



## Original Research Article

## Surgical management of anterior cruciate ligament injuries by arthroscopic reconstruction using semitendinosus tendon

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## ABSTRACT

**Introduction:** Anterior Cruciate Ligament (ACL) injury is one of the common ly injured ligaments around the knee with various clinical problems. With this study was conducted to find the postoperative outcome of arthroscopic ACL reconstruction with quadrupled semitendinosus tendon auto graft fixed in femoral tunnel.

**Materials and Methods:** Study was conducted in the department of orthopaedics, GSL Medical College. ACL teared, mature, adult patients which was confirmed by Lachman test with concomitant meniscal injury that require repair were included in the study, p re operative management and diagnostic arthroscopy, post operative recovery was graded as per the International Knee documentation Knee score (IKDKS);  $P < 0.05$  was considered statistically significant.

**Results:** Total 25 patients were included, mean age was 29 years and one was female. With post operative KDC score, 68% scored normal, 24% near normal and 8% scored abnormal; statistically the difference was significant ( $P < 0.05$ ). With post operative anterior drawer test, 68% were negative and remaining showed grade 1 results.

**Conclusion:** With these study findings, we conclude that, with ACL reconstruction, there was good success rate; moreover the functional result was also high. However small sample size and short duration of the study are the limitations.

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## 1. Introduction

Anterior Cruciate Ligament (ACL) injury is the most commonly injured ligament around the knee.<sup>1</sup> Currently, due to high speed vehicle accidents, there is a raise in ligament injuries moreover sporting life style accelerate this. Injury of ACL of knee is potentially devastating for the patient and can result in short and long term clinical problems. This is reported to be high among sportsmen especially basketball, football, skiing and soccer players.<sup>2</sup>

Rupture of the ACL is debilitate clinical problem. This leads to instability, severe pain and also decreases the function of limb. With these, affects the quality of life. It

also has a poor capacity for intrinsic repair.<sup>3</sup> Thus patients, who have knee symptoms related to ACL deficiency, may consider ligament reconstruction as a means of stabilizing. However the routine natural function of knee joint may fail several times. Reconstruction of ACL can be done arthroscopically.<sup>4</sup>

Considering the various factors like tensile strength, easy accessibility of the graft and without interruption of quadriceps mechanism has made the semitendinosus and gracilis tendon as graft of choice. There was fair evidence that patients reconstructed with hamstring graft report less morbidity than those reconstructed with bone-patellar tendon-bone graft.

With these findings, study was planned to find the results of arthroscopic ACL reconstruction with quadrupled

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semitendinosus tendon auto graft fixed in femoral tunnel and in the tibial tunnel using interference screws.

## 2. Materials and Methods

Study was conducted in the department of orthopaedics, GSL Medical College. Study protocol got approval by the institutional ethics committee; written informed consent in the presence of witness was taken from all the study patients.

The adult, patients who were skeletally mature who were confirmed to be ACL tear were included in this study; in these patients, Lachman test was used to confirm the ACL tear. Individuals with concomitant meniscal injury which require treatment were also included in this research. As a part of study protocol, all the study patients were informed that ACL reconstruction will follow rehabilitation; this rehabilitation includes full weight bearing gait and unrestricted non weight bearing range of motion.

Patients with severe ACL damage, tear of ACL with along with posterior cruciate ligament, collateral ligament injuries that require surgery and ACL tear with bone damage around the knee were excluded from the study. The pre operative management and diagnostic arthroscopy was done as per the study.<sup>5</sup>

In this study International Knee documentation Knee score (IKDKS)<sup>6</sup> was used to grade the post surgical recovery of the ACL tear. As protocol, the lowest grade in each group determines the patient's final grade.

### 2.1. Statistical analysis

Data was analyzed by SPSS version 21;  $P < 0.05$  was considered statistically significant.

## 3. Results

In this study, total 25 patients were included, mean age was 29 years and one was female. When clinically evaluated, anterior drawer test positive to all the study participants; 96% positivity by lachman test and 72% by pivot shift test. Fourteen (56%) patients showed excellent score with lysholm gillquist score, 36% scored good and 8% showed good score. Post-operative IKDC, 68% scored normal, 24% near normal and 8% scored abnormal; statistically the difference was significant ( $P < 0.05$ ). With post operative anterior drawer test, 68% were negative and remaining showed grade 1 results.

## 4. Discussion

Knee instability is the important complication of untreated ACL rupture. This can lead to long term drawback and functional issues. The theoretical advantage of arthroscopic reconstruction includes less injury to patellofemoral mechanism and possibly less frequent symptoms and post

operative knee joint contraction. In spite of availability of many graft choices for ACL reconstruction, due to the advantages, Hamstring autograft considered to be the better compared to Bone-PatellarTendon-Bone graft.<sup>7</sup>

It was reported in the literature that patellar tendon grafts is a better technique to compare multiple-strand hamstring tendon ACL reconstructions.<sup>8</sup> Higher strength, stiffness and cross sectional areas are the advantages. It was reported that less donor area was yielded in harvest of hamstring tendon autograft.<sup>9</sup>

Pinczewski et al.,<sup>10</sup> suggested that the tight contact between the bone and graft promote direct healing. Giurea et al.<sup>11</sup> compared ultimate load failure (ULF) for various fixation technique and found that interference screw for femoral site fixation has Ultimate Load Failure (ULF). However graft fixation for soft tissue with interference screw has been criticized for graft laceration during fixation, less pullout strength in cancellous bone and failure in fixation especially during cyclic loading mainly during early rehabilitation.<sup>12</sup>

In this research, ACL reconstruction was undergone by 24 (96%) male participants and only one (4%) female patients by using quadrupled semitendinosus tendon autograft. Among these study participants, graft fixation was done by using interference screw in the femoral as well as in the tibial tunnel. In this report, during rehabilitation, the failure rate was nil.

Among the study participants, 24(96%) were male patients and one female patient (4%), all were aged between 15 to 45 years. Side wise, 56% (14) had right knee and 44% (11) left knee injury. Helen C Smith et al.,<sup>12</sup> mentioned that female gender participating in athletes were at risk factor for ACL tear. Whereas in India, due to less participation of female in outdoor games and also less incidence of ACL injuries. Brown et al.,<sup>13</sup> mentioned that, due to less exposure to strenuous environment, the incidence of ACL damage was reported to be significant in the gender.

It was reported by Nikolaou et al.,<sup>14</sup> that MRI is an efficient diagnostic technique to find internal derangement of the knee. In this study, MRI showed complete ACL tear in all patients and Medial meniscus was most commonly associated followed by Lateral Meniscus which correlated with arthroscopy with accuracy more than 90%; the ACL reconstruction, arthroscopic procedure was done under spinal anesthesia, as an in-patient procedure in all patients.

Drilling through accessory anteromedial portal was found to be accurate a anatomical femoral positioning by Gavriilidis et al.,<sup>15</sup> for ACL attachment, compared to transtibial technique. Moreover, studies reported that single bundle ACL graft which was placed at the centre of the native ACL attachment sites was reported to be more accurate.<sup>16,17</sup>

In this research, the time period between the ACL injury and reconstruction was ranged between 2 months to 2 years,

6.8 months was the mean duration. As per the literature, this was categorized to be delayed reconstruction. But as per Zhu et al., study, the patients were kept on early mobilization protocol.<sup>18</sup>

Several ACL construction outcomes were reported in the literature but no globally accepted tool. International Knee Documentation Knee (IKDC) score, Lysholm and Gillquist Score (LGS) and Hop test were found to be most reliable and valid post-operative outcomes. Same was also used in the present study.

The IKDC standard knee evaluation form,<sup>6,19</sup> was designed for knee ligament injuries developed knee rating system for ACL reconstruction with seven objective parameters. In this report, during post operative recovery analyses, 92% patients were graded to be normal, near normal; whereas 2(8%) patients graded recovery as abnormal according to IKDC score.

In this study, superficial wound infections were reported by one patient; however this was controlled by oral antibiotics; the post-operative limb symmetry index was reported to be low and the other patient presented to surgery after 18 months after initial injury and had low post operative limb symmetry index. Both the participants were non cooperative to physiotherapy. Moreover they had fair outcome on Lysholm and Gillquist scale.

In one study, Andrea Reid et al. reported that ACL reconstruction is common in 15 – 45 years age group;<sup>20</sup> the mean limb symmetry was reported at the 23<sup>rd</sup> post operative week and this was reported to be 24<sup>th</sup> week in his report.

The mean values were 85% and 81% respectively by Andrea Reid et al. and current study.<sup>20</sup> This was only in some patients; especially the patients with poor outcome had much lower limb symmetry indices values which skewed the mean to the lower side. Moreover, many patients were quite apprehensive in performing the hop test, thereby increasing the disparity between the normal and the operated limb scores.

## 5. Conclusion

With these study findings, we conclude that, with ACL reconstruction, there was good success rate; moreover the functional result was also high. However small sample size and short duration of the study are the limitations.

## 6. Source of Funding

None.

## 7. Conflict of Interest

None.

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