The Alignment Correction Gold Standard in Knee Varus Deformity Needs Optimization

Abstract:

Purpose/Hypothesis: This study is about to assess and achieve the optimized mechanical axis and analyze the technical meaning of Mikulicz line shadow that is used as an index by orthopaedic clinicians extracted from standing alignment view plane radiograph of patient's lower extremities. The spatial geometric glance at the alignment of lower extremities is shown that there are infinite pathomechanical axes that are seen in standing alignment radiograph but the surgeon corrects only one of them by performing osteotomy and not the real one essentially.

Methods: A patient with deformity in his left knee was admitted in orthopaedic clinic and underwent the standing alignment radiograph and CT-Scan to be assessed from his lower limb orientation point of view. The CT-Based 3D-Model of patient's left knee created in MIMICS software and imported to JointTrack Software to perform the 2D-To-3D Registration to achieve the Standing 3D Alignment of patient's lower extremities before doing operation and again the above sequences were performed after open wedge high tibial osteotomy to compare the corrected alignment with Pre-Op condition from 3D and 2D alignment point of view.

Results: The 2D Alignment view pre-operatively and post-operatively is shown the mechanical axis is corrected properly and the 3D models of lower extremities of patient show the properly corrected spatial alignment in anterior view but it doesn't in sagittal view.

Conclusions: The survey shows that there are many lines that could be shown as a corrected mechanical axis in 2D alignment view after high tibial osteotomy but to consider the Mikulics Line as the base of 3D approach, it is concluded that corrected mechanical axis should be passed from the tibial plateau center that is not seen in post-op 3D Alignment of the patient recruited in this research and it is shown that there is not biomechanical loads balance around the knee joint in spite of 2D Alignment view appropriate correction that shows the pre-op planning should not be limited to anterior alignment and lateral view that is emphasized on posterior tibial slope rather it should be considered as correction of biomechanical balance that is preserved by Mikulics line in 3D Alignment view.