surgery you will be monitored as you awake from anaesthetic. Once awake, you will be taken to your hospital room. Plan to stay in the hospital for several days.

In addition to the incision along your knee there will be two small incisions on both your thigh and lower leg where the tracker pins were placed. Expect to feel some pain. This is a natural part of the healing process. Your doctor and nurses will work to reduce your pain.



Most patients begin exercising their knee the day after surgery, although each patient's postoperative care will vary. A physiotherapist will prescribe exercises to help restore knee strength and function, and increase range of motion in your knee. It is common to experience swelling, stiffness and tightness at this time.

Rehabilitation following surgery

The success of your surgery will largely depend on how well you follow your surgeon's instructions the first few weeks following surgery. How quickly you recover depends on factors such as knee pain, flexibility, strength and balance. Follow up visits will likely be scheduled to check up on your condition and progress as you recover.

In order for you to meet the goals of knee replacement surgery, you must take ownership of the rehab process and work diligently on your own as well as with your physiotherapist. The rehabilitation process can be quite painful at times. However, if you commit to following your program and overcome the challenges in rehab, you will succeed in meeting the goals you set when deciding on surgery.





Complications

As with any surgical procedure, there are risks involved with total knee replacement surgery. Every patient's case is unique. You should consult with your surgeon on the specific complications you may encounter. Complications may include, but are not limited to:

- **Blood clots.** Your surgeon may prescribe medication to help prevent blood clots.
- **Infection.** Antibiotics may be given before the surgery and continued afterward to help prevent infection.
- **Injury to nerves or vessels.** While rare, nerve and blood vessel damage may occur during the procedure.
- **Other risks.** Individual patient risks should be discussed with your surgeon.

Disclaimer

Robotics-assisted surgery is not for everyone. Children, pregnant women, patients who have mental or neuromuscular disorders that do not allow control of the knee joint and morbidly obese patients should not undergo a procedure. Knee replacement surgery is intended to relieve knee pain and improve knee functions. However, implants may not produce the same feel or function as your original knee. There are potential risks with knee replacement surgery such as loosening, fracture, dislocation, wear and infection that may result in the need for additional surgery. Longevity of implants depends on many factors, such as types of activities and weight. This information, including postoperative care, is provided for educational purposes only. Smith & Nephew does not provide medical advice. In no event shall Smith & Nephew be liable for any damages whatsoever arising out of the use of or inability to use the expressed views. Consult your surgeon to determine if a robotics-assisted procedure is right for you.

Robotics-assisted surgery is intended to assist the surgeon in providing software-defined spatial boundaries for orientation and reference information to anatomical structures during orthopaedic procedures. Robotic assistance is indicated for use in surgical knee procedures, in which the use of stereotactic surgery may be appropriate, and where reference to rigid anatomical bony structures can be determined. These procedures include unicondylar knee replacement (UKR), patellofemoral arthroplasty (PFA), and total knee arthroplasty (TKA).



YOUR HEALTHCARE PROFESSIONAL WILL ADVISE YOU WHETHER THIS PRODUCT/PROCEDURE IS SUITABLE FOR YOU AND YOUR CONDITION.

Serious incident reporting notice:

For Australian patients, any serious incident/adverse event that occurs in relation to the device should be reported to the manufacturer on **customerfeedback.anz@smith-nephew.com** and to the Therapeutic Goods Administration on: **<https://www.tga.gov.au/reporting-problems>**.

For New Zealand patients, any serious incident/adverse events that occurs in relation to the device should be reported on the manufacturer on **customerfeedback.anz@smith-nephew.com** and to the New Zealand Medicines and Medical Devices Safety Authority on:

<https://www.medsafe.govt.nz/safety/report-a-problem.asp>

Smith & Nephew Pty Ltd
Australia
T +61 2 9857 3999
F +61 2 9857 3900
smith-nephew.com/australia

Smith & Nephew Ltd
New Zealand
T +64 9 820 2840
F +64 9 820 2841
smith-nephew.com/new-zealand

®Trademark of Smith+Nephew
All Trademarks acknowledged
©Smith+Nephew, March 2021
07269-anz 0321

References 1.Total Knee Replacement, OrthoInfo. American Academy of Orthopaedic Surgeons (AAOS), online publication,<http://orthoinfo.aaos.org/topic.cfm?topic=A00389>, accessed 18 October, 2017. 2. Lonner, et al. "High Degree of Accuracy of a Novel Image-free Handheld Robot for Unicondylar Knee Arthroplasty in a Cadaveric Study,"Clinical Orthopaedics and Related Research. Advanced online publication. DOI 10.1007/s11999-014-3764-x5 American Association of Orthopaedic Surgeons (2014). AAOS.org.