

# A Comparative Study of the Results of the Anatomic Medial Portal and All-inside Arthroscopic ACL Reconstruction

KUMAR SHANTANU<sup>1</sup>, SUDHIR SHYAM KUSHWAHA<sup>2</sup>, DEEPAK KUMAR<sup>3</sup>, VINEET KUMAR<sup>4</sup>, SHAIENDRA SINGH<sup>5</sup>, VINEET SHARMA<sup>6</sup>

## ABSTRACT

**Introduction:** Many techniques of graft placement in Arthroscopic Anterior Cruciate Ligament (ACL) reconstruction is available now-a-days, like trans-tibial, anatomical accessory medial portal and anatomical all-inside technique.

**Aim:** To compare the improvement in clinical status of patients treated by anatomic accessory medial portal and all-inside arthroscopic ACL reconstruction technique pre-operatively post-operatively using International Knee Documentation Committee (IKDC) Subjective Knee Scores, Lysholm Knee Score, Knee Society Score, Lachman test, Visual Analog Score (VAS) in both the groups.

**Materials and Methods:** After informed consent from patients and clearance from Ethical Committee, we included patients aged 18 to 50 years with ACL injury and clinical laxity admitted in Department of Orthopaedics, King George Medical University, Lucknow. We included 100 patients in the study, which were divided into two groups, Group1 comprised of patients treated

by Anatomic accessory medial portal technique and group 2 comprised of patients treated by All-Inside technique. Then the patients were followed up post-operatively at 6 weeks, 12 weeks and 6 months, clinically for functional status using Lysholm Knee Score, IKDC Subjective Knee Score, Knee Society Score and VAS score. Grading of laxity was evaluated by Lachman test at pre-operative stage and 6 months follow-up.

After collection of the data, analysis was carried out on SPSS software version 16.0 (Chicago, inc. USA) and the statistical test that was used was 2-Way Analysis of Variance (ANOVA).

**Results:** IKDC Subjective Knee Score, Lysholm Knee Score, Knee Society Score, Lachman Test and VAS Score was better in group 2 treated by All-inside technique as compared to group1 and the difference was significant ( $p < 0.005$ ).

**Conclusion:** All- Inside arthroscopic ACL reconstruction technique (group2) is a better technique than arthroscopic Anatomic accessory medial portal technique (group1).

**Keywords:** IKDC subjective knee score, Knee society score, Lachman test, Lysholm knee score, Visual analog score

## INTRODUCTION

Anterior Cruciate Ligament (ACL) is one of the four major ligaments of the knee joint [1]. Many techniques of graft placement in arthroscopic ACL reconstruction are available now-a-days, like trans-tibial, anatomical accessory medial portal, anatomical all-inside technique [2,3]. Earlier trans-tibial drilling was the most commonly used method for creating the femoral tunnel in arthroscopic ACL reconstruction [4]. In this technique, the placement of femoral socket is dictated by the tibial tunnel, leading to a vertical graft placement, with this technique, early outcome was good but because the graft position was non-anatomical [5,6] so, the normal kinematics of the knee was disturbed [7,8] leading to pain and early onset arthritis [9]. Anteromedial (AM) portal drilling is a technique in which free hand drilling of the femoral and tibial tunnels is done [10]. To define tunnel placement it is important to appreciate medial face of femoral lateral condyle.

In lateral portal arthroscopic viewing, the inter-condylar and bifurcate ridges are not readily identified. It can lead to a high or anterior placement of the graft [11] "anatomic" or "footprint". ACL reconstruction has been introduced recently, because it restores the normal anatomical position of the graft therefore, normal biomechanics of the knee is restored [12]. In this technique, an accessory medial portal is needed so that preparation of the femoral tunnel is needed for simultaneous medial viewing [2,13]. Instrument crowding and hyperflexion are some of the challenges of this technique [13]. In the all-inside technique there is no need of accessory portal and no need for hyperflexion. This technique preserves the gracilis tendon which is a secondary stabilizer so that, it can be used as a graft in future. The present study aims to examine

the outcomes of all-inside and anatomical accessory medial portal ACL reconstruction functionally and radiologically.

## MATERIALS AND METHODS

It was a hospital based prospective study with duration of one year, from August 2014 to July 2015 (so that a complete six months follow-up could be completed within the designated time period).

After informed consent from patients and clearance from ethical committee we included patients aged 18 to 50 years with anterior cruciate ligament injury and clinical laxity admitted in Department of Orthopaedic Surgery, King George Medical University, Lucknow who chose to have ACL reconstructive surgery with allograft tissue. Patients having associated meniscal, collateral ligaments, bilateral ACL tear, posterior cruciate ligament, postero-medial corner, or postero-lateral corner or previous ACL reconstruction surgery, associated fractures involving lower limbs and /or spine/ neurovascular injuries, significant arthritis or local skin infections were excluded from the study.

Hundred patients were divided into two groups by a computer generated random table. Group1 patients were treated by anatomical accessory medial portal. Group 2 patient were treated by anatomical all-inside technique.

At the end of the study there were 48 patients under group1 and group 2 comprised of 46 patients. Two patients from each group lost to follow-up. One patient in the group 2 developed re-injury of ACL so, excluded from the study. One patient developed fracture of both bone leg during sports activity so excluded from the study.

Standard surgical procedures, anaesthesia techniques, tourniquet and rehabilitation protocols were followed in both the groups. In

group 1, femoral sockets were created through an antero-medial portal technique at the 10-o'clock (right knee) or 2-o'clock (left knee) position with the knee in 120- 130 degree of hyper flexion. The tibial tunnel creation was done with an ante-grade, cannulated drilling technique and full tibial tunnel preparation was done. Fixation in the full-tunnel group was done with a bio-absorbable tibial interference screw (Delta tapered screw; Arthrex) and graft on femoral site was fixed with tightrope RT loop (Arthrex).

In group 2, the femoral socket was prepared in 90 degree of flexion and femoral tunnel was drilled using flip cutter due to which only the required amount of tunnel was drilled whereas tibial tunnel was also not completely drilled and All-inside femoral and tibial tunnel creation was performed with a retrograde drilling technique (RetroDrill; Arthrex). The graft fixation was done by tight rope RT (Arthrex) on both the sides.

Then, the patient follow-up was done post-operatively at 6 weeks, 12 weeks and 6 months, clinically for functional status using Lysholm Knee Score, IKDC Subjective Knee Score and Knee Society Score. Grading of laxity was evaluated by anterior drawer test and Lachman test at pre-operative stage and 6 months follow-up. Radiological evaluation was done on X-ray. Angle of tibial and femoral tunnels was measured on digital immediate post-operative Knee radiographs (Antero-posterior and True Lateral Views) and at 6 months.

## RESULTS

After collecting the statistical data, analysis of the data produced the results of the study. The mean age of presentation of the patients was 24.49±3.27 years in group1 and 26.35±5.24 years in group 2 clearly showing the fact that ACL injury is more common in young patients [Table/Fig-1]. Lysholm Knee Score was better in group 2 at 6 week, 12 week, 24 weeks and the difference was significant [Table/Fig-2]. So, functional status of the patient treated by all-inside technique was much better. IKDC Subjective Knee Score was also better in group 2 at all follow ups and the difference was significant ( $p < 0.005$ ). At last follow up of 6 months the IKDC Subjective Knee Score was 90.02±4.74\* in group 1 and 91.50±3.77\* in group 2 and the p-value was 0.001 [Table/Fig-3]. Knee society score was also better at all follow ups in the group 2 treated by All-inside technique as compared to group 1 and the difference was significant. At final follow-up of 6 months Knee Society Score was 89.80±4.07 in group 1 and 91.89±3.19\* in group 2 and the p-value was 0.001 [Table/Fig-4]. Lachman test at 6 months was also better in grades in group 2 as compared to group 1 and the difference was significant ( $p = 0.002$ ) [Table/Fig-5]. VAS score was also better in group 2 at all follow ups and the difference was significant [Table/Fig-6].

Groups	Age in years (mean±SD)
AM (n=48)	24.49±3.27
AI (n=46)	26.35±5.24
p-value <sup>1</sup>	0.0394

**[Table/Fig-1]:** Age distribution between the groups.

<sup>1</sup>Unpaired t-test, AM-accessory medial portal, AI-all-inside technique

Groups	AM	AI	p-value
6 week	80.73±3.66	82.91±2.95	0.001*
12 week	81.51±2.82	85.54±3.21*	0.001*
6 month	92.33±3.83*	89.35±3.81*	0.001*

**[Table/Fig-2]:** Comparison of Lysholm Knee Score between the groups.

ANOVA, Analysis of Variance.

\*Statistical difference from 6 week within treatments

AM-accessory medial portal, AI-all-inside technique

Groups	AM	AI	p-value
6 week	75.52±1.77	85.22±4.04	0.001*
12 week	84.11±1.85*	88.14±3.74*	0.001*
6 month	90.02±4.74*	91.50±3.77*	0.001*

**[Table/Fig-3]:** Comparison of IKDC Subjective Knee Score between the groups.

ANOVA, Analysis of Variance.

\*Statistical difference from 6 week within treatments

AM-accessory medial portal, AI-all-inside technique

Groups	AM	AI	p-value
6 week	82.69±2.91	85.91±3.57	0.001*
12 week	85.82±3.19*	88.57±3.41*	0.001*
6 month	89.80±4.07*	91.89±3.19*	0.001*

**[Table/Fig-4]:** Comparison of knee society score between the groups.

ANOVA, Analysis of Variance.

\*Statistical difference from 6 week within treatments

AM-accessory medial portal, AI-all-inside technique

Time period	AM	AI	p-value
Pre-op	2.86±0.35	2.74±0.49	0.18
6 month	0.41±0.49*	0.20±0.40*	0.02**

**[Table/Fig-5]:** Comparison of Lachman test between the groups.

\*Statistical difference from pre-operative to 6 month within treatments (Wilcoxon rank sum test),

\*\*Significant

AM-accessory medial portal, AI-all-inside technique

Time period	AM	AI	p-value
Post-op	7.24±0.43	5.54±0.54	0.001*
Day 3	5.18±0.48	3.85±0.91	0.001*
12 week	3.27±0.44	1.72±0.62	0.001*
6 month	1.88±0.33	0.26±0.44	0.001*

**[Table/Fig-6]:** Comparison of VAS score between the groups.

ANOVA, Analysis of Variance.

\*Statistical difference from 6 week within treatments

AM-accessory medial portal, AI-all-inside technique

## DISCUSSION

Today, in available literature there are many studies showing different techniques and their advantages over each other, but no conclusion has been met yet [14]. In our study, we have compared all-inside technique using tightrope from Arthrex and conventional technique using endo-button on femoral side with bio-degradable screw on the tibial side.

The results have shown that, All-inside technique certainly has many advantages over the conventional technique, first being use of only single tendon i.e., quadrupled semi tendinosus whereas, in the conventional way where gracilis was also used and then, both of them doubled making four strands in total which has almost equal diameter as quadrupled semi-tendinosus, thus, by using all-inside technique we can certainly save gracilis which can be used for future ligament repairs. Furthermore, the retained gracilis tendon preserves post-operative hamstring strength and also acts as secondary stabiliser [15]. In the all-inside technique there is no need of any extra portal and all the femoral tunnel preparation are carried out using a single modified anterolateral portal with the knee in 90° of flexion [3]. In the All-inside technique, femoral tunnel is placed on its anatomical location while avoiding the pitfalls as identified by James H. Lubowitz [16]. Therefore, in this technique there is no need to flex beyond 90° and this could lead to disorientation, a short femoral tunnel and malpositioning of the femoral aiming jig [16].

One of the other advantages of all-inside technique is that, the cartilage is not damaged since, we drill from the lateral side with a flip cutter whereas, femoral tunnel drilling is done from the antero-medial portal in conventional technique which has high chances of cartilage damage [17]. Furthermore, in the all-inside technique

semi-tendinosus graft is harvested from posterior side of the knee with a small stab incision using open graft harvestor. In the long term the posterior small scar is cosmetically more acceptable than the anteromedial incision scar as a result of graft harvesting in the conventional technique. In all-inside technique no over-drilling has to be done on the femoral side required for flipping the button thus saving more cancellous bone and also preventing tunnel blow out as compared to conventional technique [18]. In our technique, tibial tunnel is drilled as per graft length and requirement whereas, whole tibia has to be drilled in the conventional technique which is probably a reason for increased post-operative pain and high VAS score.

## LIMITATION

In our study, there were a few limitation like limited sample size and shorter recovery time of patients because of which longer follow-ups was not possible.

## CONCLUSION

All-inside ACL reconstruction has definite advantage over AM portal technique but the overall cost of surgery is higher in all-inside technique due the extra use of flip-cutter.

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### PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh, India.
2. Assistant Professor, Department of Orthopaedics, Era's Medical College, Lucknow, Uttar Pradesh, India.
3. Assistant Professor, Department of Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh, India.
4. Assistant Professor, Department of Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh, India.
5. Assistant Professor, Department of Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh, India.
6. Professor, Department of Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh, India.

### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Kumar Shantanu,  
1/68 Viram Khand, Gomti Nagar, Lucknow, Uttar Pradesh, India.  
E-mail: kshantanu82@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Aug 22, 2016**

Date of Peer Review: **Sep 06, 2016**

Date of Acceptance: **Sep 21, 2016**

Date of Publishing: **Nov 01, 2016**