

## CLINICAL OUTCOMES OF ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING HAMSTRINGS TENDON AUTOGRAFT

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### ABSTRACT

#### BACKGROUND

Anterior cruciate ligament is most commonly injured ligament in the knee. The first description of the true nature of ACL that it is a joint stabilizer, which restricts abnormal motion, was given by Galen<sup>1</sup> (Circa 170 AD) The first prosthetic ACL made of Dacron was developed by Rubin, Marshall and Wary in 1975.<sup>2,3</sup> D.L McIntosh did extra-articular reconstruction using fascia lata in 1972.<sup>4</sup> The first use of semitendinosus and gracilis for ACL reconstruction in 1982, was done by Lipscom.<sup>5</sup> M.J. Fredman in 1988<sup>6</sup> and was the first person who did the arthroscopic reconstruction of ACL using four-strand hamstring graft. Functional outcome of arthroscopic ACL reconstruction was better compared to open repair in short term but in long-term follow-up, the results were similar, concluded by Cyril B. Frank et al,<sup>7</sup> in their study.

#### MATERIALS AND METHODS

The study was conducted among 25 patients with signs and symptoms of ACL tear who got admitted from OPD and casualty of government general hospital between September 2016 to August 2018. Patients underwent anterior cruciate ligament reconstruction using hamstring autograft for ACL injury and followed for 7 to 24 months of follow-up.

#### RESULTS

Post-op mean IKDC score is 87.54%. 84% of patients with Lysholm Knee Score had an excellent to good outcome. Complications- 4% (n=1) had a superficial infection, 4% (n=1) had extensor lag, 4% (n=1) had deep infection.

#### CONCLUSION

Clinical outcome after arthroscopic anterior cruciate ligament reconstruction with hamstring graft is an excellent treatment option for anterior cruciate ligament-deficient knees with less post-operative complications.

#### KEYWORDS

ACL, Anterior Cruciate Ligament, Hamstring Autograft.

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#### BACKGROUND

The knee joint is one of the most commonly injured joints in our body and the most commonly injured ligament in the knee is the anterior cruciate ligament. There is an increase in the incidence of ligament injuries of the knee due to the ever-increasing Road traffic accidents and increased participation in sporting activities. The ACL along with other ligaments, the capsule is the primary stabilizer of knee and prevents anterior translation, and restricts valgus and rotational stress to a certain degree.

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When an ACL injury occurs, the symptoms of knee instability, pain and a decrease in joint function occur. Although conservative treatment with intensive physiotherapy, bracing and lifestyle modification can be tried in some patients with less anticipated knee function, in symptomatic young active individuals, ACL reconstruction is necessary. Also, ACL injuries are mostly associated with injury of the meniscus which needs to be addressed, else the person can develop early onset of osteoarthritis of the knee.<sup>1</sup> Functional outcome of arthroscopic ACL reconstruction was better compared to open repair in short term but in long-term follow-up, the results were similar, concluded by Cyril B. Frank et al.<sup>7</sup> in their study. Michael Wagner et al.<sup>8</sup> in their study found that the hamstring graft was superior in function and knee stability, thus recommending hamstring graft even in high-level athletes. A.W. Mayo Robson in 1895<sup>9</sup> was the first person who did the acl repair. Usually, the ACL reconstruction is delayed until 6 to 8 weeks after injury. ACL reconstruction within the first week of injury had a

high incidence of arthrofibrosis compared to those who underwent surgery after 3 weeks, concluded by Shelbourne et al. in their study. The injury to surgery interval of 6 to 8 weeks is necessary for the injured knee to become free of irritation (swelling, effusion, erythema).

**Aims and Objectives**

- 1.To evaluate the functional outcome of arthroscopic single-bundle anterior cruciate ligament reconstruction using quadrupled hamstring tendon (Gracilis and semitendinosus) autograft in individuals with ACL injuries.
- 2.To evaluate the results of arthroscopic ACL reconstruction using hamstrings autograft

**MATERIALS AND METHODS**

The study was conducted among 25 patients with signs and symptoms of ACL tear who got admitted from OPD and casualty of government general hospital between September 2016 to August 2018. Patients were undergone anterior cruciate ligament reconstruction using hamstring autograft for ACL injury and followed for 7 to 24 months.

**Inclusion Criteria**

The following patients were included-

- Clinical /MRI evidence of symptomatic individuals with anterior cruciate ligament insufficiency.
- Patients between age 20 to 40 (skeletally matured patients).
- Associated with a medial or lateral meniscus tear.
- Associated Grade I and II MCL and LCL injuries.
- No history of previous surgery in the knee.

**Exclusion Criteria**

- Asymptomatic individuals
- Patients with systemic diseases compromising their pre-anaesthetic fitness
- Associated with PCL tear
- Associated Grade III MCL and LCL injuries
- Patient with osteoarthritic knee
- Patients with associated fracture of the tibial plateau
- Patients with local skin infections

**Sample Size**

25 cases.

**Procedure**

A prospective study. Patients are followed up periodically postoperatively.

**Patients Are Assessed**

2000 IKDC SCORE pre operatively and post operatively and Lysholm knee score.

**Methodology**

After a detailed clinical examination, all the patients' radiographs and MRI were taken. The patients have assessed IKDC score pre operatively. Then surgery was

performed, and the details of the surgical procedure are as follows: the patient is anaesthetized and positioned supine. In all our patients, a minimal graft diameter harvested was 9 mm ensured. The tibial tunnel was drilled from the anteromedial aspect of the tibia entering the joint at the posterior aspect of the ACL foot print. The femoral tunnel was drilled in the medial aspect of the lateral femoral condyle transtibially. The graft was secured on the femoral side using a closed loop endobutton and on the tibial end with interference screws at approximately 10° of flexion.

**Post-Operative Management**

Immobilization in knee brace and limb elevation was done in the immediate post-op period. Intravenous antibiotics were given postoperatively for 3 days. The wound was inspected on the 2<sup>nd</sup> post-operative day. The wound was inspected on 2<sup>nd</sup> and 7<sup>th</sup> post-operative day. The sutures were removed on the 12<sup>th</sup> postoperative day. Rehabilitation was started from day one using ACL rehabilitation protocol up to 6 months.

**RESULTS**

Twenty-five cases of arthroscopic, ACL reconstruction were regularly followed for an average period of 16 months in Kurnool Medical College, Kurnool (Study period from September 2016 to August 2018).

Age (Years)	Patients	Percentage
15-20 Years	1	4%
20-25 Years	12	48%
26-30 Years	7	28%
30-35 Years	4	16%
36-40 Years	1	4%

**Table 1. Age Distribution**

Gender	Number of Patients	Percentage
Male	23	92%
Female	2	8%

**Table 2. Sex Distribution**

Side	Number of patients	Percentage
Right	14	56%
Left	11	44%

**Table 3. Side Involvement**

Side	Number of Patients	Percentage
RTA	15	60%
Sports	5	20%
Others	5	20%

**Table 4. Mode of Injury**

Duration	Number of Patients	Percentage
Duration	8	32%
4-6 Months	12	48%
7-9 Months	2	8%
>10 Months	3	12%

**Table 5. Duration Between Injury and Surgery**

Sl. No.	Duration	Number of Patients	Percentage
1	Isolated ACL Tear	10	40%
2	ACL Tear Associated with Medial Meniscus Tear	8	32%
3	ACL Tear Associated with Lateral meniscus Tear	3	12%
4	ACL Tear Associated with Medial and Lateral Meniscus Tear	4	16%

**Table 6. Associated Meniscal Injuries**

Symptom at Presentation	Number of Patients	Percentage
Knee Pain Without Instability	12	48%
Instability Without Pain	8	32%
Locking Without Instability	2	8%
Knee Pain and Instability	3	12%

**Table 7. Symptom at Presentation**

	Pre-op Mean (Standard Deviation)	Post-op Mean (Standard Deviation)	p Value
IKDC subjective Score	52.35 (10.45%)	87.54 (6.98%)	0.00001

**Table 8. IKDC Subjective Score**

The mean pre-op IKDC subjective score was 52.35 while the mean post of the score was 87.54. There was a significant improvement in post-op IKDC score when compared with pre-op score ( $p < 0.05$ ).

Sl. No.	Results	No. of Cases	Percentage
1	Excellent	11	44%
2	Good	10	40%
3	Fair	4	16%
4	Poor	0	0

**Table 9. Lysholm Knee Score**

**Complications**

1. One patient out of 25 in our study had a superficial infection at the donor site which settled with intravenous ceftriaxone 1 gm IV twice a day for 10 days.
2. One patient developed a deep infection of the donor site with gaping of the wound. The patient underwent wound debridement and secondary

closure and was given intravenous antibiotics. The wound healed well, and sutures were removed after 10 days.

3. One patient developed fixed flexion deformity of 10 degrees with a range of movements ranging from 10 to 90 degrees. The patient had poor compliance with the rehabilitation protocol.
4. Hypoesthesia around the graft harvest site was seen in a few patients and can be attributed to the involvement of the saphenous nerve.

**DISCUSSION**

Due to the increased occurrence of Road Traffic Accidents and an increased number of persons participating in sports activities, the number of ACL reconstructions being done has been increased. Arthroscopic reconstruction of the injured ACL has become the gold standard and is one of the most common procedures done in orthopaedics and thus it has been extensively studied and outcomes of ACL reconstruction have gained considerable attention. In our study, the most common mode of injury was a Road Traffic Accident followed by Sports injuries. Male predominance was found in our study. 23 (92%) patients were males and 2 (8%) were females. Most of the patients were in the age group of 20-25 years (48%). 48% of patients ( $n=12$ ) underwent ACL reconstruction 4 to 6 months after injury.

The Right knee was involved in 14 (56%) of patients and left knee in 11 (44%) patients. There was not much difference in lateralization of injury.

D. W. Lewis et al,<sup>10</sup> in their study on the incidence of meniscal injuries at the time of ACL reconstruction, found that 58% of patients had meniscal injuries and that medial meniscus was most commonly injured. They also concluded that meniscal repair or resection did not alter the final outcome.

In our study, there was associated meniscal injury in 60% of patients. Ten patients in our study had an isolated ACL injury. Eight patients had an injury to the medial meniscus whereas three patients had an injury to the lateral meniscus alone. Four patients had an injury to both the medial and lateral meniscus. The most commonly injured was medial meniscus which was in accordance with other studies.

Among the patients with meniscal injuries, four patients were treated by partial meniscectomy. The rest of the patients were treated conservatively. The functional outcome of patients with isolated ACL injury was comparable with that of the patients with associated meniscal injuries. This is in accordance with the study by D.W Lewis et al who stated that the presence of meniscal injury does not alter the functional outcome.

The most common symptom at presentation was knee pain (48% of patients). The other presenting symptoms were instability (32%), locking (8%) and (12%) patients presented with both pain and instability.

The position of the ACL Graft has a direct effect on knee biomechanics and ultimately on clinical outcome (Beynon et al). A non-isometrically placed graft is likely to

stretch and cause increase in laxity. Good et al., (1994) showed that the closer to the centre of the femoral insertion in the sagittal direction (lateral view) the graft is placed, the better the AP stability.

As of Lysholm and Gilquist knee scoring we compared our results of Lysholm and Gilquist in 1997. They had studied 60 cases totally and had excellent and good results in 88%. They had 8% with fair results and 4% with poor outcomes. We also had 84% good results. However we had 16% with fair outcome and we didn't have any poor outcomes in the present study.

The mean pre-operative IKDC score in this study was 52.352 whereas the postoperative score was 87.54. There was a significant improvement in postoperative IKDC score when compared with the pre-operative score. The mean pre-operative IKDC score in the study by Kumar et al. was 55.63, Prasad et al.<sup>11</sup> were 42.45 and Aparajit et al.<sup>12</sup> was 50.5 whereas the postoperative scores were 89.38, 94.33 and 86.03, respectively. Patients perspective of the ACLR outcome should be the primary outcome measure used by surgeons was suggested by Renstorm.

In our study, one patient had a superficial infection and one patient had a deep infection. The deep infection was managed with wound debridement and intravenous antibiotics while the patient with superficial infection was managed with antibiotics alone. 2500 cases of arthroscopic ACL reconstruction, reported an infection rate of 0.3% in a study done by Williams et al.<sup>13</sup>

## CONCLUSION

Patients undergoing primary ACL reconstruction at our hospital using the aforementioned technique and graft displayed highly favourable outcomes. The clinical relevance of the data is significant. It reaffirms the successful nature of this technique in a concise reproducible manner. A baseline has been developed from which various other reconstruction methods can be judged. These comparisons between various operative techniques are essential in the continuous strife to improve surgical outcome and patient care.

## REFERENCES

- [1] Galen C. Galen on the usefulness of the parts of the body. Ithaca, New York: Cornell University Press 1968.
- [2] Macey HB. A new operative procedure for repair of ruptured cruciate ligament of the knee joint. Surg Gynecol Obstet 1939;69:108-109.

- [3] Rubin RM, Marshall JL, Wang J. Prevention of knee instability. Experimental model for prosthetic anterior cruciate ligament. Clin Orthop Relat Res 1975;113:212-236.
- [4] Galway RD, Beaupre A, Macintosh DL. Pivotal shift: a clinical sign of symptomatic anterior cruciate insufficiency. J Bone Joint Surg Br 1972;54:763-764.
- [5] Lipscomb AB, Johnston RK, Snyder RB. Evaluation of hamstring strength following use of semitendinosus and gracilis tendons to reconstruct the anterior cruciate ligament. Am J Sports Med 1982;10(6):340-342.
- [6] Friedman MJ. Arthroscopic semitendinosus reconstruction for anterior cruciate ligament deficiency. Techniques in Orthopaedics 1988;2(4):74-80.
- [7] Frank CB, Jackson DW. The science of reconstruction of the anterior cruciate ligament. J Bone Joint Surg Am 1997;79(10):1556-1576.
- [8] Wagner M, Kääh MJ, Schallock J, et al. Hamstring tendon versus patellar tendon anterior cruciate ligament reconstruction using biodegradable interference fit fixation: a prospective matched-group analysis. Am J Sports Med 2005;33(9):1327-1336.
- [9] Robson AW. VI. Ruptured cruciate ligaments and their repair by the operation. Ann Surg 1903;37(5):716-718.
- [10] Lewis DW, Chan D, Fisher O, et al. Incidence of meniscal and chondral injuries at the time of ACL reconstruction, and their relationship with outcome at 2 years. Orthopaedic Proceedings 2012;94-B(Suppl 9):41.
- [11] Veeragandham P, Raghavan V, Chattopadhyay A, et al. Functional outcome following arthroscopic ACL reconstruction using semitendinosus graft: a prospective observational study. Int J Res Orthop 2017;3(3):423-430.
- [12] Aparajit P, Koichade MR, Jain N. Study of arthroscopic reconstruction of anterior cruciate ligament injury. International Journal of Biomedical Research 2016;7(6):329-336.
- [13] Williams RJ, Laurencin CT, Warren RF, et al. Septic arthritis after arthroscopic anterior cruciate ligament reconstruction. Diagnosis and management. Am J Sports Med 1997;25(2):261-267.