

Case Study Report on Anterior Cruciate Ligament Reconstruction (Left) Knee Subject Developing Anterior Cruciate Ligament Degeneration on Right Uninjured Knee in 4 Years, Treated With Physiotherapy Conservatively.

Dr.S.S.Subramanian,

The Principal, Sree Balaji College of Physiotherapy, Affiliated To (Bharath) University, BIHER, Chennai, India

ABSTRACT: This original case study where an obese young adult having undergone anterior Cruciate ligament – reconstruction (left) in 2012 developed anterior Cruciate ligament degeneration of right knee. We having treated the subject with Proprioceptive exercises, weight reduction exercises, core and strength training were analyzing here, the prognosis made with physiotherapy. Also various mechanisms behind both etiology of the subject developing anterior Cruciate ligament degeneration of contra lateral leg (Right) and benefits obtained with physiotherapy.

I. INTRODUCTION

The anterior cruciate ligament is a major stabilizer of the knee, restricting anterior tibial translation and rotational forces at the tibiofemoral joint (Flynn et al 2005) and anterior cruciate ligament deficiency results in pain, increased instability and altered function in a larger proportion of patients (Herrington & Fowler 2006).

ACL injury is the most common injuries of knee joint (Allan et al 2013) and accounts for 50% of total injuries occur in knee joint. Combined ACL and MCL injury occurs in most of the cases. More than 250,000 anterior cruciate ligament injuries occur yearly in US (Chapman et al 2011) and more than 50% of them undergoes anterior Cruciate ligament reconstruction (AAOS 2007).

Anterior Cruciate ligament reconstruction surgery is aimed at restoring static joint stability, minimizing further damage to the menisci and articular cartilage (Gold Blatt et al 2005) and preserve knee joint health (e health 2004). Lynch et al 2013 have identified criteria's such as absence of giving way, absence of joint effusion, quadriceps strength symmetry, return to sports, patient reported outcomes, as successful outcome of the post anterior Cruciate ligament reconstructive surgery.

Objective of this study was to analyse various causes for having developed anterior Cruciate ligament deficiency of the right knee (Left knee he was treated with anterior Cruciate ligament reconstructive surgery – 4 years back) and means of physiotherapy with due evidence scientifically.

II. BACKGROUND INFORMATION

Mr. XXXX, 28 years, an engineer by profession was interested in basketball and cricket as hobbies, with subsequent injury to right knee anterior Cruciate injury reconstructive surgery was done in 2012 and he was rehabilitated with due exercises. He was doing all his activities till February 2016, as he developed pain in contralateral (Left) Knee NMRI revealed anterior Cruciate ligament degeneration.

O/le

Ambulant unaided, endomorph, left genu recurvatum.

Anthropometric Findings:

Height: 165 cms Resting Heart rate: 84/mt Weight: 96kg

Blood Pressure: 126/ 85 mm/Hg BMI: 55 Kg/ m²

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 11, November 2016

Waist Circumference: 106cm

C/O

Pain over contralateral knee increasing on standing, walking, while playing cricket and basket ball.

O/E

- Pain over left medial and anterior knee joint with tender medial joint line positive
- Increase laxity of left knee joint, while (anterior cruciate ligament reconstruction) right knee didn't show any abnormal clinical findings.
- Crepitus active knee movements right > left
- Bilateral hamstring tightness
- Exaggerated lumbar lordosis
- Circumference of quadriceps and gastrocnemius muscles

Table: 1

Circumference Measurement of Muscles	Left (cm)	Right (cm)
Quadriceps from 1" Base of Patella	47	44
Gastrocnemius from "3 Tebial Tubercle	37	38

- Quadriceps atrophy on the anterior Cruciate ligament – Reconstruction leg by 3cms
- Left knee genu recurvatum
- Active range of motion in prone position

Table: 2

Range of knee flexion in prone and standing

Starting Position	Right	Left
Prone Position	0 ⁰ -110 ⁰	0 ⁰ -120 ⁰
Standing	0 ⁰ -100 ⁰	0 ⁰ -110 ⁰

Provisional Diagnosis:

Post arthroscopic anterior Cruciate ligament reconstruction of left knee, and degenerative anterior Cruciate ligament of right knee

Table: 3

Result of Pre and Post ROM, Womac Score, Waist Circumference, BMI, Deformity.

Parameters	ROM				Womac Score	Deformity	VAS Scale	BMI Kg/ m ²	Waist Circumference Cm
Pre	Prone		Standing		48	-	8	55	106
	Left	Right	Left	Right					
	0 ⁰ -120 ⁰	0 ⁰ -110 ⁰	0 ⁰ -100 ⁰	0 ⁰ -110 ⁰					
Post	Prone		Standing		12	Left knee Genu Recurvatum (Normal Control lateral knee)	3	51	97
	Left	Right	Left	Right					
	0 ⁰ -125 ⁰	0 ⁰ -115 ⁰	0 ⁰ -120 ⁰	0 ⁰ -110 ⁰					

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 11, November 2016

III. TREATMENT GIVEN

This subject was getting treated by the author with physiotherapy from February 2016 till today with a frequency of weekly twice, each session lasts for 30-35 minutes and an exercise intensity of 70-80% of maximal heart rate.

- I. Weight reduction with resisted exercises using Physioball
- II. Proprioceptive exercises to both lower extremities
- III. Strengthening of bilateral hip, knee and core muscles
- IV. Rehabilitation with conservative means of contra lateral knee (Non operated)

IV. DISCUSSION

The major purpose of presenting this case study subject was to address the following clinical findings and observation to be discussed with due evidences.

- a. Why with in four years of anterior cruciate ligament - right surgery the subject develops anterior Cruciate ligament – injury (Degenerative) of contralateral knee.
 - b. Does obesity influences anterior Cruciate ligament injury and a drop in BMI and waist circumference improves anterior Cruciate ligament rehabilitation?
 - c. For the last four years after anterior Cruciate ligament – right, the subject was non adherent to any form of physical activity after initial rehabilitation, does lack of follow up with exercises lead to anterior Cruciate ligament injury of another non operated leg?
 - d. Does sedentary life style and nature of occupation of the subject has a role in development of pain and anterior cruciate ligament injury to the normal leg, hence unable to continue games?
 - e. Hypertrophy of gastrocnemius and atrophy of quadriceps is another findings from this study.
1. Patients with anterior Cruciate ligament tear has a 0^0 - 13^0 risk of developing knee osteoarthritis at ten years after injury (Oiestad etal 2009). Anterior Cruciate ligament – reconstruction life time cost for a patient was \$38, 121 and \$ 7.6 million annually in US, who were projected to develop radiographic osteoarthritis lifetime, would have symptomatic osteoarthritis knee and would need TKR (Scott etal 2000). Barenus etal 2014 found increase in knee osteoarthritis prevalence post anterior cruciate ligament reconstruction after 14 years. Increased knee laxity after on anterior cruciate ligament injury are more likely to have meniscal Chondral lesions (Logerstedt etal 2010).
 2. Proprioceptive input and neuro muscular control are attended after anterior Cruciate ligament injury (Wojtys & Huston 1994) and Proprioceptive exercises produces compensatory muscle activation patterns in the neuro muscular system that may assist with joint stability (Cooper etal 2005). Proprioceptive deficits have been found beyond 1 year post anterior Cruciate ligament – reconstruction (Decker etal 2002) and Proprioceptive exercises have been shown to enhance strength gains in the quadriceps and hamstring muscles post anterior Cruciate – reconstruction (Zatter Storm 2000).
 3. However several factors such as impaired functional performance, knee instability and pain, reduced range of motion, quadriceps strength deficits, neuro muscular dysfunction and biomechanical mal adoptions may account for highly variable degrees of success following anterior Cruciate ligament rehabilitation (Failla etal 2015). **As supported by this study we find post anterior cruciate ligament – reconstructive this study subject has developed pain, weakness of quadriceps and Genu recurvatum of uninjured leg with anterior Cruciate ligament degeneration.**
 4. In a systematic review recorded quadriceps strength after anterior cruciate ligament – reconstruction of 20% to persists for 2 years (Palmieri etal 2008). Oztel etal reported 6-9% deficit after 3 years post anterior cruciate ligament and long term quadriceps deficit were the result of lower neural drive. **This case study subject – after anterior cruciate ligament reconstruction has quadriceps atrophy of 3 cm and hyper atrophied gastrocnemius by 1 cm – compared with contralateral uninjured leg.** Knee function scores (Global rating scale of received function) after anterior Cruciate ligament reconstruction 12 months another multicenter orthopedic outcomes network (MOON) has recorded post anterior Cruciate ligament reconstruction subjective rating from 2-6 years at from base line of 45% to 77% (Spindler etal 2010). **This case study subject after 10 months of therapy**

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 11, November 2016

post anterior cruciate ligament reconstruction has rating of his knee functions improved by four fold as shown in the table for womac score.

5. A systematic review post anterior Cruciate ligament reconstruction have reported with increasing health care costs, increased psychological distress, re injury (Wright et al 2012).
6. A Cochrane review found that there was insufficient evidence to recommended anterior Cruciate ligament reconstruction compared with operative treatment and recent randomized, controlled trials have found no difference between those who had anterior Cruciate ligament reconstruction and those treated non operatively with regard to knee function, health status and return to pre injury level after 2 and 5 years in active, young individuals (Smith et al 2014). Eitzen and Moksnes 2010 found progressive exercises to be effective with anterior cruciate ligament injury improving knee function and remain non operatively managed. **In the line with this study this case study subject is conservatively treated for anterior Cruciate ligament left knee with regular exercises and follow up on his knee function was good as displayed in the table 3.**

V. CONCLUSION

Obesity, known to influence weight bearing joints, hence following anterior cruciate ligament – reconstruction, regular physical activities should be emphasized along with weight reduction means. Emphasis in sustained rehabilitation where follow up of anterior Cruciate ligament – reconstruction helps to minimize patients developing complications such as anterior Cruciate ligament – deficiency of contra lateral leg as major findings of this study.

Further studies are recommended on larger sample size, longer duration follow ups, application of other physiotherapy modalities, using other parameters to be analyzed as therapeutic outcomes.

Limitations of this study includes subject is under the authors care with physiotherapy only from Jan 2016, whereas following anterior Cruciate ligament – reconstruction till December 2015, he was treated elsewhere.

REFERENCES

1. Flynn RK, Pedersen CL, Birmingham TB, Kirkley A, Jackowski D, Fowler PJ. The familial predisposition to tearing the anterior cruciate ligament: a case control study. *Am J Sports Med.* 2005; 33(1):23–28.
2. Herrington L, Fowler E. A systematic literature review to investigate if we identify those patients who can cope with anterior cruciate ligament deficiency. *Knee.* 2006; 13(4):260–265.
3. Allan M. Joseph . Christy . L . Collins, MA Natalie. M. Hence, VS, Ellen S. Yard, Sarah. K. Fields, R. Dawn Comstock. A Multi Sport Epidemiologic Comparison of Anterior Cruciate Ligament Injuries in High School Athletics, *journal of athletic training* pg. No.812. 2013
4. Chapman's Orthopaedic Surgery. 3rd edition, volumes 3, 2001: 2348-2388.
5. American Academy of Orthopaedic Surgeons, July 2007, Anterior Cruciate Ligament Injury. Surgical Considerations. <http://orthoinfo.990s.org/topic=A00297#A00297>.
6. Goldblatt JP¹, Fitzsimmons SE, Balk E, Richmond JC. Reconstruction of the anterior cruciate ligament: meta-analysis of patellar tendon versus hamstring tendon autograft. *Arthroscopy.* 2005 Jul; 21(7):791-803.
7. E health, July 2004. What is the anterior Cruciate ligament. http://www.ehealthmd.com/library/acltears/ anterior Cruciate ligament _what is.html
8. A.D Lynch, David S Logerstedt, Hege Grindem, Ingrid Eitzen, Gregory E Hicks, Michael J Axe, Lars Engebretsen, May Arna Risberg, Lynn Snyder-Mackler. Consensus criteria for defining 'successful outcome' after ACL injury and reconstruction: a Delaware-Oslo ACL cohort investigation. *Br J Sports Med* 2013; 1–9.
9. Øiestad BE¹, Engebretsen L, Storheim K, Risberg MA. Knee osteoarthritis after anterior cruciate ligament injury: a systematic review. *Am J Sports Med.* 2009 Jul; 37(7):1434-43.
10. Scott DL, Berry H, Capell H, Coppock J, Daymond T, Doyle DV, et al. The long-term effects of non-steroidal anti-inflammatory drugs in osteoarthritis of the knee: A randomized placebo-controlled trial. *Rheumatology (Oxford)* 2000;39:1095–101
11. Barenus B., Ponzer S., Shalabi A., Bujak R., Norlén L., Eriksson K. Increased risk of osteoarthritis after anterior cruciate ligament reconstruction: a 14-year follow-up study of a randomized controlled trial. *The American Journal of Sports Medicine.* 2014; 42(5):1049–1057.
12. Logerstedt DS, Snyder-Mackler L, Ritter RC, Axe MJ, Godges JJ. Knee stability and movement coordination impairments: knee ligament sprain. *J Orthop Sports Phys Ther.* 2010; 40(4):A1–A37.
13. Wojtys EM¹, Huston LJ. Neuromuscular performance in normal and anterior cruciate ligament-deficient lower extremities. *Am J Sports Med.* 1994 Jan-Feb; 22(1):89-104.
14. Cooper R. L, Taylor N. F, Feller J. A. A Systematic Review of the Effect of Proprioceptive and Balance Exercises on People With an Injured or Reconstructed Anterior Cruciate Ligament. *Research in Sports Medicine: An International Journal.* 2005; 13(2):163–178.
15. Decker MJ Torry MR Noonan TJ, et al. landing adaptations after ACL reconstruction. *Med Sci Sports Exerc.* 2002; 34(9):1408-13.
16. Zatterstrom R, Friden T, Lindstrand A, Moritz U. Rehabilitation following acute anterior cruciate ligament injuries: A 12-month follow-up of a randomized clinical trial. *Scandinavian Journal of Medicine and Science in Sports.* 2000;10(3): 156-163

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 11, November 2016

17. Failla MJ¹, Arundale AJ², Legerstedt DS³, Snyder-Mackler L⁴. Controversies in knee rehabilitation: anterior cruciate ligament injury. Clin Sports Med. 2015 Apr; 34(2):301-12.
18. Palmieri-Smith RM, Thomas AC, Wojtys EM. Maximizing quadriceps strength after ACL reconstruction. Clin Sports Med. 2008; 27:405-424.
19. Spindler KP, Huston LJ, Wright RW, et al. The Prognosis and Predictors of Sports Function and Activity at Minimum 6 Years After Anterior Cruciate Ligament Reconstruction A Population Cohort Study. Am J Sports Med. 2010:1-12.
20. Wright RW, Gill CS, Chen L, et al. Outcome of Revision Anterior Cruciate Ligament. 2012:531-536.
21. Smith TO, Postle K, Penny F, McNamara I, Mann CJV. Is reconstruction the best management strategy for anterior cruciate ligament rupture? A systematic review and meta-analysis comparing anterior cruciate ligament reconstruction versus non-operative treatment. Knee. 2014; 21(2):462-470.
22. Eitzen I, Moksnes PH. A Progressive 5-Week Exercise Therapy Program Leads to Significant Improvement in Knee Function Early After Anterior Cruciate Ligament Injury. J Orthop Sport Phys Ther.2010;40(2):705-721