DOWNSTREAM EFFECTS OF ROTATIONAL FEMORAL OSTEOTOMIES: INFLUENCE ON THE PATELLOFEMORAL JOINT
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PURPOSE:
To assess the influence of femoral derotation osteotomies on radiographic measurements of the patellofemoral joint.

BACKGROUND:
Alterations in femoral version are recognized as a risk factor for abnormal patellofemoral mechanics leading to patellofemoral pain and instability.

METHODS:
• 9 cadaveric specimens (5 males and 4 females)
• Distal femoral osteotomy performed, secured with locking plate or external fixator
• Computed tomography (CT) of femur (0.625mm thick cuts, GE LightSpeed VCT 64-Slice)
• External rotation at the osteotomy, secured again, then CT scan repeated
• Congruence angle, lateral patellar displacement (Figure), sulcus angle, patellar tilt angle, tibial tubercle-trochlear groove (TT-TG) distance were measured from each CT
• Analysis of variance was performed to evaluate mean differences for each measure prior to, and following external rotation. Simple linear regression was used to evaluate the effect of external rotation on the patellofemoral joint measurements.

RESULTS:
• External rotation at the femoral osteotomy: mean = 22.4°, range: 7° to 58°
• Both the congruence angle and the lateral patellar displacement were significantly influenced by the external rotation (p<0.001 and p=0.001 respectively):
  – Congruence angle decreased by a mean of 35.1±23.9° following the external rotation (p<0.001).
  – Lateral patellar displacement decreased by a mean of 7.3±4.5 mm following the external rotation osteotomy (p=0.001).
• Femoral external rotation did not alter the sulcus angle or the patellar tilt angle (p=0.5), but reduced the TT-TG by a mean of 1.4±1.2°, however, this was not significant (p=0.515).
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• Regression analysis found that the external rotation did not influence the lateral patellar displacement in a predictable manner (p=0.259) but did predictably influence the congruence angle, with each degree of external rotation decreasing congruence angle by 0.9° (95% confidence interval: -1.2 to -0.6, p<0.001).

CONCLUSION:
Femoral derotation osteotomies may affect the patellofemoral joint. In particular, externally rotating the femur medializes the patella within the trochlea as assessed by the lateral patella displacement and the congruence angle. These findings draw attention to the relationship between the patellofemoral joint and femoral rotational osteotomies. This relationship can be utilized to help guide clinicians in planning femoral derotation osteotomies in patients with a history of patellar instability and patellofemoral pain syndrome. Further clinical studies will be necessary to assess the role of femoral derotation osteotomies in patients with a history of patellar instability and patellofemoral pain syndrome.

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