

Better knee movement with robotic surgery



NG WAN CHING

The Makoplasty procedure promises patients less downtime and a more natural-feeling knee

Hearing the horror stories of other patients who had undergone knee replacement surgery kept Mr Edward Sim, 55, from doing anything about his own knee for years. Even though that meant living for about seven years with the excruciating pain of knee osteoarthritis, a chronic degeneration of the knee joint. This severely curtailed the activities he enjoyed, such as running.

He chose to endure the pain rather than to have a problematic knee operation.

That is, until he heard about a robotic system which doctors say is a game changer for people like him, who still have years of active lifestyle ahead.

The Makoplasty robotic system makes it more accurate for surgeons to do partial knee replacements.

More importantly, patients who undergo this procedure will experience more natural movement of their knees and will be better able to play sports afterwards, unlike those who undergo a total knee replacement.

It does this by using a program to map a precise pre-surgical plan for the patient using computed tomography (CT) scan data.

During the procedure, the robotic tracking system constantly updates the surgeon on the patient's anatomy, making it easier for him to carry out a more accurate surgery.

"My older sister had a total knee replacement surgery in 2009 and she complained of more pain for a year after the operation. I got scared after her experience," said Mr Sim, a production planner and swimming instructor who used to run regularly.

What disturbed him was his sister's complaint that her new knee did not feel "natural".

But Mr Sim did not need a full knee replacement as only one compartment of his left knee was worn out.

A knee has three compartments and only those with degeneration in all three compartments need a total knee replacement.

He was a candidate for partial knee replacement, but he had heard that some who had such an operation also ended up with chronic pain and an operated knee which feels "very tight".

Indeed, because a traditional partial

knee replacement fails earlier than a total knee replacement, patients end up going for total knee replacement surgery. A total knee replacement can last between 15 and 20 years.

A retrospective review done in the United States of 406 patients who had total knee replacements showed that 47 per cent would have benefited from replacing just one or two of their knee compartments, said Dr Siow Hua Ming, a consultant orthopaedic surgeon at Providence Orthopaedics at Mount Elizabeth Novena Hospital.

The results of the review were presented at an arthroscopy conference in 2011.

Partial knee replacements have fewer bone cuts and preserve all the ligaments within the knee.

"This can potentially lead to faster recovery and a more natural-feeling knee," said Dr Kevin Lee Boon Leng, a consultant orthopaedic surgeon at Mount Elizabeth Medical Centre.

My older sister had a total knee replacement surgery in 2009 and she complained of more pain for a year after the operation. I got scared after her experience.

Mr Edward Sim (right), a production planner and swimming instructor who used to run regularly, on one of the reasons why he initially chose not to have knee replacement surgery

The anterior cruciate ligament (one of the major ligaments of the knee) is cut and removed in all total knee replacements.

For the patient, this means that the normal feel and movement of the knee will be permanently lost.

With seven in 10 people in Singapore at risk of knee osteoarthritis, any potential improvement in treatment options would be welcome, said doctors.

Yet, doctors here tend to be sceptical about knee-surgery improvements because many of them fail to deliver as promised, noted Dr Jeffrey Chew, a consultant orthopaedic surgeon at the Centre for Orthopaedic Group of Companies at the Mount Elizabeth Novena Hospital.

CONFIDENCE IN NEW SYSTEM

For Mr Sim, the problem deteriorated slowly over the years, to the point where he could not even jog slowly any more.

Things changed after he attended a talk last year about the Makoplasty robotic system, which was then newly



ST PHOTO: LAU FOOK KONG

available at Mount Elizabeth Novena Hospital.

"It made sense to me and my wife and gave me the confidence to do a partial knee replacement," he said.

The robotic system, which has been used in the United States for about five years, is controlled by the surgeon, who uses it to determine the portions of the knee affected by osteoarthritis to be resurfaced or smoothened, while keeping clear of the surrounding healthy bone and ligaments, said Dr Chew, who has carried out 16 such procedures here.

The surgeon can also make real-time adjustments to optimise the position of the partial knee implant.

This near-perfect accuracy helps to retain the range of motion of the knee after surgery and makes it feel more natural, said Dr Chew.

As for the traditional manual method, especially if the surgery is done in a minimally invasive way, surgeons cannot visualise the affected area as effectively.

Some may remove more bone than necessary or put in an implant of the wrong size, which can cause chronic pain, poor knee flexibility or a knee that feels too tight, said Dr Chew, who operated on Mr Sim's knee.

Robotic surgery could allow those in their 50s or older, and with osteoarthritis in just one or two compartments of the knee, the option of a more targeted and less-invasive operation, instead of having the whole knee replaced, he said.

They could eventually get back to activities, such as running, jogging, cycling or even skiing. This is more difficult to achieve with a total knee replacement, he added.

ENCOURAGING RESULTS

In an ongoing study in Britain, 50 patients who underwent Makoplasty were compared with 50 others who had implants manually placed by the surgeon.

The doctors doing the study are from the British National Health Service. The manufacturer of the robot does not have any investment in the study.

The average margin of error is 0 to 2 degrees for the newer method, while that of the manual method is 4 to 6 degrees, said Dr Siow, who has performed six Makoplasty procedures.

Meanwhile, only 0.4 per cent of those who have Makoplasty required revision procedures after two years.

But 4 per cent of patients with a traditional partial knee replacement have to undergo surgery again, due to a variety of reasons, such as loosening of the implant, to correct the position of the implant and to treat infection, he added.

Almost 30 patients have so far undergone the Makoplasty procedure at

Mount Elizabeth Novena Hospital, the only hospital with the robotic system.

Benefits include having smaller incisions, less blood loss during surgery, less post-operative pain, a shorter operating time, as well as a quicker recovery and shorter hospital stay – two or three days compared with five days for a total knee replacement, say doctors.

The cost of a Makoplasty procedure starts from \$26,500, while the traditional method starts from \$23,000, said a hospital spokesman.

Patients can use their MediShield to help pay for a Makoplasty procedure, just like for the traditional partial knee replacement, said Dr Chew.

Dr Lee said the risks of the new procedure are similar to the traditional method. These include infection, deep vein thrombosis, injury to blood vessels and nerves around the knee, as well as implant failure.

The last two risks are minimised in the case of Makoplasty because of the accuracy of the robotic system.

LONG-TERM PROSPECTS UNCLEAR

However, Makoplasty has its detractors, with neither the Singapore General Hospital (SGH) nor the National University Hospital offering it.

While robotic surgery may improve implant positioning, it may not reduce failure rates in partial knee replacements, said Associate Professor Yeo Seng Jin, senior consultant and director of the adult reconstruction service at the SGH's department of orthopaedic surgery.

He said there are no reported 10-year results for the new procedure or the implant used with it.

The implants are made by the same manufacturers of the robotic system and are different from those which have been on the market for a much longer time.

The main reasons why partial knee replacements fail are osteoarthritis occurring in other parts of the knee and loosening of the implant.

"Makoplasty may not change this. It may increase complications, such as fractures due to extra pins inserted into the bone for the robot to work," he said.

These extra pins are needed for navigational purposes – to guide the surgeon on where to place the implant – and how much bone to remove.

Mr Sim underwent the surgery in mid-November last year and he is happy with the results so far.

"I had very little pain. My knee feels natural. By the end of last month, I was jogging again, slowly," he said.

"I look forward to getting back to my running routine soon."

wanching@sph.com.sg

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Fans on protecting their knees

I am a physiotherapist and "walk the talk" by meeting the Health Promotion Board's framework of preventive medicine of doing "more than 150 minutes of moderate to intense physical activity a week". At the same time, I eat enough to replenish the nutrients in my body.

Every week, I do moderate- to high-intensity running drills, one or two running sessions of 5km to 10km, as well as a session of moderate- to high-intensity interval workout for resistance training. I have not had any problems with my knees despite these activities.

Most people may think that once they start ageing, degenerative knee problems beset them and exercise is contraindicated. However, with sufficient and gradual conditioning, one will be able to participate in suitable exercises without damage to his joints despite mild aches and pain.

The benefits of exercise far exceed the disadvantages.

Guojie Lian

I lead an active lifestyle – playing tennis and badminton about three or four times a week.

I compete against inter-school exponents and also have training sessions, which are a mix of high- and low-intensity exercises.

While doing sets and repetitions, it can get intense. This takes a toll on my body. Before any training session or game, I make sure I do proper stretching exercises. I also do cool-down exercises after that.

My doctor at the sports clinic taught me to protect my knees by taping them with kinesiology tape (athlete tape). I do feel the strain after matches, but it's far less painful than what I would usually feel if I had not used the tape.

Marcus Chan

I am a choreographer for KpopX Fitness, which is a moderate- to high-intensity Korean aerobic exercise. I have runner's knees (thinning cartilage) with back pain. If my dance moves cause me pain, I will stop or modify the moves.

In short, I listen to my body. I am also very careful and strict with postures and doing the moves right, such as keeping the knees in line with the toes.

Maddy Lim

Three months ago, my hubby and I started brisk walking for an hour every day. We have been doing it so religiously that we would feel lethargic if we were to miss the walk for a day.

I have rheumatoid arthritis and I used to have knee pain, but the pain is now gone. I have also lost 7kg as a result. Start walking at your own pace and make it a family affair. A family that works out together, stays together.

Emma Krish

WINNER

Marcus Chan wins a \$50 shopping voucher for the best post. The winner should e-mail his full name, username, address, identity card number and contact number to sthealth@sph.com.sg by next Wednesday. Specify STMYB Facebook as the subject.

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