Transtibial versus anteromedial portal technique of arthoscopic Anterior cruciate ligament Reconstruction:A Prospective Randomised Trial

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Transtibial versus anteromedial portal technique of arthroscopic Anterior cruciate ligament Reconstruction: A Prospective Randomised Trial

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Abstract

Background. Although the true natural history remains unclear, ACL disruptions are functionally disabling, they predispose the knee to subsequent injuries such as tears of the menisci, and they are associated with the early onset of osteoarthritis. The objective of the study is to compare the results of ACL reconstruction by two different techniques i.e. anteromedial portal technique and transtibial technique.

Material and Methods: The study was conducted on 60 clinico radiological cases of ACL tear which were randomly divided into two groups, half of them were operated by anteromedial technique (AMP) and another half by transtibial technique (TT) of ACL reconstruction. Assessment was done preoperatively and immediate postoperatively by clinical examination of the knee, Lysholm score, IKDC scale and MRI. Follow-up assessment was done by knee examination, Lysholm score and IKDC scale.

Results: The difference between mean Lysholm score and IKDC scale after 12 to 17 months of follow-up was not statistically significant. The pivot shift test was negative in all cases in both TT and AMP group whereas Lachman test was negative in 77% of TT group patients and 80% of AMP group patients. On post-op MRI mean inclination angles of ACL in sagittal view were 53.22° in normal knees, 55.85° in TT and 53.81° in AMP group of patients. And in coronal views they were 72.77°, 77° and 70.63° in normal, TT and AMP group respectively. In both sagittal and coronal views the difference between normal and TT group, and TT vs AMP group was significant. But it was not statistically significant between normal and AMP group.

Conclusion: Post-operative MRI showed that TT produces more vertical and non-anatomical tunnel whereas AMP produces more anatomical tunnel but the difference in functional score was statistically not significant. Therefore, this study doesn’t guarantee the superiority of one technique over the other.

Introduction

Anterior cruciate ligament (ACL) is an important structure to stabilize the knee joint and its injury can induce knee joint laxity and pain. ACL injuries are common among athletes. The arthroscopic single-bundle (SB) autograft has been a widely used technique for ACL reconstruction. Initially the most popular femoral drilling method was the two-incision technique, where the femoral tunnel is created outside-in. The Transtibial (TT) technique was the subsequent method of choice for the femoral tunnel placement. Although there is no definitive evidence to support a clear benefit of the one-incision over the two-incision technique. The TT drilling method was adopted to obviate the necessity for the lateral incision and to, potentially, reduce operative time and surgical morbidity. Moreover, good clinical outcomes were reported with the TT technique. However, recently it has been postulated that the SB TT ACL reconstruction places the graft in a non-anatomical femoral insertion site which has been blamed to be the cause of non-reproducible results and poor pivot control in the knee.

The use of the Anteromedial portal (AMP) for drilling the femoral tunnel in the SB technique was suggested as a method to place the single bundle graft in an anatomical position and improve rotational stability, without increased complexity of double bundle reconstruction. With the TT technique, the position of the femoral tunnel is dictated by the tibial tunnel, whereas the AMP technique provides the surgeon with a greater freedom to place the graft in the anatomical position on femoral side.

There has been an increased recognition of ACL reconstruction failure attributable to vertically oriented grafts in recent years. Although anterior tibial translation can be well controlled with isometric femoral positioning and a vertical graft orientation, patients often have residual rotational instability and a persistent pivot shift postoperatively that preclude their ability to return to previous level of athletic activity. The restoration of normal knee kinematics and improvement in tibial rotational control with greater femoral tunnel obliquity have been recently established in a number of biomechanical studies.
Although significant anatomic and biomechanical differences between Transtibial and Anteromedial portal ACL reconstructions are evident in various cadaveric studies, the clinical significance of these findings is unclear. It is certainly possible that these differences may not translate into improved patient satisfaction or better functional outcomes. There is no question that successful outcomes after Transtibial ACL reconstruction have been well established in the literature. Buchner et al., have reported 85% nearly normal or normal International Knee Documentation Committee scores at a mean of 6 years follow-up after Transtibial ACL reconstruction in 85 patients, with 75% showing a difference of less than 3 mm in KT-1000 measurements between normal and operated knees. Similarly reported excellent subjective and objective outcomes as well as restoration of knee stability as assessed by KT-1000 arthrometer in 96 patients with Transtibial ACL reconstruction at 24 months’ follow-up. Randomized, prospective studies with validated functional outcome tools are necessary to further define the clinical relevance of these biomechanical cadaveric studies findings. Comparative prospective studies comparing the results of TT and AMP technique have shown varied results with no definite advantage of either of them. We were interested in this study to prospectively compare the clinical outcomes of arthroscopic SB ACL reconstruction using the TT or the AMP technique for drilling the femoral tunnel in a homogeneous sample of patients.

**Materials and Methods**

All the surgeries were done by single surgeon who had adequate experience of arthroscopic ACL reconstruction surgery. In this prospective study a total of 60 clinicoradiological proven cases of ACL tear with clinical symptoms like knee instability were admitted and underwent arthroscopic ACL reconstruction, after randomization by coin flip method, into two groups. One group of 30 patients were operated using Transtibial technique and second group of 30 patients by using Anteromedial portal technique of arthroscopic ACL reconstruction.

**Exclusion criteria**

Patients having ACL rupture with any additional knee ligament injuries like posterior cruciate ligament tear, posterolateral corner insufficiency, previous knee ligament surgery, malalignment and injured contralateral knee were excluded.

**Methods of preoperative evaluation**

All patients underwent a preoperative assessment including a history, clinical examination, knee examination (Lachman test, Pivot shift), Lysholm score, IKDC scale (subjective as well as objective), and MRI.

**Operative procedure**

**Semitendinosus and gracilis harvest and preparation**

An oblique 3 cm skin incision was made over the pes anserine starting 1 cm medial to the tibial tubercle and heading postero-medial, starting 5 cm below the joint line (FIG. 1). The subcutaneous fat was incised and stripped off the pes with a sponge. The superior border of the pes was identified with finger, the gracilis tendon was identified by rolling it with finger and fascia was then incised between gracilis and semitendinosus tendon. Through this incision the gracilis tendon was scooped out using Lahey’s forceps (FIG. 2). The distal end of the tendon was cut with the scissors; making sure to get the maximal length distally. The fascial bands were released with the traction and by blunt finger dissection and with combined action of pulling the tendon and pushing the tendon stripper, gracilis tendon was amputated at musculo-tendon junction. Then again with Lahey’s forceps; the flat tendon of semitendinosus was scooped out (FIG. 3) and snared with No. 1 sutulpack. The tendon was incised between gracilis and semitendinosus tendon was then incised between gracilis and semitendinosus tendon. The total length obtained was usually 25 cm for semitendinosus and 20 cm for gracilis tendon.

**Graft preparation**

Both the semitendinosus and gracilis graft are double looped and their free ends whip stitched using no.5 ethibond (FIG. 4). Sizing was done using tendon sizer. The usual thickness obtained was 8-9 mm.

**Arthroscopic Technique**

A complete diagnostic arthroscopy was performed first for every patient in this study to confirm the ACL tear and possible other findings (meniscal or chondral injury) inside the injured knee. The ruptured ACL was examined with an arthroscopic probe, dissected, and debrided. The tibial footprint of the ACL was left intact. The femoral footprint was also identified and minimally debrided and marked with radiofrequency probe or awl.

In patients of group A (Transtibial technique):

All the surgical techniques were performed by single surgeon in usual fashion. Transfemoral incision was made 5 cm above the joint line in front of adductor longus muscle, and then intramuscular plane was dissected with blunt finger. After elevation of the adductor longus muscle, the femoral footprint was identified and marked with radiofrequency probe or awl.
Standard anterolateral and anteromedial portal were made. The tibial tunnel was drilled first using ACL tibial jig set at 55 degree. Reaming was done to make the tibial tunnel of size dictated by the thickness of the graft. The centre of femoral tunnel was then marked using a femoral offset jig through the tibial tunnel, trying to reach the ACL footprint centre as far as possible (FIG. 6). Femoral tunnel was then drilled according to the size of graft and after ensuring the length of atleast 20 mm of graft in the tunnel, a 4.5 mm cannulated drill bit was used to create the channel for the Endobutton CL passage from the roof of femoral tunnel till the femoral cortex. The Endobutton CL size was selected depending upon overall length/distance between intra articular femoral tunnel aperture and femoral cortex.

The double looped hamstring graft was then pulled through the tibial tunnel into femoral tunnel over appropriate size Endobutton CL and then the button was flipped over the femoral cortex.

In patients of group B: (AMP) Technique:

In this technique the anteromedial portal was made a little distal and medial then in Transtibial technique (FIG.5). In AMP technique femoral tunnel was constructed first.

While keeping knee in 110 degrees flexion and looking from the arthroscope in anterolateral portal, a guide wire was passed from anteromedial portal using a appropriate sized AMP femoral offset jig. By this method of using anteromedial portal for femoral drilling, we found that one could easily reached the femoral ACL foot print in most of cases i.e. low lateral or 9:9:30 o’ clock position in right knee and 2:30-3 o’clock position in left knee (FIG. 7, 8). Over this guide wire 4.5 mm cannulated drill bit was used to drill upto lateral femoral cortex. Depth guage was used to measure the total length of tunnel which came out to 35-40 mm (FIG. 9) in most cases. Since Endobutton CL comes in size of 15 and 20 mm loop (smallest size), and it was ensured to keep atleast 20mm graft in femoral tunnel, we made the appropriate sized femoral tunnel (both in terms of length and width). Beath pin was used to pass suture loop of no. 5 ethibond from Anteromedial portal through femoral tunnel and brought out the skin overlying lateral femoral cortex. Now the knee was extended upto 90 degrees flexion and tibial tunnel was made using ACL jig, set at 55 degrees to make appropriate sized tibial tunnel. Through this tibial tunnel a grasper was used to pull through the suture loop from inside the knee. Over this suture loop the graft along with Endobutton CL was pulled through tibial and femoral tunnels (FIG. 10, 11). And then the Endobutton CL was flipped over the lateral femoral cortex. This ensured fixation of graft at femoral side.

Fixation of graft on tibial side using intrafix

After passage of the graft by either technique, the four graft strands (2 of gracilis and 2 of semitendinosus) which were coming out of tibial tunnel were pulled firmly and the knee was cycled through full range of motion 10-12 times. The knee was then brought in full extension and appropriate sized biodegradable tibial Intrafix ( Mitek - USA ) was used to fix the graft in the tibial tunnel.

Standard instrumentation of Mitek – USA was used to insert the Intrafix sheath and screw while applying 15-20 pounds of traction to the four graft strands using the graft tension device.

The wound and portal were closed using 1-0 vicryl and silk, standard antiseptic dressing was done and crepe bandage applied. The tourniquet was deflated after application of crepe bandage. Long knee immobiliser was applied in full knee extension.

Postoperative care

1. Patients were given intravenous antibiotics for three days.
2. Rehabilitation protocol :-
   a. Immediate quadriceps and hamstrings exercises.
   b. Partial weight bearing with crutches / walker in first post operative week.
   c. After first week; range of motion in arc of 0-90\(^\circ\) (closed kinetic chain) was started.
   d. Progression of range of motion was on tolerated basis, guided by presence and degree of pain and swelling.
   e. Full weight bearing by 3-4 weeks as per patient tolerance.
   f. Running and cycling after one month.
   g. Return to sports not before six months.

Follow up

All patients were followed up for minimum of one year, thereafter 15\(^{th}\) day for stitch removal, 15\(^{th}\) day follow up for 2 months. After that follow up of the patient was done at 4\(^{th}\), 7\(^{th}\) and 12\(^{th}\) months.

Methods of post operative evaluation

In each follow up visit, clinical examination was performed and the parameters of Lysholm score and IKDC scale were recorded. MRI scan was done at 4-6 months follow up to document graft orientation. In MRI scan we measured the sagittal and coronal...
tibial graft angles. Sagittal ACL tibial angle is the angle created between line paralleling the midlateral tibial plateau and a line demarcating the anterior most margin of the ACL, drawn on the midline sagittal image best depicting the ACL. Coronal ACL tibial angle is the angle created between a line demarcating the medial most margin of the long axis of the ACL and a line connecting the medial and lateral most margins of the tibial plateau on the same section.

In each follow up visit clinical examination was performed according to the Lysholm score, IKDC scale (subjective and objective) and knee examination test (Lachman and Pivot shift).

**Lachman test**
For the test, the knee is unlocked in 20° flexion. The patient's heel rests on the couch. The examiner holds the patient's tibia, with the thumb on the tibial tubercle. The examiner's other hand is placed on the patient's thigh, a few centimetres above the patella. The hand on the tibia applies a brisk anteriorly directed force to the tibia.

The quality of the endpoint at the end of the movement is described as either "firm" or "soft." Grading depends on the quality of the endpoint observed, and on whether there is a difference of 3-5 mm between the affected and the unaffected knee. A soft endpoint will make the grading "abnormal" rather than "nearly normal."

**Pivot shift test**
With the knee extended, the foot is lifted and the leg internally rotated, and a valgus stress is applied to the lateral side of the leg in the region of fibular neck with the opposite hand. The knee is flexed slowly while the valgus and internal rotation is maintained. With the knee extended and internally rotated, the tibia is subluxed anteriorly in ACL tear. As the knee is flexed past approximately 30 degrees the iliobibial band provides the force that reduces the lateral tibial plateau on the lateral femoral condyle. The scoring system is conventional: + = glide; ++ = clunk; +++ = gross.

**Lysholm score**
The Lysholm knee score is a measure of knee function, symptoms and disability. This questionnaire is constituted of eight questions, with closed answers alternatives. Recording of the Lysholm score was done preoperatively and postoperatively.

<table>
<thead>
<tr>
<th>Limp (5 Points)</th>
<th>Pain (25 Points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>slight or periodical</th>
<th>Inconstant and slight during severe exertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Severe and constant</th>
<th>Marked during severe exertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Support (5 Points)</th>
<th>Marked on or after walking more than 2 km</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Slick or crutch</th>
<th>constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight-bearing impossible</th>
<th>Swelling (10 Points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Locking (15 points)</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No locking and no catching sensations</th>
<th>On severe exertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Catching but no locking</th>
<th>On ordinary exertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Locking</th>
<th>constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequently</th>
<th>Stair climbing (10 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Locked joint on examination</th>
<th>No impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instability (25 points)</th>
<th>Slightly impaired</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Never giving way</th>
<th>One step at a time</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rarely gives way except for athletic or other severe exertion</th>
<th>Impossible</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gives way frequently during athletic events or severe exertion</th>
<th>Squatting (5 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occasionally in daily activities</th>
<th>No problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Often in daily activities</th>
<th>Slightly impaired</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Every step</th>
<th>Not beyond 90 degrees</th>
<th>Impossible</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
</tr>
</thead>
</table>

Excellent: 95 – 100; Good: 84 – 94; Fair: 65 – 83; Poor: ≤ 64

**ikdc scale**
The IKDC rating scale consists of both a subjective questionnaire and an objective evaluation.
Subjective IKDC Score

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

**SYMPTOMS**:  
*Grade symptoms at the highest activity level at which you think you could function without significant symptoms, even if you are not actually performing activities at this level.*

1. What is the highest level of activity that you can perform without significant knee pain?
   - 4= Very strenuous activities like jumping or pivoting as in basketball or soccer
   - 3= Strenuous activities like heavy physical work, skiing or tennis
   - 2= Moderate activities like moderate physical work, running or jogging
   - 1= Light activities like walking, housework or yard work
   - 0= Unable to perform any of the above activities due to knee pain

2. During the past 4 weeks, or since your injury, how often have you had pain?
   - 10= Never
   - 9= Constant

3. If you have pain, how severe is it?
   - 10= No pain
   - 9= Worst pain imaginable

4. During the past 4 weeks, or since your injury, how stiff or swollen was your knee?
   - 4= Not at all
   - 3= Mildly
   - 2= Moderately
   - 1= Very
   - 0= Extremely

5. What is the highest level of activity you can perform without significant swelling in your knee?
   - 4= Very strenuous activities like jumping or pivoting as in basketball or soccer
   - 3= Strenuous activities like heavy physical work, skiing or tennis
   - 2= Moderate activities like moderate physical work, running or jogging
   - 1= Light activities like walking, housework or yard work
   - 0= Unable to perform any of the above activities due to knee swelling

6. During the past 4 weeks, or since your injury, did your knee lock or catch?
   - 0= Yes
   - 1= No

7. What is the highest level of activity you can perform without significant giving way in your knee?
   - 4= Very strenuous activities like jumping or pivoting as in basketball or soccer
   - 3= Strenuous activities like heavy physical work, skiing or tennis
   - 2= Moderate activities like moderate physical work, running or jogging
   - 1= Light activities like walking, housework or yard work
   - 0= Unable to perform any of the above activities due to giving way of the knee

**Sports activities:**

8. What is the highest level of activity you can participate in on a regular basis?
   - 4= Very strenuous activities like jumping or pivoting as in basketball or soccer
   - 3= Strenuous activities like heavy physical work, skiing or tennis
   - 2= Moderate activities like moderate physical work, running or jogging
   - 1= Light activities like walking, housework or yard work
   - 0= Unable to perform any of the above activities due to knee

9. How does your knee affect your ability to:

   a. Go up stairs
   b. Go down stairs
   c. Kneel on the front of your knee
   d. Squat
   e. Sit with your knee bent
   f. Rise from a chair
   g. Run straight ahead
   h. Jump and land on your involved leg
   i. Stop and start quickly

**Function:**

10. How would you rate the function of your knee on a scale of 0 to 10 with 10 being normal, excellent function and 0 being the inability to perform any of your usual daily activities which may include sports?

**CURRENT FUNCTION OF YOUR KNEE:**
The Subjective IKDC score was evaluated by summing the scores for the individual items and then transforming the score to a scale that ranges from 0 to 100. To calculate the final subjective IKDC score, simply add the score of each item and divide by the maximum possible score which was 87.

Subjective IKDC score = \left[ \frac{\text{Sum of items}}{\text{Maximum possible score}} \right] \times 100

The score is interpreted as a measure of function such that higher scores represent higher levels of function and lower levels of symptoms. A score of 100 is interpreted to mean no limitation with activities of daily living or sports activities and the absence of symptoms.

### Objective IKDC Scale

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>A (normal)</th>
<th>B (nearly normal)</th>
<th>C (abnormal)</th>
<th>D (severely abnormal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Effusion</td>
<td>None</td>
<td>Mild (&lt; 25cc)</td>
<td>Moderate (25-60cc)</td>
<td>Severe (tense knee)</td>
</tr>
<tr>
<td>1. Ligament examination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Lachman test</td>
<td>-1 to 2mm</td>
<td>3 to 5mm (1^\circ)</td>
<td>6 to 10mm (2^\circ)</td>
<td>&gt;10mm (3^\circ)</td>
</tr>
<tr>
<td>b. Pivot shift</td>
<td>Equal</td>
<td>Glide</td>
<td>Gross</td>
<td>Marked</td>
</tr>
<tr>
<td>1. Passive motion defect</td>
<td>&lt; 3°</td>
<td>3 to 5°</td>
<td>6 to 10°</td>
<td>&gt;10°</td>
</tr>
<tr>
<td>2. Lack of extension</td>
<td>0 to 5°</td>
<td>6 to 15°</td>
<td>16 to 25°</td>
<td>&gt;25°</td>
</tr>
</tbody>
</table>

*Group grade: The lowest grade within a group determines the group grade

### Results

Results of ACL reconstruction after 12-17 months of follow up were evaluated and showed excellent & good results in all patients of both groups according to Lysholm score. All patients were males; with mean age 24.76 years in TT group and 23.73 in AMP group.

Mean Lysholm score postoperatively were 94.54 and 95.13 in TT and AMP group respectively. Their difference was not statistically significant.

All patients had normal or nearly normal (grade A+B) knee except one patient TT and one in AMP group according to the post operative objective IKDC score. In the present study all patients were males; with mean age 24.76 years in TT group and 23.73 in AMP group.

The mean subjective IKDC after 12-17 months follow up were 93.54 and 94.93 in TT and AMP group respectively. Their difference was not statistically significant.

In the present study all patients were pivot shift negative in both TT and AMP group. Lachman test was negative in 77% cases in TT and 80% cases in AMP group. When patients were grouped according to associated meniscal injury; the difference in mean Lysholm and mean subjective IKDC score in TT and AMP group was not statistically significant \((p \text{ value} >0.05)\). When patients were grouped according to the time elapsed since injury; the difference of mean post op subjective IKDC score was statistically not significant \((p \text{ value} >0.05)\). In TT group most of the patients 20(66%) regained very good range of motion \((0-120^\circ \text{ or above})\), 6(20%) cases had 15 degree loss of terminal flexion. In AMP group most of the patients 26(86.7%) regained very good range of motion \((0-120^\circ \text{ or above})\), 2 (6.7%) cases had 15 degree loss of terminal flexion and 2(6.7%) case could not flex his knee beyond 90°, because he was very apprehensive and not done exercises as instructed. In present study 6(20%) cases in Transtibial group and 4 (13.3%) cases in AMP group complained of mild knee pain. No case developed superficial stitch infection. 8(27%) cases in Transibial group and 4(13.3%) cases in AMP group had sensory loss over upper medial tibia.

On post op MRI mean inclination angles of ACL in sagittal view were 53.22° in normal knees, 55.85° in TT and 53.81° in AMP group of patients. And in coronal views they were 72.77°, 77° and 70.63° in normal, TT and AMP group respectively. In both sagittal and coronal views the difference between normal and TT group, and TT vs AMP group was significant. But it was not statistically significant between normal and AMP group, meaning thereby that in AMP group of patients, the graft inclination in the notch (both sagittal and coronal sections), resembles the native ACL in contralateral normal knee, while it isn’t in TT group.

### Discussion

The ACL injury is not only immediately problematic because of functional instability but it is the source of long term complications such as meniscus tears, failure of secondary stabilizers and early onset of osteoarthritis. Reconstruction of the ACL allows patients to resume their active life style and can delay the onset of osteoarthritis. The ACL reconstruction can be done either by Transtibial technique (TT) or by Anteromedial portal (AMP).
technique of drilling of femoral tunnel. ACL reconstruction by TT technique has several advantages such as it is technically less demanding, shorter operative time with less chances of posterior wall of femur blow out and a long femoral tunnel length. But by this technique reconstructed ACL has improper insertion site. And the reconstructed ACL is more vertically oriented and has larger tibial graft angles which is thought to impart less rotational stability.\(^{23}\)

Anatomy is the basis of any orthopaedic surgery. That is why anatomic ACL reconstruction strives to restore as accurately as possible the native ACL anatomy. In anatomic ACL reconstruction, following fundamental principles are applied - restoring the insertion sites, matching the graft orientation to the native ACL size and correctly tensioning the graft.

The anatomic ACL reconstruction through AMP technique has several advantages. Accurate independent femoral tunnel placement, proper graft insertion site, replication of native anatomy and tibial graft angles which is thought to have better restoration of normal knee kinematics.\(^{23}\) Another advantage is that anatomic tunnel placement exposes the graft to normal biomechanical stimuli and in this way creates a more favourable environment for healing and remodelling.\(^{41}\)

By AMP technique it is feasible to put the graft in a more anatomical orientation but this technique of ACL reconstruction has some disadvantages like it is technically more demanding which leads to more operative time so surgical expertise is must. Other disadvantages are short femoral tunnel length and more chances of posterior femoral wall blow out.\(^{23}\)

AMP technique, effect of meniscus tear and duration of injury on the results. By doing MRI scan of operated and contralateral normal knee, this study also tries to objectively show the inclination angle of the ACL graft as compared to normal ACL, in both groups of patients i.e. Transtibial and AMP.

**Conclusion**

Our study, shows a significant finding that TT technique produces a vertical and a non anatomical graft, while in AMP technique the grafted ACL resembles very closely (in a statistically significant manner) to the native ACL in contralateral knee.

This anatomical reconstruction of ACL by AMP technique, has shown better functional scores (higher mean Lysholm and IKDC scores), but the difference was lacking in statistical significance. This could be pertinent reason for this could be that either of the technique including AMP technique is not truly anatomical. ACL actually is not a single bundle ligament but is composed of two functioning bundle – anteromedial and posterolateral. So a real anatomical reconstruction would be anatomical double bundle reconstruction using the Anteromedial portal technique.

So our study doesnot show superiority of one technique over the other and it seems that there is no correlation between the inclination angle of the tunnel and functional results in ACL reconstruction techniques. It is truly on the surgeons preference to choose any of the above technique in which he is more familiar.

**Biblography**

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Illustrations

Illustration 1

Case 1 (ACL Tibial angles in Trans tibial technique in normal and operated knees)

Illustration 2

Case 2 (ACL Tibial angles in trans tibial technique in normal and operated knees)
Illustration 3

Case 3(ACL Tibial angles in AMP technique in normal and operated knees

Illustration 4

Case 4(ACL Tibial angles in AMP technique in normal and operated knees