

Assessment of Complication Rates of Functional Outcome of Transtibial and Transportal Femoral Tunneling techniques of Arthroscopic ACL Reconstruction

Tushar Ubale¹, Ashish Assudani², Pradeep A. Sangnod², Vishal Patel², Samir Pilankar³, Satishchandra Kale³

ABSTRACT

Introduction: Anatomical position and coronal obliquity of the ACL graft are important for restoration of the rotational stability and maintenance of the knee joint functions in the long term. In view of this, present study was undertaken to assess the pain and instability related with functional outcome of transtibial and transportal femoral tunneling techniques of arthroscopic ACL reconstruction.

Material and Methods: The present prospective study was conducted among 60 patients operated with arthroscopic ACL reconstruction. Intraoperatively, the patients were either operated with the transtibial method of femoral tunnel drilling or the transportal method. Patients were then evaluated for pain VAS scores and complications. Paired t test and chi square test were used to compare the level of significance and a value <0.05 was considered as statistically significant value.

Results: The average pain on VAS scores of transportal patients was significantly lower than transtibial patients at 6 months follow up ($p < 0.001$). Complication of instability was more common in transtibial patients 11 (36.7%) as compared to transportal patients 9 (30%), however this difference was not significant with p value of 0.58.

Conclusion: The choice of technique should be based on individual measurements of the ACL insertion site and femoral intercondylar notch size.

Keywords: Anterior cruciate ligament; Transtibial technique; Transportal femoral tunneling technique

arthroscopic ACL reconstruction were screened and 30 patients were included in the transportal group and 30 patients in the transtibial group. Informed consent was taken. Patients with age less than 18 and more than 35 years, those with associated injuries of the collateral ligaments i.e. LCL and MCL injuries, other associated injuries like osteochondral defect requiring drilling or mosaicplasty, concomitant posterior cruciate ligament injury requiring its reconstruction, posterior cruciate ligament avulsion fracture requiring fixation, posterolateral corner repair were excluded from the study.

Intraoperatively, the patients were either operated with the transtibial method of femoral tunnel drilling or the transportal method, all odd numbered patients being in transtibial and all even numbered patients in the transportal group. All patients were otherwise operated in similar manner in terms of steps followed, grafts and implants used (i.e. single bundle hamstring grafts either 4-fold semitendinosus or 6-fold semitendinosus and gracilis graft) and undertaken by the same surgical team. All patients were given similar post-operative rehabilitation programmes and were called for follow-ups at 6 weeks, 3 months and 6 months from the surgery. Patients were then evaluated for pain VAS scores and complications. Analysis was done using Statistical Package For Social Sciences (SPSS, Inc. Chicago Illinois) version 18.0 was applied to obtain statistical significance of the data thus collected. Paired t test and chi square test were used to compare the level of significance and a value <0.05 was considered as statistically significant value.

RESULTS

The average pain on VAS scores of transportal patients was significantly lower than transtibial patients at 6 months follow up ($p < 0.001$) (table-1).

Complication of instability was more common in transtibial patients 11 (36.7%) as compared to transportal patients 9 (30%), however this difference was not significant with p value of 0.58 (table-2).

INTRODUCTION

The anterior cruciate ligament (ACL) forms the important part of knee and is responsible for anteroposterior and rotational stabilization. Its inserted proximally in the medial surface of the lateral femoral condyle and distally it is inserted in the anterolateral depression of the intercondylar fossa of the tibia and is composed of two bands: the anteromedial band and the posterolateral band. Recreational or professional sports activity requires good knee function and greater participation in sports among the general population exposes these individuals to increased risk of injury, and ACL lesions are very common.¹

Anatomical position and coronal obliquity of the ACL graft are important for restoration of the rotational stability and maintenance of the knee joint functions in the long term.² In view of this, present study was undertaken to assess the pain and instability related with functional outcome of transtibial and transportal femoral tunneling techniques of arthroscopic ACL reconstruction.

MATERIAL AND METHODS

The present prospective study was conducted at Dr. R N Cooper Municipal General hospital, Mumbai. 60 patients operated with

¹Assistant Professor, ²Resident, ³Assistant Honorary, H.B.T. Medical College and Dr R.N. Cooper Municipal General Hospital, Mumbai, India.

Corresponding author: Dr Pradeep A. Sangnod, Room No 311, RMO Quarters, Dr R.N.Cooper Hospital Campus, Ville Parle West, Mumbai-400056, India

How to cite this article: Tushar Ubale, Ashish Assudani, Pradeep A. Sangnod, Vishal Patel, Samir Pilankar, Satishchandra Kale. Assessment of complication rates of functional outcome of transtibial and transportal femoral tunneling techniques of arthroscopic ACL reconstruction. International Journal of Contemporary Medical Research 2016;3(9):2586-2588.

VAS score	Transportal		Transtibial		P value
	Mean	±Standard deviation	Mean	±Standard deviation	
VAS Pre	8.34	0.83	8.60	0.50	0.08
VAS 6 weeks	6.03	1.35	6.47	1.11	0.17
VAS 3 months	3.50	1.07	4.83	1.62	<0.001
VAS 6 months	1.87	1.17	3.27	1.68	<0.001

Table-1: Comparison of average pain on VAS in transportal and transtibial groups

FTT	Complications	
	Instability	Nil
Transtibial	11	19
	36.7%	63.3%
Transportal	9	21
	30.0%	70.7%
Total	20	40
	33.3%	66.7%

Table-2: Comparison of complications between the groups

DISCUSSION

Rupture of the anterior cruciate ligament (ACL) is one of the most common knee ligament injuries and it occurs primarily in active individuals, with female athletes being 2 to 3 times more prone to have an ACL injury than male athletes.³ The location of the bone tunnels and the adequate graft fixation are two of the most important facets of ACL reconstruction required to achieve successful results.⁴ The present study was undertaken to assess the pain scores and instability related with functional outcome of transtibial and transportal femoral tunneling techniques of arthroscopic ACL reconstruction. While evaluating the complications of ligament reconstruction around the knee it is important to be aware of the potential confounding factors that may affect outcome. Lower patient-reported outcomes after ACL reconstruction are strongly associated with obesity, smoking and severe chondrosis at the time of surgery.⁵

Astur DC et al¹ conducted a study to evaluate risks and consequences of using the transportal technique in reconstructing the anterior cruciate ligament and reported that use of the transportal technique for arthroscopic reconstruction of the ACL presents greater likelihood of injury to the lateral genicular artery and the insertion of the lateral collateral ligament, thus favoring postsurgical complications such as knee instability, osteonecrosis of the lateral femoral condyle and ligament formation from the graft. Kowalchuk DA et al⁶ conducted a study to identify preoperative and intraoperative factors that predict patient-oriented outcome after anterior cruciate ligament (ACL) reconstruction and reported that lower patient outcome after ACL reconstruction was strongly associated with obesity, smoking, and severe chondrosis at the time of surgery.

Tashiro Y et al⁴ evaluated the differences in bone tunnel apertures between the trans-accessory medial portal (trans-AMP) technique and the transtibial (TT) technique in double-bundle anterior cruciate ligament reconstruction and reported that in the TT technique, the shallow anteromedial tunnel location and more ovalized tunnel aperture can result to a higher frequency of tunnel overlap. Compared with the TT technique, the trans-AMP technique was more useful in preparing femoral tunnels anatomically and avoiding tunnel ovalization and overlapping in double-bundle anterior cruciate ligament reconstruction. Bedi A et al⁷ evaluated the anatomic and biomechanical outcomes of

anterior cruciate ligament reconstruction with transtibial versus anteromedial portal drilling of the femoral tunnel and revealed that anteromedial portal drilling of the femoral socket may allow for improved restoration of anatomy and stability with ACL reconstruction compared with conventional transtibial drilling techniques. Guglielmetti LGB et al⁸ described a new fixation device, the Endo Tunnel Device (ETD), for both techniques (transtibial and transportal), as well as the associated difficulties and the intraoperative and postoperative interferences and reported that the ETD was demonstrated to be a safe femoral fixation device in the trial; its use in both the transtibial and transportal techniques is technically simple and is associated with few intra- or postoperative complications. Mirzatlooei F⁹ compared the clinical results of transtibial and transportal TransFix methods in ACL reconstruction and found that according to the IKDC score, there were more normal knees in the transportal group than the transtibial group. However, Ambra LF et al¹⁰ conducted a survey regarding surgeons preference of technique and reported that surgeons' preferences for ACL reconstruction depends on learning time along with availability of tools rather than research evidence.

The present study found that average pain on VAS scores of transportal patients was significantly lower than transtibial and instability was more common in transtibial patients 11(36.7%) as compared to transportal patients. Transtibial tunnel technique offers major advantages as it is simple and quick and it does not require the knee to be flexed beyond 90° of flexion when the femoral tunnel is drilled. The major disadvantage of the transtibial tunnel technique is that it is not possible to independently drill the ACL femoral tunnel.¹¹ Since the success of the reconstruction depends unequivocally on graft position, the development of fixation devices that keep this neoligament in the proper position despite movements and post-operative rehabilitation techniques allows rehabilitation to begin early and extensively without loss of this positioning, which in turn reduces the risk of complications such as arthrofibrosis and deep vein thrombosis, among others.¹² To decrease the failure rate, it is necessary to carefully plan and carry out the postoperative rehabilitation program.^{3,13-15}

CONCLUSION

The choice of technique should be based on individual measurements of the ACL insertion site and femoral intercondylar notch size. The patient must be made aware that even though anatomic ACL reconstruction provides better kinematics of the knee and ultimately may lead to improved long-term health of the knee, the graft needs time to remodel and heal.

REFERENCES

1. Astur DC, Aleluia V, Santos CV, Arliani GG, Badra R. Risks and consequences of using the transportal technique in

- reconstructing the anterior cruciate ligament: Relationships between the femoral tunnel, lateral Superior genicular artery and lateral epicondyle of the femoral condyle. *Rev Bras Ortop.* 2012;47:606-10.
2. Sohn OJ, Lee DC, Park KH, Ahn HS. Comparison of the Modified Transtibial Technique, Anteromedial Portal Technique and Outside-in Technique in ACL Reconstruction. *Knee Surgery and Related Research.* 2014;26:241-248.
 3. Hensler D, Van Eck C, Fu FH, Irrgang JJ. Anatomic Anterior Cruciate Ligament Reconstruction Utilizing the Double-Bundle Technique. *Journal of orthopaedic and sports physical therapy.* 2012;42:184-95.
 4. Tashiro Y, Okazaki K, Uemura M, et al. Comparison of transtibial and transportal techniques in drilling femoral tunnels during anterior cruciate ligament reconstruction using 3D-CAD models. *Open Access Journal of Sports Medicine.* 2014;5:65-72.
 5. Tilley S, Thomas N. What knee scoring system? <http://www.boneandjoint.org.uk/content/focus/what-knee-scoring-system>
 6. Kowalchuk DA, Harner CD, Fu FH, Irrgang JJ. Prediction of patient-reported outcome after single-bundle anterior cruciate ligament reconstruction. *Arthroscopy.* 2009;25:457-63.
 7. Bedi A, Musahl V, Steuber V, Kendoff D, Choi D, Allen AA, Pearle AD, Altchek DW. Transtibial versus anteromedial portal reaming in anterior cruciate ligament reconstruction: an anatomic and biomechanical evaluation of surgical technique. *Arthroscopy.* 2011;27:380-90.
 8. Guglielmetti LGB, de Paula Leite RC, de Oliveira VM, de Camargo OPA, Nilson RS, de Moraes PM. Anterior cruciate ligament reconstruction: a new cortical suspension device for femoral fixation with transtibial and transportal techniques. *Journal of Orthopaedic Surgery and Research.* 2014 9:110.
 9. Mirzatolooei F. Comparison of short term clinical outcomes between transtibial and transportal TransFix® femoral fixation in hamstring ACL reconstruction. *Acta Orthop Traumatol Turc.* 2012;46:361-366.
 10. Ambra LF, Rezende FC, Xavier B, Shumaker FC, da Silveira Franciozi CE, Luzo MV2. Anterior cruciate ligament reconstruction: how do we perform it? Brazilian orthopedic surgeons' preference. *Int Orthop.* 2016;40:595-600.
 11. Electricwala A, Latkar C, Patil S, Jog V, Mahajan A, Deshpande. Transtibial vs Anatomical tunneling techniques for arthroscopic ACL Reconstruction in non-athletic population. *Journal of Medical thesis.* 2013;1:35-6.
 12. Luzo MV, da Silveira Franciozi CE, Rezende FC, Gracitelli GC, Debieux P, Cohen M. Anterior cruciate ligament – updating article. *Revista Brasileira de Ortopedia.* 2016;51:385-95.
 13. Akhilesh Kumar, Narendra Singh Kushwaha, Shailendra Singh, Kumar Shantanu, Shah Waliullah, Vineet Sharma. To study outcome of intramedullary nailing in grade I and II (gustiloanderson) compound diaphyseal fractures of Tibia. *International Journal of Contemporary Medical Research.* 2016;3:2473-2476.
 14. Anurag Baghel, Shailendra Singh, Narendra Singh Kushwaha, Abhishek Agrawal, Vineet Sharma, Santosh Kumar. Role of implant angles in hemiepiphysiodesis using 8 plate for correction of angular deformity around knee. *International Journal of Contemporary Medical Research.* 2016;3:2215-2218.
 15. Mohammad Iqbal Wani, Arshad Bashir, Faisal Younis Shah. Vitamin D and calcium v/s bisphosphonates in the secondary prevention of osteoporosis and prevention of osteoporotic fractures following a low energy fracture. *International Journal of Contemporary Medical Research.* 2016;3:483-486.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 09-07-2016; **Published online:** 28-08-2016