Use of Postoperative TENS Along with Rehabilitation Protocol Following Total Knee Replacement for Better Results

Jyoti Sahni[1], Rituraj Verma[2], Taruna Verma, [3]Vikas Sharma[4]

[1]Student Researcher, BPT Galgotias University, Greater Noida, India, [2]Associate Prof., Physiotherapy HOD, MPT (Orthopedics), Galgotias University, Greater Noida, India, [3]Assistant Professor, Galgotias University, [4]Assistant Professor, Galgotias University

Abstract

Objective: To assess the viability of TENS in diminishing agony and increasing function following TKR.

Sample: 30 subjects (age>55years)chose based on consideration and avoidance standardsare included in the study.

Method: 30 subjects were taken in the study,chosen based on consideration and rejection models and arbitrarily assigned to each group. Group 1 and group2. Experimental group (group 1) received TENS and exercise while control group received only exercises for 20 days (6 days per week). Functional testing was done using a questionnaire.

Results: Paired t-test was used for statistical analysis. There was huge distinction between the two groups (A & B). The experimental group has significant improvement then the observational group. The pain VAS score has more difference. There was no significant difference in ADL activities score.

Conclusion: It was concluded that applying TENS along with exercises on initial days of rehabilitation shows better results and increases the recovery process.

Keywords: *Total Knee Replacement (TKR), Transcutaneous Electrical Nerve Stimulation (TENS), Osteoarthritis, Pain, Muscle Strength.*

Introduction

Total knee replacement (TKR) or total knee arthroplasty (TKA) could be a common procedure which is finished for the betterment of knee function and reduce pain mainly in cases of degenerative knee disease called arthritis.[1] Osteoarthritis is the commonest arthritis that ends up in replacement surgeries in knees in maturity patients. People (>55 years) normally suffers from some quite knee problems including disability and pain. On evaluation 7.5% maturity people suffer from these problems, and a couple of them have acute problems. Within the process of ageing there's reduction in size of muscle fibers (fast glycolytic type II), in OA these changes are elevated. Altogether these years strength training programs are used stop all the morphological changes within the muscles assigned to injury or surgery and also in cases of ageing. Within the onset of arthritis, the most muscle that goes first into atrophy is quadriceps causing altered gait and stance.[2] Within the subject of knee pain there's weakness and disability and by the time the patient goes for the surgical procedure the damage to the muscle has already exhausted the shape of muscle atrophy. Rehabilitation following TKR is usually painful for a few of the knee movements like flexion and knee extension.[3] The acute pain during this phase indicates poor recovery (functionally). Pre-surgical program helps to coach muscles for the surgery and also plays a giant role in the post-operative recovery. For the pain

Corresponding Author:
Dr. Rituraj Verma
Associate Prof., Physiotherapy HOD, MPT (Orthopedics), Galgotias University, Greater Noida, India
e-mail: rituraj.verma@galgotiasuniversity.edu.in
Mobile No.: 9953434095

management patients rarely receive the other treatment then pharmacologic drugs. However, drugs can't be much help in cases of acute movement pain within the rehabilitation process.[5] In such cases electrical nerve stimulation (TENS) is incredibly effective for pain management and improving the patient ability to perform exercises. It eventually helps with fast recovery of the patient. TENS blocks the pain stimulation within the neural structure and brain stem by engaged on pain gate mechanism.[23] TENS helps in postoperative pain management. In any case, the few clinical preliminaries that have determined the viability of TENS for torment following TKR were directed over 10 years prior with little example estimates and differing results utilized high recurrence TENS with a ground breaking abundance (30–40mA) and detailed huge variety contrasted with fake treatment TENS on torment very still, torment after extensor muscle compression, and muscle withdrawal capacity, while others indicated no noteworthy variety in pain relieving utilization among TENS, fake treatment TENS, or no TENS.One among these examinations used tangible edge TENS and also the other didn't give specific data on adequacy. Earlier work shows that sufficiency is basic in giving absence of pain TENS in sound controls and people with postoperative agony, demonstrating low adequacy may have added to the noteworthy discoveries in these examinations. Furthermore, these two investigations utilized pain relieving admission because the essential result which can are impacted by different variables, for instance, lack of ability to direct prescriptions during rest or modified wellbeing spans. We've got indicated that TENS declines development yet not resting torment which isn't all around controlled with analgesics. In spite of the actual fact that there are numerous examinations about applying TENS on TKR patients is powerful or not. Here we are going to apply TENS on quadriceps (VMO and Vastus intermedius) alongside the physiotherapy practices convention and check whether there'll be any noteworthy outcomes.[10]

DANIEL L. ANGULO, BS, PT,' CLIFFORD W. COLWELL, JR, MD Use of Postoperative TENS and Continuous Passive Motion Following Total Knee Replacement, JOSPT 1 1: 12 June 1990, Author concluded that, the utilization of two sorts of TENS at high and low intensity produces substantial, though not significantly different, decreases in postoperative pain after TKR when employed in combination with CPM.[10] Other criterion measured for knee flexion arc, narcotic dosage, and hospital stay weren't significantly different for patients using the 2 modes of TENS and CPM alone.[6] Future studies should address whether the concurrent use of CPM and TENS is simpler for pain relief and functional outcome after TKR than the utilization of TENS or CPM alone.

Barbara Rakel, RN, PhD, FAANa, M. Bridget Zimmerman, PhDb, Katharine Geasland, RN, BSNa, Jennie Embree, MSa, Charles R Clark etal. Transcutaneous Electrical Nerve Stimulation (TENS) for the Control of Pain during Rehabilitation Following Total Knee Arthroplasty (TKA): A Randomized, Blinded, Placebo-Controlled Trial, j. pain.2014.09.025. This investigation assessed the adequacy of TENS in lessening torment and hyperalgesia and expanding capacity following all out-knee arthroplasty (TKA). Assessors, blinded to treatment portion, estimated torment, work (ROM and walk speed), and hyperalgesia (quantitative tactile tests) postoperatively and a month and a half after process

S.Asif et al, December 2005, assessed the mid-term consequences of fifty patients who experienced Total knee arthroplasty utilizing press fit condylar sigma framework. Patients were assessed clinically and radiographically by an autonomous spectator The American knee society score, oxford knee score, and knee society radiographic appraisal were utilized to rate knee work and to come to a decision the fulfillment level of each patient. The reasoned that patient indicated great mid-term results. Total knee replacement (TKR) or total knee arthroplasty (TKA) because it is often known is perhaps the most effective innovation of the sole remaining century. It's one in all the foremost well-known orthopedic method performed. Effectively reproducible with reliable results. The careful procedure is easy. In early 1970's and

M. Weiss et.al, November **2002;** led an investigation to tell apart the exercises critical to patients after TKR and also the pervasiveness of constraints to interest in these exercises. A survey was created involving 55 inquiries. Patients were asked the recurrence with which they did the exercises, the exercises imperative to them and also the degree to which their support was restricted by their knee substitution. The poll was endeavored by 176 patients, 40% men and 60% ladies.[46] Accordingly, the investigation demonstrated a high connection between the importance of exercises and recurrence of patient's interest affirming that knee substitution effectively reestablishes an enormous level of capacity.

Barbara. E.Lamb et al, August 2002; examined the practicality and impact of neuromuscular incitement on recuperation of portability after careful obsession for hip crack Recovery of strolling pace and capacity, postural security, lower appendage muscle power and agony at 7 and 13 weeks after process.

Methodology

Subjects: An absolute number of 30 subjects were chosen and treated that supported inclusion and exclusion standards expressed underneath.

The subjects were isolated (randomly) into two gatherings:

Group A/Group 1. (Experimental group) n= 15

Group B/Group 2 (Control group) n =15

Inclusion Criteria:

1. Patients agreeing to use TENS on them.
2. Never had any surgery of hip or knees before.
3. Age group of 55 and above.
4. Unilateral or bilateral TKR both
5. History of OA

Exclusion Criteria:

1. Had encountered a stroke/CNS malady or had mental disability influencing their capacity to urge tests/measures;
2. Had incessant torment apart from knee OA.
3. Had tactile weakness, characterized as absence of sharp or dull sensations over any of 5 dermatomes in their careful leg.
4. Were for all time wheelchair bound.
5. Had a condition that contraindicates TENS use, as an example, pacemaker or hypersensitivity to nickel.

Sampling: The total number of 30 subjects (age: >55) who took an interest in the examination, chose based on consideration and avoidance standards and arbitrarily assigned to both groups. Group 1 and group 2.

Instrumentation and Tools used:

1. Treatment Couch
2. TENS machine
3. Universal Goniometer
4. ADL Questionnaire
5. Sphygmomanometer

Procedure: The overall number of 30 subjects were taken within the study, chosen supported consideration and rejection models and arbitrarily assigned to every group. Group 1 and group 2. Functional and strength testing gives the data for the patient clinical treatment and allows us to observe the progress. Thus, their functional and strength testing was performed at following intervals: Day of discharge (day 4) 1st week after discharge (day 11) Day 20 of therapy (or day 24 after the surgery) Functional testing was done by knee outcome survey ADL questionnaire, strength of quadriceps was assessed employing a modified sphygmomanometer. Second a part of the study was treatment Group 1: Experimental group: They were administered with TENS from 4th postoperative day itself for five days every week for 15-20 min. The terminals were put over the distal vastus medialis and proximal vastus lateralis muscles and then activities were performed a day. Group 2: Control group, Patients performed exercises 6 days every week.

Methodology

The overall number of 30 subjects (age: >55) who took an interest within the examination, chose supported consideration and avoidance standards and arbitrarily assigned to both groups. From the primary day both the groups were provided same exercise protocols. Only the experimental group were provided the appliance of TENS prior the exercises in sitting or lying position. The terminals were put over the distal vastus medialis and proximal vastus lateralis muscles and then activities were performed a day. The sessions were scheduled 6 days every week from the primary day of discharge. There have been total 20 sessions given to every patient. Functional testing was done employing a questionnaire. Patient was provided a questionnaire to test the ADL recovery.

Data Analysis: The matched example t-test was performed for intragroup examinations. A free T-test was utilized for the examination between the two groups ($P < 0.05$). Enlightening investigation was utilized to ascertain standard deviation. Graphical portrayal was finished utilizing MS-EXCEL 2016.

Results

In the current examination, information investigation has demonstrated that there is huge distinction between

the two groups (A & B). The experimental group has significant improvement then the observational group. The pain VAS score has more difference.

The mean score on comparison of ROM of right knee on 14th day were 96.2+14.4529 (Conventional group) and 109.3333+10.4722 (experimental group) and of left knee were 95+16.084 (Conventional group) and 107.5333+14.2371 (experimental group). Now on 21st day the mean score was: Right knee: 108.8667+6.9371 (Conventional group) and 114.4+10.5749 (experimental group); Left knee:107.1333+8.3655 (Conventional group) and 113.6+8.3655 (experimental group). This shows a significant improvement in the experimental group.

In case of VAS score there is huge distinction between the two groups. The mean score of comparing VAS score of Right knee on 14th day were: 4.0667+0.8837 (Conventional group) and 1.6+1.1212 (experimental group); Left knee:

4.3333+0.9759 (Conventional group) and 1.9333+1.387 (experimental group). Now on the 21st day the mean VAS score comparison of right knee was: 1.6667+0.6172 (Conventional group) and 0.8+1.0142 (experimental group); and of left knee: 2.2667+1.0328 (Conventional group) and 1+1.1952 (experimental group).

There is no significant difference in ADL score. The mean score on 7th day were 42.33333±3.64 and 40.66667±2.55 of conventional group and experimental group. On 20th day mean score were 60.33333±1.799 and 61±1.964 of conventional group and experimental group.

Discussion

Neuromuscular electrical incitement offered a protected expansion to customary, high force intentional reinforcing program. The patients accomplished a more noteworthy power gains in an exceedingly shorter timeframe than has been commonly detailed within the writing permitting them to return back to autonomous exercises of day by day living and recreational exercises rapidly. The utilization of Transcutaneous Electrical Nerve Stimulation has been empowered for quite 2 decades and has picked up substantial fame within the clinical field as a successful methodology within the administration of agony".

It is entrenched that quadriceps shortcoming is obvious right off the bat in knee osteoarthritis and, alongside torment, is one amongst the past clinical manifestations announced by patients. Exceptional shortcoming and squandering of quadriceps muscle may be a typical finding in patients after injury or activity of the knee. this outcome shows that TENS (NMES) helps with improving the standard of quadriceps muscle after complete knee arthroplasty and furthermore helps in introductory restoration of the patient. Absolute knee arthroplasty is an exceptionally fruitful system that extensively lessens torment and redesigns personal satisfaction for a few patients.

R.L. Mizner's investigation demonstrated that patients finally out knee arthroplasty create less power and show bigger disappointment of willful enactment of quadriceps muscle.

Earlier investigation by Sarah E. Sheep presumes that NMES may be a practical a good treatment choice in speeding the recuperation of versatility after careful obsession of hip for a situation study presented by Michael Lewek et.al presumed that neuromuscular electrical incitement offers a conceivably more achievement method for upgrading muscle power than flow restoration conventions. They likewise inferred that their patient had the choice to come back to autonomous exercises of day by day living and recreational exercises.

Alexander Berth likewise reasoned that patients with osteoarthritis knee have eminent respective willful shortages that are in any event to some extent reversible inside 3years finally out knee arthroplasty.[1]

In an examination done by Kyriakos Avramedis et.al, electrical incitement was applied on the second day after absolutely the knee substitution they chose invigorate the vastus medialis muscle thanks to its significance in step execution and engine control of the knee) they consequently connoted that the clinical use of the electrical incitement helps in improving the strolling pace of the patients who are recuperating from the full knee arthroplasty and increment their capacity to participate[ate within the activity program. They saw a continued refinement within the movement execution of the patients. They from this point forward, reasoned that the electrical incitement may be utilized to accelerate the recovery in patients who have experienced absolute knee arthroplasty, especially in those with critical quadriceps shortcoming.

Relevance to Clinical Practice: Transcutaneous electrical stimulation may be employed in cases after total knee arthroplasty to boost strength within the quadriceps, mainly in cases which have a history of osteoarthritis.

Future Research: Futureresearchis critical with the inclusion of a greater number of subjects to line up the generalization of those results.

In future research outcome of transcutaneous electrical stimulation may be studied on cases of total knee arthroplasty thanks to other causes in addition Bilateral total knee arthroplasty may also be taken under consideration to work out their progress.

Conclusion

Thus, the study supports the experimental hypotheses expressing that: "There are going to be an impact of TENS on Postoperative pain in TKR which there's huge distinction between the patients having TENS applied with exercise vs no TENS with exercises. There'll be improved strength in quadriceps and ROM."

Limitations of Study:

1. The sample size is small in the following study.
2. The Study is not separated for Male and female
3. All patients had bilateral knee replacement surgery.
4. Only the patients with history of osteoarthritis were taken.

Ethical Clearance: Participants gave informed consent before taking part.

Source of Funding: Self

Conflict of Interest: Nil

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