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## **Anterior cruciate ligament injury: Conservative physiotherapy with four years follow up**

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### **Abstract**

Anterior Cruciate ligament injuries being common especially among female. This subject was treated conservatively with grade II anterior cruciate ligament injury and with four year follow up. This original case study analyses the mechanism of prognosis with due evidences, Where the patient was treated with regular physiotherapy. The subject has improved with functional means of knee joints and with obesity.

**Keywords:** ACL, Anterior Cruciate Ligament, ROM, Range of Motion, VAS, Visual Analogue Scale, WOMAC SCORE, Subjective Rating Score on 10 Functional Items of Knee on a 5 Point Scale

### **Introduction**

Anterior Cruciate ligament (ACL) is widely known as the most important ligament in the knee. Anterior and posterior cruciate ligaments cross each other to their respective tibial attachments and both are intra capsular and extra synovial (Anderson et al 2003). Anterior Cruciate ligament is made up of bundles of longitudinal fascicles that pass lateral to the femoral condyle. The femoral attachment on the medial surface of the lateral femoral condyle is a circular area tilted slightly forward from the vertical. The tibial attachment is in front and bilateral to the anterior tibial spine (Tim and Dawkins 1991). The anterior cruciate ligament is the primary restraint to anterior translation of the tibia on the femur. It provides secondary stabilization to varus / valgus rotation of the knee. Besides anterior Cruciate ligament is a critical stabilizer that prevents hypertension of the tibia (Anderson et al 2000). The anterior Cruciate ligament has two discrete bands: an anterior medial and a posterior lateral bundle. When the knee is fully extended, the femoral attachment of the anterior medial bundle is anterior to the attachment of the posterior lateral bundle, which is taut. When the knee is flexed, the positions are reversed, with taut anterior medial bundle, causing the anterior Cruciate ligament to wind on itself (Tim and Dawkins 1991). Sustaining an anterior Cruciate ligament injury predisposes an individual to the risk of significant long term rehabilitation, such as in the case of osteoarthritis (Gillquist & Messner 1997). Intra articular location of anterior Cruciate ligament was cited as possible reason for lack of healing (Frank et al 1994). The blood supply of the anterior Cruciate ligament is restricted to small branches on the ligament surface, with almost no vessels penetrating the mid substance. This lack of pre existing blood vessels may inhibit angiogenesis in hemisected anterior Cruciate ligament, resulting in slow or in complete healing (Robert et al 2003). The aim of this case study is to analyse the impact of conservative rehabilitation of a female subject of anterior Cruciate ligament injury with a four year follow up.

### **Background Information**

Ms. XXXX, aged 28 years, unmarried, endomorph, vegetarian, employed as chartered accountant with sedentary life style, with poor exercise habits gives history of knee giving way and buckling frequently, NMRI revealed left anterior Cruciate ligament injury in 2012 May. She was then advised for anterior cruciate ligament reconstructive surgery by the orthopaedic surgeon. The subject was regularly attending physiotherapy sessions with the author since then till today, for conservative management of her anterior cruciate ligament injury.

### **O/E as on May 2012**

Ambulant, bilateral genu recurvatum and valgum

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### Anthropometric Findings

Body weight: 96 kg, Resting Heart Rate: 96/mt,  
Height: 165 Cm, Blood Pressure: 128/82 mm/ng,  
BMI: 56 Kg/m<sup>2</sup>, Waist Circumference: 111Cm

- Lachman and pivot tests were positive
- Crepitus increasing on movements of both knee joints left> right
- Active range of motion: left Knee – 0<sup>0</sup>-90<sup>0</sup> Right Knee -0<sup>0</sup>-120<sup>0</sup>
- circumference of quadriceps 1” from base of patella: Left: 19 “ Right: 20”
- increased laxity of both knee joints but more on left > right
- Pain →increasing on weight bearing activities and with long standing.
- Tenderness → medial joint line tender positive
- Motor power → bilateral Vastus Medialis lag positive

**Table 1:** Motor Power of Hip & Knee.

Knee	Left	Right
	Quadriceps 3/5 Hamstrings 3/5	4/5 4/5
Hip	Abductors 3/5	4/5
	Extensors 3/5	4 /5
	Flexors 2/5	4/5
	Lateral Rotators 3/5	4/5
	Internal Rotators 4/5	4/5

- Exaggerated lumbar lordosis with weak abdominal muscles
- Has moderate exercise tolerance
- Other peripheral joints range of motion full and free

### Provisional Diagnosis

Anterior cruciate ligament injury left knee treatment given:

1. Weight reduction means using Physioball
2. Strengthening of both lower extremities
3. Alignment correction to both legs
4. Proprioceptive training exercises to both lower extremities

### Results

**Table 2:** Subjects of (2012) Pre and (2016) Post Exercises VAS, WOMAC, ROM, BMI, Waist Circumference

	VAS	Womac%	ROM <sup>0</sup>		BMI Kg/ m <sup>2</sup>	Waist Circumference Cm
			Left	Right		
Pre	8	58	0-90 <sup>0</sup>	0-120 <sup>0</sup>	56	111
Post	2	16	0-115 <sup>0</sup>	0-125 <sup>0</sup>	46	92

### Discussion

This original case study was to be discussed for having successfully treated anterior cruciate ligament injury with conservative management of this female subject with exercise therapy means with four year follow up.

- a. Role of obesity in conservative anterior Cruciate ligament rehabilitation?
- b. Impact of Proprioceptive exercises in anterior Cruciate ligament
- c. Influence of exercises on cartilage quality
- d. Life style modification with regular physiotherapy on anterior Cruciate ligament injury

1. Anterior cruciate ligament injury to female is almost two times than male in sports injuries (Putukian et al 2000), the reasons could be lack of fitness levels necessary (Arendt & Dick et al 1995) hormonal differences as a potential etiological factor (Griffin et al 2000) and intrinsic factors including variables such as limb alignments, joint laxity, ligament size, wider pelvic, increased genu valgum and increased tibial torsion (Arendt et al 1997) and Woo et al 2000 have recorded anterior Cruciate ligament injuries expected percentage is greater during voluntary period than luteal phase of menstrual cycle. This study subject with pre injury BMI of 56 Kg/M<sup>2</sup> being obese had non traumatic anterior cruciate ligament injury.
2. Female demonstrate a decreased knee flexion and an increased valgus motion and moment hence knee joint mechanics exhibited by females are thought to place them at a greater risk for anterior cruciate ligament injury (Pollard et al 2007), but this study subjects ROM of knee has improved with physiotherapy as shown in table 2.

3. Gender differences in neuromuscular control and kinematics (Secker et al 2003) have been implicated as predisposing factors of anterior cruciate ligament injury as females demonstrated greater knee extension, valgus angle and hip internal rotation than males during landing activities (Lephart et al 2002). The combination of knee extension, genu valgus and femoral internal rotation is believed to place the anterior cruciate ligament in vulnerable and possibly damaging position (Ireland et al 1997) development of anterior cruciate ligament injury prevention programme is needed with this knowledge of potentially injuries lower extremity mechanics (Sigward et al 2006)
4. Anterior cruciate ligament generally heals very poorly (Woo et al 2000) and an incomplete regeneration after partial rupture was recorded on rabbits (Hefti et al 1991). A neglected anterior cruciate ligament injury leads to instability, torn menisci and eventually arthritis, early accurate diagnosis is essential for definitive treatment and preservation of the knee (Bull et al 1999). This study subject has recorded good functional outcome with therapy by 3 fold as reflected in the table 2 in the womac score.
5. An 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 ligament. The final determination of a torn anterior cruciate ligament is made an clinical examination the lack man test (Bull et al 1999) and lateral pivot shift are the two important for torn anterior Cruciate ligament diagnostic tests.

6. Strengthening of quadriceps and gastrocnemius are of greater importance than hamstrings, an agonist to anterior cruciate ligament, during the rehabilitation after anterior cruciate ligament injury (Kvist & Gillquist et al 2001).
7. Closed kinematic exercises play a primary role in anterior cruciate ligament rehab (Heijne et al 2004) as CKC activities are modelled as closed linkages where movement in one joint produces movements in all the other joints of the extremity (Palmitier et al 1991). CKC exercises stimulate functional movements that are common in activities of daily life and also increase the tibio femoral joint compression and emphasize co contraction between hamstrings and quadriceps muscles (Heijne et al 2004).
8. Ihara and Nakayama et al 1986 supported that neuro muscular and Proprioceptive training show the most encouraging evidence of effective anterior cruciate ligament injury prevention and treatment.
9. Correction of neuro muscular Imbalances is important for both the optimal biomechanics and reduction of knee injury incidence (Ford et al 2003). The study subject pain has come down as visual analogue scale score reduction from 8 to 2 and reduction in obesity as evidenced with drop in BMI and waist circumference and an improved functional means with womac score rated by the subject as shown in table 2 were the major benefit the subject was rehabilitated with exercises as stated above.

## Conclusion

Non-invasive, non-pharmacological management of anterior Cruciate ligament injuries were effective in an obese, anterior Cruciate ligament injured subject treated with regular physiotherapy is the major outcome of this original case study. Further studies with larger sample size more variables with NMRI are recommended. Limitations of the study, where only subjective scoring and physical measurements were used to analyse the theory outcome.

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