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Physiotherapy for Total Knee Replacement

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Abstract

A clinical practice guideline on total knee arthroplasty was developed by an American Physical Therapy (APTA) volunteer guideline development group that consisted of physical therapists, an orthopedic surgeon, a nurse, and a consumer. The guideline was based on systematic reviews of current scientific and clinical information and accepted approaches to management of total knee arthroplasty.The most important gold standard treatment following advanced knee osteoarthritis is total knee arthroplasty. Following surgery of total knee replacement, the majority of patients report decreased pain and successful long-term results, but recovery is unpredictable, and most patients continue to exhibit muscle weakness in their lower limbs and functional limitations in comparison to similarly aged control individuals.

Keywords: Knee Arthroplasty, Knee, Knee Injuries

I. Introduction

Large joint osteoarthritis (OA) is among the most prevalent diseases causing pain and disability worldwide. The exact etiology and mechanism of developing knee OA are still unknown; however, several factors may increase the risk its occurrence. **(1)**

Knee OA could be induced due to the disturbance of the equilibrium between the cartilage degeneration and regeneration with aging, causing knee joint pain, stiffness, limping, and even deformity. Joint cartilage cannot be regenerated naturally. Delaying the degenerative process is the mainstay of manageme**(2)**

Total knee replacement operation (TKR), also known as total knee arthroplasty (TKA), is the treatment of choice in severe knee OA, with failed conservative treatments. The frequency of TKR operations in the USA is anticipated to reach more than three million by 2030 .**(3)**

Although TKR reliably reduces pain and improves self-reported function in patients with end-stage, however, the optimum functional capacity and muscle strength are still hard to regain after surgery, which may subject the patients to future persistence of pain and disability**(4)**

Following TKR, around 60% decrease in quadriceps strength has been reported, even with early starting of the post-operative rehabilitation. This quadriceps weakness may lead to long-term deficit and impairment of functional performance after TKR surgery. There is a high positive correlation between quadriceps muscle deficits and the continued functional limitations**. (5)**

Hence, interventions are needed to be initiated from the early post-operative phase in order to improve the post-operative quadriceps strength, and this is very important to increase the beneficial outcomes post-TKR . According to Bade and colleagues, most of the current TKR rehabilitation programs are not fully effective in regaining the optimal muscle strength to normal levels**.(6)**

The majority of rehabilitation protocols aim to improve quadriceps strength and range of motion (ROM). These protocols also intend to facilitate activities of daily living (ADL), and aid in the performance of more demanding exercise . Thus, activities that promote muscle strength, gait, and balance are specifically targeted to maximize outcomes.**(7)**

In recent years, numerous postoperative interventions have been evaluated. These practices include continuous passive motion, high velocity contractions, rapid rehabilitation, and telerehabilitation. Some of these interventions, such as high velocity contractions, modify the technique with which patients perform specific exercises . Other interventions including telerehabilitation utilize remote devices to provide standard rehabilitation**.(8)**

Despite the many rehabilitation modalities available, the optimal rehabilitation strategy has yet to be determined. The lack of consensus on the most effective strategies is likely a result of the existing variation in the delivery, duration, and intensity of rehabilitation programs. Consequently, there is a scarcity of evidence-based practice guidelines and recommendations to guide postoperative TKA rehabilitation.**(9)**

Regular exercise to restore strength and mobility to your knee and a gradual return to everyday activities are important for your full recovery after total knee replacement. orthopaedic surgeon and physical therapist may recommend that you exercise for 20 to 30 minutes daily, or even 2 to 3 times daily; and walk for 30 minutes, 2 to 3 times daily during your early recovery.**(10)**

Knee replacement physiotherapy involves instructions and education for patients in performing daily activities. It also involves exercises for joints and muscles, which help the replaced knee recover faster. Physiotherapists always plan the exercise program according to the needs and demands of each patient. For example, suppose a person is an athlete and needs strength in his knee muscles to return to sports activities. In that case, a physiotherapist designs a unique set of exercises for him to be competitive.**(11)**

Physical therapy after knee replacement uses different exercises, each with a different goal and technique. In the start, light exercises are used in sessions, which gradually increase to put extra load on the knee joint. **(12)**

Rehabilitation starts on the same day as knee replacement surgery, and it may sound strange to you. On the day of surgery, the physiotherapist guides the patient to stand up with the support and walk a few steps. The hospital staff will provide help for daily activities like using the toilet or changing clothes. The physical therapist also guides the patient on how to get in and out of bed and do different daily activities with less irritation**.(13)**

II. Physical therapy after total knee replacement

Physical therapy after total knee replacement includes strength training, and the physiotherapist gradually increases the load on the knee joint where knee replacement surgery is performed. The physical therapist also works on flexibility, balance, and walking training as the patient improves. Rehabilitation also involves a home training program, where physiotherapists teach patients to move around in the home environment**.(14)**

Every patient has a unique condition at the time of surgery, and each patient may require different time periods to recover fully from knee replacement surgery. Because of the severity of their condition, some patients need more physiotherapy sessions than others**.(15)**

Physiotherapy after knee replacement surgery helps in faster recovery and is now an important part of the recovery. Orthopedic surgeons and physiotherapists work in collaboration to plan individual treatment for each patient according to their condition. Physio after knee replacement improves new knee joint integrity and strengthens the muscles around the knee joint**.(16)**

TKR has been proven to be effective for improving a patient's functional status and overall health quality, and it is widely regarded as a highly cost-effective intervention for end-stage knee osteoarthritis.GP input is vital in the continuum of care for the periods both before and after TKR surgery, particularly for communicating with patients about their expectations for TKR outcomes and rehabilitation. **(17)**

III. Knee rehabilitation

Knee rehabilitation practices have vastly evolved in the past decade, with many being associated with a paradigm shift from a traditional 'sick patient' model of care to a 'well patient' model. Advances in multimodal pain management, blood management and early mobilisation protocols all contribute to a rapid recovery pathway that has been proven to lower hospital length of stay without adversely affecting postoperative complications or readmissions**(18)**

Rapid recovery pathways encompass each stage of the patient journey and are primarily aimed towards reducing length of hospital stay while maintaining patient outcomes.[8] Recent non-surgical

advances in the perioperative period have enabled early mobilisation and have had a direct impact on reducing length of stay.**(19)**

Examples of these advancements include blood preservation protocols, multimodal analgesia delivery, avoidance of surgical drains and a decreased use of indwelling urinary catheters (IDCs). these low-technology, low-cost or no-cost changes in practice account for the greatest share of improvements in patient experience over the past decade**.(20)**

Minimising perioperative blood loss and reducing postoperative blood transfusion is an effective blood management strategy that is essential to rapid recovery joint arthroplasty and reduces episode-of-care costs. **(21)**

Tranexamic acid (TXA) is an antifibrinolytic inhibitor that minimises bleeding by blocking blood clot degradation. Randomised trials have shown that TXA administered either intravenously or topically results in reduced rates of transfusion and thrombotic events in a TKR population, as well as reduced drain output (when used) and increased postoperative haemoglobin. **(22)**

In accordance with the decreased need for wound drains is the reduction of IDC use in TKR surgery as a result of low-dose spinal anaesthesia and early mobilisation protocols. Discontinuing routine IDC insertion for TKR is an important component of rapid recovery pathways, which aim to facilitate early mobilisation and achievement of discharge goals. **(23)**

The use of an IDC can potentially increase postoperative urinary tract infections (UTIs), and the duration of its use is the most important risk factor for developing a UTI.[12] This is highly relevant to patients with TKRs as a UTI has been associated with an increased risk of prosthetic joint infection.**(24)**

Evidence now suggests that even those patients with TKRs who undergo epidural analgesia show no increased risk of postoperative urological complications without the placement of a preoperative IDC; for those with prostate disorders, the placement of a preoperative IDC increases the risk of postoperative UTI**.(25)**

Postoperative pain following TKR surgery is feared by a number of patients and, if severe, may inhibit early mobilisation and knee range-of-motion exercises. Multimodal analgesia is an integral part of a rapid recovery pathway, with regional nerve blocks and peri-articular injections (PAIs) used in favour of epidural anaesthesia or patient-controlled analgesia (PCA) devices.**(26)**

Low-dose spinal anaesthesia and sedation when combined with a regional nerve block and PAIs is highly effective for promoting rapid recovery. It facilitates early mobilisation without the undesirable side effects of nausea, vomiting and drowsiness often associated with opioid drugs administered by means of intravenous PCA.**(27)**

Current definitions of early mobilisation refer to ambulation 4–8 hours following TKR surgery.'Day of surgery' mobilisation is becoming a more common practice in Australia because of the wide range of health benefits it provides to patients, with the realisation that it is extremely advantageous for patients to gain consciousness post-surgery with no pain and the ability to mobilise within a few hours of their surgery. A literature review of early mobilisation protocols in a post-surgical population revealed reduced rates of postoperative complications such as deep vein thrombosis, pneumonia, atelectasis, UTIs, sepsis, myocardial infarction and stroke.**(28)**

Early mobilisation has shown a reduction in hospital length of stay, and there is evidence to suggest it can provide improved patient outcomes without an increased risk of complications.**(29)**

Patients have also reported an overall increase in satisfaction with the introduction of early mobilisation and less pain than patients receiving standard care. Previous attitudes about hospitalisation have reinforced passive coping strategies and inactivity in patients; however, early mobilisation assists to counteract this and improve health-related quality of life.**(30)**

Despite patients with TKRs receiving an in-hospital physiotherapy program of some description, the optimum type of TKR exercise intervention in the early postoperative phase remains unknown. A recent systematic literature review and meta-analysis exposed an urgent need for further high-quality studies into supervised exercise therapy programs that aim to provide greater functional outcomes and patient-reported satisfaction following TKR surgery, particularly in the early postoperative period.**(31)**

Differing protocols provide some instruction for exercises after TKR to be used in combination with healthcare professionals' clinical judgment to make adjustments or progressions. Unfortunately, this paucity of evidence hinders the creation of best-practice guidelines for specific exercises, including their duration or frequency following TKR surgery; currently, vast variations in care exist. The goals of physiotherapy have changed in line with rapid recovery pathways that have been shown to rapidly decrease length of stay after TKR surgery.**(32)**

The most effective physiotherapy exercise protocol during the acute hospital stay is based on restoring safe functional mobility and performing exercises with a focus on increasing knee range of motion such as bike pedalling. **(33)**

It showed that a simple self-directed, low-cost, three-exercise bike pedalling–based protocol was superior to a therapist-led standard multi-exercise regimen, for both functional and patient-reported outcomes. Based on the results of this trial, patients who have had a TKR can complete a few simple home-based exercises – focusing on bike pedalling, knee extension and heel-toe walking practice – for the first two weeks following their knee surgery and expect optimal outcomes.**(34)**

Conclusion

The early implementation of a high-intensity rehabilitation program following total knee replacement operations had resulted in greater short- and long-term functional gain compared to the lower-intensity rehabilitation program, so it is advisable to be implemented to augment the functional outcomes post-TKR surgeries**(35)**

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