



PHYSIOTHERAPY MANAGEMENT FOR POST RECONSTRUCTION POSTERIOR CRUCIATE LIGAMENT ACUTE PHASE: A CASE STUDY

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Abstract

Introduction: Rupture is a tear of tissue caused by trauma. Posterior Cruciate Ligament (PCL) ruptures can be caused by direct or indirect contact with the knee. A grade 3 PCL injury requires surgery. Rehabilitation in PCL injuries focuses on quadriceps muscle augmentation to counteract the force of the hamstrings muscles and the gravity that move the tibia towards the posterior.

Case Presentation: A football athlete suffered a knee injury while playing football. From mri examination found the diagnosis of rupture PCL sinistra grade 3, then undergo reconstruction surgery PCL sinistra. The results of the examination there are several problems in patients, such as oedem, atrophy, spasm, pain (press & motion), and limited motion.

Management and outcome: interventions given in the form of exercise therapy as much as 3 times. Pain measured by Numeric Rating Scale (NRS), oedem (metline), range of motion (gonio meter).

Discussion: Based on the interventions provided found results that exercise has benefits in patients post acute phase PCL reconstruction that has the goal of maximum protection on grafting, maintaining patellar mobility, maintaining quadriceps muscle tone, maintaining full passive extensions, controlling pain and oedem, early mobilization in knee joints

Conclusion: Intervention in the form of exercise therapy can relieve pain, reduce oedem and improve ROM in patients post acute phase PCL reconstruction.

Keyword: PCL, Post Rekonstruction, Exercise, Physiotherapy, Acute Phase



Introduction

Posterior Cruciate Ligament (PCL) is one of the four major ligaments in the knee that serve to stabilize the tibia in the femur. In addition, PCL also serves to withstand varus, valgus and exorotasi forces. PCL is about 1.3 to 2 cm thicker and twice as large as an Anterior Cruciate Ligament (ACL), making it less likely to suffer injury. Rupture is a tear of tissue caused by trauma(1). PCL ruptures can be caused by direct or indirect contact with the knee. The most common causes of PCL injury are traffic accidents (45-57%), exercise (33-40%). PCL injuries make up 2.4% of all knee injuries in sports, and football is a common cause of PCL injuries (19.3%) (2).

PCL injury classification based on the level of tibial to posterior translation of femur bone. Posterior drawer test is one of the most accurate physical examinations with 90% sessionivity and 99% specificity. The degree of posterior translation is used to determine the degree of injury. Grade I: 1-5 mm, grade II: 6-10 mm, grade III: >10 mm. Magnetic Resonance Imaging (MRI) can help diagnose acute PCL ruptures and other combined injuries with sensitivity levels of up to 100%(3).

A grade 3 PCL injury requires surgery. PCL reconstruction measures show good functional results, but instability and pain are still the main problems(4). The main complaints after reconstruction were associated with pain, oedem, reduced mobility, muscle weakness, joint laxity, and decreased proprioceptive(5). Atrophy quadriceps is a major concern after post reconstruction, therefore isometric quadriceps exercises should be performed immediately. Pain and swelling also contribute to the inhibition of quadriceps. Rehabilitation on PCL injuries focuses on quadriceps muscle augmentation to counteract the force of the hamstrings muscles and the gravity that move the tibia towards posterior(3).

Case Presentation

A 20-year-old male football athlete was injured 4 months ago while playing football, a patient is a goalkeeper from a football club in Semarang. When competing patients collide with their opponents, but the patient is still able to continue the match. On the same day Mr. R suffered a motorcycle accident, further aggravating the condition of the knee injury. Then Mr. R conducted an MRI examination found from the MRI results of patients diagnosed with rupture PCL sinistra grade 3, three months after the injury the patient had just undergone reconstruction surgery PCL sinistra. Patients come to physiotherapy with pain complaints as well as limited movement. From the results of the examination there are several problems in patients, such as odema, atrophy, spasm, pain (press & motion), limited motion, and balance disorders. In addition, from the results of

vital sign examination found blood pressure of patients 110/80 mmHg, pulse 76x /min, respiratory rate 20x/min, temperature 36.5°C, height 170 cm, and weight 57 kg. The plan of physiotherapy that will be given is exercise therapy.

Management and Outcome

This intervention is carried out during one week where the patient follows the intervention 3 times a week. Patients are given physiotherapy interventions in the form of exercise therapy based on PCL Reconstruction Protocol Brigham and Women's Hospital.

Tabel 1. Intervention Exercise Therapy on Post PCL Reconstruction Acute Phase

Intervention	Purpose	FITT
Quad set	Activation m.quadriceps	F : 3 times a week I : 1 set (10 repetisi, hold 5-10 detik) T : 2-3 menit T : isometrik
SLR and Dorsal flexion ankle	Activation m.quadriceps	F: 3 times a week I: 5 set (10 reps) T: 15 minutes T:Isometric
Hamstring set	activation m.hamstring	F : 3 times a week I : 1 set (10 reps, hold 5-10 second) T : 2-3 minutes T : isometric
Hipabduction	activation ITB and abductor	F : 3 times a week I : 3 set (10 reps) T : 3-5 meinutes
Heelslide	Stretching and activation m.quadriceps	F : 3 times a week I : 1 set (15 – 25 reps, hold 5-10 second) T : 2 minutes T : isotonic
SeatedKneeFlexion	increaseknee flexion	F : 3 times a week I : 1 set (10 – 20 reps, hold 5-10 second) T : 2 minutes T : isotonic
Patelarmobilization	prevent scarring around the patellar	F : 3 times a week I : 1 set (10 reps, hold 2 seconds at the end of the slide in the direction of distal, proximal, lateral, medial) T : 1 menit

Pronekneeflexion	increaseknee flexion	F : 3 times a week I : 1 set (10 reps, hold 20-30 second) T : 3-4 minutes T : isotonic
Wallsquat (60 degree)	strengthening of the muscles of the limbs, trunk, and cores so as to improve problems arising from pain / instability, improve blood circulation in the joints and bone nutrition	F : 3 times a week I : 1 set (5 reps, hold 30 seconds) T : 3-5 meinutes T : isotonic
Bridgingwithball	Activation core muscle	F : 3 times a week I : 3 set (10 repetition, hold 5-10 seconds) T : 3-5 minutes T : isotonic
Diagonal weightshifting	help to prepare for normal gait	F : 3 times a week I : 3 set (5-10 steps) T : 3-5 minutes T : dynamic
Backwardstepping	help to prepare for normal gait	F : 3 times a week I : 3 set (5-10 step) T : 3-5 minutes T : diynamic

Rehabilitation Guidelines Anterior Cruciate Ligament (ACL)

After being given exercise therapy, it was found that there was a decrease in press and motion pain, oedem, and an increase in the scope of joint motion.

Tabel 2. Result of Evaluation Exercise Therapy on Post PCL Reconstruction Acute Phase

Pengukuran	Pre Test	Post Test
Movement pain	5	4
Pressure pain	4	3
ROM	0°-0°-100°	0°-0°-120°
Oedem		
10cm above tuberositas tibia	35 cm	34,5 cm
15cm above tuberositas tibia	35 cm	35 cm
20cm above tuberositas tibia	38 cm	38 cm
10cm below tuberositas tibia	31 cm	31 cm
15cm below tuberositas tibia	33 cm	32 cm

Discussion

Based on the interventions provided found results that exercise has benefits in patients post acute phase PCL reconstruction that has the goal of maximum protection on grafting, maintaining patellar mobility, maintaining quadriceps muscle tone, maintaining full passive extensions, controlling pain and oedem, early mobilization in knee joints(7). ROM exercise in the early phases can minimize side effects of immobilization such as cartilage damage, excessive collagen formation, and pain. Patella mobilization is one of the important interventions in this phase as a barrier to flexion movement to protect the tissues undergoing surgery. Quadriceps muscle augmentation is a major component for PCL reconstruction programs because quadriceps serves as a dynamic stabilizer in preventing the translation of tibia to posterior(8). Decreased pain and ROM in the knee joint is the effect of exercise so as to increase functional stability(8).

Exercise therapy is a systematic, planned performance of body movements, postures, or physical activity that is intended to provide the patient or client with the means to prevent the occurrence of decreased muscle value, improve, restore, as well as improve physical function, its implementation using active body movements maupaun passive⁹. This exercise therapy can reduce the sticking of tissue that originally shortened will be able to lengthen again and result in the return of normal muscle function so as to increase the area of joint movement. Movement causes sudden stretching, lengthening of fibers detected by muscle spindle, which brings a dynamic response. It is then sent through the afferent nerve that intersses with the motoric alpha nerve, then sent to the skeletal muscle fibers and causes the muscles to contract(9)

ROM exercises with passive movement will stimulate motoric neurons (brain) with the release of transmitters (acetylcholine) to stimulate cells to activate calcium so that protein integrity occurs. If calcium and troponin C are activated then actin and myosin are maintained so that skeletal muscle function can be maintained so that there is an increase in muscle tone. The contraction mechanism can increase smooth muscles in the extremities. Exercises with passive movement will stimulate motoric neurons (brain) with the release of transmitters (acetylcholine) to stimulate cells to activate calcium so that protein integrity occurs. If calcium and troponin C are activated then actin and myosin are maintained so that skeletal muscle function can be maintained so that there is an increase in muscle tone. The contraction mechanism can increase smooth muscles in the extremities. The intercation process is activated by calcium and ATP ions, further broken down into ADP to provide energy for extremity muscle contraction. repetitive motion

exercises make the concentration to perform repetitive movements at the best possible quality(10).

Active motion training in addition to improving the range of motion of joints can also stimulate blood circulation, maintain muscle elasticity and reduce pain(11). The active movement of the lower limbs promotes increased blood flow in the lower limbs so as to improve peripheral circulation during the initial post-operative phase(12).

Conclusion

Based on the interventions given found that exercise has benefits in patients post acute phase PCL reconstruction that has the goal of maximum protection on grafting, maintaining patellar mobility, maintaining quadriceps muscle tone, maintaining full passive extension, controlling pain and oedem, mobilization of the initial phase in the knee joint. Exercise in the early phases can minimize side effects of immobilization such as cartilage damage, excessive collagen formation, and pain. Quadriceps muscle strengthening is a major component for PCL reconstruction programs because quadriceps serves as a dynamic stabilizer in preventing the translation of tibia to posteriors.

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