

# Postoperative analysis of femoral tunnel position after ACL reconstruction with BTB graft by modified transtibial technique

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# Disclosure

- No blinding done among surgeons, radiologists, healthcare related products & services
- No conflict of interest



# Introduction

- Transportal technique is being advocated to achieve the anatomical tunnel placement in Arthroscopic ACL reconstruction
- BTB graft is still the 'Gold standard' for the ACL reconstruction. Since the Passage of BTB graft through Trans portal technique femoral is more challenging its has become less popular.
- In our clinical practice, we use a modified transtibial technique where the passage of graft is easier and also can achieve the anatomical tunnel placement.



# Aim

Study intends to analyze accuracy of femoral tunnel, by adopting modified transtibial approach for ACL reconstruction with BTB graft

Compare femoral tunnel position achieved through modified transtibial technique with transportal technique.





# Methodology

34 patients who underwent ACL reconstruction with BTB autograft by modified transtibial technique were included in the study.

## Inclusion criteria-

- All the patients were involved in sporting activity/ high demanding activity.

## Exclusion criteria-

- ACL insufficiency in adolescent age group
- Patella baja
- Patella alta
- 3D CT imaging for femoral & tibial tunnel analysis was done by 2 musculoskeletal radiologist
- Quadrant method for femoral tunnel positioning



# Modification in Surgical technique

## Harvesting BTB graft using mobile window technique

**Tibial tunnel:**

**Medialized starting point**

**11 mm diameter to ensure optimal angulation**

**Femoral tunnel:**

**Flexible reamer & posterior offset guide used for accuracy**



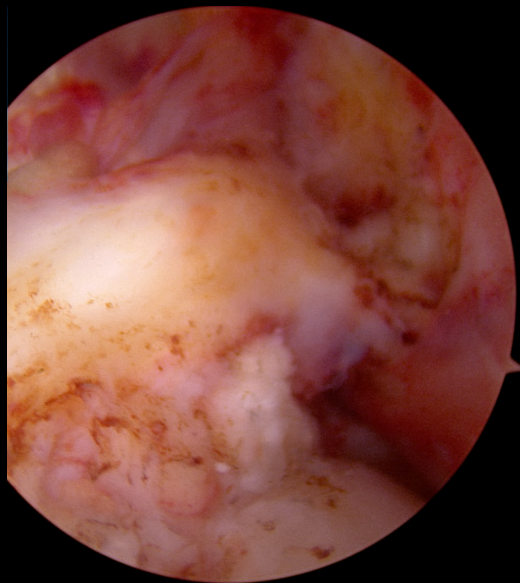
Mid tendon curvilinear  
3cm incision



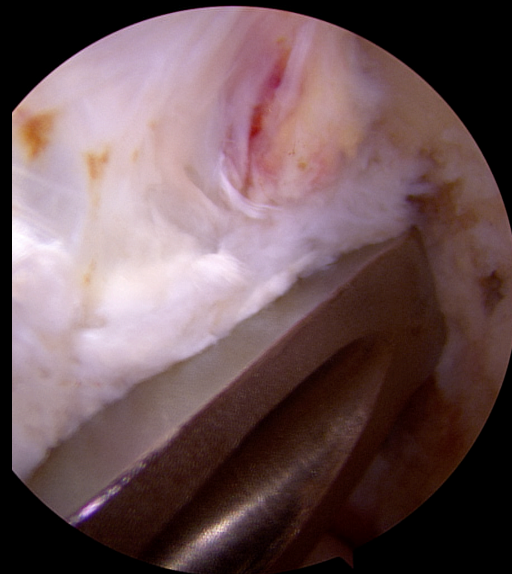
Para-median vertical  
3cm incision



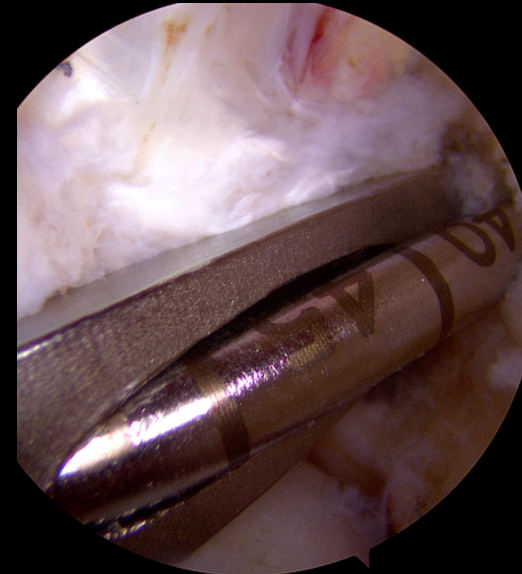




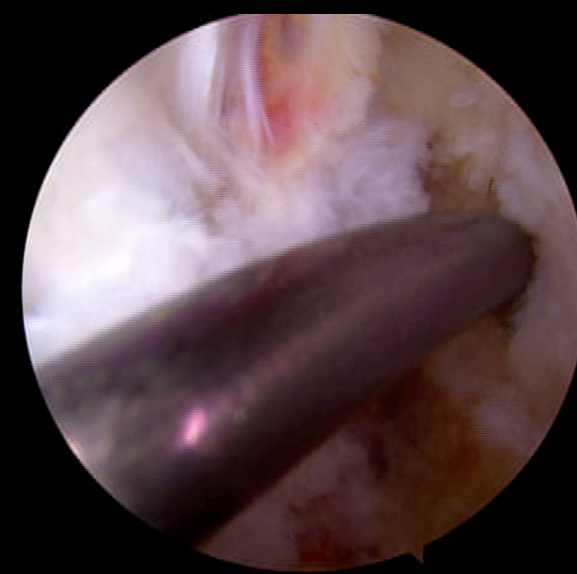
**ACL tear**



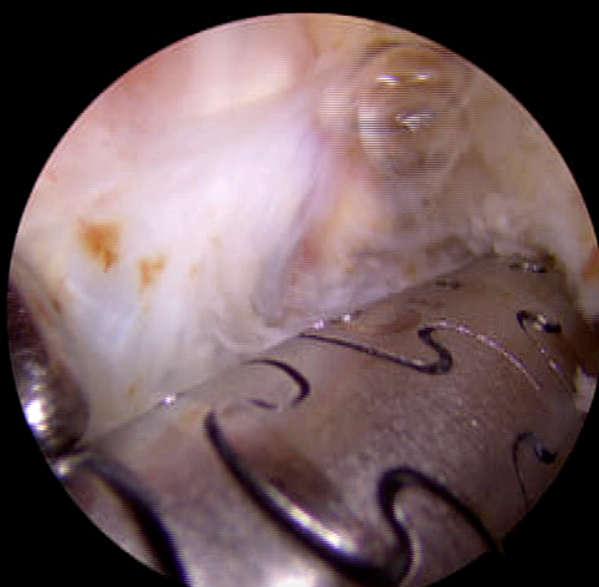
**Posterior offset**



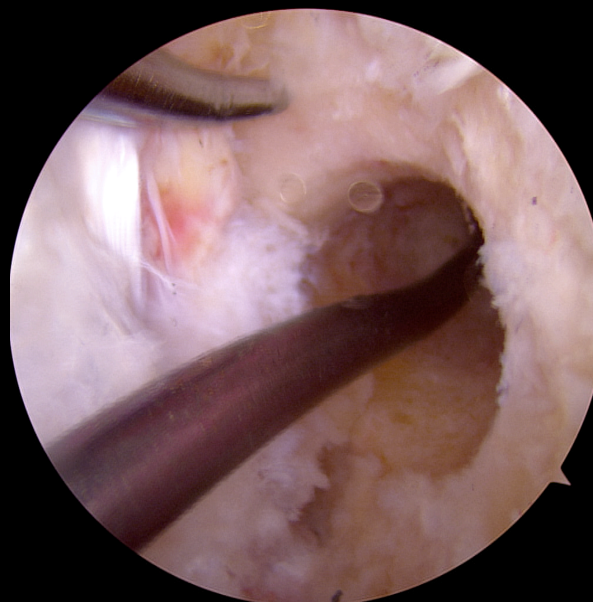
**Guide wire Placement**



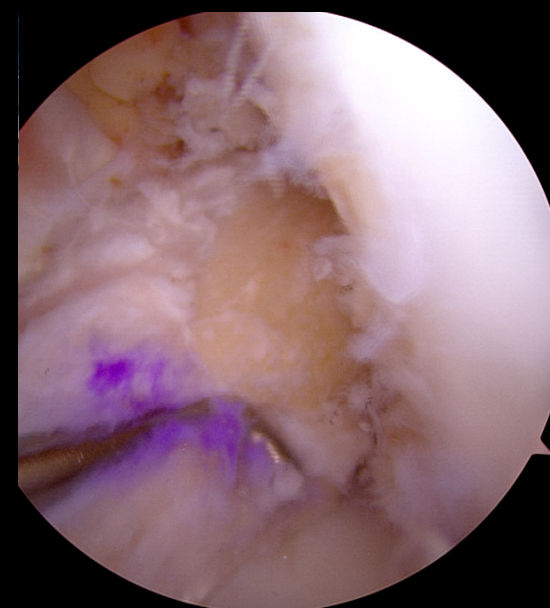
**Flexible guide wire**



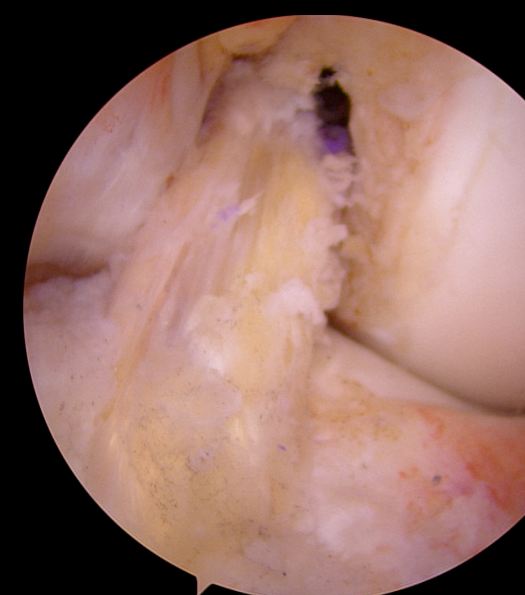
**Flexible reamer**



**Final femoral tunnel**



**Graft passage**

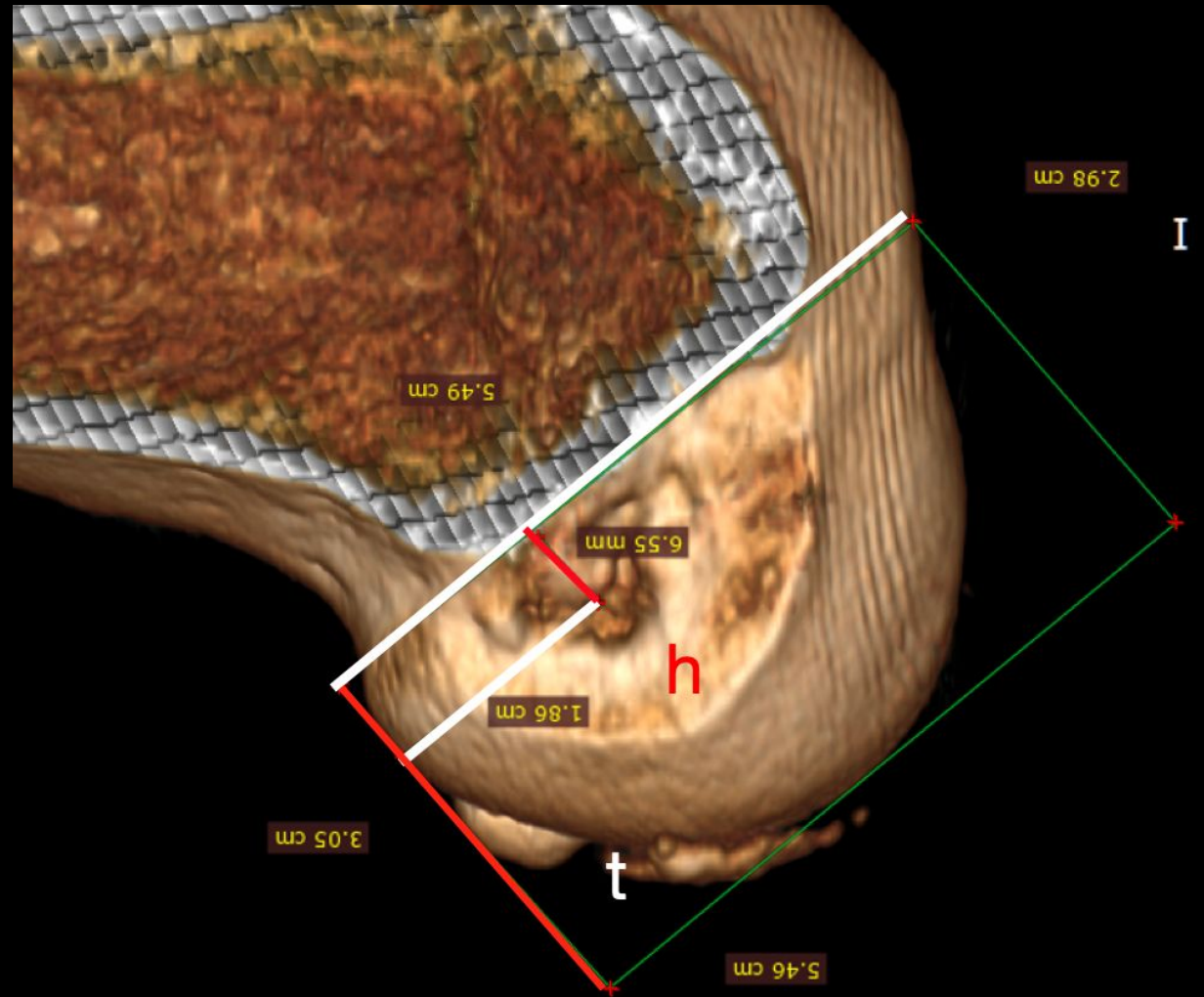


**Final Graft position after fixation**





# Measurements



Femur- Horizontal (t) Vertical (h)

Tibia-

- Tibial tunnel angulation
- intraarticular aperture positioning for tibial tunnel



# Tibial tunnel analysis

	Our results	Other studies (Hwang SJ, Wang W, Zoellner TM)	P value 95 % CI (By ANOVA T TEST)
Intraarticular aperture AP location	41.89+/-5%	44%	P=0.001
Tibial tunnel angle in coronal plane	64.9 +/-3.5%	65-72%	P = 0.020

**With this standardised tibial tunnel, femoral tunnel created was analysed with quadrant method**



# Femoral tunnel analysis

Previous studies (abebe et al, kaseta et al) reported transtibial femoral tunnels were more anterior & proximal compared to native ACL footprint

	Our results	Transportal technique by CT (Li et al)	Native ACL Cadaveric study by Radiograph	P value 95 % CI (By ANOVA T TEST)	Significance
<b>t (horizontal)</b>	34.87 +/-6% (Anterior)	24.2+/-6.86 % (Posterior)	29.5+/-2.8% (Normal)	P=0.001	Horizontal distance is within range
<b>h (vertical)</b>	21+/- 5% (High)	21.16+/-5.14 % (High)	38.5+/-3.2% (Lower)	P = 0.001	Vertical distance is higher respect to AM bundle



# Conclusion

The tunnels in our modified Trans tibial technique are within the acceptable limits of the native ACL anatomy as compared to trans portal technique in radiological analysis using 3D CT scan.

## Limitation of study

Although the method of comparison is similar in all the studies, individual values, standard deviation, size of study population, and uniformity technique used were not clearly stated

For this modified transtibial technique to be reproducible, more randomised control studies involving larger study population sizes and longer follow-up periods are needed



# Reference

1. Kim YM, Joo YB, Lee KY, Hwang SJ. Femoral Footprint for Anatomical Single-Bundle Anterior Cruciate Ligament Reconstruction: A Cadaveric Study. Knee Surg Relat Res [Internet]. 2018 Jun 1 [cited 2024 Nov 26];30(2):128. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC5990235/>
2. Li J, Yang J, Xu Z, Wang W. Comparison of the quadrant method measuring four points and bernard method in femoral tunnel position evaluation on 3-dimensional reconstructed computed tomography after anatomical single-bundle anterior cruciate ligament reconstruction. BMC Musculoskelet Disord [Internet]
3. Howell SM, Gittins ME, Gottlieb JE, Traina SM, Zoellner TM. The relationship between the angle of the tibial tunnel in the coronal plane and loss of flexion and anterior laxity after anterior cruciate ligament reconstruction. Am J Sports Med [Internet]. 2001 [cited 2024 Aug 2];29(5):567–74. Available from: <https://pubmed.ncbi.nlm.nih.gov/11573914/>

