PHYSIOTHERAPY PROGRAM PHASE 1 POST RECONSTRUCTION ACL CONDITIONS: A CASE STUDY

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Abstract

Introduction: The incidence of ACL Rupture ranges from 30 to 78 per 100,000 people per year, after ACL reconstruction 61% to 89% of athletes successfully return to sport, usually 8 to 18 months after reconstruction. In the management of cases of ACL tear, reconstruction of the ACL ligament will be carried out with the procedure of grafting the ACL with tendon tissue to restore the stabilizing function of the ACL ligament in the knee joint.

Case Presentation: A 19-year-old male patient with a post ACL reconstruction diagnosis, with complaints of pain in the patient's knee, difficulty bending the knee, and decreased muscle strength in the leg after ACL reconstruction.

Management and Outcome: The patient participated in 6 therapies, in 1 therapy for 60 minutes for 2 weeks, with a physiotherapy program in the form of giving Ice compression, ROM exercise, and Strenghtening exercise. And in the evaluation, several measurements were carried out, namely pain measurements using NRS, measurements of muscle strength using MMT, and also measurements of Range of Motion using a goniometer.

Discussion: The Physiotherapy program carried out in phase 1 of post-ACL rehabilitation is aimed at reducing pain and edema, increasing the range of motion of the joints, and also strengthening muscles before moving on to the next stage/phase. reduce the intensity of inflammation in the tissue, ROM Exercise which aims to maintain or improve joint mobility and can also increase muscle mass and muscle tone, in addition to maintaining the mobility of the joint and to minimize a decrease in the elasticity of the tissue around the joint, and Also doing strengthening exercises to strengthen the muscles around the knee to increase stability in the knee joint.

Conclusion: Post-ACL rehabilitation physiotherapy program using MOON Guideline in Phase 1 Rehabilitation with Ice Compression, ROM Exercise, and also Strenghthening Exercise can reduce pain, increase muscle strength and can improve the functional ability of patients after ACL reconstruction.

Keyword: Anterior Cruciate Ligament Reconstruction, Physiotherapy Program, Exercises

Introduction

The incidence of ACL rupture ranges from 30 to 78 per 100,000 people per year. After ACL reconstruction 61% to 89% of athletes successfully return to sports, it takes 8 to 18 months after reconstruction, ACL injuries are more common in sports such as football, basketball, and also gymnastics (Gans et al., 2018). The Anterior Cruciate Ligament is one of the main ligaments in the knee that functions to prevent the tibia from sliding forward from the femur and to control the rotational movement of the knee. (Filbay & Grindem, 2019).

Rupture of the ACL ligament is grouped into 3, namely in grade I, namely there is an overstretch on the ligament then an inflammatory response appears and there is mild pain, grade II is a partial tear in the ligament and an inflammatory response appears, and there is pain and then an unstable feeling in the knee, Grade III is a complete break in the ligament and causes instability in the knee (Kiapour & Murray, 2014), In the condition of ACL injury, instability occurs because the ACL ligament cannot withstand movements that usually involve rapid deceleration and changes in direction. When instability occurs repeatedly, it will cause injury to the meniscal and articular cartilage (Laskowski, 2014).

In the management of the ACL tear case, reconstruction of the ACL ligament is carried out with the procedure of grafting the ACL with tendon tissue to restore the stabilizing function of the ACL ligament in the knee joint. After ACL reconstruction, the goal of further rehabilitation is to prevent complications such as swelling, decreased joint range of motion, muscle weakness and also decreased knee function (Cerulli et al., 2013). In some cases, especially in athletes, this rehabilitation phase can be useful to restore performance before returning to sports after ACL reconstruction (Paschos & Howell, 2016).

In the Guideline of the Multicenter Orthopedics Outcomes Network (MOON ACL Rehabilitation Guidelines) (Wright et al., 2015) especially in post-operative patients after ACL reconstruction, the role of physiotherapy in rehabilitation is exercise to prevent post-reconstruction complications, namely in reducing edema, increasing muscle strength and also the joint range of motion of patients after ACL reconstruction and also improving the performance and functional abilities of the patient. Post reconstruction. Therefore, in this case study, the author draws a theme related to the phase 1 physiotherapy program for post-ACL reconstruction conditions.

Case Presentation

Subjective Examination

Patient D, aged 19 years, complained of pain in the knee after playing futsal, the patient fell when jumping and treading with the knee twisting, the pain was felt during activities and also felt loose in the knee then after 10 months the complaint came to the hospital and was diagnosed with tearing on the ACL (Anterior Cruciatum Ligament) and was advised for ACL reconstruction surgery then ACL reconstruction surgery was performed on February 24, 2021 using a graft on the ITB tendon (Illiotibial band). Then after 10 days post ACL reconstruction came to the physiotherapist.

The goal to be achieved is to prevent and reduce complications of patients after ACL reconstruction in Phase 1 of Rehabilitation that appears such as edema, muscle atrophy, and also a decrease in the patient's range of motion, especially in the patient's right knee.

Physical examination

The study is related to the physical examination, which is related to the examination of vital signs, inspection,palpation. Based on the results of the inspection findings ranging from static to dynamic, namely on static inspection it was found that there was edema on the patient's right knee, there was an incision wound on the right knee, and for dynamic inspection, the patient was seen holding pain when bending the knee, and there was a walking pattern antalgic gait. Then for the findings from palpation it was found that there was spasm in ITB, and also the difference in temperature between the right and left knees due to edema in the patient's right knee.

Based on the findings of the vital sign, it shows normal conditions in various aspects such as blood pressure, respiratory rate, pulse rate, and temperature.

Table 1. Vital Sign

Blood Pressure :	130/80 mmHg
Pulse Rate :	88 x/min
Respiratory Rate :	22x/min
Temperature :	36,4 ^{o}C
Height :	164 cm
Weight :	69 kg

Basic motion examinations were carried out, namely examination of active motion, examination of passive motion, and isometrics. On examination of passive and active motion, it was found that there was

limited range of motion in the right knee joint and was accompanied by motion pain with firm endfell. On the isometric examination, there is no pain during movement.

Pain measurement using NRS (Numerical Rating Scale), Muscle strength measurement using (Manual Muscle Testing), Measurement of joint range of motion using a goniometer. Pain measurement using the Numerical Rating Scale, which was found on the examination of pain at rest with a value of 3 which indicates mild pain at rest in the right knee, and examination of pain during movement found a value of 6 which indicates moderate pain during movement of the knee right.

In the measurement of muscle strength, it was found that there was a decrease in muscle strength, especially in the right knee with a value of 3 in the flexor and extensor muscles, which means the individual is able to perform movements without resistance and there is also a value of 4 in the adductor and abductor hip muscle groups in patients, which means the individual can perform movements with light resistance.

Then on examination of the Range of Motion of the patient, especially on the right knee which has limited movement, it is found that S: 0°-0°-100° which indicates limitations in flexion and extension movement of the patient's right knee.

And to measure the patient's functional level using the IKDC (International Knee Documentation Committee) Questionnaire measuring scale, this instrument measures several aspects of measurement including Symptoms, Sports Activities, and Functional knees, with an implementation score of 0-100, which indicates a value of 100 indicates that there is no limitation, while a value of 0 indicates severe functional impairment of the patient.

Management and Outcome

The process of physiotherapy is carried out to patients during therapy at the Metro Physiotherapy Clinic, Lampung. The purpose of the intervention carried out on the patient is in the Rehabilitation phase in phase 1 after ACL Reconstruction, namely reducing pain, increasing the patient's muscle strength, increasing the range of motion of the right knee joint, and also increasing the patient's functional ability.

Table 2. Intervention Plan

Intervention	Dosage	Outcome
Ice Compression	F : 3x /days I : -	Reduction of pain and odema Outcome : NRS (*Numerical*

	T : 15 min/sesion	*Rating Scales*)
ROM Exercise • Hells Slide • Prone Hang • Patellar Mobilization	20x repetition, 3 set	Improved Range of Motion Outcome : Goniometer
Muscle Activation/Strength • Quadriceps Sets • Hamstring Sets • Gluteus Activation • SLR • Side Lying Hip Adduction/ Abduction • Ankle Pump With Theraband • Heel Raises	10 sec hold, 10x repetition, 3 set	Improved Muscle Strenght Outcome : MMT (*Manual Muscle Testing*)

After doing a physiotherapy program at the Metro Physiotherapy Clinic for 2 weeks with 3 interventions a week, the following results were obtained.

Pain Measurement Results with NRS

After doing an examination of Pain using NRS (Numerical Rating Scale) the following results were obtained:

Table 3. Pain Measurement

	T1	**T(Last)**
Static Pain	3/10	1/10
Pain in Motion	6/10	2/10

From the results obtained on the measurement of the pain scale, the results obtained on the first examination with a silent pain value of 3 and motion pain 6 after routine physiotherapy interventions and the final result in measuring the pain value became a silent pain value of 1 and motion pain with a value of 2.

Muscle Strength Measurement Results

The results of measuring muscle strength using MMT (Manual Muscle Testing) obtained the following results:

Table 4. Muscle Strength Measurement

T1	**Knee**			**Hip**		
(Dextra)	Fleksor	3	Fleksor	5	Adduktor	4
	Ekstensor	3	Ekstensor	4	Abduktor	4
T (Last)	**Knee**			**Hip**		
(Dextra)	Fleksor	5	Fleksor	5	Adduktor	5
	Ekstensor	5	Ekstensor	5	Abduktor	5

The results obtained from measuring muscle strength using Manual Muscle Testing (MMT) showed that there was an increase in muscle strength, especially from the flexors and extensors of the knee with an increase from muscle value 3 to muscle value 5.

Range of Motion Measurement Results

The results of measuring the joint range of motion in patients using a goniometer obtained the following results:

Table 5. Range of Motion Measurement

	Knee Dextra		
T1	Fleksi	100°	Pain
	Ekstensi	0°	Pain
	Knee Dextra		
T(Last)	Fleksi	120°	No Pain
	Ekstensi	5°	No Pain

From the results obtained on the measurement of the joint range of motion before and after the physiotherapy intervention, it was found that there was an increase in the ROM (Range of Motion) in

Flexion and Extension of the patient's right knee which was originally from the value of S: 0-0-100 to S: 5-0-120, there is an increase of 20 degrees in knee flexion and also 5 degrees in right knee extension.

Functional Ability Measurement Results

The results of measuring functional ability using the International Knee Documentation Committee Questionnaire, the results are as follows.

Table 6. Functional Ability Measurement

	T1	**T(Last)**
Functional	40,2	66,7

From the results obtained on the measurement of functional ability using the International Knee Documentation Committee Questionnaire, it was found that there was an increase in functional aspects of symptom reduction, increased sports activity and also functional knee from a value of 40.2 to 66.7.

Discussion

The Physiotherapy program carried out in phase 1 of post-ACL rehabilitation is aimed at reducing pain and edema, increasing the range of motion of the joints, and also strengthening muscles before moving on to the next stage/phase.

The use of Ice Compression for 10-15 minutes is carried out on the injured part, precisely in the patient's right knee where there is still edema and pain because there is still inflammation in that part. Giving Ice Compression aims to reduce the intensity of inflammation in the tissue, according to (Waterman et al., 2012) Giving Ice Compression here can reduce edema, pain and spasm by decreasing tissue metabolism, local vasoconstriction, and also the release of inflammatory mediators.

ROM exercise that aims to maintain or improve the ability to move the joints normally and can also increase muscle mass and muscle tone, so as to maintain mobility of the joints and to minimize a decrease in the elasticity of the tissues around the joints. (Fukuda et al., 2013).

Apart from ROM exercise, it is also carried out for Strenghtening Exercise which aims to increase the strength of the muscles around the injured area which before weakening due to post-reconstruction, because this weakness causes inadequate muscle groups around the knee and can result in functional instability of the knee. Therefore, to prevent muscle weakness, physiotherapists are advised to train the

muscles around the knee after ACL reconstruction as early as possible during the rehabilitation phase. (Faxon et al., 2018).

Conclusion

The rehabilitation physiotherapy program after ACL reconstruction using the MOON Guideline in Phase 1 of Rehabilitation with Ice Compression, ROM Exercise, and also Strenghthening Exercise can reduce pain, increase muscle strength and can improve the functional ability of patients after ACL reconstruction.

Acknowledgment

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