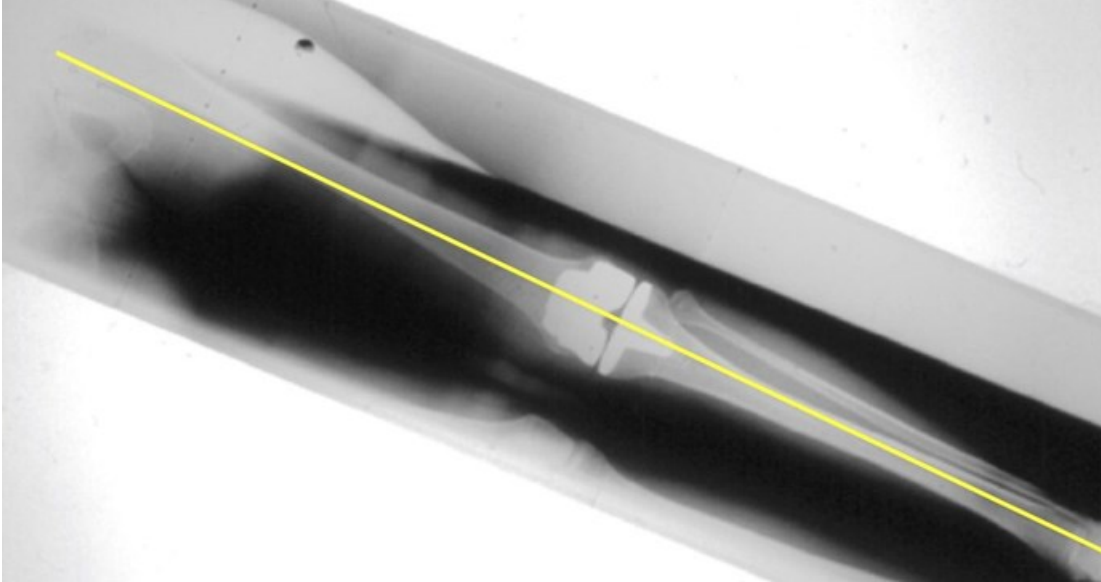


# Getting the balance right in knee replacement surgery

A pioneering approach to total knee replacements is gaining international credence some 13 years after South African orthopaedic surgeon, Professor Ponky Firer, developed his unique balanced technique for the procedure.



An X-ray with yellow line illustrating neutral mechanical alignment.

In a 2018 internationally published peer-reviewed paper he wrote with his practice associate, Dr Brad Gelbart, based on data recorded by an independent research nurse, their study noted a resounding 93% of patients reporting outright satisfaction with the results of their total knee replacements performed by Firer using his balanced technique.

This represents a significant improvement on the 80% to 85% satisfaction rates recorded in published international studies and national joint registries on knee replacements performed with the conventional alignment techniques used by the majority of orthopaedic surgeons.

## Follow-up study

Firer is currently working on an eight to 13 year follow-up study to track the same cohort of patients' progress. "Our follow-up is not yet complete, but has so far confirmed that 99.1% out of 785 total knee replacements from our original study remain intact, and the patients are still enjoying excellent outcomes."

engineering before pursuing a career in medicine, developed his unique technique in an attempt to address the potential post-operative difficulties related to imbalance of the soft tissues of the knee, which produces pain and instability and hence dissatisfaction.

"It is conventionally believed that the soft tissues should be adjusted to ensure the prosthetic knee fits within a very narrow hypothetical 'ideal' range of zero to three degrees in relation to the mechanical axis. This axis is an imaginary line extending from the centre of the hip to the centre of the ankle and should pass through the centre of the knee when surgery is performed in the traditional way – this is known as 'neutral mechanical alignment'.

"However, when you look at the distribution of the typical healthy knee population, it doesn't conform to these theoretical confines, and may have as much as six or seven degrees' variance from the point that was thought to be the 'ideal'," says Firer.

## **Blueprint**

"Just as every person's face is different, each person's knees are unique and are integral to the body's overall balance. Instead of adjusting the soft tissues during total knee replacements, my approach takes the patient's own soft tissues as the blueprint to guide surgery, as this indicates their natural alignment before they developed a knee problem.

"We adjust the bone cuts during surgery to achieve balance rather than cutting the ligaments, as is usually done, because there is no need to damage healthy tissues. The person can therefore retain their body's natural alignment, which involves a complex and interconnected system of levers and balance – from our feet all the way up to our heads – and the knees fulfil a particularly crucial function," he says.

According to Firer, getting the balance of the ligaments just right for each patient is essential to the success of knee replacements, as internationally approximately a third of surgical revisions are due to soft tissue instability. Where the tissues are too tight this causes pain, and when tissues are not tight enough the knee joint becomes unstable.

"Interestingly, we found that the alignment distribution that we achieved with our patient-specific balanced technique mirrored in nature the pattern one would expect to find across the population of healthy knees.

## **Natural alignment**

"Internationally, orthopaedic surgeons have been approaching knee replacements from different perspectives seeking better outcomes for patients, and it is encouraging that they are now arriving at the same conclusion: 'use bone cuts to balance the knee rather than aim for one alignment for all, which entails having to change the normal ligaments to get the required balance'.

"This strongly supports our hypothesis and growing body of clinical evidence that there is clear benefit to restoring the patient's natural alignment rather than imposing a theoretical 'norm' of mechanical alignment that may not be appropriate for the unique biomechanics of the individual.

"The prosthetic knees nowadays can last well up to 20 years and beyond, and combined with more intuitive and patient-specific surgical placement methods that complement natural balance, we are looking forward to continuing our longitudinal study to see how this may further improve on the longevity and functionality of the knee replacement," Firer said.