THE EFFECT OF MUSCLE ENERGY TECHNIQUE (MET) ON RANGE OF MOTION (ROM) KNEE JOINT IN PATIENTS POSTOPERATIVE POSTERIOR CRUCIATE LIGAMENT RECONSTRUCTION (PCLR) HAMSTRING GRAFT : A CASE STUDY

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Abstract

***Introduction**:* Posterior crusiate ligament reconstruction (PCLR) surgery is an operating method to replace PCL ligaments with other materials (graft). PCLR postoperative rehabilitation focuses on reducing pain, swelling, stiffness, instability, regaining range of motion (ROM), muscle strength, and normal functional activity. Restoring the range of motion (ROM) postoperatively of PCL reconstruction is an important aspect of normal human functioning.

***Case Presentation**:* A male is a 38-year-old language tutor with a height of 150 cm and a weight of 75 kg. Patients condition of motion pain in the knee and limitation of movement flexion knee sinistra after PCLR hamstring graft surgery since December 2021. The patient feels difficulty and pain at the time of the sitting position to the stand, stand for a long time and walk a long distance. the patient can already carry out his work even with a sitting position and the legs remain straight. Currently, patients undergo routine physiotherapy at the clinic practice physiotherapy Magetan 3x / week. The patient's current condition is experiencing limited mobility when bending the knee.

Management and Outcome: The intervention used muscle energy technique (MET) for 3x/week in 4 weeks. The disorder is a limitation of movement for knee flexion. Evaluation carried out using a goneometer instrument to measure the range of motion (ROM)

***Conclusion**:* It can be concluded that in this case, after providing physiotherapy intervention in the form of MET, it has an effect on the increase knee joint ROM in patients postoperative PCLR.

Keyword: *Posterior Crusiate Ligament Reconstruction* (PCLR), *Muscle Energy Technique* (MET), *Range Of Motion* (ROM)

Introduction

The prevalence of posterior crusiate ligament reconstruction (PCLR) in the general population performed in Italy showed an incidence of 0.46 operations per 100,000 population/year, ranging from 0.32 to 0.54 with a clear difference in age and sex. The patient's age is 22-39 years and the ratio of men to women is 5:3 meaning that men have a higher risk (Longo et al., 2021). Posterior cruciate ligament (PCL) is the largest intraarticular ligament in the knee and is the main stabilizer of posterior tibial translational to the femoral bone (LaPrade et al., 2021). PCLR is an operating method for replacing PCL ligaments with other materials (graft). Generally, the material is taken from the hamstring tendon or patellar tendon of the patient himself so it is called autograft. The purpose of reconstructing PCL is to reduce posterior instability of the knee after an injury (Levy et al., 2021).

PCLR postoperative rehabilitation focuses on reducing pain, swelling, stiffness, instability, regaining range of motion (ROM), muscle strength, and normal functional activity (Priyanka et al., 2017). Restoring postoperative ROM is an important aspect of normal human functioning (Ingale, Patil, & Wadhokar, 2021). ROM exercises can prevent the occurrence of contractures (shortening of the muscles or joints), muscle atrophy, improve blood circulation to the extremities, reduce vascular paralysis, and provide comfort to the patient (Rudiyanti, 2019). So that treatment is needed for the curative process of postoperation PCLR

Case Presentation

Mrs. S is a 38-year-old language Tutor with a height of 150 cm and a weight of 75 kg. Patients complain of pain in the knee and have not been able to fully flexion knee sinistra movements after PCLR hamstring graft surgery since December 2021. The patient feels difficulty and pain at the time of the sitting position to the stand, stand for a long time and walk a long distance. The patient can already carry out his work even with a sitting position and the legs remain straight. Currently, patients undergo routine physiotherapy at the clinic practice physiotherapy Magetan 3x/week. The patient's current condition is experiencing limited mobility when bending the knee.

Management and Outcome

This case study was carried out a range of motion (ROM) examination, both active and passive. THE ROM was measured using a goneometer instrument during flexion motion and knee extension then documented with International Standard Orthopedic Measurement (ISOM) notation. The results of the ROM measurements are described in table 1.

Table 1. Knee ROM examination using goneometer

ROM knee	Sinistra	Dextra
Active	S 0°-0°-23°	S 0°-0°-135°
Passive	S 0°-0°-23°	S 0°-0°-135°

Based on table 1 it was found that in patients on behalf of Mrs. S had active and passive ROM limitations during flexion motion. The intervention given based on the patient's problem is Muscle energy technique (MET) to increase the active ROM of knee joint flexion sinistra. MET is applied using Post Isometric Relaxation (PIR) and Reflexive Reciprocal Inhibition (RRI) techniques. The explanation of the intervention will be described as follows:

1) The subject is in a lying prone position
2) Passively the hip sinistra is extended until m. iliopsoas is stretched and simultaneously the therapist supports the patient's thigh and pelvic neutral position as well as passive knee flexion along the patient's resistance point (according to the patient's ROM)
3) One of the therapist's hands fixed the pelvic aims to stabilize the patient's pelvic when

isometric contractions are performed and the other fixation in the patient's ankle is aimed at stabilizing the leg when given the prisoner.

4) In this position, the patient is instructed to perform isometric contractions by pushing the knee down against the therapist-given prisoner.
5) This technique was originally performed with knee flexion and pushed with knee extension against the prisoner of the therapist.
6) Hold for 7–10 seconds, followed by relaxation and regulation of breath from the patient for 3–5 seconds
7) Then the knee is passively stretched in the direction of flexion and held for 30 seconds.
8) The legs are then rested for about 8-10 seconds the goal is to prevent an increase in blood pressure due to maneuvers and to reduce the compensatory recruitment of muscles during isometric contractions, the subject is instructed to breathe normally
9) The procedure is repeated 8 times.

Treatment is carried out 3x/week for 4 weeks. Evaluation of measurements is carried out on the first day of treatment (T1) and the last day (T12) the purpose is to determine the influence of pre and post after being given treatment. Based on patient reported progress over the 4 weeks of treatment described in table 2.

Table 2. Changes in the range of motion (ROM) of knee sinistra during therapy

Knee Sinistra	T1	T12
Active	S 0°-0°-23°	S 0°-0°-26°
Passive	S 0°-0°-23°	S 0°-0°-26°

Based on table 2 After 12x treatment with MET administration showed an increase in active ROM and passive knee joint sininstra for knee flexion movement 4° from the normal value of 135°

Discussion

The increase in ROM after met therapy programs has been explained through various hypotheses proposed by different studies. Harry and George (2021) revealed that MET has been explored as a treatment focused on improving the extensibility of soft tissues and ROM joint. A specific set of studies validated the use of MET by observing effects on different segments and directions of body movement and muscle extensibility. During autogenic inhibition, the golgi tendon organ (GTO) response plays an important role in flexibility. Strong muscle contractions against the same resistance trigger GTO. GTO inhibits agonist muscle contraction and allows the antagonist muscle to contract more easily, so that the muscle can be stretched further and more easily.

Research by Gaur, Kapoor, and Phansopkar (2021) revealed that MET can be attributed to the fact that pressure on the muscles creates autogenic inhibition during the initiation of connective tissue, thereby causing muscle relaxation in tense muscles. In addition, the fascia and muscles when the passive extension movement of the joint occur in the opposite direction after the muscle relaxes from the maximum isometric contraction. The reason for gaining flexibility can also be a change in the stretching approach. MET increases muscle length causing plastic changes and creep viscoelasticity in myofacial connective tissue. It occurs due to biomechanical changes or neurological changes or due to an increase in grit on stretching. Biomechanical and neuro-physiological mechanisms can stimulate ROM changes and muscle tension after the application of MET. Neurological factors work by inhibiting the motor activity of the muscles that will perform stretching, the purpose of stretching is to reduce muscle activity to minimize resistance to stretching.

Conclusion

It can be concluded that in this case, after the administration of physiotherapy intervention in the form of MET which was carried out 3x a week for 4 weeks, it had an effect on the increase in knee joint ROM in patients postoperative PCLR

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