재활보조기구

게시일시 및 장소 : 10 월 19 일(토) 08:30-12:30 Room G(3F)

질의응답 일시 및 장소 : 10 월 19 일(토) 11:00-11:30 Room G(3F)

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Comparison of the Forefoot Pressure-Relieving Effects of Foot Orthoses

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Objective

Metatarsalgia is frequently treated with a metatarsal pad (MP) to offload the painful area. Sometimes clinical use of MPs is limited due to discomfort related inadequate position, thickness and so on. Insole thicknesses over 10mm were proved to reduce plantar pressure with a similar degree of MPs in previous studies. However, over 10mm thickness insole padded shoes may be too tight to wear in practice. The aim of this study was to compare the effect of a metatarsal pad and a 6mm soft plastazote(Plastazote®; Chicago, Justin Blair & Company) on plantar pressure of the forefoot.

Methods

We enrolled 16 asymptomatic participants (Table 1). Forefoot plantar pressure datas were recorded using with pedar-x®-in-shoe System during walking in three different conditions (i) no padding (Control group), (ii) a MP positioned just proximal to the metatarsal heads (MTHs) (Group 1) and (iii) a 6mm soft plastazote (Group 2) in a standardised shoe. We used anatomically-based masking protocol divided the forefoot into sub-areas (beneath (bMTHs) and distal to the MTHs (dMTHs)) as determined by the position of each metatarsal head. Also, participants rate the perceived insole comfort by visual analogue scale. We used Wilcoxon's signed-ranks for pressure properties differences between the three conditions. Data analyses involved use of SPSS v18.0 for Windows. $P < 0.05$ was considered statistically significant.

Results

Forefoot peak pressure(PP) [kPa], and maximum force(MF) [N] in the dMTHs (PP ; $p = 0.008$, MF ; $p = 0.036$, respectively) and bMTHs (PP ; $p = 0.000$, MF ; $p = 0.002$, respectively) were reduced in group 1 and 2 compared to the control group (Table 2). This analysis revealed that a 6mm soft plastazote was significantly more effective than a metatarsal pad for reducing peak pressure and maximum force in the dMTHs(PP ; $p = 0.005$,MP ; $p = 0.002$) and bMTHs(PP ; $p = 0.036$, MF ; $p = 0.642$). However, Contact area did not change significantly in the dMTHs and bMTHs. Insole comfort with a 6mm soft plastazote also revealed significant better than a metatarsal pad ($p = 0.000$) (Table 3).

Conclusion

This is the study to investigate plantar pressure properties assessment focusing on anatomically based specific MTHs. This study reveals that the both metatarsal pad and 6mm soft plastazotes were effective for reducing forefoot pressures. In addition, the 6mm soft plastazotes are more effective and better tolerable to participants than metatarsal pad. Further research in forefoot pain patients is needed.

Table 1. Participant Characteristics (n=16)

Participant Characteristics	Values
Foot side (Right:Left)	8:8
Sex (male:female)	6:10
Age (years)	31.9±7.5
Weight (kg)	61.8±12.1
Height (cm)	168.3±8.7
BMI (kg/cm2)	21.6±2.1
Age (years)	31.9±7.5
Weight (kg)	61.8±12.1

BMI: Body mass index in, Values are Mean±SD (standard deviation)

Table 2. Difference of Plantar Pressure Data According to the Foot Orthoses (n=16)

	Control	Group1 (Metatarsal Pad)	Group2 (6mm Soft Plastazote)
Peak Plantar Pressure [kPa]			
dMTHs	256.3±52.1	214.1±42.4*	199.7±39.5**†
bMTHs	133.2±42.0	127.4±34.3*	123.7±39.4**†
Maximum Force [N]			
dMTHs	118.1±41.88	95.07±20.1*	88.3±15.3**†
bMTHs	59.4±21.594	55.57±18.9	57.3±20.7
Contact Area [cm^2]			
dMTHs	56.6±218.1	57.8±17.4	62.0±27.1
bMTHs	41.6±29.7	44.9±23.6	56.3±201.6

dMTHs: distal to the metatarsal heads, bMTHs: beneath the metatarsal heads

Values are Mean±SD (standard deviation)

* Significantly different for the group 1 compared with the control group, $p < 0.05$

** Significantly different peak for the group 2 compared with the control group, $p < 0.05$

† Significantly different peak pressure for the group 2 compared with the group1, $p < 0.05$

Table 3. Difference of Insole Comfort According to the Foot Orthoses (n=16)

	Control	Group1 (Metatarsal Pad)	Group2 (6mm Soft Plastazote)
Insole Comfort Score	3.4±2.3	5.0±2.1	1.5±1.0**†

Values are Mean±SD (standard deviation)

* Significantly different for the group 1 compared with the control group, $p < 0.05$

** Significantly different peak for the group 2 compared with the control group, $p < 0.05$

† Significantly different peak pressure for the group 2 compared with the group1, $p < 0.05$