



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 8, Issue, 5, pp. 17023-17026, May, 2017

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

KNEE ACL INJURY VERSUS MCL INJURY, PROGNOSIS WITH CONSERVATIVE PHYSIOTHERAPY - AN EVIDENCE BASED STUDY WITH CLINICAL EVALUATION, NMRI & SUBJECTIVE RATING SCALE

Subramanian S.S and Kanimozhiselvi S.J

Sree Balaji College of Physiotherapy Bharath University Chennai-100

DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0805.0267>

ARTICLE INFO

Article History:

Received 17th February, 2017
Received in revised form 12th
March, 2017
Accepted 04th April, 2017
Published online 28th May, 2017

Key Words:

ACL- Anterior cruciate ligament, MCL-
Medial Collateral Ligament, ROM-Range
of Motion, VAS-visual analog scale

ABSTRACT

Most commonly injured is ACL, this study with combined traumatic ACL and MCL injury, strives to analyse clinical reasoning for delayed MCL recovery. Detailed understanding of anatomy of soft tissues with respect to their attachments, vascularity, biomechanical limitations, and ability to recover after injury are most important for a physiotherapist. **Aims and objectives:** I. To evaluate the efficiency of physiotherapy on a subject with knee ACL and MCL injury ii. To compare prognosis of ACL versus MCL with conservative physiotherapy based on clinical evaluation, NMRI and subjective rating scale. **Methods:** This case study subject with traumatic injury of knee ACL and MCL as shown in NMRI was treated with conservative physiotherapy for 3 months period. **Results:** Recovery of ACL was recorded within 12 weeks where as MCL has not healed after 16 weeks as evidenced with NMRI and clinical tests. **Conclusion:** An in-depth knowledge of clinical anatomy of various muscles, ligaments are paramount for successful rehabilitation. Pattern of prognosis with clinical reasoning, evidenced practice were to enrich therapist, profession and health care were to be used to an efficient health care practice was due core outcome of this original research findings.

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INTRODUCTION

The anterior cruciate ligament (ACL) is a band of fibrous tissue that connects the femur to the tibia. Its function is to control the stability of the knee when performing twisting or pivoting actions and stops the tibia from moving forwards. The medial collateral ligament (MCL), is one of the four major ligaments of the knee. It is on the medial (inner) side of the knee joint in humans and other primates. Its primary function is to resist valgus forces on the knee.¹

ACL injury is the most common injuries of the knee joint and accounts for 50% total injuries occur in knee joint, combined ACL and MCL injury occurs in most of the cases² with more than 250000 ACL injury occurs per year in US³ and 50% of them undergoes ACL reconstruction⁴

In New Zealand 80% of all ACLR injuries were treated with reconstruction surgery⁵, an average cost of an ACLR surgery at \$ 10, 326 US in 2011⁶ and \$ 13 billion was spent annually in US for diagnosis, reconstruction and rehabilitation of ACL injuries⁷. ACL tear patients have 13% risk of developing Osteoarthritis (OA) knee in 10 years after injury⁸ and would need Total Knee Replacement (TKR)⁹. Increased knee laxity after ACL injury are likely to have meniscal and chondral

lesions¹⁰ 20% quadriceps deficit and lower neural drive following ACL reconstruction surgery was been reported¹¹. Rehabilitation of MCL injury takes 6 weeks¹² and combined MCL and ACL requires longer duration of rehabilitation.¹³

Aims & Objectives

1. To evaluate the efficiency of physiotherapy on a subject with ACL and MCL injury of knee.
2. To compare prognosis of ACL versus MCL with conservative physiotherapy
3. To evaluate functional scores with physiotherapy on ACL and MCL injury
4. To clinically evaluate prognosis of ACL and MCL
5. To compare radiological (NMRI) investigations with physiotherapy outcome.

MATERIALS AND METHODOLOGY

A female subject aged 36 years, Post graduate in dentistry, working as a Teaching Faculty in a Dental College & Hospital has injured her ACL and MCL following a fall from two wheeler and is getting treated conservatively with Physiotherapy 08-06-2016 till 08-09-16 with a frequency of thrice a week for 25-30 minutes duration of specific exercises.

*Corresponding author: **Subramanian S.S**

Sree Balaji College of Physiotherapy Bharath University Chennai-100

On Observation

- Gait-Antalgic Gait
- Effusion present around the left knee

On Examination

- Left knee tenderness present over the medial aspect of knee.
- Instability of left knee

Motor Power

Joints	Muscle	Right	Left
Knee	Flexors	5/5	3/5
	Extensors	5/5	3/5
Hip	Abductors	3/5	3/5
	Extensors	3/5	3/5
Spine	Flexors & extensors		3/5
Feet	Dorsi flexors and plantar flexors		NAD
Both upper extremities & spine	-		NAD

- Atrophy of left quadriceps muscle
- Difficulty in transfers from sitting to standing position
- Bilateral Vastus Medialis lag positive

Special Tests

- Anterior drawer sign was positive for ACL lesion.
- MCL stress test was positive for MCL lesion.

Provisional Diagnosis

Traumatic ACL & MCL injury of left knee.

Physiotherapy techniques applied on this study subject were as below

- Closed kinematic chain exercises
- Core strengthening exercises
- Alignment correction exercises
- PNF techniques
- Open(initial stage) & Closed (later stage) kinematic exercises
- Proprioceptive techniques using physio ball
- Irradiation techniques of PNF
- Strengthening exercises to both hip and knee

RESULTS

Prognosis based on subjective rating scale, clinical evaluation and NMRI were listed as below:

Table 1 Results of Pre and Post VAS & WOMAC Score

Test	VAS	WOMAC
Pre	8	59%
Post	3	19%

Table 2 On clinical evaluation the results were as below

Before physiotherapy	After physiotherapy
<ul style="list-style-type: none"> • Partial tear involving Anterior Cruciate Ligament with buckling of Posterior Cruciate Ligament noted. • Joint effusion • Subcutaneous edema in anterior aspect of knee. 	<ul style="list-style-type: none"> • Mild joint effusion. • Soft tissue edema adjacent to femoral attachment of Medial Collateral Ligament

Table 3 NMRI radiological investigations before and after physiotherapy

Before exercises	After exercises
<ul style="list-style-type: none"> • Left knee tenderness present over the medial aspect of knee. • Mild swelling present. • Anterior Instability. • Anterior drawer sign positive. • MCL stress test positive. • Gait disturbance. 	<ul style="list-style-type: none"> • Anterior drawer sign negative. • MCL stress test positive. • Reduced swelling. • Medial joint line tenderness present. • No Abnormal findings with gait

DISCUSSION

Hypothetical Questions Arising Out From This Study

1. What are all the factors influencing healing of ligaments?
2. What is the pattern of healing of ACL versus MCL?
3. Does Physiotherapy influences on conservative treatment of ACL and MCL injuries?
4. Mode of exercise chosen in this study. Are they effective?
5. To correlate clinical findings with radiological investigations
6. Clinical reasoning of delayed MCL healing while ACL has healed well?

Factors Influencing Healing of Ligaments

Gender differences in neuromuscular control and kinematics¹⁴ were implicated predisposing factors of ACL injury, as female demonstrated greater knee extension, valgus angle and hip internal rotation than male during landing activities¹⁵. ACL injuries among female was two times than male in sports injuries¹⁶ and hormonal differences as a potential etiological factor¹⁷, and expected percentage of ACL injury during luteal phase of menstrual cycle was also recorded¹⁸

Pattern of healing of ACL versus MCL

Impact on the pattern of recovery was widely reported with combined ACL and MCL injury on animal (rabbit) model¹⁹ and similar findings were supported with a study on goat model²⁰.

Studies in Favour of MCL early healing

MCL injuries are the most common knee injuries²¹ while valgus stress testing revealed no significant difference between the operative and non operative management course of the MCL²², MCL surgery is not necessary in cases where both superficial and deep portions of the Ligament are damaged has been recorded²³ and ACL surgery without surgical repair of MCL gives greater ROM than surgical repair of both ACL and MCL have been reported²⁴, However most MCL injuries are treated non operatively with stabilization and rehabilitation²⁵. Though these studies favour conservative, early healing of MCL, this study subject with lesser prognosis compared to ACL may have required surgical interventions²⁵ among instances of persistant instability of knee surgical repair may be indicated

1. Open (initial stage) & Closed (later stage) kinematic exercises^{26, 27}, Proprioceptive techniques using physio ball²⁸, Irradiation techniques of PNF²⁹.

2. The Clinical reasoning of delayed MCL healing while ACL has healed Well is supported³⁰ who have recorded similar findings
3. MRI may be helpful but it is not always diagnostic for complete acute tears and is unreliable in long standing tears because fibrosis owing to scar tissue may give the appearance of an intact LG. the final determination of torn ACL to be clinically made with Lachman test³¹.

Studies in Favour of ACL delayed healing

Sustaining an ACL injury predisposes an individual to the risk of significant long term rehabilitation³² intra articular location of ACL was cited as possible reason for lack of healing³³. The blood supply of ACL is restricted to small branches on the LG surface, with almost no vessels penetrating the mid substance. This lack of pre existing blood vessels may inhibit angiogenesis in hemisected ACL resulting in slow or incomplete healing³⁴

Psychosocial aspects of the condition

Injuries affect the quality of life of the injured individual with knee injuries can directly affect the ability to participate in sports, daily activities. Also knee injuries reduce mobility, psychological and social aspects of a human being such as individual's independence³⁵. However there is lack scientific evidence about the efficacy of the rehabilitation protocols with knee ligament injuries and more studies are necessary¹⁰

Limitations of This Study

Being a single case study report with only 3 months of therapy, were the limitations. Longer follow ups and larger sample size are highly recommended as continuation of this study. Also other measurable parameters such as X- ray, cadence, functional MRI could be continued as future studies.

Uniqueness of this study report

This conservative management with physiotherapeutic means, study subject who was adviced for arthroscopic repair, is not only rehabilitated, but able to participate and emerge as first in the marathon following rehabilitation is worthy mentioning and unique with physical exercises as major role in prognosis is recorded in her.

CONCLUSION

An in depth clinical anatomy with the various soft tissue structure, vascularity, healing means, pattern of prognosis are of greater importance as physiotherapist when applied with evidences are the most focused area. Hence not only to study, learn anatomy but its applications clinically forms the basic foundation for a successful clinical therapist is prudent. Also importance of clinical evaluation, radiological investigations subjective rating scales were with scientific evidence should form the basis of physical therapy

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How to cite this article:

Subramanian S.S and Kanimozhiselvi S.J. 2017, Knee ACL Injury Versus Mcl Injury, Prognosis With Conservative Physiotherapy - An Evidence Based Study With Clinical Evaluation, Nmri & Subjective Rating Scale. *Int J Recent Sci Res*. 8(5), pp. 17023-17026. DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0805.0267>
