

New developments in knee replacement surgery:

Personalised knee replacements

Sanjiv Jari BSc (Hons), MB ChB, FRCS (Eng), FRCS (Tr & Orth)
Consultant Orthopaedic Surgeon



Total knee replacements are a common orthopaedic operation carried out for arthritic knee joints causing pain and loss of function, together with disruption to patients' quality of life.

Total knee replacements have been around for over 30 years, with most of the advances being in implant design, so as to concentrate on increasing how long a total knee replacement will last.

Traditional knee replacements utilise normal x-rays from which some measurements can be made. At the time of the operation, cutting blocks are used to prepare the knee for a knee replacement, based on estimate of best fit during the procedure itself. This is currently the most common way to perform a total knee replacement and is a very successful method of undertaking the surgery, generally.

However, new technology is gearing towards making the patient the centre of advances in knee replacements. Mr Jari now routinely uses a novel technique of personalised or customised knee replacements as he understands that both patients and their individual anatomy are unique.

This technique involves the patient undergoing a preoperative CT or MRI scan, depending on the implant being used. The images from the scans are sent to the prosthesis manufacturer in the USA. From the images, computerised technology is utilised to provide the optimal size of the implants needed. Specific customised cutting blocks are then created, which are then sent back to the surgeon for use at the time of the operation. The process has a lead time of around 5 to 6 weeks from the time of the scan. The result is that there is no requirement for estimation at the time of surgery, with more specific and accurate personalised bone cuts being made, which have been predetermined prior to the operation. The use of these personalised blocks also means that the cavity of the bones does not need to be breached, as is routinely undertaken in the traditional method. This then has the effect of reducing potential complications from surgery that can be associated with knee replacements such as heart and lung

complications, which occasionally occur. Extensive research has been carried out by knee implant manufacturers to produce personalised knee replacement solutions, specific to the patient's individual anatomy. The important aspect of a knee replacement is to ensure that the alignment is correct. If the alignment is incorrect, the knee can wear out more quickly. This would be similar to putting tyres onto a car where the alignment is off. The tyres will wear out more quickly due to uneven wear. This is where a personalised knee replacement is ideal as that is what is catered for by the personalised solution.

The personalisation of the knee replacement does not affect the surgeon's ability to still modify and adjust the implants at the time of the operation if necessary.

As the bone canal is not breached with the personalised knee replacements, the procedure is less invasive and potentially can have fewer complications. When the personalised knee replacement is combined with a rapid recovery protocol, which includes pain relief, immediate rehabilitation and mobilisation, this can lead to a more pleasant patient experience, with a shorter hospital stay.