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A Comparative Study Of Functional Outcome Of Acl Reconstruction With Autologous Hamstrings Tendon Graft Versus Autologous Quadriceps Tendon Graft

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Abstract
Background: *Acl reconstruction has been described using a variety of approaches till date ranging from open to arthroscopic.the most often used graft in acl reconstruction was bone-patellar tendon-bone graft. However,issues with the knees extensor function loss of mobility,patellar instability and continued presence of anterior knee function have forced surgeons to consider alternate graft materials for use in acl reconstruction. The objective of our study is to compare functional outcome of arthroscopic acl reconstruction with autologous hamstrings tendon graft versus autologous quadriceps tendon graft.*
Materials and methods: *this prospective study included 30 patients with complete acl tear and arthroscopic acl reconstruction done. In 15 patients autologous hamstrings tendon autograft used and in 15 patients autologous quadriceps tendon hamstrings autograft used. The functional outcome of knee was assessed using lyshomsocre, ikdc(international knee documentation committee)score preoperatively and 1year after operation. Diameter of the graft measured during procedure.thigh circumference also measured pre & post operatively.*
Results: *all 30 patients(each group 15 patients) were followed up to 1year. There is significant difference in knee functional outcome as measured with lysholm score and ikdc score.diameter of quadriceps tendon graft was significantly larger than hamstrings diameter(p=0.012).significant thigh wasting seen in hamstring group.*
Conclusion: *with lower donor site morbidity and increased graft thickness with minimally invasive technique for graft harvesting.acl reconstruction autologous quadriceps tendon graft had better functional outcome (ikdc, lysholm) and shown comparable outcomes to autologous hamstrings tendon graft.*
Keywords: *anterior cruciate ligament reconstruction,autologous quadriceps tendon autograft,autologous hamstring tendon autograft.*

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I. Introduction

In an attempt to improve knee biomechanics,many developments in anterior cruciate ligament reconstruction have been developed throughout the past 30 years. In order to repair the torn ends of the ligaments, surgery was done in the 1970s. After that, autografts were utilized in the 1980s to repair the acl through an open procedure known as an arthrotomy. The most common treatment option for acl injuries these days is arthroscopic autograft acl repair. Acl injuries occur about 60 times per 100,000 people year; however,

this rate may grow as more people participate in active sports[1]. Ninety percent of athletes are anticipated to be able to resume their pre-injury level of sports involvement given the current advancements in arthroscopic acl rehabilitation.

Following a knee injury, an acl rupture can result in osteoarthritis, meniscal damage, and persistent instability.

By preventing meniscal injury during acl reconstruction, chondral damage can be avoided, which ultimately reduces the risk of osteoarthritis of knee[2].

Up till now, acl reconstruction (aclr) has been reported through a range of techniques, from open to arthroscopic. The bone-patellar-tendon bone (bptb) graft was the most often utilized graft in acl reconstruction[3,4]. Nevertheless, problems with the extensor function of the knee, decreased mobility, patella instability, patella fracture, and persistent anterior knee pain have compelled surgeons to think about using different graft materials in aclr. The hamstring graft is an alternative autograft material that can be used for aclr for the extensor mechanism with less difficulty.the application of quadriceps tendon grafts for aclr was initially described by marshall et al. In 1979. However, due to preliminary research demonstrating subpar biomechanical qualities and disappointing clinical results[5], the technique fell out of favour.

It is anticipated that the use of quadriceps tendon will increase with the introduction of contemporary qt harvesting procedures, with many people actively supporting its application[6]

II. Materials And Methods

This prospective interventional study was carried out on patients of department of orthopaedics at maharajah's institute of medical sciences,nellimarla,vizianagaram from january 2023 to june 2024.a total of 30 subjects(both male and female) were for in this study.

Study design: prospective interventional study

Study location: maharajah's institute of medical sciences,nellimarla,vizianagaram,andhra pradesh

Study duration: january 2023 to june 2024

Sample size:30 patients

Subjects and selection method: the study population was drawn from patients with acl tear who presented to maharajah's institute of medical sciences and treated with arthroscopic acl reconstruction with either autologous hamstrings tendon graft or autologous quadriceps tendon graft from january 2023 to june 2024.patients were divided into two groups of 15 patients each based on their treatment modality received.

Inclusion criteria:

1) age between 18-45 years
2) acl injury diagnosed clinically and by imaging(mri).
3) patients with informed consent.

Exclusion criteria:

1) associated ligament injury
2) chondral damage
3) fracture around the knee
4) presence of a pathological condition in the lower extremity or an abnormal contra lateral knee joint.

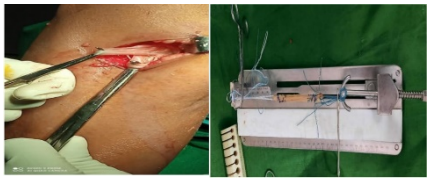
Procedure merthodology

Clinical diagnosis was made by positive anterior drawer test.positivelachmann test & positive pivot shift tests. The indication for surgery was an acl tear confirmed by clinical diagnosis and mri in a healthy patient experiencing knee instability in daily activities or wished to maintain his or her pre-injury level of activities. All patients were operated by same surgeon, with same procedure. All patients were followed up to minimum 1 year.

Patients were reviewed periodically. Preoperative and postoperative ikdc (international knee documentation committee), lysholm score of knee were assessed for knee functioning. Graft diameter was measured intraoperatively. Donor site morbidities were assessed with thigh circumference measurements.

Illustrations (figures) :

Figure 1 :hamstrings group



Hamstrings harvesting graft diameter

Figure 2 :quadriceps group

Harvesting quadriceps graft diameter

Statistical analysis:

The statistical analysis was performed using students 't' test to compare variables in patients who were treated with either autologous hamstrings tendon graft or autologous quadriceps tendon graft..differences were considered statistically significant when p<0.001.

III. Results

In the present study out of 30 patients who were treated with arthroscopic acl reconstruction, in 15 patients hamstrings tendon auto graft used and 15 patients quadriceps tendonautograft used.

Table 1 -graft diameter

Graft	Mean graft diameter	P value
Hamstrings	8.2 ± 0.8	0.012
Quadriceps	8.8 ± 0.7	

Mean graft diameter in hamstrings graft was 8.2±0.8cm & in quadriceps graft was 8.8±0.7cm. There is a significant difference in graft diameter (p<0.012)

Table 2 : ikdc score

Graft	Pre- op	1 year follow up	P value
Hamstrings	56.9 ± 3.21	88.4 ±2.73	<0.001
Quadriceps	58.7 ± 3.31	92.8 ±1.32	<0.001

Table 3 :lysholm score

Graft	Pre- op	1 year follow up	P value
Hamstrings	69.8 ± 15.9	93.1 ± 7.3	<0.001
Quadriceps	70.8 ± 10.2	94.9 ± 5.6	<0.001

IV. Discussion

The most important findings in present study were as follows. The quadriceps tendon autograft showed a comparable functional score at the 1-year follow up compared with the hamstring tendon autograft ; the quadriceps tendon autograft had a larger diameter compared with the hamstring tendon autograft; less thigh hypotrophy was found in the quadriceps tendon autograft group; some of the patients in the hamstring group experienced anterior kneeling pain which disrupted their daily activities.

Autograft choice is one of most important considerations during acl reconstruction surgery of the knee. With a mean difference of 0.6 mm in favour of the quadriceps tendon autograft, we discovered that there was a substantial difference in graft diameter between the hamstring and quadriceps tendons. Previous studies concluded that a graft diameter of 8.5 mm had a 1.7% revision rate. Additionally, between graft thicknesses of 7 mm and 9 mm, the probability of a patient having a revision acl reconstruction decreased by 0.82 times for every 0.5 mm increase in graft diameter[7]. Another study discovered a positive link which is statistically significant, between graft diameter and revision rate with graft diameters smaller than 8 mm and a 1 mm increase in graft diameter and a higher ikdc score[8] .

Previous studies employing the quadriceps tendonautograft to restore the acl revealed favorable findings in terms of knee stability and functional outcome. Few donor site morbidities, such as thigh hypotrophy and patient-reported symptoms like hypoesthesia or anesthesia caused by injury to the saphenous nerve's infrapatellar branch, occurred after hamstring grafts. Thigh hypotrophy resulting from semi-t and gracilis tendon

harvesting, especially at deep flexion angles, reduces hamstring strength. Dynamic knee stability is also impacted by an imbalance between the quadriceps and hamstrings caused by hamstring hypotrophy[9].

With the observations of this study, the quadriceps tendon autograft can be promoted in medical practice as the preferred graft for acl reconstruction because it exhibits comparable functional scores to the hamstring tendon with minimum donor site morbidity,increased graft thickness with minimally invasive graft harvesting techniques especially in patient groups who frequently squat during daily activities, as is the case in our country.

V. Conclusion

When compared to other autografts,qt exhibits superior biomechanical qualities and may have reduced donor site morbidity. In comparison to the hamstrings graft for acl repair, it also provides a less invasive harvesting process,higher graft thickness,and satisfactory functional scores (ikdc and lysholm score)when compared to hamstrings graft for acl reconstruction. Qt showed a slight improvement in residuapivot shift, but patient-reported outcomes did not differ significantly.

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