ABSTRACT

Background: Orthoses for the conservative management of hallux valgus have been a point of controversy. A biomechanical analysis of the effects of an orthosis on extrinsic contact pressures at a hallux valgus deformity has not been previously reported. The purpose of this study was to compare hallux valgus pressure parameters without an orthosis versus with orthoses of three different lengths.

Materials and Methods: Forefoot pressures in 38 feet with hallux valgus were recorded as subjects performed walking trials. Pressure sensors were placed on the plantar, medial, and dorsal surface of the first metatarsal head, as well as laterally at the fifth metatarsal head. Subjects performed trials without an orthosis, followed by trials with orthoses of three different lengths: full length, ¾ length, and sulcus length.

Results: Plantar average pressures decreased in a full length orthosis versus no orthosis (35.760 vs. 47.575 kPa, p=.009) and in ¾ length orthosis versus no orthosis (37.212 vs. 47.575 kPa, p=.000). Plantar maximum pressures decreased in full length orthosis versus no orthosis (111.188 vs. 138.508 kPa, p=.013) and in ¾ length orthosis versus no orthosis (116.427 vs. 138.508 kPa, p=.011). Dorsal average pressure increased in full length orthosis versus no orthosis (28.462 vs. 20.887 kPa, p=.0004) and in sulcus length orthosis versus no orthosis (35.988 vs. 20.887 kPa, p=.000). Dorsal maximum pressure increased in full length orthosis versus no orthosis (62.383 vs. 51.312 kPa, p=.002) and in sulcus length orthosis versus no orthosis (70.467 vs. 51.312 kPa, p=.000). Lateral average pressure increased in full length orthosis versus no orthosis (45.975 vs. 39.851 kPa, p=.019) and in sulcus length orthosis versus no orthosis (48.818 vs. 39.851 kPa, p=.006). Lateral average pressure decreased in ¾ length orthosis versus no orthosis (34.175 vs. 45.975 kPa, p=.029). Lateral maximum pressure decreased in ¾ length orthosis versus no orthosis (73.243 vs. 82.475 kPa, p=.049). We were unable to identify changes in the medial average pressures or medial maximum pressures; however, these pressures were trending up with the full and sulcus length orthoses and trending down with the ¾ length orthosis.

Conclusion: Our data suggests that a foot orthosis may be ineffective in relieving medial pressures; however, some orthoses may increase dorsal pressures at the metatarsal head of a hallux valgus deformity.

Clinical Relevance: Our data suggests that foot orthoses cannot be expected to decrease pressure at the first metatarsal head medially. If a clinician chooses to use a foot orthosis, our data suggests a ¾ length orthosis will not increase dorsal pressures; however, full length and sulcus length orthoses may increase dorsal pressures.