

# Effect of The Tibial Tunnel Communication on The Bone-Tendon Healing and Location of The Graft at The Tibial Tunnel Aperture in The Double-Bundle Anterior Cruciate Ligament Reconstruction

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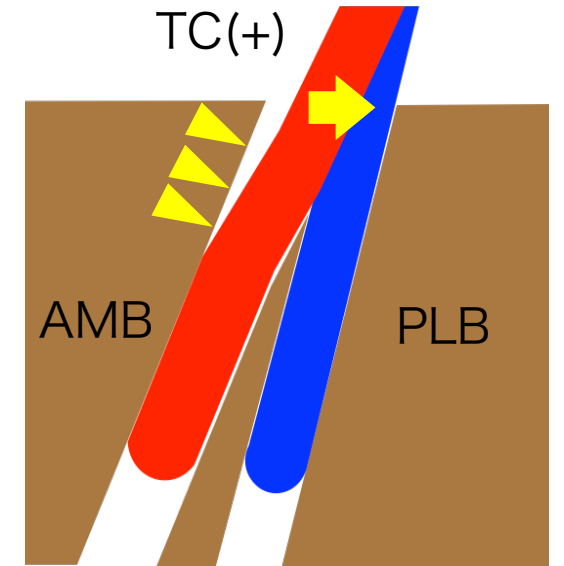
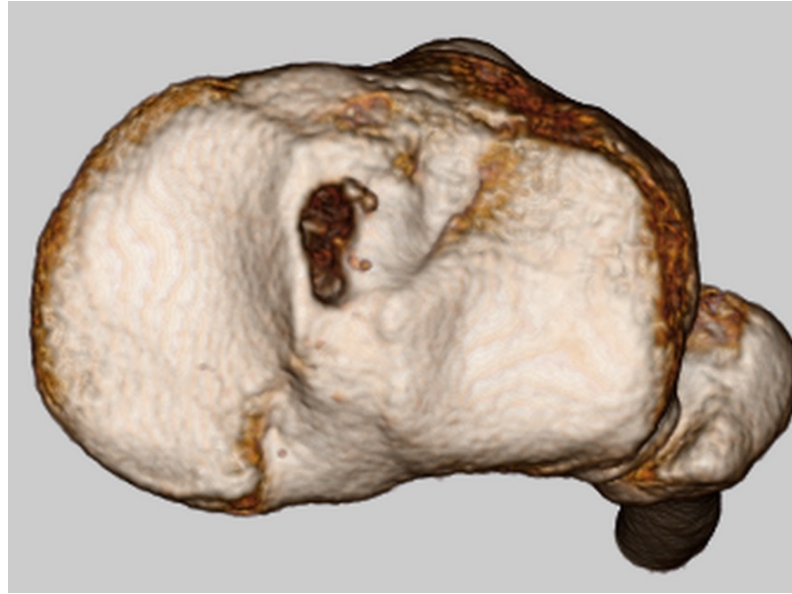
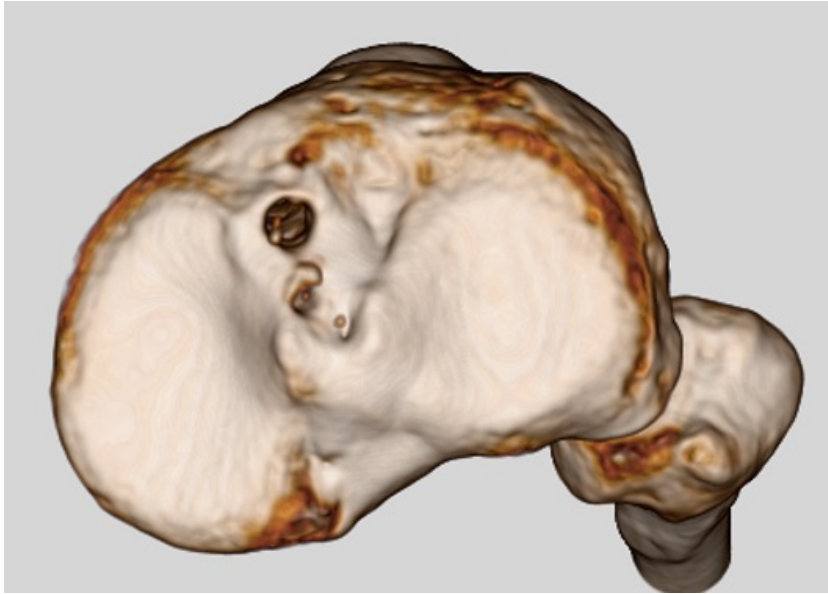


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Disclosure Statement of COI

Authors: Naoto Suzue, Yoshitsugu Takeda

The authors have no financial conflicts of interest disclose concerning the study.

# Background



Intra-operative tibial tunnel communication (TC) is not a rare complication after double-bundle anterior cruciate ligament (DB ACL) reconstruction.

There is a concern that TC results in the posterior shift of the anteromedial bundle (AMB) graft with poor bone-tendon healing.

# Purpose

To compare the bone-tendon healing and the location of the AMB graft at the tibial tunnel aperture between the DB ACL reconstruction with and without TC.

# Hypothesis

TC would affect the bone-tendon healing due to the posterior shift of the AMB graft at the tibial tunnel aperture.

# Patient

## Inclusion Criteria

- DB ACL reconstruction
- Minimum 1 year follow-up
- 3D-CT at 1-week after surgery
- MRI at 6 months after surgery

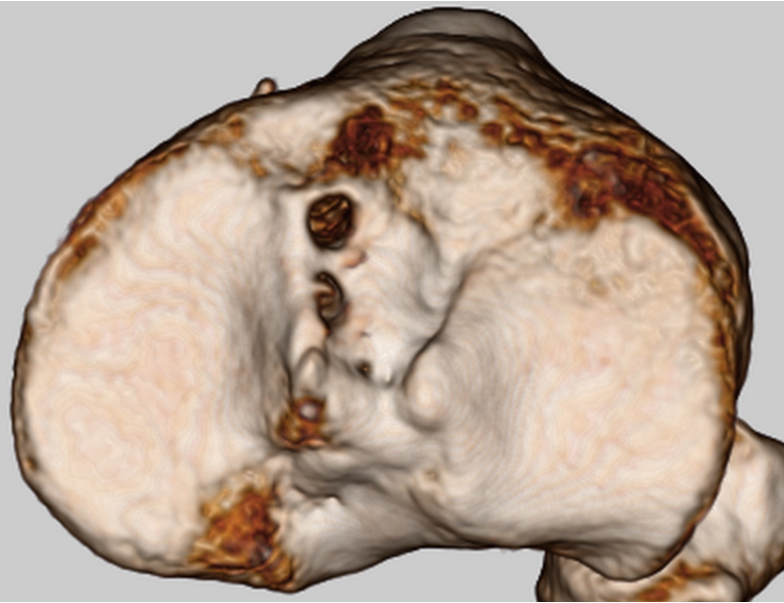
107 Knees

## DB ACL reconstruction

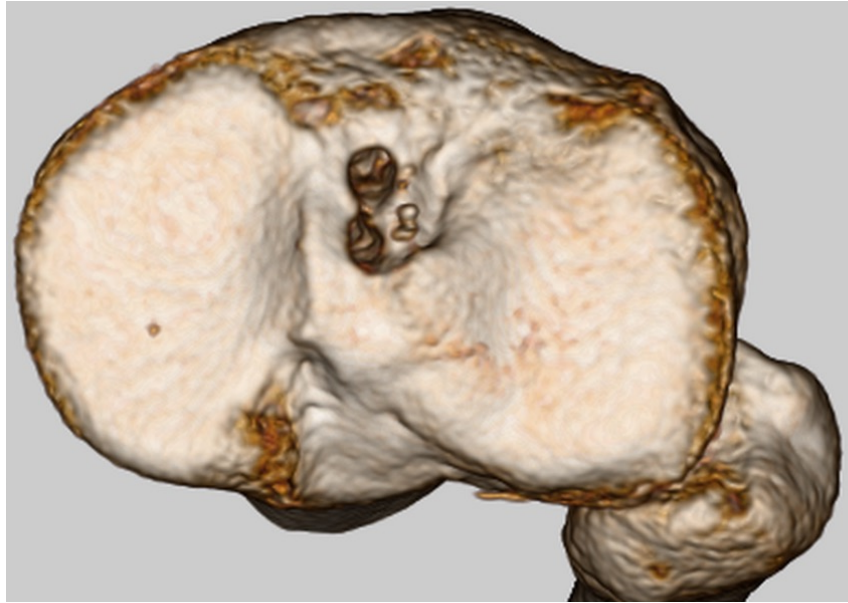
- STG
- Trans-portal technique
- Graft fixation
  - ✓ Femur: Suspension device
  - ✓ Tibia: Interference screw
    - DSP
    - TensionLoc

# Tibial Tunnel Evaluation

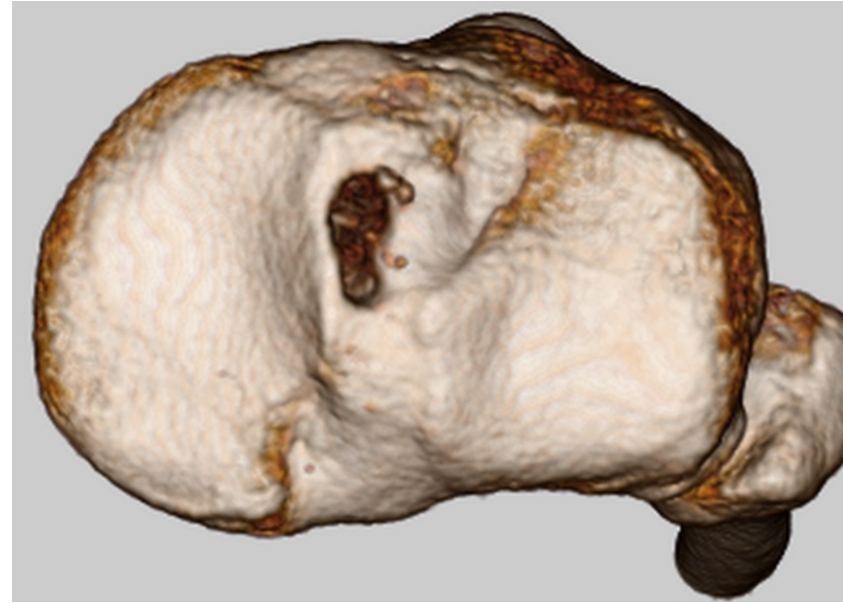
3D-CT Images at 1 week after surgery



No Tunnel Communication  
(Group NC)



Small Tunnel Communication  
(Group SC)

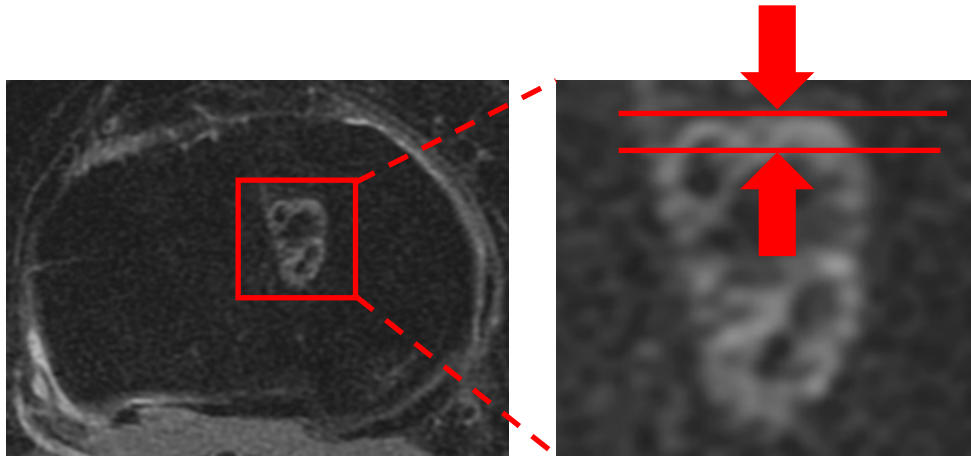


Large Tunnel Communication  
(Group LC)

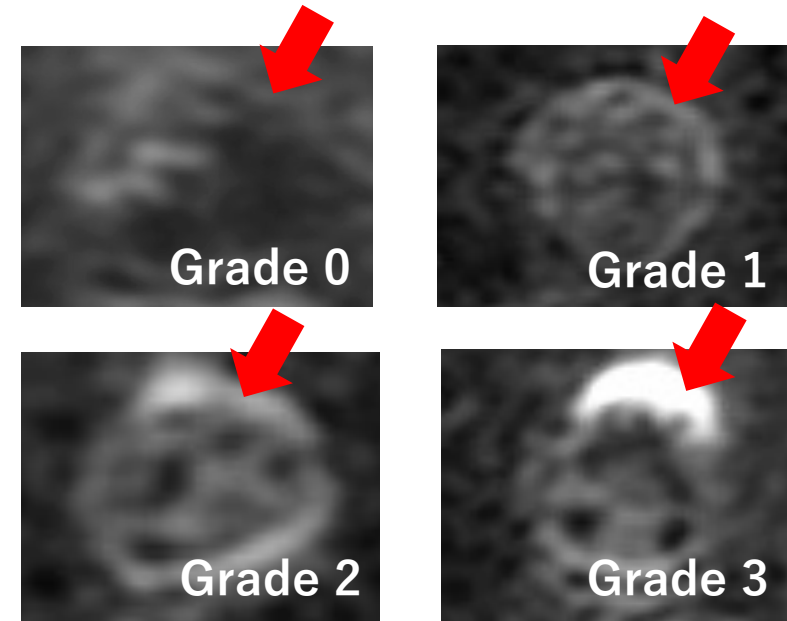
# Posterior Shift of AMB

# Bone-Tendon Healing

MRI at 6 months after surgery (PDW-FatSat)



Measure the width of the Fibrous Interzone (FIZ) at the most anterior part of the AMB tunnel



Evaluate the intensity of the anterior half of FIZ

Grade 0 = Patellar tendon  
Grade 1 = Skeletal muscle  
Grade 2 > Skeletal muscle < Joint fluid  
Grade 3 = Joint fluid



# Clinical Outcomes at Final F/U

- Side-to-side difference of Kneelax at 134N
- Lysholm score
- Tegner activity score
- IKDC objective form

## Statistical Analyses

- One-way ANOVA
- Chi-square test
- $P < 0.05$



# Patients Demographics

	Group NC	Group SC	Group LC
✓ N	61 (57.0%)	17 (15.9%)	29 (27.1%)
✓ Age (y.)	26.8 (12~43)	27.6 (15~55)	28.3 (15~59)
✓ Sex (male/female)	52/9	11/6	18/11
✓ Follow-up period (mo.)	16.2 ± 6.7	18.0 ± 6.0	20.7 ± 9.2
✓ Meniscus status			
• Meniscectomy	4	2	3
• Repair	36	6	10
✓ Graft diameter (mm)			
• AMB	6.7 ± 0.6	7.0 ± 0.6	7.1 ± 0.7
• PLB	5.7 ± 0.5	5.7 ± 0.4	5.9 ± 0.6

*(n.s.)*

# Width of FIZ at the most anterior part of AMB

Group NC	1.0 ± 0.4	
Group SC	0.9 ± 0.4	<i>(n.s.)</i>
Group LC	0.9 ± 0.5 (mm)	

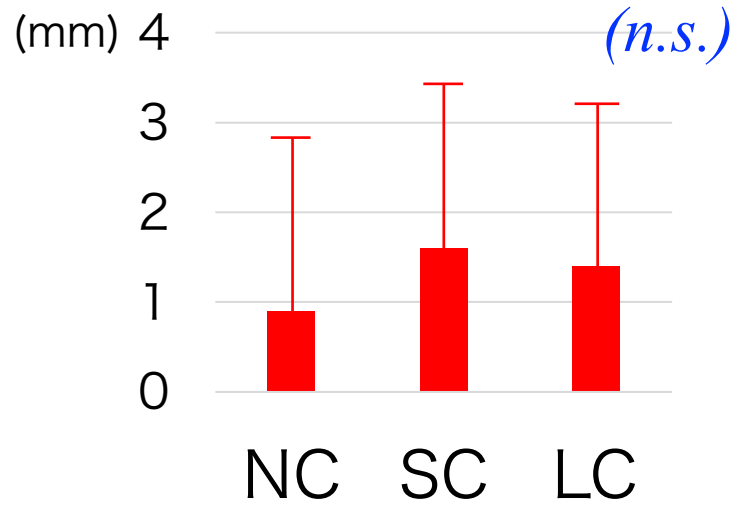
# Intensity of the anterior half of FIZ

	Grade 0	Grade 1	Grade 2	Grade 3
Group NC	3 (4.9%)	49 (80.3)	8 (13.1)	1 (1.7)
Group SC	2 (11.8)	13 (76.4)	2 (11.8)	0
Group LC	3 (10.3)	22 (76.0)	3 (11.8)	1 (3.4)

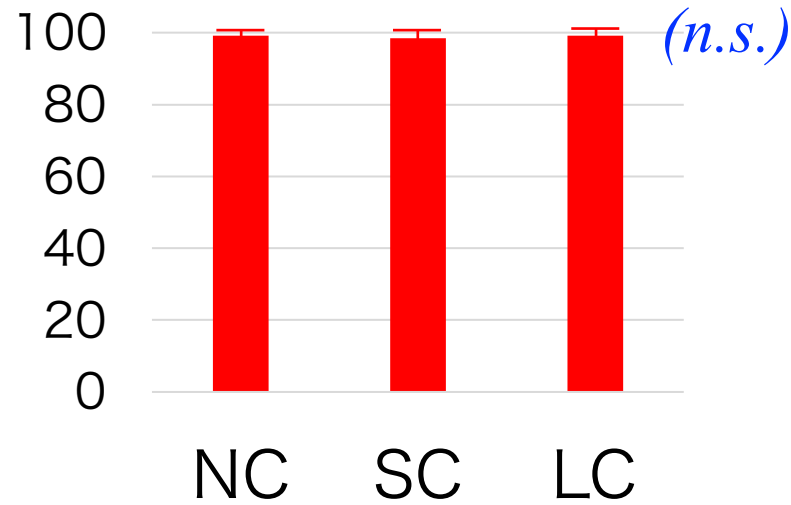
*(n.s.)*

# Clinical Outcomes at Final F/U

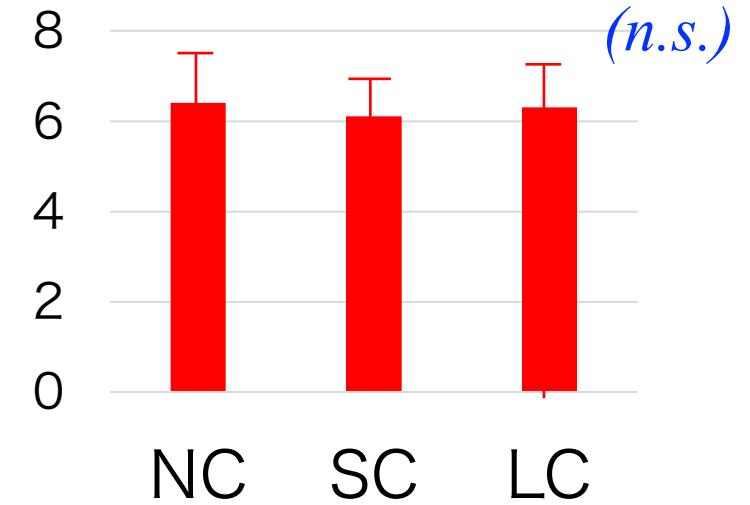
Kneelax (134N)



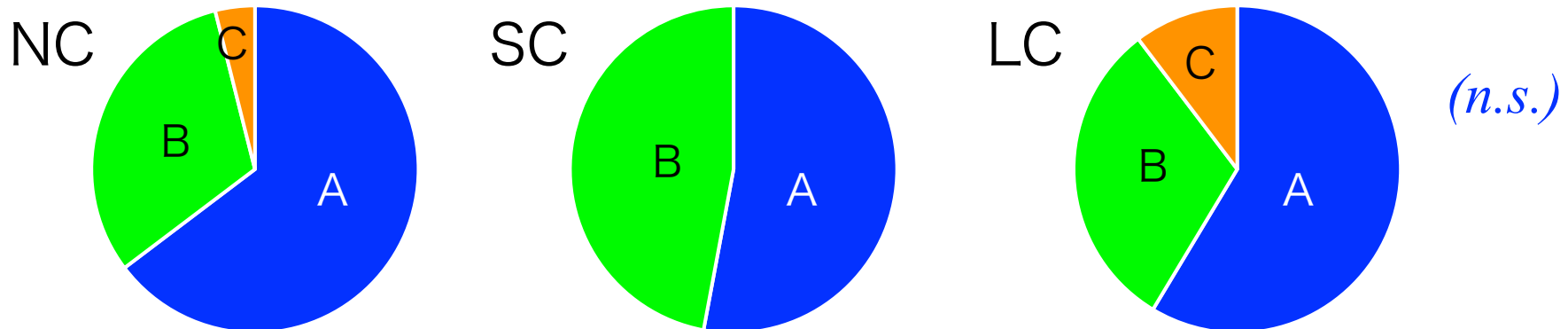
Lysholm score



Tegner activity score

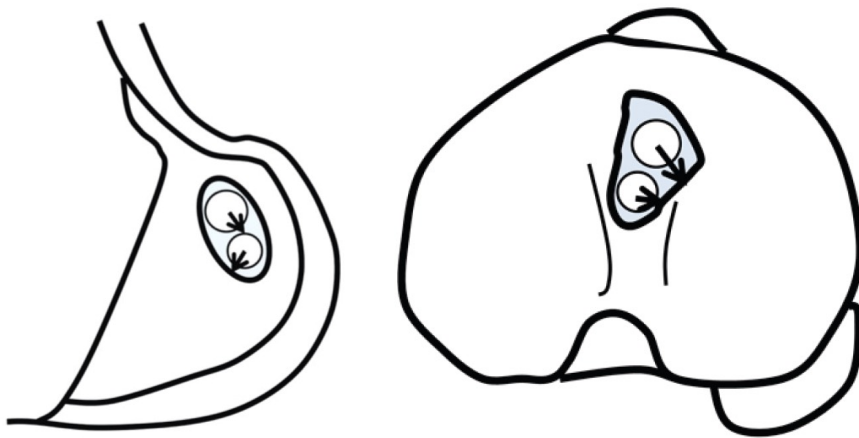


IKDC objective form

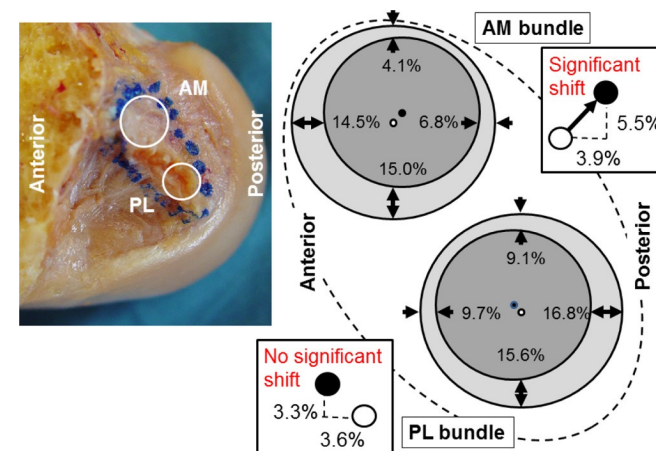


# Discussion

- The current study did not prove our hypothesis that TC would affect bone-tendon healing due to the posterior shift of the AMB graft at the tibial tunnel aperture.
- Araki et al. showed that the femoral and tibial tunnels had moved in the direction that the grafts were pulled after DB ACL reconstruction.
- However, Onodera et al. showed that the grafted tendon was not shifted in the direction of pulling the grafts in each femoral tunnel.
- Our results in the tibial tunnel corresponded with the Onodera's study



*Araki D. et al AJSM 2014*



*Onodera J. et al. OJSM 2017*

# Conclusion

The present study suggested that intra-operative tibial TC would not result in the posterior shift of the AMB graft and affect bone-tendon healing of the AMB graft in the DB ACL reconstruction.

# References

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