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### PHYSIOTHERAPY MANAGEMENT FOR PRE-OPERATIVE ANTERIOR CRURIAE LIGAMENT INJURY : A CASE REPORT

Martina Dwi Anjoni<sup>1</sup> Taufik Eko Susilo<sup>2</sup>

*Physiotherapy Department, Faculty of Health Science, Universitas Muhammadiyah Surakarta*

\*Corresponding author: Martina Dwi Anjoni, Email: [martinaaa0303@gmail.com](mailto:martinaaa0303@gmail.com)

#### Abstract

**Introduction :** Previous studies have shown that preoperative management of ACL injuries performed at least 3 weeks before surgery can improve postoperative recovery, prevent knee joint effusion, can be fully active and passive range-of-motion, and increase quadriceps muscle strength with strengthening exercises.

**Case Presentation :** A 19-year-old man as an athlete complains of pain in the right knee. The patient reported that the onset of the pain complaint was that in March the patient fell on the stairs with his feet sideways out. After the incident the patient felt pain, swelling and bruising in the right knee area. The results of Magnetic Resonance Imaging (MRI) carried out on May 20, 2021 showed a complete Anterior Cruciate Ligament (ACL) rupture.

**Management and Outcome :** Ultrasound and strengthening exercise with the aim of increasing and maintaining the muscle strength of the lower limbs in preparation before surgery, reducing pain during walking activities and preventing further back pain. Evaluation of pain using VAS and muscle strength using MMT.

**Discussion :** In this case, prior to surgery or reconstruction, a pre-operative rehabilitation program for ACL injuries was given with the aim of focusing on quadriceps strength, reducing pain for normal gait and ADL.

**Conclusion :** Pre-operative physiotherapy management of ACL injuries found an increase in muscle strength in the quadriceps and hamstring muscles. But in pain management there is no reduction in pain during walking activities.

**Keyword :** Pre-Operatif Anterior Cruriate Ligament, Management Physiotherapy



## Introduction

Anterior Cruciate Ligament (ACL) injuries are one of the most common injuries in orthopedics. The ACL acts as a stabilizer that prevents excessive anterior displacement of the tibia against the femur [1]. The prevalence of knee injuries is about 48/1000 patients per year, 9% of which are ligamentous injuries, with ACL injuries being the most common, usually in the 15-25 year age group when the knee is slightly flexed and externally rotated [3]. ACL injuries are very common in sports, especially in twisting or jumping. The successful rehabilitation outcome of ACL reconstruction depends on several factors including pre-operative management of the ACL.

Previous studies have shown that preoperative management of ACL injuries performed at least 3 weeks before surgery can improve postoperative recovery, prevent knee joint effusion, can be fully active and passive range-of-motion, and increase quadriceps muscle strength with strengthening exercises. [4]. Meanwhile, previous studies have not discussed the pre-operative management of the anterior cruciate ligament in the management or reducing pain during activities of daily living. Therefore, the author tries to discuss the pre-operative management of the anterior cruciate ligament with muscle weakness problems, especially in the quadriceps muscle and reducing pain when walking activities with ultrasound physiotherapy modalities and strengthening exercise. The pre-operative management of the ACL in this study was carried out within 4 weeks with a physiotherapy program 3x a week.

## Case Presentation

A 19-year-old man as an athlete came to the physiotherapy clinic on May 26 complaining of pain in the right knee. The patient reported that the onset of the pain complaint was that in March the patient fell on the stairs with his feet sideways out. After the incident the patient felt pain, swelling and bruising in the right knee area. The pain felt by the patient in the inner knee area, the type of pain is throbbing and localized. The pain gets worse when you use it to walk.

The patient did an ice pack independently on the right knee regularly for 3 days, the patient felt pain and swelling reduced. Then the patient performs activities as usual to walk, go up



and down stairs and exercise. A few days later the patient did basketball exercises when the patient felt the pain in the right knee back unbearable.

The patient underwent treatment to several health facilities by being given pain medication but the pain did not decrease and the pain got worse when the patient walked, went up and down stairs, jogging and basketball. The patient underwent radiological examination to support the patient's diagnosis. The radiographic results showed no fracture of the injured right knee. Then, the results of Magnetic Resonance Imaging (MRI) carried out on May 20, 2021 showed a complete Anterior Cruciate Ligament (ACL) rupture. Patients are given a physiotherapy program in preparation for surgery which is planned to be operated on July 12, 2021 with a physiotherapy program 3x a week.

From the physical examination, the general condition of the patient was good, consciousness was *compost mentis*, weight 60 kg and height 178 cm. Examination of vital signs was found to be normal, namely blood pressure 120/80 mmHg, pulse 70x per minute, respiration rate 22x per minute and body temperature 36.4o C. The patient's main complaint was pain in the medial side of the knee dextra and several times the patient complained of low back pain. At the time of observation from static inspection it was found that there was atrophy in the quadriceps dextra muscle, dynamic inspection of the patient walked without a tool with an unbalanced gait pattern and the pain got worse when walking.

### **Management and Outcome**

Pain examination using VAS (Visual Analog Scale) showed no silent pain and no tenderness on the medial and lateral sides of the knee and motion pain values were obtained 6. Physical examination of basic movements on active motion on the right side showed flexion and extension movements. knee full ROM but there is pain, flexion, extension, abduction, adduction hip full ROM there is no pain. Examination of passive motion on the right side revealed physiological endfeels, namely flexion of the knee soft endfeel, extension of the knee firm endfeel, flexion of the hip elastic endfeel, extension of the hip elastic endfeel, abduction of the hip elastic endfeel and adduction of the hip firm endfeel. Examination of muscle strength was found on the right side of the flexor and extensor knee with an MMT



value of 4, the hip flexor and adductor MMT value 5 and the hip extensor and abductor MMT value 4 (See Table 1).

Table 1: Physical Examination

Gerak	Aktif	Nyeri	Pasif (Endfeel)	MMT
Fleksor Knee	Full ROM	+	Soft endfeel	4
Ekstensor Knee	Full ROM	+	Firm endfeel	4
Fleksor Hip	Full ROM	-	Elastic endfeel	5
Ekstensor Hip	Full ROM	-	Elastic endfeel	4
Abduktor Hip	Full ROM	-	Elastic endfeel	4
Adduktor Hip	Full ROM	-	Firm endfeel	5

Specific tests were carried out as a differential diagnosis, the results obtained were anterior drawer test (+), anterior lachman test (+), posterior drawer test (-) and appley compression test (-). The patient was diagnosed with complete Anterior Cruciate Ligament (ACL) rupture. In this case, physiotherapy treatment was given 3x a week with ultrasound modality and strengthening exercise with the aim of increasing and maintaining the muscle strength of the lower limbs in preparation before surgery, reducing pain during walking activities and preventing further back pain. In this patient obtained full ROM, no effusion, then the pre-operative program was given with resistance strength training and ultrasound. The exercise plans provided are quadriceps band exercise, leg press exercise, hip abductor exercise, hip extensor exercise, single-limb squat and stationary bicycle (See Table 2). In this case, core stability exercise was given with the aim of reducing further complaints of low back pain, increasing strength and balance in controlling movement from the trunk to the pelvis. Ultrasound given aims to minimize motion pain during walking activities because the effect



of ultrasound modeling scar tissue around the joints is given with a duration of 5 minutes with an intensity of 0.7 watts and a frequency of 3 MHz.

Table 2: Pre-operative rehabilitation program

Exercise	Sets by Number of Repetitions
Quadriceps band exercise	3 x 10
Leg press exercise	2 x 10
Hip abdduktor exercise	3 x 10
Prone hangs	2 x 10
Single-limb squat	3 x 8
Stationary bicycle	10-15 minutes (tolerante patient)

## Discussion

In this case, prior to surgery or reconstruction, a pre-operative rehabilitation program for ACL injuries was given with the aim of focusing on quadriceps strength and knee ROM because these two parameters are related to functional outcome after surgery [4].

In this case, he had a deficit in quadriceps muscle strength which was characterized by atrophy of the quadriceps muscle, which was supported by the existing literature that more than 20% before surgery experienced a quadriceps muscle strength deficit. A comprehensive pre-operative ACL program can restore optimal knee joint function and faster post-operative recovery [5].

The purpose of the pre-operative program is to restore full ROM without pain, optimize muscle strength and function, familiarize patients with basic post-operative exercises later and prevent knee joint instability [3]. Other evidence based states, pre-operative rehabilitation aims to control pain and swelling, restore normal ROM, increase muscle strength for normal gait and ADL, mentally prepare for surgery [2].



Stability exercise is given with the aim of reducing further complaints of low back pain, increasing strength and balance in controlling motion from the trunk to the pelvis. Ultrasound given aims to increase cellular metabolism, and has a thermal effect that generates heat by increasing the threshold and activating nerve endings, and can facilitate tissue regeneration [6]. In this case, there was an increase in muscle strength from the pre-operative rehabilitation program, but there was no reduction in pain (See Table 3).

Table 3: Pre-operative evaluation of the rehabilitation program

Outcome	Pertemuan 1  28 May	Evaluasi 1 weeks  04 June	Evaluasi 2 weeks  11 June	Evaluasi 3 weeks  18 June	Evaluasi 4 weeks  25 June
Nyeri Gerak	(6/10)	(6/10)	(6/10)	(6/10)	(6/10)
<b>MMT</b>					
Fleksor Knee	4	4	4	5	5
Ekstensor Knee	4	4	4	5	5
Fleksor Hip	5	5	5	5	5
Ekstensor Hip	4	4	4	5	5
Abduktor Hip	4	4	4	5	5
Adduktor Hip	5	5	5	5	5

## Conclusion

Pre-operative physiotherapy management of ACL injuries for 4 weeks with an evaluation once a week to see the development of muscle strength and decreased pain during walking activities found that there was an increase in muscle strength in the quadriceps and hamstrings. But in pain management there is no reduction in pain during walking activities.

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