

Maintaining Posterior Tibial Slope and Patellar Height During Medial Opening Wedge High Tibial Osteotomy: Response

Authors' Response:

We appreciate the interest in our article, "Maintaining Posterior Tibial Slope and Patellar Height During Medial Opening Wedge High Tibial Osteotomy." We read with eagerness the suggestions and questions raised by the authors of the letter, and we value the opportunity to reply to them.

First, the Caton-Deschamps and Insall-Salvati indices were used in our study to assess changes in patellar height (PH) after medial opening wedge high tibial osteotomy (MOWHTO) in a series of 62 patients.⁶ We acknowledge that MOWHTO alters the anatomy of the proximal tibia, and these measurements of the Caton-Deschamps and Insall-Salvati parameters were calculated with reference to the tibia. However, we further assessed the PH with a femoral-based index, the Schröter index, which has been previously validated and has demonstrated good to excellent intra- and interrater reliability in assessing PH after MOWHTO.⁴ Demonstrating no significant change in PH by both tibial- and femoral-based indices refutes the query regarding the accuracy of the PH measurements in the study and strengthens the conclusion. The authors of the letter suggested using the Miura-Kawamura index to assess PH, but they ignored the fact that we also used the Schröter index; both indices are femoral based and there is no literature to suggest superior accuracy for one index over the other. In addition, the Schröter index is purely based on femoral landmarks, whereas the femoral line in the Miura-Kawamura index is drawn perpendicular to the tibial axis. Furthermore, in the original article by Miura et al,⁸ there was no change in PH or a slight increase after high tibial osteotomy. However, femoral landmarks might differ in anteroposterior and lateral radiographs with the degree of knee flexion, which can be challenging to accurately consider, especially on anteroposterior views. So, femoral landmarks might require radiographs to be taken with the knee at the same degree of flexion in all cases, which is realistically challenging.


Second, the used test variables for posterior tibial slope (PTS) included the hip-knee-ankle angle (HKA), medial proximal tibial angle, mechanical lateral distal femoral angle, joint line convergence angle (JLCA) and joint line

obliquity (JLO), and proximal posterior tibial angle. The medial proximal tibial angle and proximal posterior tibial angle are tibial-based measurement parameters that yield the PTS measurements more precisely, especially when considering the soft tissue correction and joint line obliquity as assessed by the JLCA and JLO. The authors of the letter suggested adding mechanical axis deviation (MAD) to the test variables for assessing the coronal alignment, per Ji et al.⁵ However, the HKA was used to assess the coronal alignment in our study; the HKA correlates with the MAD. Moreover, the HKA has been demonstrated to be more clinically relevant and the MAD differs by height and sex.³ Therefore, we believe that the addition of the MAD to PTS test variables is not necessary. Furthermore, the MAD is more affected with axial limb rotation and knee flexion,¹ both of which were taken into account in our study.

Third, we acknowledge the fact that different weight-bearing positions affect the measured JLCA and the global varus malalignment.² This is even more pronounced in patients with high body mass index and advanced osteoarthritis (Kellgren-Lawrence grades 3 and 4).⁹ In our study, patients had a mean body mass index of $24.7 \pm 3.4 \text{ kg/m}^2$, and no patients had advanced osteoarthritis (Kellgren-Lawrence grade 4). However, in our practice, all long-leg radiographs are taken in the standing position, and the JLCA is always accounted for with the equation proposed by Micicci et al⁷ to avoid any overcorrection.

Finally, with all the above points made clear along with the results and the conclusion from our study, the main point here is to demonstrate that the PTS and PH can be maintained after MOWHTO by following the presented step-by-step guidance. Changes in the PTS and PH in high tibial osteotomy can be intentional and planned for various indications; however, unintentional changes in the PTS and PH are considered surgical errors. This should resolve the debate regarding the effect of opening versus closing wedge osteotomy on the PTS and PH.

Once again, we would like to thank authors Wang, Ma, and Zhao for their queries and the editors for allowing us to clarify the highlighted points. We hope that this reply will further shed light on the queried points and be helpful for those interested in this study.


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