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A COMPARATIVE STUDY OF CLINICAL OUTCOME BETWEEN TRANSTIBIAL AND ANTEROMEDIAL PORTAL TECHNIQUE FOR FEMORAL TUNNEL CONSTRUCTION.

Orthopaedics

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ABSTRACT

Introduction: The most commonly employed technique of femoral tunnel placement, the trans-tibial technique, has been reported not to provide anatomical placement of femoral tunnel and result in rotational instability. Cadaveric and radiographic studies have confirmed that drilling the femoral tunnel through anteromedial portal allows a more anatomical placement of the tunnel and higher rotational stability than does the trans-tibial technique. However, clinical results of trans-tibial and anteromedial portal techniques are still controversial. A recent literature review showed improved short term results with anteromedial portal technique but no difference in terms of clinical functions between the two techniques at mid and long term follow up. **Aim:** To assess and compare clinical outcome between transtibial and anteromedial portal technique during arthroscopic single bundle anterior cruciate ligament reconstruction, using hamstring tendon autograft. **Material & Methods:** Our study was a prospective, randomized, comparative study which was conducted at the department of Orthopaedics, LLRM Medical College, Meerut, over a period of 2 year 3 months and (from 24th March 2015 to 30th june 2017). In our study, 30 cases were included as per the inclusion criteria. Out of them,15 cases had undergone arthroscopic single bundle ACL reconstruction with 4 strand hamstring tendon autograft, using anteromedial technique as a method for femoral tunnel drilling. In the other 15 cases transtibial technique was used instead of anteromedial technique. Both the groups were compared clinically using Lachman test, pivot-shift test, Lysholm score, and IKDC subjective and objective scores. **Result:** Almost all the cases were present in the age group 18 to 40 years, with mean age of the patients in anteromedial group was 25.8 years and in transtibial group was 28.53 years. 28 cases were males and 2 female cases. Medial meniscus was most commonly injured 10 (33.33%%) than the lateral meniscus 4(13.33%) patients. Partial meniscectomy was done in 5 (35.71%) patients who had significant meniscal injury. Most of the cases in both the groups had grade III Lachman test positive 29 (96.67) pre-operatively. Post-operatively all patients became Lachman test negative. All patients in both the groups showed positive pivot-shift test pre-operatively. Post-operatively all patients became pivot-shift test negative. Both groups showed significant improvement in knee stability based on Lachman and pivot-shift test, while no significant difference was noted between the two groups. **Conclusion:** The result of anterior cruciate ligament reconstruction using quadrupled hamstring tendon autograft was good and comparable between the anteromedial and transtibial group in terms of post-operative knee stability and functional ability based on Lysholm score and IKDC score.

KEYWORDS

INTRODUCTION

Anterior cruciate ligament (ACL) is one of the main structures of the knee and is responsible for anteroposterior and rotational stabilization [1]. Anterior knee instability associated with rupture of the anterior cruciate ligament is a disabling clinical problem, especially in a athletic individual [2], it predisposes the knee to subsequent injuries like secondary meniscal tear and chondral injuries.

The classical history of ACL is a twisting injury to the knee or direct blow to the outside of the knee with a contact or non-contact mechanism and patient usually describes the knee as having been hyper extended or popped out. Anterior cruciate ligament tear is a serious injury that results in immediate knee instability, lengthy rehabilitation, increased joint laxity, reduced activity and participation as well as an increased risk of knee osteoarthritis in the long term [3].

Anterior cruciate ligament injuries can be managed with non-operative or operative treatment. Non-operative treatment is chosen for individuals who are willing to make lifestyle changes and avoid activities that cause recurrent instability, but this treatment will not prevent instability related changes in the knee and will eventually lead to osteoarthritis. The decision to recommend operative treatment for ACL rupture is multi-factorial and must be individualized to each patient on the basis of age, desired activity level, presence of potential concomitant injuries. In general, younger and more active patients are more likely to require surgery to facilitate a return to the desired daily activities including sports.

The success in ACL reconstruction surgery is mainly determined by similarities between the graft morphology, tension, position, and orientation compared to the native ACL. Although many patients follow up studies report good outcomes in the short term after ACL reconstruction, long term studies have reported a high incidence of joint degeneration (as much as 52-56% in 12–13 years after surgery [4]) and an estimated 8-10% of ACL reconstructions result in recurrent instability and graft failure [5]. Many authors suggest non anatomic femoral tunnel placement as a common reason for failure of an ACL reconstruction. Hence a more anatomic approach to ACL reconstruction has recently received an increase interest and at present femoral tunnel drilling technique is the most important discussion in arthroscopic ACL reconstruction.

The goal of anatomic reconstruction is to place the ACL graft at a more anatomic location on both the tibia and femur. The graft is therefore being placed lower on the medial wall of the lateral femoral condyle, thereby orienting it in a more horizontal position with the presumption that a more horizontally oriented graft, as opposed to a vertical graft, would optimize rotatory as well as translational stability [6].

The most commonly employed technique of femoral tunnel placement, the trans-tibial technique, has been reported not to provide anatomical placement of femoral tunnel and result in rotational instability [7]. Cadaveric and radiographic studies have confirmed that drilling the femoral tunnel through anteromedial portal allows a more anatomical placement of the tunnel and higher rotational stability than does the trans-tibial technique [8]. However, clinical results of trans-tibial and anteromedial portal techniques are still controversial. A recent literature review showed improved short term results with anteromedial portal technique but no difference in terms of clinical functions between the two techniques at mid and long term follow up.

AIMS & OBJECTIVES

To assess and compare clinical outcome between transtibial and anteromedial portal technique during arthroscopic single bundle anterior cruciate ligament reconstruction, using hamstring tendon autograft.

MATERIAL &METHODS

Study Area: Orthopaedic department, LLRM Medical College, Meerut.

Study Population: clinically and radiologically proven cases of anterior cruciate ligament tear with symptoms of knee instability.

Sample Size: 30 (15 in anteromedial technique, 15 in transtibial technique).

Study Design: randomised prospective comparative study.

Study Duration: 2015-2017

Inclusion Criteria:
All skeletally mature patients aged between 18 - 45 years with closed anterior cruciate ligament tear with or without stable meniscal injuries and normal contralateral knee.

Exclusion Criteria:
1. Arthrofibrosis.
2. Inflammatory arthropathy.
3. Unwillingness of patient to participate in post operative rehabilitation.
4. Associated ligament injury requiring surgical treatment.
5. Malalignment of knee
6. Pregnant females
7. Infection

Pre-operative Assessment:
1. Detailed informative history including mechanism of injury.
2. Thorough general physical examination.
3. Complete knee examination including stability tests (Lachman and pivot- shift test).
4. Routine and indicative laboratory examinations like complete blood count, renal function test, random blood sugar, serum electrolytes, liver function test, urine routine, electrocardiogram, chest X-ray.
5. Antero-posterior and lateral radiographs of the affected knee.
6. Pre-operative recording of Lysholm and IKDC scores.
7. Pre-operative physiotherapy advised to achieve full range of motion and good quadriceps control of knee and to decrease any knee swelling.

Lysholm Score:
The Lysholm score [9] is a measure of knee function, symptoms and disability. Lysholm score is a subjective evaluation questionnaire designed specifically for injuries of the knee ligaments. It includes questions on symptoms such as pain, stability and locking, to assess the impact of the injury on the patient's daily activities. It is a 100 point scoring system with scores between 84 and 90 graded as good and >90 graded as excellent.

IKDC Score:
The IKDC rating scale [10] consists of both a subjective questionnaire and an objective evaluation.

The IKDC subjective score is a questionnaire with different subjective factors such as symptoms, sports activities and ability to function. The objective IKDC grading has seven domains related to the knee, reflecting both impairment and disability. The worst grading for first three key domains - presence of effusion, knee range of motion and ligament stability, determines the eventual IKDC grade. Grade A is considered to be a 'normal knee', grade B a 'nearly normal knee', grade C an 'abnormal knee' and grade D a 'severely abnormal knee' (we deleted certain components of IKDC like use of KT-1000 arthrometer to suit our needs).

Post-operative Management:
Patients were given intravenous antibiotic for 48 hours. Post-operative knee elevation and ice compression was used to decrease pain and effusion. Then patients in both groups had undergone an identical six months post-operative program of aggressive rehabilitation. Rehabilitation program was concentrated particularly on the management of soft tissue swelling, restoration of full range of motion within the first month, recovery of full extension of knee, muscle control and proprioception exercises. A copy of the rehabilitation protocol was given to each patient and they were asked to bring their copies on each visit to the hospital for monitoring.

Clinical Assessment:
Patients were discharged on the fifth postoperative day. All patients were followed up on the 2nd, 4th, 6th weeks and at 3rd, 6th months and 1 year. Stitch removal was done after two weeks. At each follow up visits, all patients were evaluated by stability test using Lachman and pivot-shift test.

Lachman test graded as 0(<3 mm), 1 (3-5 mm), or 2 (>5 mm) based on anterior translation of tibia.

The pivot-shift test graded as 0 (negative), 1 (glide), 2 (clunk), or 3 (gross). All assessments were graded as a difference from the normal contralateral side.

Lysholm subjective scores were recorded at each follow up and **IKDC scores** were recorded at 3rd and 6th months. **Range of motion**, in relationship to that of the contralateral normal knee was measured with use of a goniometer at each follow up.

Statistical Methods:
Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean ± SD and median. Normality of data was tested by Kolmogorov-Smirnov test. If the normality was rejected then non parametric test was used.

Statistical Tests Were Applied As Follows-
1. Quantitative variables were compared using unpaired t-test/Mann-Whitney Test (when the data sets were not normally distributed) between the two groups.
2. Qualitative variables were correlated using Chi-Square test /Fisher's exact test.

A p value of <0.05 was considered statistically significant. The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0.

Rehabilitation Protocol
The patients in both groups had undergone an identical six months post operative programme of aggressive rehabilitation. Rehabilitation programme was concentrated particularly on the management of soft tissue swelling, restoration of full range of motion within the first month, the recovery of full extension of the knee, muscle control and proprioception excercises. A copy of the rehabilitation protocol was given to each and every patient who was included in this studyand they were asked to bring their copies at each visit to hospital for monitoring.
We devised this rehabilitation protocol by taking various references from
a) McNicholas Knee Clinic [11] - ACL reconstruction protocol (Hamstring Tendon Graft/
Patella Tendon Graft)
b) Palomar Orthopaedic Specialists [12] - Dr. O'Meara's, Anterior Cruciate Ligament
Reconstruction Rehabilitation Protocol
c) Worcester County Hospital [13] -Anterior Cruciate Ligament Reconstruction Rehabilitation

Protocol

Rehabilitation protocol was advised in stages and as follows:
Stage 1: 0 to 2 weeks

Stage 1a: Day 1 to day 3 after surgery
1. Hinged brace locked in extension.
2. Use ice, compression bandage and elevation of knee to minimize pain and swelling.
3. Range of motion exercises including ankle range of motion, heel slides, passive patellar mobilization, prone hangs and pillow under heel for passive knee extension.

Stage 1b: Day 3 to day 6 after surgery
1. Weight bearing as tolerated using crutches with hinged brace locked in extension.
2. Strengthening exercises as tolerated including quadriceps and hamstring sets, straight leg raises (supine, abduction, adduction, prone), well body exercises, non – weight bearing gastrocsoleus stretches.

Stage 1c: Day 7 to 14 th day
1. Regain full extension and 110 degree of knee flexion.
2. Seated passive knee extension, hip flexion, and terminal knee extension.

Stage 2: 2 to 6 weeks

Stage 2a: 2 to 4 weeks
1. Full weight bearing encouraged, and the postoperative brace and crutches are used as needed for support and comfort.
2. Towel extension stretches with quadriceps setting.
3. Stationary cycling with no resistance for 10 to 15 minutes daily.
4. Weight bearing gastrocsoleus stretches.
5. Continue prone leg hangs with progressively higher ankle weights until full extension achieved.

Stage 2b: 4 to 6 weeks
1. Mini squats 0-30 degrees.
2. Closed chain extension (leg press 0-30 degrees).
3. Stair walking (forward/backward, up/down).
4. Active leg curls for hamstring strengthening in both standing and prone position.

Stage 3: Week 6 to month 4
Stage 3a: 6 to 12 weeks
1. Resisted hamstring curls are commenced if comfortable.
2. Chair squats.
3. Single limb concentric and eccentric closed chain exercises.
4. Single limb calf raises.
5. Hamstring, quadriceps and calf stretching exercises. Advanced closes kinetic chain strengthening (lunges, leg press 0-60 degrees, one leg squats) are started.

Stage 3b: 12 to 16 weeks
1. Continue flexibility exercises as appropriate for patient.
2. Straight ahead jogging.
3. Lateral sport cord drill (slow, controlled).
4. Progress isokinetic quadriceps to full extension by 4 months.
5. Slow start to slow stop forward to backward running can be commenced by the end of 16 weeks

Stage 4: month 4+
1. Agility training.
2. Fast start to fast stop, forward to backward running is started from 20 weeks onwards.
Sport specific drills in the order mentioned are commenced at or after 24 weeks (e.g., zigzag running, circle running, figure of eight running, and carioca running).
3. Continue and progress flexibility and strengthening programs.

Follow up and methods of evaluation
All these patients were followed up for minimum for 6 months. Patient were called on the 15th day for stitch removal, every 15th day follow up for first 3 months, then every 4 weeks follow up for next 3 months then every 2 month for next 6 months and then every 6 month thereafter.
At each follow up visit all patients were evaluated by thorough clinical examination, ligament evaluation tests and Lysoholm subjective score. IKDC subjective score was evaluated 1year after surgery. The range of motion of the involved knee in relationship to that of the contralateral, normal knee will be measured with the use of a goniometer. Sensory changes possibly related to the surgical dissection of the infrapatellar branch of the saphenous nerve were evaluated by asking the patients to delineate the boundaries of the area using a dermographic pen.

OBSERVATION

Technique Used For Femoral Tunnel Drilling
Two types of techniques were used for drilling femoral tunnel namely anteromedial portal and transtibial. Each of these techniques was used randomly in the patients who participated in thestudy. 15 patients were included in each group.(graph 1)

Table 1:

Characteristic Feature	Technique used(Surgical Documentation)		Total
	Anteromedial Portal	Traditional Transtibial	
AGE (in years)			
<20	3	2	5
21-30	10	7	17
>30	2	6	8
GENDER			
Male	13	15	28
Female	2	0	2
MODE OF INJURY			
Fall from height	0	1	1
Fall from train	0	1	1
Fall while dancing	2	1	3
RTA	8	8	16
Sports	5	4	9
SIDE INVOLVED			
Right	11	10	21
Left	4	5	9
ASSOCIATED MENISCAL INJURIES			
Lateral	1	3	4
Medial	5	5	10
Absent	9	7	16
SURGICAL APPROACH FOR MENISCAL INJURY			
Excision of the torn part	6	20%	
Left alone	1	3.3%	
Partial menisectomy	23	76.7%	

Duration From Injury To Operation:
There was a gross variation within the patients from time of injury to operation. In anteromedial group the average duration was 14.8 months. In transtibial group the average duration was 21.67 months. The range was from minimum of 4 months to maximum of 36 months in anteromedial and minimum 3 months to maximum 120 months in transtibial (table 2).

Table 2: Duration From Injury To Operation In The Patients In Each Group

Duration from injury to operation (Surgical Documentation) in months	Anteromed-ial portal	Traditional Transtibial	P value
Sample size	15	15	0.404
Mean ± Stdev	14.8 ± 8.99	21.67 ± 32.23	
Median	12	8	
Min-Max	4-36	3-120	
Inter quartile Range	8.250 - 22.500	6 - 22.500	

Duration Of Follow Up:
The mean duration of post-operative follow up in anteromedial group was 8 months and in transtibial group was 9.2 months. The range is from 4 months to 12 months in anteromedial and 3 to 18 months in transtibial (table 3).

Table 3: Duration Of Follow Up In The Patients In Each Group

Duration of follow up (Clinical assessment) in months	Anteromed-ial portal	Traditional Transtibial	P value
Sample size	15	15	0.577
Mean ± Stdev	8 ± 3.3	9.2 ± 4.74	
Median	6	9	
Min-Max	4-12	3-18	
Inter quartile Range	6 - 12	6 - 12	

Lachman test (table 4)
Lachman test was graded as 0 (<3 mm), I (3-5 mm), or II (<5 mm) based on anterior translation of tibia. All the patients in the anteromedial group had grade 3 Lachman test positive and among patients in transtibial group 14 patients had grade 3 and 1 patients had grade 2 Lachman positive.

All 30 patients had significant improvement in Lachman test grade. In anteromedial and transtibial group all patients became Lachman test negative.

Table 4: Pre-operative And Post Operative Lachman Test In The Patients In Each Group

		Technique used(Surgical Documentation)		Total
		Anteromedial portal	Traditional Transtibial	
Pre op Lachman test (Clinical assessment)	Negative	0 (0.00%)	0 (0.00%)	0 (0.00%)
	Grade 1	0 (0.00%)	0 (0.00%)	0 (0.00%)
	Grade 2	0 (0.00%)	1 (6.67%)	1 (3.33%)
	Grade 3	15 (100.00%)	14 (93.33%)	29 (96.67%)
Total		15 (100.00%)	15 (100.00%)	30 (100.00%)
		Anteromedial portal	Traditional Transtibial	
Post op Lachman test (Clinical assessment)	Negative	15 (100.00%)	15 (100.00%)	30 (100.00%)
	Grade 1	0 (0.00%)	0 (0.00%)	0 (0.00%)
	Grade 2	0 (0.00%)	0 (0.00%)	0 (0.00%)
	Grade 3	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total		15 (100.00%)	15 (100.00%)	30 (100.00%)

Pivot-shift Test: (table 5)

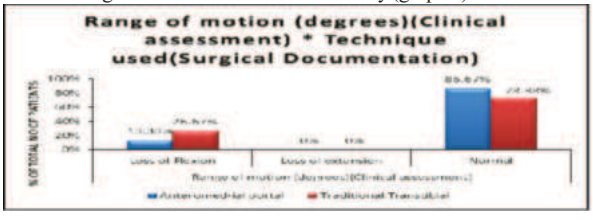
Pivot-shift test was graded as 0 (negative), I (glide), II (clunk), or III (gross). Pre-operatively all 30 patients showed positive pivot-shift test. In anteromedial group 6 patientS had grade II, 9 patients had grade III pivot-shift test. In transtibial group 6 patients had grade II, 9 patients had grade III pivot-shift test. Post-operatively, all patients became pivot-shift test negative.

Table 5: Pre-operative And Post-operative Pivot-shift Test In The Patients In Each Group

		Technique used (Surgical Documentation)		Total
		Anteromed-ial portal	Traditional Transtibial	
Pre op Pivot shift test (Clinical assessment)	Negative	0 (0.00%)	0 (0.00%)	0 (0.00%)
	Grade 1	0 (0.00%)	0 (0.00%)	0 (0.00%)
	Grade 2	6 (40.00%)	6 (40.00%)	12 (40.00%)
	Grade 3	9 (60.00%)	9 (60.00%)	18 (60.00%)
Total		15 (100.00%)	15 (100.00%)	30 (100.00%)
		Anteromed-ial portal	Traditional Transtibial	
Post op Pivot shift test(Clinical assessment)	Negative	15 (100.00%)	15 (100.00%)	30 (100.00%)
	Grade 1	0 (0.00%)	0 (0.00%)	0 (0.00%)
	Grade 2	0 (0.00%)	0 (0.00%)	0 (0.00%)
	Grade 3	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total		15 (100.00%)	15 (100.00%)	30 (100.00%)

Range of motion:

There was no statistically significant difference between two groups in terms of range of motion at the end of the study (graph 2).



Lysholm Score:

The Lysholm score is a measure of knee function, symptoms and disability. Lysholm scoring showed that there was a dramatic improvement in the scores at 6 months follow up in both groups (graph 3).

Grading As Per Lysholm Score (table 6)

Lysholm score is a 100 point scoring system with scores between 84 and 90 graded as good and >90 graded as excellent. At 6 months post-operative follow up 86.67% had good results, 13.33% had fair results. No patients had excellent or poor results in either of the groups.

Table 6: Grading As Per Lysholm Score

		Technique used(Surgical Documentation)		Total	P value
		Anteromed-ial portal	Traditional Transtibial		
Grade Lysholm score(Clinical assessment)	Excellent	0 (0.00%)	0 (0.00%)	0 (0.00%)	0.598
	Good	12 (80.00%)	14 (93.33%)	26 (86.67%)	
	Fair	3 (20.00%)	1 (6.67%)	4 (13.33%)	
	Poor	0 (0.00%)	0 (0.00%)	0 (0.00%)	
Total		15 (100.00%)	15 (100.00%)	30 (100.00%)	

IKDC Subjective Score:

The IKDC subjective score is a questionnaire with different subjective factors such as symptoms, sports activities and ability to function (graph 4).

IKDC Objective Grade (table 7)

The objective IKDC grading has seven domains related to the knee, reflecting both impairment and disability. The worst grading for first three key domains - presence of effusion, knee range of motion and ligament stability, determines the eventual IKDC grade. Grade A is considered to be a 'normal knee', grade B a 'nearly normal knee', grade C an 'abnormal knee' and grade D a 'severely abnormal knee'.

Table 7: Pre Op IKDC Objective Grade In The Patients In Each Group

		Technique used (Surgical Documentation)		Total	P value
		Anteromed-ial portal	Traditional Transtibial		
Pre op IKDC (objective grade) (Clinical assessment)	A	0 (0.00%)	0 (0.00%)	0 (0.00%)	0.483
	B	0 (0.00%)	0 (0.00%)	0 (0.00%)	
	C	2 (13.33%)	0 (0.00%)	2 (6.67%)	
	D	13 (86.67%)	15 (100.00%)	28 (93.33%)	
Total		15 (100.00%)	15 (100.00%)	30 (100.00%)	
Post op 6th month IKDC (objective grade) (Clinical assessment)	A	11 (73.33%)	10 (71.43%)	21 (72.41%)	1.000
	B	4 (26.67%)	4 (28.57%)	8 (27.59%)	
	C	0 (0.00%)	0 (0.00%)	0 (0.00%)	
	D	0 (0.00%)	0 (0.00%)	0 (0.00%)	
Total		15 (100.00%)	14 (100.00%)	29 (100.00%)	

DISCUSSION

The tear of anterior cruciate ligament along with the set of functional disability brings in an area of growing interest and importance in current Orthopaedics.

30 patients were included with 15 patients each in anteromedial and transtibial group. The age of the patients ranged from 18 to 45 years. The mean age in anteromedial group was 25.80 years while in transtibial group was 28.53 years. According to literature, age as an independent variable is not a factor influencing the outcome of ACL reconstruction except for the early osteoarthritic changes seen in older age.

In our study 28 patients were male while 2 female. According to studies conducted by Aredt E et al [14], females participating in sports are more prone for ACL tear because of anatomic, environmental, hormonal and biochemical factors. The ratio of number of female patients and number of male patients undergoing ACL reconstruction was as high as 1: 3.5-2.5, in the studies conducted by Warren R and Marshall J et al [15].

In 30.00% of the cases the mode of injury was sports related activities. The most common mechanism noted was landing the foot in external rotation. All of them were non-professional sports persons and involved in sports like football, cricket, kabaddi, long jump, running and karate. Road traffic accident (RTA) was seen in 53.33% of cases, in which fall from bike was the most common. Fall on ground while

dancing was the mode of injury in 10.00% of cases. . This is in contrast to western literature where it was described that 90% of patients suffered ACL tear from sports related activities (as shown by Seaglione NE et al [16]), this reflect the low level of participation in sports in our country. Right knee was involved in 21(70.00%) patients and left knee in 9(30.00%) patients.

In our study some type of meniscal injury was seen in 14 out of 30 patients (46.66%). Isolated medial meniscus injury was seen in 10 patients and isolated lateral meniscus injury in 4 patients.

Significant meniscal injury was in 5 patients, for which partial meniscectomy was done. 7 patients had small tears involving either anterior or posterior horns of medial or lateral meniscus.

In these cases the small unstable part was excised and freshened. In remaining 2 patients the tear was minor in either of the menisci and was left alone. Smith et al [17] reported that the incidence of meniscal tears in association with ACL injury ranged from 16-82% in acute cases and as high as 96% in chronic ACL injury.

As pre-operative swelling and limited range of motion have been related to the development of arthrofibrosis after ACL reconstruction, all the patients in our study were evaluated for range of motion and quadriceps functioning prior to surgery. There was a gross variation within the patients from time of injury to operation. In anteromedial group the average duration was 14.8 months and in transtibial group the average duration was 21.67 months. Church S et al [18] reported significantly higher incidence of meniscal tears and degeneration of knees in patients undergoing ACL reconstruction 12 months after the injury. The mean duration of post-operative follow up in anteromedial group was 8 months and in transtibial group was 9.2 months.

Pre-operatively all the patients included in our study showed positive Lachman test (96.67% had grade III and 3.33% had grade II). Also all patients showed positive pivot-shift test (60% had grade III, 40.00% had grade II). This was well above what was described by John M et al [19] where Lachman test was positive in 64 to 79% of cases and the pivot-shift was positive in 25 to 39% of cases. From this it can be said that only the patients with grossly unstable knees are seeking medical advice in our country because of our socio- economic condition reflecting the low health consciousness in our country. Post-operatively all patient became Lachman test negative and pivot-shift negative. There was no statistically significant difference noted between the two groups in comparing both the tests, indicating no difference in knee stability and functional ability in both groups, but a significant improvement was noted within each group when comparing pre-operative and post-operative values of these tests.

In our study the mean pre-operative Lysholm score for the anteromedial group and transtibial group was 53.6 and 50.4 respectively and it significantly improved to 82.27 and 81.29 respectively at the end of the study. The mean IKDC subjective score for the anteromedial group and transtibial group was 51.81 and 51.47 respectively and they significantly improved to 80.82 and 79.46 respectively. This is in accordance to the study conducted by Alberto Gobbi et al [106], who noticed in 100 subjects that mean Lysholm score was 50 pre-operatively and it improved to 90 and mean IKDC subjective score was 47 pre-operatively which improved to 85 post-operatively in the same group of patients after 2 years of follow up.

Knees were graded as per Lysholm score after atleast 6 months of follow up. 26 knees were graded good and 4 knees fair. In terms of IKDC objective grading, pre-operatively all the knees were graded as C (abnormal knee) or grade D (severely abnormal knee) and at 6 months follow up, all the knees became grade A (normal knee) or B (nearly normal knee) in both the groups.

Post-operatively at the end of study 24(80%) of patients had full range of motion (0-140º) and remaining 4(20%) of patients showed restriction of terminal flexion of knee. No patient showed any restriction in extension of knee.

CONCLUSION

Anatomical placement of tunnels is the most important factor for a successful ACL reconstruction surgery. Improving the surgical technique to recapitulate the anatomic footprints of the native ACL and restoring normal knee kinematics has therefore become a significant focus. However, no consensus exists on which surgical technique is optimal to reliably achieve these goals. The result of anterior cruciate ligament reconstruction using quadrupled hamstring tendon autograft was good and comparable between the anteromedial and transtibial group in terms of post-operative knee stability and functional ability based on Lysholm score and IKDC score.

REFERENCES

1. Petersen W, Tillmann B. [Anatomy and function of the anterior cruciate ligament].Orthopade. 2002;31(8):710-8.
2. Meighan AA, Keating JF, Will E. Outcome after reconstruction of the anterior cruciate ligament in athletic patients. A comparison of early versus delayed surgery. J Bone Joint Surg Br. 2003;85:521-4.
3. Lohmander LS, Englund PM, Dahl LL, Roos EM. The long-term consequence of anterior cruciate ligament and meniscus injuries: osteoarthritis. Am J Sports Med. 2007 Oct; 35(10):1756-69.
4. Purnell ML, Larson AI, Clancy W. Anterior cruciate ligament insertions on the tibia and femur and their relationships to critical bony landmarks using high-resolutionvolume-rendering computed tomography. Am J Sports Med. 2008 Nov;36(11):2083-90.
5. Michel J. strobe-1, 'Manual of Arthroscopic surgery' 1 st edition 366-368.
6. Butler DL. Anterior cruciate ligament: its normal response and replacement. J Orthop Res 1989; 7:910-21
7. Beard DJ, Kyberg PG, Ferguson CM, et al. (1993). Proprioception after rupture of the anterior cruciate ligament. An objective indication in the need of surgery. J Bone Joint Surg. 75B: 311-315.
8. Sharma L and YC Pai (1997). Impaired proprioception and osteoarthritis. Curr Opin Rheumatil. 9: 253-258.
9. Tegner Y, Lysholm J. Rating systems in the evaluation of knee ligament injuries. Clin Orthop Relat Res. 1985 Sep;198:43-49.
10. IKDC COMMITTEE AOSSM: Anderson A, Vergfeld J, Boland A, Dye S, Feagin J, Harner C, Mohpadi N, Richmond N, Shelbourne J, Perry G. ESSKA: Staubli H, Hefti S, Hoher J, Jacob R, Mueller W, Neyret P. APOSSM: Chan K, Kurosaka M.
11. McNicholas Knee Clinic- ACL reconstruction protocol(Hamstring Tendon Graft/ Patella Tendon Graft) http://www.mcnicholaskneeclinic.co.uk/pdfs/aclreconstruction.pdf
12. Palomar Orthopaedic Specialists- Dr. O'Meara's, Anterior Cruciate Ligament Reconstruction Rehabilitation Protocol http://www.palomarortho.com/protocols/antcruciateligament.pdf
13. Worcester County Hospital -Anterior Cruciate Ligament Reconstruction Rehabilitation http://www.worcesterortho.com/forms/WCO_ACL_Hamstring Autograft Protocol.pdf
14. Arendt E, Dick R. Knee injury patterns among men and women in collegiate basketball and soccer: NCAA data and review of literature. Am J Sports Med. 1995;23(6):694-701.
15. Warren R, Marshall J, Girgis F. The prime static stabilizer of the medial side of the knee. J Bone Joint Surg [Am].1974;56-A:665.
16. Seaglione NE, Warren RF, Wickiewicz TL, et al. Primary repair with semitendinosus tendon augmentation of anterior cruciate ligament injuries. Am J Sports Med.1990;18:64.
17. Smith JP, Barrett GR. Medial and lateral meniscal tear patterns in anterior cruciate ligament-deficient knees: A prospective analysis of 575 tears. Am J Sports Med. 2001;29:415-419.
18. Church S, Keating JF, Reconstruction of the anterior cruciate ligament: timing of surgery and the incidence of meniscal tears and degenerative change. J Bone Joint Surg [Br].2005;87-B;1639-1642.
19. John M, Marzo, Rassell F, Warren. Acute anterior cruciate and medial collateral ligament injuries: surgery of the knee (2 nd edition).403-423.