

# ISOLATED EFFECTS OF PATELLAR RESURFACING IN TOTAL KNEE ARTHROPLASTY AND THEIR RELATION TO NATIVE PATELLAR GEOMETRY

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## Introduction

In total knee arthroplasty (TKA), the question of whether or not to resurface the patella remains controversial<sup>1</sup>. There is evidence to indicate that patellar resurfacing can lead to both improved clinical outcomes and a reduced probability of revision surgery<sup>2</sup>. The isolated effects of patellar resurfacing on patellar kinematics are rarely investigated. Nonetheless, knowing more about these effects could help to enhance present understanding of the emergence of kinematic improvements or deteriorations associated with patellar resurfacing. The aim of this study was to isolate the effects of patellar resurfacing from a multi-stage in vitro study, in which kinematics after total knee arthroplasty before and after patellar resurfacing were recorded. Additionally, the influence of the native patellar geometry on these effects was analyzed.

## Methods

Eight fresh frozen specimens were tested successively with different implant configurations on an already established weight bearing knee rig<sup>3</sup> (fig.1). Patello-femoral kinematics was thereby measured using an ultrasonic measurement system and its relation to the native patellar geometries was analyzed.

## Results

After patellar resurfacing, the specimen showed a significantly medialized patellar shift. This medialization of the patellar tracking was significantly correlated to the lateral facet angle of the native patella. The patellar shift after patellar resurfacing was highly influenced by the position of the patellar button and the native lateral patellar facet angle (fig. 2). As a result, the ideal medio-lateral position of the patellar component was affected by the geometry of the native patella.

## Discussion

Most important finding of the study was that the difference in the PS and PS+ tibial inlays did not change patello-femoral kinematics in a significant way, either in the native stage nor in the patellar resurfaced stage. Placing the patellar button significantly affected patellar tracking, which was medialized with the resurfaced patella. Patellofemoral rotations were not significantly affected by patellar resurfacing. Based on our results, it could be worth to consider the native patellar geometry to choose the medio-lateral position of the patellar implant, and thus minimize the deviation from patellar kinematics without patellar resurfacing. Further

research is needed to analyze how to determine the medio-lateral implant position in everyday clinical workflows.



Figure 1: Munich weight-bearing knee rig.

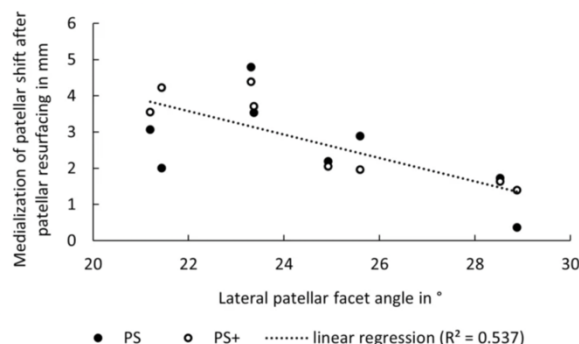


Figure 2: Dot plot showing the connection between the average difference of patellar shift before and after patellar resurfacing and the lateral patellar facet angle for PS and PS+. The linear regression model for all these values shows that 53.7% of the variance in the patellar shift difference can be explained by the lateral facet angle.

## References

- [1]Grassi,A.et al. Knee Surg. Sports Traumatol. Arthrosc. 26, 3206–3218 (2018).
- [2]McConaghy,K. et al. EFORTOpenRev.6,861–871(2021).
- [3]Bauer, L. et al. J. Clin. Med. 10, 1227 (2021).

