Abstract #2125

Biomechanical Consequences of First Metatarsophalangeal Joint Arthrodesis on Lesser Toes Movement

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Introduction/Purpose: Effect of 1st metatarsophalangeal joint (MTPJ) arthrodesis on lesser toes active range of motion (ROM) is clinically important as limitation of lesser toe active ROM may predispose to metatarsalgia and decrease push off strength during terminal stance phase of gait. This effect was however not studied in the current literature. We aim to investigate this effect and study the role of Knot of Henry as a contributing factor to this effect.

Methods: 10 fresh frozen cadaveric specimens were used. Musculotendinous junction of flexor digitorum longus (FDL) was identified at medial ankle and proximal tensile force was then exerted to this part to simulate active muscle contraction. 3rd toe range of motion (ROM) and FDL excursion were measured. 1st MTPJ arthrodesis was performed by 2 crossed Kirschner wires in the standard arthrodesis angles. Measurements of 3rd toe range of motion (ROM) and FDL excursion with active muscle contraction were repeated. Knot of Henry was then identified and soft tissues connection here was then released. Same measurements were repeated.

Results: There was significant decrease in the 3rd toe ROM and FDL excursion post 1st MTPJ arthrodesis, with significant improvement after knot of Henry release. Pre 1st MTPJ arthrodesis, mean 3rd toe MTPJ and PIPJ ROM, and FDL excursion were 20 °, 22 ° and 6 mm respectively. Post 1st MTPJ arthrodesis, the respective measurements were 9.5 °, 14 ° and 4.7 mm. Post knot of Henry release, the respective measurements were 16.5 °, 19 °, and 5 mm.

Conclusion: Limitation of lesser toe active ROM post 1st MTPJ arthrodesis was shown in our study. In addition, our study also showed that this effect is partly contributed by knot of Henry soft tissue connection, as release of this connection improved lesser toe ROM. These results improve our understanding of 1st MTPJ arthrodesis biomechanics and also suggest potential benefits of knot of Henry release in 1st MTPJ arthrodesis to improve lesser toe active ROM and therefore decrease rate of metatarsalgia and improve push off strength during terminal stance phase of gait.