



13 Year Follow Up of a Subject with Anterior Cruciate Ligament – Reconstruction, treated with Physiotherapy

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Abstract

The subject having undergone anterior Cruciate ligament – reconstructive surgery of – right knee with subsequent rehabilitation in a 12 weeks period resumed his pre injury level of daily activities and continued occasionally with exercises. This follow up highlightens the biomechanical and gait changes and subjective rating of the knee strives with evidence for prevention of further degeneration and promotive means with physiotherapy.

Keywords: (ACL – R) - Anterior Cruciate Ligament Reconstruction, WC – Waist Circumference, BMI – Body mass Index, Womac Score – Subjective Rating Scale on Knee Function.

Introduction

Anterior Cruciate Ligament is a major stabilizer of knee, restricting anterior tibial translation and rotational forces at the tibio femoral joint (Flynn et al 2005). Anterior Cruciate ligament – D efficiency results in pain, increased instability and altered function in a larger proportion of patients (Herrington et al 2006). It has been suggested that anterior Cruciate ligament reconstruction (Anterior Cruciate Ligament – right) may aid patients in regaining proper joint kinematics, possibly minimizing proper joint kinematics, possibly minimizing the abnormal stresses that could occur with anterior Cruciate ligament – deficiency (Loboutin et al 2009). Total medical costs including diagnosis, surgical reconstruction and post operative rehabilitation of anterior cruciate ligament injuries amounts to 13 billion in

United States annually (Brophy et al 2009). The average cost of an anterior Cruciate ligament reconstruction surgery is \$10, 326 US dollars in 2011 (Lubowitz & Appleby 2011). In New Zealand 80% of all knee LG injuries required anterior cruciate ligaments – Reconstruction surgery (Gianotti 2009).

Objective of this original case study follow up for 13 years was to analyse various biomechanical causes, musculoskeletal impairments and provide therapy with clinical evidence to the subject in a subject who has undergone ACL – Reconstructive Surgery in 2003.

Mr. XXXX, Aged – 46 Years

Anthropometric Findings

BMI: 43 Kg/m² Weight: 86 kg

Height: 170cm, Resting Heart Rate: 92 / mt

Waist Circumference: 94cm

Background Information

The subject has injured his ACL (R) and having undergone ACL – Reconstructive surgery was rehabilitated with due physiotherapeutic means in 6 weeks in 2003 but the subject complains of pain

on uninjured knee with LBA, 6 years later. While his physical condition as in 2009:

Complaints of the subject was occasional continued buckling/ giving way of normal / uninjured left knee with exertion such as long standing, with exertional activities.

O/E

Table: 1 Motor power of hip and knee joint

Joint	Motor Power	Right	Left
Hip	Flexors -	4/5	4/5
	Extensors –	4/5	3+/5
	Abductors -	3+/5	3+/5
Knee	Flexors -	3+/5	3+/5
	Extensors –	3+/5	3+/5

Spinal and Abdominal Muscle Grade III / V

Active ROM Knee Flexion in prone position
→ Left: 0° - 120° Right: 0° - 110°

- Vastus Medialis weakness: more pronounced an uninjured (Left)
- Gait : Antalgic gait with list to left
- Exaggerated lumbar lordosis:

The subject was getting treated from 2003 till today with physiotherapy

Provisional Diagnosis:

Left knee anterior cruciate ligament – R, low back ache, early osteoarthritis knee changes on left knee.

Treatment Given:

- a) Proprioceptive exercise using Physioball
- b) Alignment correction exercises
- c) Strengthening of core and both lower extremities

With a frequency of twice a week, each session for a duration of 30 minutes, progression was done with increasing the holding period and repetitions.

His present physical condition with major results as shown in the table: 1

Table: 2 Results of Pre, Post ROM, Womac, Waist Circumference, BMI and Motor Power of the subject

	ROM		Womac	Waist Circumference	BMI	Motor Power
	Left	Right				
Pre	0° - 120°	0° - 110°	37%	105cm	$43\text{kg} / \text{m}^2$	Quadriceps – Left - 3/5 Right – 3/5
Post	0° - 130°	0° - 120°	12%	94cm	36 kg/m^2	Quadriceps – Left - 4/5 Right – 3+/5

Discussion

The major issues in this 13 year follow up in a subject who has undergone anterior Cruciate ligament – Reconstructive Surgery, were discussed as below:

1. Abnormal leg alignment of both knee joints.
2. Knee instability with increased body weight.

3. Subjective feeling of ACL – R knee giving way with long hours of standing.
4. Mild antalgic gait after serve physical exertion.
5. Low back ache, early arthritic changes in the contra lateral (leg knee) and developing genu recurvatum.

1. Injuries affect the physical aspect of a human being and major knee injuries can directly affect the ability to participate in sports, daily activities and employment requirements (Luw et al 2008) and independence plays crucial role in bringing personal meaning and enrichment to an individual's life (Zikkal and Cantor 1990) as quality of life and psychosocial health of the injured individual are often much lower than that of an individual whom is not injured (Spanier et al 2014). Though WOMAC score has decreased by 3 fold as shown in table, this subject's quality of life was partially affected even after 13 years following anterior Cruciate ligament – reconstructive surgery.

2. Knee circumference (Kirwan et al 1979) taken 1cm above the superior border of patella is more precise. This subject has a wasting of quadriceps by 3 cms on the operated leg.

3. Varus or valgus deformity of the knee displaces the line of weight bearing through the knee joint, increasing the load on the medial or lateral compartments, tibiofemoral angle between the mid medially lines of the femur and tibia is approximately 7° in the normal leg (Burks et al 1997). Abnormal leg alignment showed significantly more degenerative changes in the knee (Caval & Waliswski et al 1992). This study subject as shown in the below photographs has developed bilateral genu varum and genu recurvatum on left knee (Uninjured)



4. Although anterior cruciate ligament – right is primarily performed to regain stability after anterior Cruciate ligament, a long term goal of this procedure is to decrease the risk of developing knee osteoarthritis and improve long term joint health (Ichiba et al 2009). Concomitant meniscal injury requiring meniscectomy after anterior cruciate ligament rupture is a contributing factor to knee osteoarthritis (Newman et al 2008). 44% of patients who underwent anterior cruciate ligament Reconstruction – developed osteoarthritis knee (Brittney et al 2014). Anterior Cruciate ligament reconstruction with a hamstring tendon graft has demonstrated better self reported function and decreased anterior knee pain compared with reconstruction with a patella tendon graft (Wipfler et al 2011), (Frobell et al 2013) have shown among patients reconstructed with patella tendon graft a significant increase in patella femoral osteoarthritis but not tibiofemoral, Osteoarthritis compared with patients who received hamstring tendon grafts, suggesting that graft choice and the potential effects on long term joint health and risk for osteoarthritis knee. Anterior Cruciate ligament tear patients have 13% risk of developing osteoarthritis knee in 10 years after injury (Distad et al 2009). Whereas this case study subject has developing grade I osteoarthritis knee of uninjured left knee joint.

5. Strengthening of quadriceps and gastrocnemius instead of hamstring are of greater importance in the rehabilitation after an anterior Cruciate ligament – reconstruction (Kvist and Gillquist 2001). Closed kinematic chain exercises were widely used in this subject's rehabilitation as they stimulate functional activities and similar daily activities (Hygiene et al 2004). CKC exercises increase tibiofemoral joint compression and emphasize co contraction between hamstrings and quadriceps muscles. Thus they are thought to stabilize the joint and minimize strain on the healing anterior Cruciate ligament (Escamila et al 1998). Correction of neuromuscular imbalances is important for both optimal biomechanics and reduction of knee injury incidence (Ford et al 2003). In line with above said findings closed kinematic chain exercises, and strengthening of both knees and hips were used while treating the subject.

Conclusion

Most of the patients who have undergone anterior Cruciate ligament – R have developed osteoarthritis and subsequent biomechanical changes in the un injured leg were widely recorded. This study subject was conservatively getting managed with regular physiotherapy for his ACL – R limb as well contra lateral normal limb. Therefore long term follow up with regular physiotherapy should be focused on ACL – R, rehabilitated patients, which would help sustainability of the success for the medical fraternity and an enhanced continued quality of life for the subject remains the core of this presentation. Further studies with larger sample size and more measurable, biochemical and radiographic variables are recommended. Limitations were being a single case study and limited variables were analyzed here.

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