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Effectiveness of physiotherapy exercises following total knee replacement: A case report

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Abstract

56 year old female, housewife by occupation had a history of bilateral knee pain for the past 4 years. Patient came to orthopaedic physiotherapy department with chief complaint of difficulty to bend right knee since one and half months. The intervention was carried out 5 sessions per week for 6 weeks. The patient was treated with range of motion exercises, stretching and mobilization.

Keywords: Total knee replacement, postoperative physiotherapy, osteoarthritis.

1. Introduction

Osteoarthritis (OA), also known as degenerative joint disease, is the most prevalent non-inflammatory joint disease. There are two classifications for OA, primary OA and secondary OA. Idiopathic OA has not known risk factors. Secondary OA is usually metabolic, anatomic, traumatic, or inflammatory in nature [1]. The common risk factors for OA include increasing age, obesity, previous joint injury, overuse of the joint, weak thigh muscles and genetics.² Both men and women have OA, but before the age of 45 it is more common in men; after age 45, it is more common in women [3]. Those with knee OA often have difficulty performing everyday tasks such as bathing, dressing, cleaning, kneeling, and using. It is estimated that approximately 27 million people in the United States have clinical OA of at least 1 joint.⁴ Clinical OA is defined by examination of the patient on the basis of symptoms and physical findings [5]. An estimated 10 to 15% of older adults develop knee OA [6] Osteoarthritis (OA) is the largest source of physical disability and the joint most commonly affected by OA is the knee. OA becomes more prevalent with aging [7]. The most common reason for TKA is osteoarthritis (OA) of the knee joint. This degenerative process is estimated to affect 10-15% of older adults above the age of 60, and can result in significant joint pain, stiffness, range of motion limitations, and functional mobility impairments [8] when conservative treatment options such as weight loss, regular exercise or medical interventions fail to provide adequate symptom relief, TKA is considered [9] Immediately following surgery, physical therapy is initiated within the hospital and often times, continue after the patient is discharged in an outpatient setting. Rehabilitation is aimed at reversing the limitations and impairments associated with the TKA procedure with a focus on pain management, ROM, strengthening, gait mechanics and functional activity training [10].

Case description

History: 56 year old female who is housewife by occupation had a history of bilateral knee pain since 4 years she was diagnosed with bilateral osteoarthritis of knee and was treated with PCL substituting implant by an orthopaedic surgeon. Then patient was referred to an orthopaedic physiotherapy department. Patient came with a chief complaint of difficulty in bending her right knee associated with difficulty in walking, after then patient knee was examined and physiotherapy treatment was started and intervention was carried out 5 sessions per week for 6 weeks.

Investigation

X ray was done in Antero-Posterior view and Lateral view according to Kellgren and Lawrence system of classification of osteoarthritis of knee: osteophyte formation, joint space

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narrowing, severe sclerosis (fig. 1), post-operative total knee replacement of right side (fig. 2).



Fig 1: Pre-operative X-ray



Fig 2: Post-operative X-ray

Outcome Measures: Pain intensity was assessed using Numerical Pain Rating Scale (NPRS), Knee range of motion was measured using universal goniometer, and knee strength was assessed by using Manual Muscle Testing (MMT), Barthel index was used for measure functional dependency.

Treatment

Before starting the treatment, importance of physiotherapy, treatment protocol and its possible improvement was explained in brief to the patient by the therapist. On the basis of problem list, short term and long term goal were planned. Treatment focused on therapeutic exercises for strengthening and joint mobility as these impairments directly affects the patients functional mobility. Strengthening and range of motion treatment were made to be challenging to the patient and progressive in nature. Treatment also includes modalities to reduce pain. Treatment was given for 5 sessions per week for 45 minutes for 6 weeks and consists of following: Treatment consisted of all the components of conventional physical therapy in

addition to manual physical therapy. Components of conservative physical therapy included range of motion exercises, strengthening exercises, aerobic exercises, stretching, and training in performance of everyday activities, such as navigating stairs and ambulation. Manual therapy techniques included joint mobilization, scar tissue massage and therapist-assisted manual stretching. Each treatment session was approached from an impairment-based model, with the physical therapist making adjustments in the delivery of interventions (i.e. amount of time, intensity, etc.) according to the needs of the patient. All treatment sessions began with an 8 to 10 minutes warm-up on the stationary recumbent bicycle to increase the blood flow and extensibility of the muscles surrounding the knee joint. The conventional physiotherapy treatment includes a cold pack which was applied to the knee joint following the treatment session for pain relief and to reduce swelling. Stretching of the lower extremity muscles – predominantly of the quadriceps and hamstrings – was conducted both independently by the patient and with overpressure applied by the physical therapist (3 repetitions/set). Strengthening exercises with theraband were aimed primarily to increase strength in the quadriceps and to a lesser extent in the hip muscles. Strengthening exercises targeting the quadriceps progressed from open-chain exercises such as quad sets and short-arc-quads to closed-chain exercises such as step-ups and mini squats (10 repetitions/ set). Continuous passive movement (CPM) was given to improve knee flexion range. During the later half of the patient’s therapy course, training in functional activities such as stair climbing, forward walking, and sideways walking, backward walking was done. This was followed by manual therapy techniques such as joint mobilization to relief pain (Maitland Grade 1 and 2) which further progress into increase knee joint mobility, mobilization to the patella were performed (Maitland Grade 3 and 4). Additionally, the patient was given a home exercise program to be performed on non-treatment days that consisted of stretches and exercises that replicated or approximated those, done during therapy sessions. After intervention there was reduction in pain at knee as well as improvement in range of motion, muscle strength and functional independency.

Table 1: Show Pre-intervention and Post-intervention

Outcome measures	Pre-intervention		Post-intervention	
NPRS	7		3	
Knee ROM	AROM	PROM	AROM	PROM
Flexion	0-42 ⁰	0-45 ⁰	0-95 ⁰	0-110 ⁰
Extension	42-5 ⁰	42-3 ⁰	0	0
Knee MMT				
Flexors	2-		4-	
Extensors	1		4-	
Barthel index	40		80	

Discussion

The above results showed significantly improved functional outcomes in pain, range of motion, strength and functional independency. Pain over right knee was reduced to 3 from 7 on NPRS scale. Range of motion improved to 110⁰ from 42⁰ of right knee after all intervention. Although restricted knee ROM is a common post-operative impairment encountered following TKR. Active range of motion helps to improve functional activity. Maitland mobilization helps

to improve range of motion as well as to reduce pain. Stretching helps to reduce contracture and tightness.

A. F. Lenssen, R. A. De Bie conducted a study to determine the effect of continuous passive motion (cpm) in rehabilitation following total knee arthroplasty. The results indicate that, in addition to an improved range of motion, a protocol including CPM seems to have a favourable effect on pain and muscle strength in the first two weeks after surgery^[11].

Nor Azlin M.N. & K. Su Lyna conducted a study to determine the effects of passive joint mobilization on pain and stairs ascending-descending time in subjects with knee osteoarthritis (OA knee) which shows that the addition of passive joint mobilization to conventional physiotherapy reduced pain but not stairs ascending-descending time among subjects with knee osteoarthritis^[12]

Mariette J Jansen, Wolfgang Viechtbauer conducted a study to know the effects of strength training alone, exercise therapy alone and exercise with additional passive manual mobilisation on pain and function in people with knee osteoarthritis. The study concluded that Exercise therapy plus manual mobilisation showed a moderate effect size on pain compared to the small effect sizes for strength training or exercise therapy alone. To achieve better pain relief in patients with knee osteoarthritis physiotherapists or manual therapists might consider adding manual mobilisation to optimise supervised active exercise programs^[13]

Conclusion

On the basis of present study, it can be concluded that physiotherapy treatment helps to reduce pain, improve range of motion, strength and improve functional independency.

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