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Dasari Sri Lakshmi

Ayurveda Physician and
Physiotherapist, Jayalakshmi
Anusandhana Chikitsalaya,
SGS Hospital, Sri Ganapathi
Sachchidananda Ashram,
Mysore, India.

Correspondence:

Dasari Sri Lakshmi
Ayurveda Physician and
Physiotherapist, Jayalakshmi
Anusandhana Chikitsalaya,
SGS Hospital, Sri Ganapathi
Sachchidananda Ashram,
Mysore, India.

“Hydrotherapy in Total Knee Arthroscopy – A Case Report”

Dasari Sri Lakshmi

Abstract

Total knee arthroplasty (TKA) or total knee replacement is the reconstruction surgery of the knee joint. TKA is the best treatment option for those who suffer osteoarthritis symptoms in at least 2 out of the 3 compartments of the knee who have failed conservative treatments. TKA physiotherapy is very essential to maintain joint mobility and continuing to do the knee exercises is the key for optimal recovery to start the routine life. Hydrotherapy or aquatic exercise therapy is a unique technique of exercising in water to help patient perform movements with great ease. TKA patient post-operatively commonly complains of pain and stiffness of the joint due to which exercising and walking are painful for the first 2-3 months. Buoyancy of water helps release body weight on joints and finds it easy to perform the movements. Hydrotherapy was started after complete wound healing. 3 weeks of hydrotherapy helped patient to have reduced pain, stiffness and thus was able to weight bear more willingly. Hence this paper presents the potential benefits of hydrotherapy in TKA after complete wound healing as choice of management for optimal recovery with reduced pain, stiffness and duration.

Keywords: Total knee arthroplasty (TKA), total knee replacement (TKR), hydrotherapy, aquatic exercise therapy, buoyancy, physiotherapy.

Introduction

Total Knee Arthroplasty (TKA) is also commonly referred to as total knee replacement which is reconstruction surgery of the knee joint. TKA is choice of treatment option for patient who suffer with osteoarthritis symptoms in at least 2 compartments of 3 in the knee and has failed conservative treatments are indicated for TKA. Partial knee arthroplasty is a treatment option for individuals with symptomatic osteoarthritis localized to 1 compartment of the knee and has no relief with conservative treatment. The primary goal of TKA or partial knee arthroplasty surgery is pain relief with improved functional activities. Knee is a synovial hinge joint with minimal rotational movements. It is comprised of the distal femur, proximal tibia, and the patella. The 3 separate articulations and compartments are medial femoro-tibial, lateral femoro-tibial, and patello-femoral. The stability of the knee joint is provided by the congruity of the joint as well as by the collateral ligaments. The capsule surrounds the entire joint and extends proximally into the suprapatellar pouch. Articular cartilage covers the femoral condyles, tibial plateaus, trochlear groove, and patellar facets. Menisci are interposed in the medial and lateral compartments between the femur and tibia which act to protect the articular cartilage and support the knee. The asymmetry of the natural bony anatomy maintains the alignment of the joint and ligamentous tension.^[1]

Dynamics of Hydrotherapy

Hydrotherapy is the use of water for treatment. It is one of the basic methods of treatment widely used in the system of natural medicine, which is also called as water therapy, aquatic therapy, pool therapy, or balneotherapy. Use of water in various forms and in various temperatures can produce different effects on different system of the body. Hydrotherapy for health promotion is one of the naturopathic treatment modalities used widely in ancient cultures. ^[1] Hydrotherapy practice in physiotherapy has developed from a scientific basis of

hydrodynamic theory. An understanding of the physical properties of water and the physiology of human immersion, coupled with skills to analyse human movement, have helped physiotherapists in using hydrotherapy as a tool for facilitating movement and restoring function. Hydrotherapy offers benefit toward improving pain, strength, flexibility, function, balance and fitness in patients with generally chronic conditions such as rheumatic diseases, osteo-arthritis, chronic low back pain and or among elderly people. [2-5]

Case Report

A 62-year-old female patient with severe arthritis right knee who is suitable for TKA underwent the surgery. Patient approached SGS Hospital for Physiotherapy 8 days post-operatively.

On examination

- Patient complained of pain, stiffness and inability to do knee flexion and extension.
- Joint was oedematous and staples were not removed.
- Active knee flexion was 30° and extension with 10° lag.
- Could walk for 20 steps at a stretch with support of walker thrice daily.
- Circumductory limping gait was observed as no movement was made in knee joint and hip circumduction was done to clear the ground while walking.

Past history

Patient had a history of fall 1 year prior to surgery and pain was managed. After 15 days it was diagnosed as ligament tear. The pain was gradually increasing even though all the conservative treatments were done. Patient’s daily activities gradually started to restrict due to severe pain. After complete evaluation patient was indicated for TKA.

Rehabilitation Program and Results

After TKA surgery regular Physiotherapy was started 8 days post-op after complete evaluation. Active knee exercises, gait correction, walking and stair case climbing with support were incorporated gradually. On 21st day patient could walk independently without support though gait correction was done till near normal gait was achieved. On 25th day post-op patient could climb up and down of stairs with support. As progress was gradual and without complications, patient was rehabilitated accordingly and after complete wound healing on 39th day post-op with surgeon’s approval hydrotherapy was started. After 3 weeks of hydrotherapy patient could feel reduced stiffness and pain. Hence knee movements, walking and stair case climbing were done with ease. Rehabilitation program is in Figure-1 and results are discussed in Table-1.

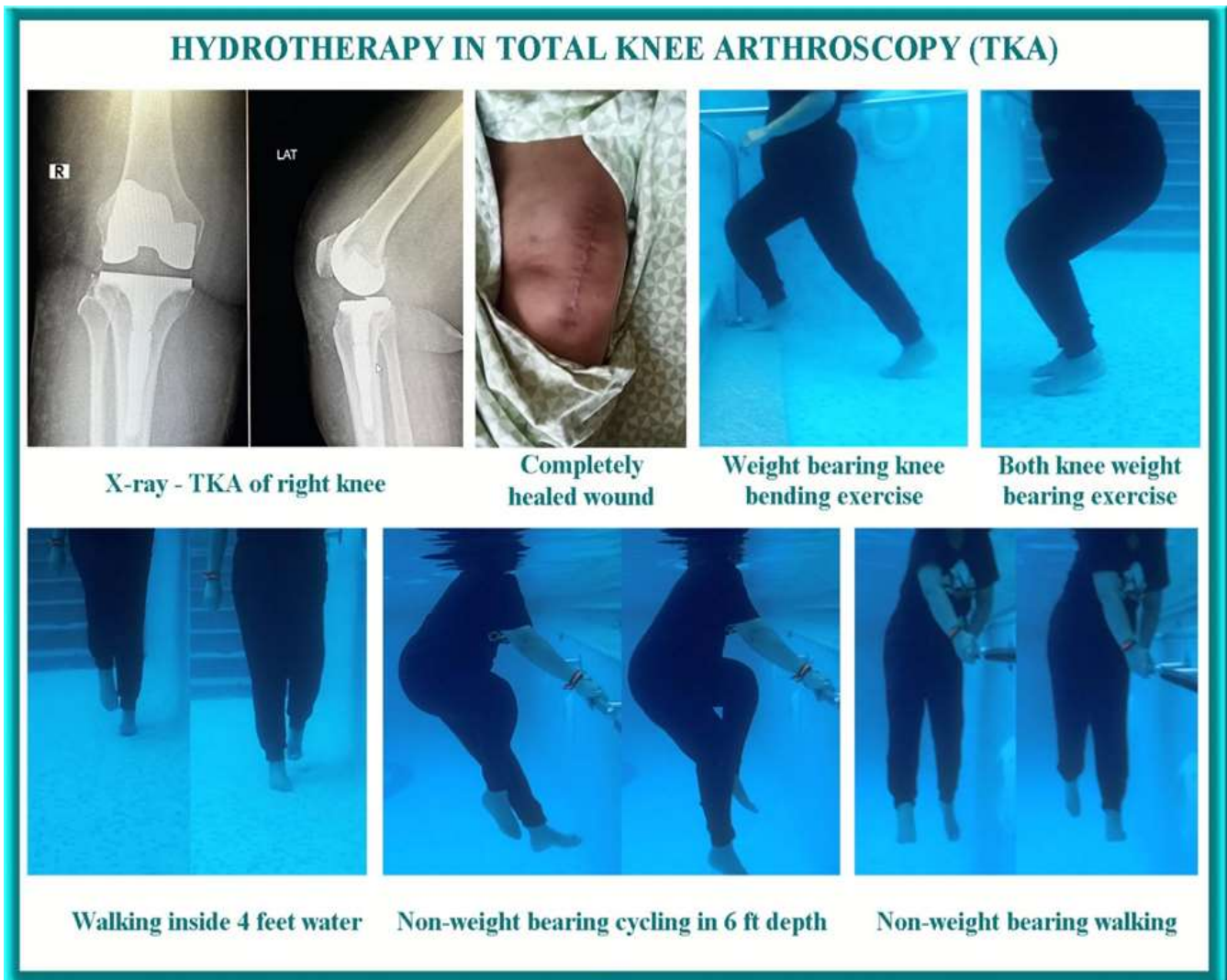


Fig.-1: Rehabilitation program – hydrotherapy

Table-1: Results.

| Post-Op day | TKA knee ranges | | Exercises progress/Results |
|--|--|------------------------------------|---|
| | Flexion | Extension | |
| 8 th day | 30° | 15° extension lag | Gait correction in front of mirror with help of supporting bars. |
| 9 th day-20 th day | Improved from 30° to 90° | Extension lag reduced from 15°-10° | Gait correction, non-weight bearing one step climbing and quadriceps strengthening exercises with ice pack in between exercises. |
| 21 st day | 90° but pain and stiffness from 45° | 10° extension lag | Initial attempt to walking without support. |
| 22-26 th day | Gradual reduction of pain range | 10° extension lag | One step partial weight bearing in front of mirror and gradually holding in weight bearing position for 10 seconds. |
| 27 th day | 90°, pain and stiffness from 60° | 10° extension lag | Initial attempt to climb up stairs weight bearing on right knee with support- one leg at a time. |
| 35 th day | 90°, pain and stiffness from 70° | 5° extension lag | Alternate leg stair case climbing with support and weight bearing on right knee. |
| 39 th day | 90°, pain and stiffness from 70° | 5° extension lag | Wound completely healed. With surgeon's approval hydrotherapy was started. |
| 3 weeks after 39 th day | | | Exercises in water – knee bending, single leg weight bearing on right knee, 90° squats, walking for 30 minutes in water and cycling movements were gradually incorporated over 10 days duration. Same exercises were continued for remaining 11 days. |
| 60 th day | 90°, pain and stiffness only at final degrees. | Full, mild discomfort | Walking and stair case climbing without support with ease. Pain and stiffness have reduced considerably. |

Discussion

TKA is a reliable treatment option for patients suffering from knee pain secondary to osteoarthritis who have failed conservative treatment measures. TKA is indicated for pain relief; improve functional status and correction of a significant or progressive deformity at the knee with evidence of osteoarthritis. The two major factors for primary osteoarthritis are increased average life expectancy and obesity contributing to the wear and tear of articular cartilage in the major weight-bearing joints. Patients can also suffer from secondary osteoarthritis, or osteoarthritis caused by an abnormal concentration of force across the joint such as in rheumatoid or post-traumatic cases. Initial treatment is conservative and once conservative treatment is not effective, surgical intervention may be considered. TKA is a reliable surgical procedure with a predictable outcome in the indicated patient.

Hydrotherapy is a unique technique of working in water to help patient perform movements with great ease in painful conditions like TKA after complete wound healing. Buoyancy of water helps release body weight on joints and person finds it easy to perform the movements. As per Archimedes's Principle of buoyancy, body immersed in a liquid experience an upward force equal to the weight of the liquid displaced. This is why the body feels less weight in water than on land, this is also the principle behind hydrostatic weighing. A perpendicular pressure against the surface of the body exerted by water is called hydrostatic pressure. Water molecules have a tendency to attract each other. As a result, molecules are cohesive. This causes an increase in resistance to range of motion, compared to that of the air. Buoyancy of water can assist and resist with the exercises of the extremities. Changing the speed will either grade or change the exercise difficulty. Buoyancy of water is affected by postural alignment and the surface area immersed in the water.

Hydrotherapy can be choice of management in painful and musculoskeletal disorders. It helps in pain management, maintaining muscle flexibility and improves/maintain joint range of motions. Due to the above advantages of

hydrotherapy, after complete wound healing exercises for TKA were done in water. Following exercises were done at 4 feet depth where in low back and both lower limbs were completely immersed in water. Hydrotherapy exercises of right knee bending placing right leg on step help to do knee flexion as well as weight bear in bent posture like in stair case climbing. Single leg weight bearing on right knee was encouraged so that total body weight is carried by right leg. While walking to clear left leg from the ground entire body weight is transferred to right leg. Hence this exercise will help to weight bear on right leg. 90° squats will help to take body weight on knees and standing up are movements similar to sitting to standing from chair. Walking for 30 minutes in water was encouraged, as walking inside water is easier than walking outside due to buoyancy of water. At 6 feet depth non-weight bearing 90° squats, non-weight bearing walking and cycling movements were gradually incorporated. Patient was immersed till shoulders and patient was holding supporting bars while doing exercises. Hence to do hydrotherapy exercises learning swimming is not a prerequisite. All above exercises were gradually introduced over 10 day's duration and number of repetitions were increased gradually. Hydrotherapy exercises were started for 15-20 minutes and gradually increased to 45 minutes; later same exercises were continued up to 3 weeks. The results were encouraging with reduced pain, stiffness and improved joint mobility while doing exercises that has been experienced post-operatively.

Conclusion

In TKA maintaining joint mobility and continuing to do the knee exercises is the key for optimal recovery to start the routine life. Regular physiotherapy was given post-operatively and after complete wound healing hydrotherapy was started. 3 weeks of hydrotherapy helped patient greatly with reduced pain and stiffness. Patient was also able to completely weight bear on operated knee while walking and staircase climbing. Hydrotherapy in TKA after complete wound healing can be choice of rehabilitation

method for optimal recovery with reduced duration, less discomfort, pain and stiffness.

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