

Femoral Tunnel Reaming Method in ACL Reconstruction Cannot Be Determined from Plain Radiographs Alone

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Background

- Postoperative assessment after ACL reconstruction often relies on plain radiographs. Clinicians sometimes infer femoral tunnel (FT) drilling technique (transtibial vs anteromedial portal) from these films—especially when tunnel position appears non-anatomic.
- We tested whether blinded orthopaedic/MSK reviewers can accurately identify FT reaming method from standard 2-week postoperative radiographs alone, and whether perceived malposition biases assumptions about technique.

Methods

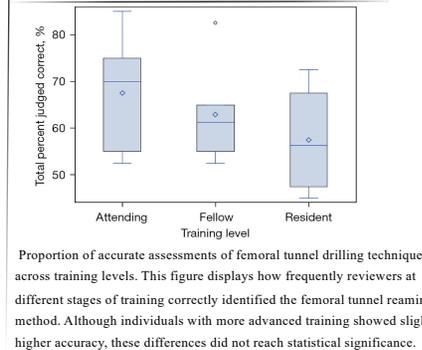
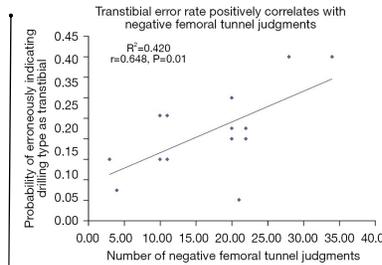
- **Design:** Blinded observer diagnostic-accuracy and inter-rater reliability study.
- **Cases:** 40 primary ACLRs by a single surgeon; 20 transtibial FT reaming matched to 20 anteromedial-portal FT reaming by age/sex/BMI.
- **Imaging:** Standard AP & lateral radiographs obtained ~2 weeks post-op.
- **Reviewers:** 15 blinded orthopaedic/MSK-trained evaluators.
- **Outcomes:** (1) Assumed FT reaming method; (2) perceived FT position/quality.
- **Analysis:** Accuracy (% correct), inter-rater agreement (κ), and correlation between technique-misclassification and negative tunnel-placement judgments.

Results

- **Accuracy:** Reviewers identified FT reaming method correctly 64% of the time.
- **Reliability:** Overall inter-rater agreement was poor (Fleiss' $\kappa = 0.26$).
- **Bias signal:** Transtibial misclassification increased when reviewers judged FT placement as “poor” (Pearson $r = 0.648$, $P = 0.01$).
- **Implication:** When tunnels look malpositioned, evaluators tend to assume a transtibial technique—regardless of the true method.



AP and lateral radiographs demonstrating tunnel position. Postoperative radiographs demonstrate ACLR tunnels reamed with the anteromedial (AM) (A,B) and transtibial (TT) (C,D) techniques. Reaming method could not be reliably determined from plain radiographs. Femoral tunnel is located using the white arrow (D).



Conclusions

- Plain radiographs alone cannot reliably determine femoral tunnel reaming method after ACLR.
- Perceived tunnel malposition appears to bias reviewers toward assuming a transtibial approach.
- Clinical takeaway: Avoid attributing ACLR failure or non-anatomic tunnel appearance to a specific drilling technique without corroborating data (operative report, CT/3D imaging, or intraoperative documentation).

Discussion

- Radiographs are ubiquitous in follow-up and in second-opinion evaluations.
- Misattribution of technique can drive premature conclusions about “why” an ACLR failed.
- Practical approach:
 - Use operative records to confirm drilling method.
 - If tunnel position is in question, obtain advanced imaging (e.g., CT with 3D recon) to evaluate aperture location/orientation.
 - Focus on modifiable failure drivers (graft choice, fixation, alignment, rehab/RTS, concomitant pathology) rather than presumed technique alone.

Clinical Relevance

➤ Radiographs ≠ Technique

- On routine AP/lateral post-op radiographs, clinicians identify femoral tunnel reaming technique with only modest accuracy and low inter-reviewer reliability.
- Cognitive bias exists: “poor” tunnels are more often assumed to be transtibial, independent of the true technique.
- Don't infer technique or assign blame from plain films alone—confirm with the operative report and use objective measurement or CT/3D imaging when tunnel position is clinically consequential.

References

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