

ASSESSMENT OF FUNCTIONAL AND CLINICAL OUTCOME OF ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING IPSILATERAL AUTOLOGOUS HAMSTRING GRAFT- A PROSPECTIVE STUDY.

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Page | 1

Abstract

Background

Anterior Cruciate Ligament Reconstruction using Autologous Ipsilateral Hamstring Graft is one of the commonest procedures performed for restoration of Knee Stability. The ACL is the main support of the knee joint and averts it against anterior movement. It also helps in preventing rotatory and valgus pressure. The chief goal of the present research is to investigate the functionality of ACL remodeling with conventional hamstring autograft.

Materials and Methods

This is prospective research that includes 40 subjects which was carried out in IGIMS, Patna, Bihar, India. The study was conducted for 1 year. The patients were utilizing the endo button and absorbable intervention screw to limit movement, post-surgery knee strength, and internal knee performance. Tegner Lysholm's knee scoring system was utilized for the evaluation of functioning results.

Result

The majority of the harm was caused by sports. The patients were followed up for 2 years after the surgery. Lysholm's score was upgraded postoperatively. All in all, fine outcomes followed after six months. The majority of the patients went back to their routine activity. 20 patients' injuries occurred on the right side and for the other 20 patients, injuries were on the left side. 24 patients had initial symptoms of lack of stability in the knee. 12 patients had pain and 4 patients suffered from locking.

Conclusion

In this research, it was deduced that arthroscopy-aided anterior cruciate ligament remodeling utilizing hamstring autograft gives stability to the knee, decreases post-surgery injuries, and provides speedy recovery. The outcomes regarding functionality are great, the patient activity becomes normal after some time and the patient can use the staircase easily.

Recommendation

Standard hamstring autograft is a great choice in the remodeling of the anterior cruciate ligament.

Keywords: Anterior cruciate ligament, Hamstring Autograft, Postoperative

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Introduction

The anterior cruciate ligament primarily affects the support of the knee joint, generally in the time of sports activities or straight trauma. The main surgical process of anterior cruciate ligament split includes remodeling of the ligament concerning reconstructing the strength and performance of the knee [1]. There are many autograft alternatives accessible for the remodeling of the anterior cruciate ligament. Autografts earlier chosen were BPTB, thereafter HT, and Quadriceps tendon. Bone patellar tendon-bone grafts are related to considerable bone-to-bone recovery however disagreement occurs because of morbidity in the

donor area [1]. Differences of opinion concerning perfect graft for remodeling kept on continuing due to their drawbacks. Even though there is considerable automatic force and less possibility of donor area morbidity with hamstring tendons implant, the difference in implant dimension from one patient to another is however an important characteristic in discovering the result due to a little than perfect circumference of the collected HT can bring on graft collapse [2].

When anterior cruciate trauma happens, the indication of knee joint uncertainty, discomfort, and a reduction in knee functioning arise. Despite the fact traditional care with thorough physical therapy, vitalizing and way of living

changes can be attempted in a few patients with a lower expectation of knee joint functioning, in juvenile patients with symptoms, anterior cruciate trauma remodeling is mandatory. The majority of the anterior cruciate ligament damages are related to the damage that occurred in the meniscus which must be dealt with, otherwise patient may face premature onset of osteoarthritis [3]. The functioning result of arthroscopic anterior cruciate trauma remodeling was preferable to collate to open repair [4]. According to a study conducted by Wagner et al [5], observed that HT was better in functioning and knee support. Robson et al [6], was the first person who performed anterior cruciate ligament repair. Anterior cruciate ligament remodeling performed in the time of the first seven days of trauma had chances of arthrofibrosis.

Utilization of PLT is proportionately budding evolution in the area of arthroscopic anterior cruciate ligament remodeling. In the beginning, tried out by utilizing Peroneus Longus Tendon autograft, the outcome was excellent [7]. Peroneus Longus Tendon graft has been found to have many benefits like excellent support and quick renewal at the donor site [8]. The trauma of the anterior cruciate ligament is of two types of immediate association and nonimmediate association. Anterior cruciate ligament damage is more prevalent in females as compared to males [8]. This may be due to the intercondylar notch of females being small, low solidity of the anterior cruciate ligament, or related to hormones. At first, the patients were examined physically in mobility, examination, and quantification of the knee is done. Then radiographic examinations are done for better treatment of the patient. The chief goal of this research is to investigate the functionality of ACL remodeling with conventional hamstring autograft.

Materials and Methods

Study design and population

This is prospective cohort study research. 40 patients were included in this study that had injured anterior cruciate ligament.

Study location and duration

The present research was carried out at Indira Gandhi Institute of Medical Science (IGIMS) in Patna, Bihar, India spanning from July 2022 to May 2023.

Inclusion criteria

- Patients' age ranges from 18 years to 40 years
- Conventional arthroscopic anterior cruciate ligament repair utilizing HT autograft.
- Patients who gave consent.

Exclusion criteria

- Anterior cruciate ligament injury along with other trauma.
- Non arthroscopic acute cruciate ligament repair.
- Infectious knee
- Defected knee since birth
- Patients who did not give consent

Sample size

Patients who enrolled after filling the inclusion criteria. For calculating sample size the following formula was used:

$$N\Delta = \frac{2(Z_{\alpha} + Z_{1-\beta})^2 \sigma^2}{2}$$

Where, N= sample size, Z is a constant

Z_α is set by convention according to accepted a error of 5% as 1.649 Z_{1-β} is set by convention according to accepted 1-β or power of study of 80% as 0.8416Σ is standard deviation estimated Δ is difference in the effect between two interventions (estimated effect size).

Data collection

Detailed history of the patient was noted immediately after they were admitted to the hospital. Further clinical examination of laxity was done under anesthesia and evaluated by the Lysholm Tegner knee scoring system. Lateral radiographs of the subjects were done, and MRI was also done before the surgery. The objective of the research was elucidated to the patients and the treatment required. Instant difficulties after the surgery like inflammation after surgery, nerve injury, and circulatory damage are looked up. Patients were under observation for five days after surgery.

Figure 1: MRI showing ACL Tear

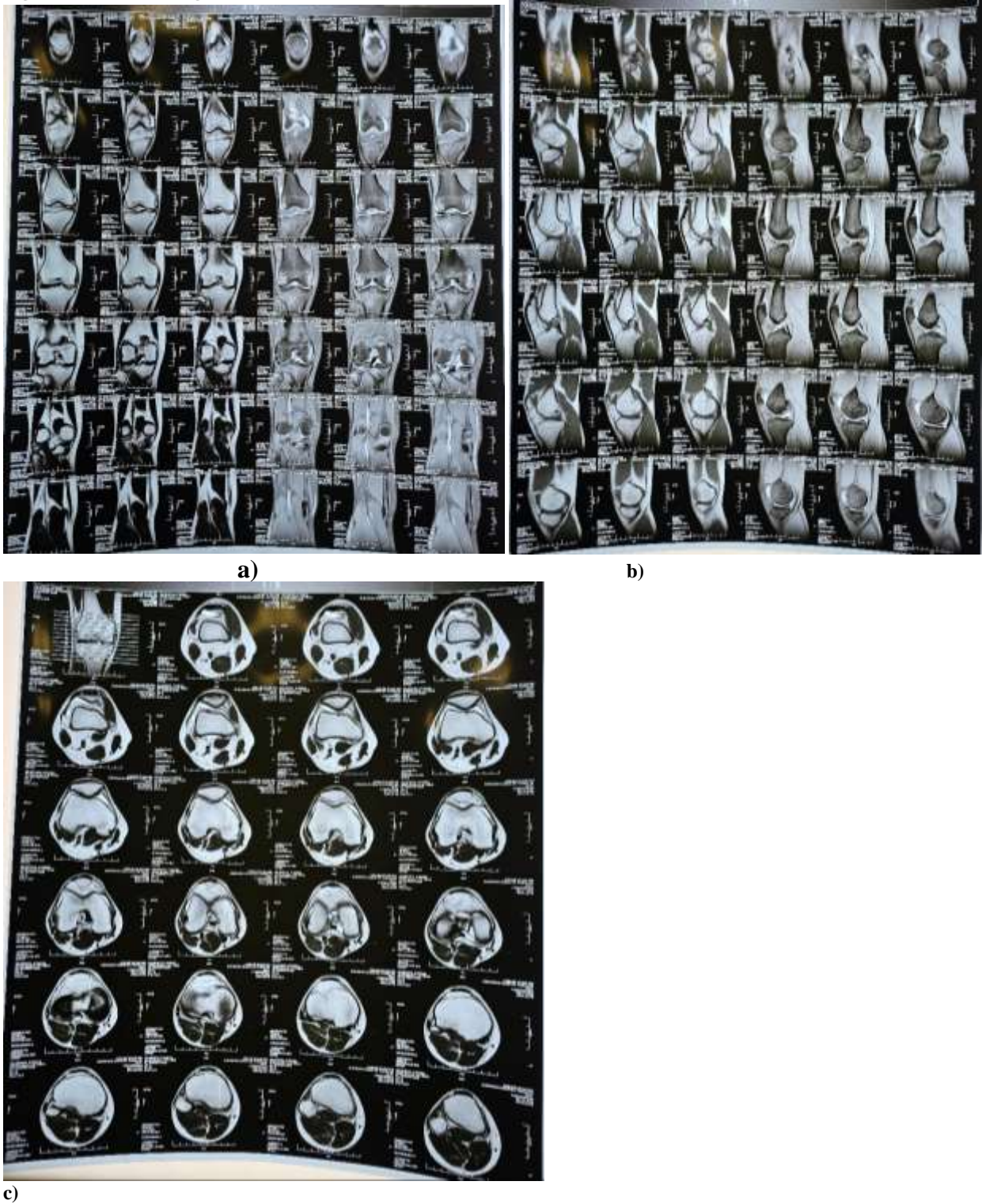


Figure 2: Surgical procedure



Step 1- Entry Portal being Marked



Step 2- Diagnostic Arthroscopy done to assess ACL Tear



Step 3- Torn ACL identified



**Step 4- Clearing of Soft Tissue
being done**



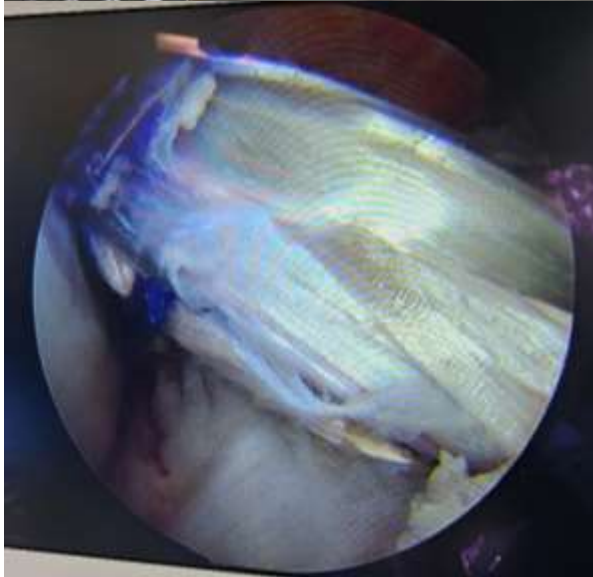
Step 5- Graft Extraction Being carried out



Step 6- Graft Preparation



Step 7- Graft Augmentation



Step 8- Graft being passed through Tibial and secured with Endobutton

Bias

There was a possibility that bias may have occurred during the beginning of the research but was circumvented by providing all patients with similar details and keeping the confidentiality of the group allocation from the nurses who collected the data.

Ethical consideration

The aim of the research was demonstrated. Consent was taken from all the research subjects. The privacy of the subjects was kept. The research was approved by the institutional ethics committee.

Statistical analysis

Statistical package for social sciences version 21.0 statistical analysis software was utilized for the statistical evaluation. The categorical data was described as frequency and percentage. For theoretical data, the chi-square test or Fisher

exact test was utilized. Determinable data was evaluated by T-test.

Results

As shown in Table 1, patients were majorly in the age group of 18-25 years further 35-40 years in which 10 patients were present. In the age range of 25-30 years, 4 patients were there and in the age range of 30-35 years, 3 patients were there.

In Table 2, 20 patients' injuries occurred on the right side and 20 patients on the left side.

Table 1: Distribution of the patients according to their age

The age group of the patients	Number of patients
18-25 years	23
25-30 years	4
30-35 years	3
35-40 years	10

Table 2: Classification according to the position of the injury

Position of the injury	Number of the patients
Right	20
Left	20

As shown in Figure 3, the majority of the injuries occurred during physical activity (70%). 8 (20%) were injured due to road accidents.

As shown in Table 3, 24 patients had initial symptoms of lack of knee stability. 12 patients had pain and 4 patients suffered from locking.

In Table 4, in most of the patients, an 8 mm graft size was used. In 10 patients 9 mm graft size was used and in the remaining 5 patients 7 mm graft size was used.

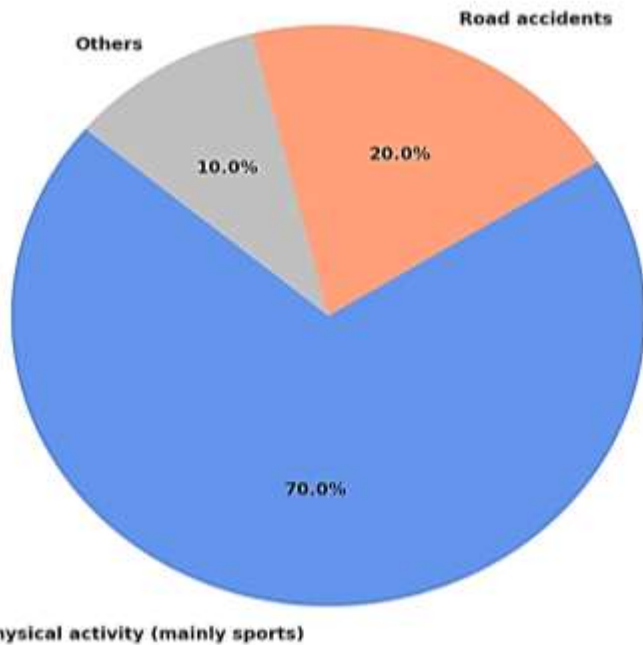


Figure 3: Classification according to the means of injury

Table 3: Classification according to the initial symptoms

Initial symptoms	Number of patients
Lack of stability in the knee	24
Pain	12
Locking	4

Table 4: Classification according to the graft size utilized

Size of graft	Number of patients
7 mm	5
8 mm	25
9 mm	10

Discussion

The study predominantly involved younger adults, with the 18-25 age group representing the majority of the cases (23 patients), indicating that this age group is at a higher risk or more frequently affected by the condition. The 35-40 age group also showed a notable number of cases (10 patients), suggesting that this condition is also prevalent among middle-aged adults, though to a lesser extent.

The injuries occurred equally on both the right and left sides, with 20 patients for each, suggesting no predilection for injury on either side of the body.

The primary cause of injury was physical activity, specifically sports, affecting 28 patients. This highlights the high risk associated with sports and physically demanding activities. Road accidents were the second leading cause, contributing to 8 injuries, followed by other less common causes affecting 4 patients, indicating a variety of less frequent risks.

Lack of stability in the knee was the most common initial symptom, reported by 24 patients, which points to significant functional impairment as an immediate consequence of the condition. Pain was the next prevalent symptom, affecting 12 patients, while joint locking was less commonly reported (4 patients), indicating it might emerge as a more advanced or less noticed symptom.

The choice of graft size in treatments varied, with the 8 mm graft being the most frequently used, implemented in 25 patients. This suggests that it might be the standard size chosen for its suitability in a broad range of cases. The 9 mm graft was used in 10 patients and the 7 mm graft in 5 patients, suggesting that these sizes are chosen based on specific patient or surgical needs, likely tailored to individual anatomical variations or the severity of the injury.

The main objective of anterior cruciate ligament remodeling is to bring back the strength of the knee joint. Presently fixation is done by using endobutton and biomechanical intervention screws which enables to provide better recovery after the surgery [9]. According to research done by Brown et al [10], observed that the injury is more prevalent in females as compared to males, and the position of the trauma is not related to the recovery time. In the present study, both sides are equally involved. In research done by Chaudhary et al [11], he found that the majority (65%) of the trauma was due to physical activity, followed by road accidents which are similar to the present research result.

However, in research done by Subhash et al, it was evaluated that physical activity and road accidents are equally responsible for ACL injury [12]. The bone-patellar tendon-bone graft at one point was regarded as an excellent graft for anterior cruciate ligament repair because of its tensile power, graft dimension constancy, easily collectible [13]. A methodical assessment is issued by Conte et al [14], if the dimension of the graft is less than 8 mm there are more chances of its collapse.

Details such as stature, body weight, and body mass index were recorded to anticipate the graft dimension and enable doctors to plan their treatment accordingly. In research carried out by Lewis et al [15], it was seen that the frequency of meniscal injury occurred during anterior cruciate ligament repair, and it was also evaluated that meniscal injury does not interfere with the ultimate result.

Generalizability

The observation of this research cannot be generalized for a greater sampling of people.

Conclusion

From the present study, it was evaluated that anterior cruciate ligament remodeling utilizing hamstring autografts gives stability to knee joints, decreases discomfort after surgery, and helps in speedy recovery. The outcomes regarding functionality are great, the patient activity becomes normal after some time and the patient can use the staircase easily.

Limitation

The limitation of the current study includes a small study group of people who were involved in this study.

Recommendation

Standard hamstring autograft is a great choice for the remodeling of the anterior cruciate ligament.

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Conflict of interest

There was no conflict of interest.

Sources of funding

No outside funding was provided for this work.

List of Abbreviations

ACL- Anterior cruciate ligament

BPTB- bonepatellar tendon-bone

HT- Hamstring tendon

PLT: Peroneus Longus Tendon

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