Health & Medicine  |  Fumiharu Yamashita

Long-term outcomes in total knee arthroplasty (TKA) patients with rheumatoid arthritis (RA)

Due to the degeneration of the knee joint in individuals with rheumatoid arthritis (RA), walking becomes difficult. Total knee arthroplasty (TKA) can restore the ability to walk. Several reports have been published highlighting the survival rate of TKA in RA patients, however, no study has focused on the prospect of outdoor walking. Dr Fumiharu Yamashita and his team from the Department of Orthopaedic surgery, Kyoto Shimogamo Hospital, Japan, have conducted an investigation to study the postoperative outdoor walking period of patients who have undergone TKA. Through this investigation, they report the long-term outcomes of TKA in patients with rheumatoid arthritis.

Humans need to be able to walk outdoors to maintain their physical and mental wellbeing. With age, however, humans find it more difficult to walk. Due to the degeneration of the knee joint in individuals with rheumatoid arthritis (RA), walking becomes difficult, but total knee arthroplasty (TKA) restores the ability to walk. Arthroplasty refers to the surgical reconstruction or replacement of a joint. The knee function and survival rate of TKA implants in patients with RA have been reported in numerous long-term follow-up studies. With the advent of methotrexate (MTX) in 1999 and biological medicines in 2003, medical treatment for RA in Japan has advanced dramatically and it has had a variety of implications on artificial joint surgery. Since the introduction of these drugs, however, there have been few reports of long-term outcomes of TKA for RA.

A CLOSER LOOK AT RA AND ITS TREATMENT
Rheumatoid arthritis (RA), a chronic inflammatory systemic disease, affects several joints in the body. It is an auto-immune condition in which the body attacks its tissue, mainly joints. The hands, wrists, and knees are the most common joints affected by RA. The lining of a joint affected by RA becomes inflamed, causing joint-tissue destruction. Long-term or chronic pain, unsteadiness (loss of balance), and deformity (misshapenness) can all result from tissue damage. Many rheumatoid arthritis patients undergo orthopaedic surgery, particularly prosthetic joint replacement surgery. According to the Scandinavian arthroplasty registers, RA patients account for 3–15 per cent of all prosthetic joint replacements in the hips and knees. Other joints including shoulders, elbows, fingers, and ankles are also commonly replaced in RA patients.

SURVIVAL OF RA PATIENTS WITH TKA
Since Cobb et al. released their review in 1953, several studies of rheumatoid arthritis patient survival and prognosis have been published. Patients with rheumatoid arthritis had a 50% worse survival rate than a control group in a prospective longitudinal study. This study from 1997 emphasised the use of cement for primary fixation. According to the researchers, knee prosthetic designs, materials, osteotomy (jigs), and cementing methods should all be improved in the future to obtain better output. Osteotomy during TKA is a surgical procedure in which a bone is operated upon to shorten or lengthen it or to correct its alignment.

Further research from 1997 (Laskin et al) shows that in patients with RA, posterior cruciate ligament-retaining TKA (posterior cruciate ligament is a ligament located at the back of the knee) causes a much higher rate of posterior instability and re-currence. (Deformity of the knee joint), leading to an early revision in certain cases. The posterior cruciate ligament should be sacrificed in rheumatoid arthritis patients, and a prosthesis with intrinsic constraint should be employed instead.

Norwegian Arthroplasty Register: Knee Joint Arthroplasties in RA Patients
A study conducted by researchers at the Norwegian Arthroplasty Register in 2010 evaluated the risk of infection in primary total knee surgery in RA patients. Because of the nature of the disease and the therapy with standard disease-modifying antirheumatic medications, patients with RA are thought to be more susceptible to infection. There are conflicting studies into whether RA patients’ higher baseline infection risk influences the probability of deep infection after initial total joint replacement surgery. In elective orthopaedic surgery, prosthetic joint infection (PJI) is a serious complication. The patient will likely face implant removal or exchange, which will result in a functional decrease, a long hospital stay, and the use of potentially toxic and antimicrobial resistance-inducing medications. A noteworthy finding of this study was that individuals with RA had a higher risk of infection and revision after total knee replacement. Because of the connective tissue illness, RA and its potentially immunomodulating medicine are risk factors for skin and soft tissue infections. One possible explanation is that the sensitive soft tissue envelope around the knee joint makes the total knee replacement RA patients more susceptible to infection.

Investigation from Kyoto Shimogamo Hospital
Dr Fumiharu Yamashita and his team from the Department of Orthopaedic Surgery, Kyoto Shimogamo Hospital, Japan, have investigated the post-operative outdoor walking period of patients who have undergone TKA. In this investigation, they present two major observations. These include the long-term results of TKA in RA patients who were treated with TKA over 13 years beginning in 1997, and the outcomes of a survey that highlights the possibility of long outdoor walking after TKA. They also emphasise the importance of information sharing between physicians and RA patients regarding the post-operative ambulation period before TKA.

The records of 142 consecutive patients with RA (201 knees), who had a primary TKA from August 22 1997 to March 16 2011, were evaluated in this retrospective research. All procedures were performed under general anaesthesia by a single surgeon at a single institution, and all patients were treated by the same doctor. 79 patients were on oral steroids, and 82 patients were on methotrexate at the time of surgery. In 22 patients, TKA was performed concurrently with biologic treatment with a tumour necrosis factor antagonist. After TKA, 59 patients

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Progression of bone resorption of the hand for patients with mutilans type RA:
- a) 40 years old, female, 3 years after RA incidence
- b) 52 years old, female, 15 years after RA incidence
- c) 52 years old, female, 15 years after RA incidence
behind the research
Dr Fumiharu Yamashita

Research Objectives
Dr Fumiharu Yamashita studies the postoperative outdoor walking period of patients who have undergone total knee arthroplasty.

Detail
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Bio
Dr Fumiharu Yamashita has been undertaking basic and clinical practice on articular cartilage repair, joint surgery and rheumatoid arthritis since 1966. Since 1988 he is Associate Professor at the Department of Orthopedic Surgery, Kyotio Prefectural University of Medicine in Japan. In 1992 he became Director of the Kyoto Shimogamo Hospital. Since 2017, Dr Yamashita is Chairman of Medical Corporation, Kyoto Shimogamo Hospital.

Collaborators
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References

Personal Response
Do you and your team have any plans to conduct similar research on patients with osteoarthritis in future?

Currently, we are investigating the walking period of patients with knee osteoarthritis who underwent TKA at the same time as this paper. We are also investigating the survival rate of RA and OA patients. Very interesting results have been obtained. I would like to publish it as a treatise in the future.

The inability to continue outdoor ambulation was not discovered to be caused by bilateral TKA or subsequent lower extremity surgery.

All patients were assessed for the Japanese Orthopaedic Association score (JOA score), active ROM, X-ray findings, RA activity, duration of outdoor ambulation, and implant cumulative survival rate. On a 100 point scale, JOA scores measure pain, range of motion, manual muscle testing, capacity to ambulate, and ability to climb stairs. Pain is marked 40 points, ROM is marked 12 points, quadriceps muscle strength is marked 20 points, walking period of patients who have undergone total knee arthroplasty is marked 20 points, walking ability is worth 70 points, and climbing stairs is worth 60–69 points. JOA scores measure pain, range of motion, manual muscle testing, capacity to ambulate, and ability to climb stairs. Pain is marked 40 points, ROM is marked 12 points, quadriceps muscle strength is marked 20 points, walking ability is worth 70 points, and climbing stairs is worth 60–69 points. JOA scores measure pain, range of motion, manual muscle testing, capacity to ambulate, and ability to climb stairs. Pain is marked 40 points, ROM is marked 12 points, quadriceps muscle strength is marked 20 points, walking ability is worth 70 points, and climbing stairs is worth 60–69 points.

METHODS AND OUTCOME OF DR YAMASHITA’S INVESTIGATION
Genevices (Smith and Nephew, Memphis, TN, USA) was the type of prosthesis utilised in all cases and was first presented in Japan in August 1997. 115 patients (164 implants) had cruciate-retaining TKAs, 25 patients (35 implants) had posterior-stabilised TKAs, and two patients had revision TKAs (two implants). On post-operative day 1, an extension knee brace was applied in all cases, and ROM (range of motion) exercises, continuous passive motion, and muscle-strengthening activities were begun. Weight-bearing was permitted the second day after surgery, and stair climbing began three weeks later. After being able to walk with a T-cane and endure ascending stairs, all patients were discharged from the hospital.

The shorter length of outdoor ambulation has been linked to advanced stage of disease, the presence of comorbidity, and surgical complications. Functional outcome and walking ability was assessed using the Japanese Orthopaedic Association score (JOA score). Patients were classified as having excellent, good, fair, or poor functional outcomes. Excellent and good functional outcomes were marked as 15 points, and fair and poor functional outcomes were marked as 10 points. Outdoor ambulation was assessed using the JOA score. Patients were classified as having excellent, good, fair, or poor functional outcomes. Excellent and good functional outcomes were marked as 15 points, and fair and poor functional outcomes were marked as 10 points.

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