

Radiographic Landmarks of Medial Patellofemoral Ligament Reconstruction: A Systematic Review of Cadaveric Femoral Tunnel Position

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Background: Current standard practice for choosing femoral tunnel placement for medial patellofemoral ligament reconstruction (MPFLR) utilizes Schöttle’s point as it is thought to best recreate ligament isometry. However, the considerable individual variability in MPFL insertion location suggests that Schöttle’s point may not be an accurate target for all patients and could contribute to poor postoperative outcomes and even graft failure. This study conducts a systematic review of radiographic landmarks used to identify the femoral tunnel position during MPFLR.

Methods: A meta-analysis was performed of the PubMed, EMBASE, and Scopus databases to identify studies that reported the radiographic position of the MPFLR femoral tunnel. Included studies reported femoral tunnel position relative to the posterior cortical extension line (PCEL) in the anterior-posterior direction and to Blumensaat’s line or another radiographic landmark in the proximal-distal direction. Weighted means and standard deviations were calculated in SPSS.

Table 1. Summary of Study Characteristics

Study	QOE (%)	Knees (n)	Sex (M/F)	Age ± SD
Barnett 2012	76.92	10	NA	NA
Bhimani 2022	100.00	8	3/5	52 ± 13.6
Bhimani 2024	100.00	9	4/5	54 ± 14.3
Kaipel 2014	61.54	20	6/11	73.5 ± 15.5
Kruckeberg 2018	92.31	10	6/4	56.2 ± 9.2
Schottle 2007	46.15	8	NA	NA
Stephen 2012	76.92	8	5/3	75.3 ± 10.5*
Wijdicks 2009	84.62	11	NA	72.7 ± 14.1
Ziegler 2015	76.92	10	4/6	43 ± 19.7

Results: Nine studies met inclusion criteria and were included in the final systematic review. A total of 94 cadaveric knees were analyzed with a mean age of 62.45 ± 11.64 years. The average distance from the PCEL to the MPFLR femoral tunnel was 1.34 ± 4.65 mm anterior [95% CI: 0.40, 2.28, range: 4.80 mm posterior to 8.80 mm anterior]. The average distance from Blumensaat’s line was 1.56 ± 1.99 mm proximal [95% CI: 1.12, 2.00, range: 0.90 mm distal to 4.70 mm proximal]. Three studies reported the mean distance from the condylar transition line, averaging 2.90 ± 2.18 mm distal [95% CI: -5.04, -0.54, range: 0.50 mm to 5.70 mm distal].

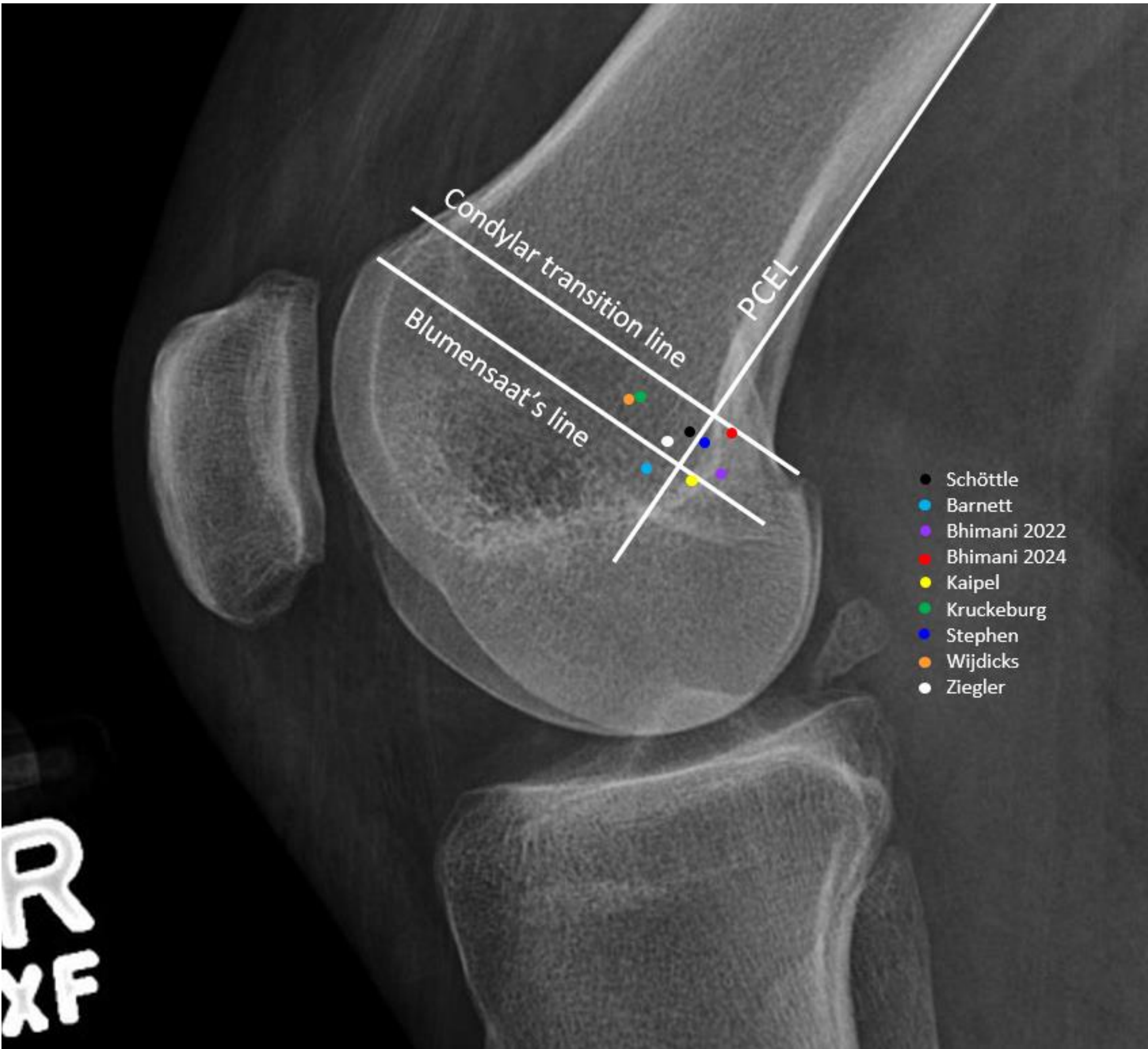


Figure 1. Fluoroscopic Representation of Findings

Conclusion: This systematic review highlights the substantial heterogeneity in the radiographic location of the anatomic origin of the MPFL. The findings underscore the importance of integrating radiographic data with intraoperative landmarks to enhance precision of tunnel placement and optimize graft isometry.