Pedobarography for The Assessment of Outcome After Ankle or TTC Arthrodesis

Foot & Ankle Category: Ankle

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Introduction
Pedobarography is widely used for measurement of foot function in various diseases and for evaluation of surgical outcomes. However, there is no consensus on reporting of pedobarographic outputs and frequently there is no adjustment for body weight and walking speed making comparisons between different studies difficult. Hundreds of parameters are registered by the pedobarograph requiring usually a research setting to evaluate the data. The primary purpose of this study was to evaluate which pedobarographic parameters adjusted for walking speed and body weight are associated with belonging to one of the three groups “healthy volunteers”, “ankle arthrodesis” (AA) and “tibiotalocalcaneal arthrodesis” (TTC). The secondary purpose was to evaluate which parameters are associated with the American Orthopaedic Foot and Ankle Society (AOFAS) score.

Methods
We clinically assessed 99 patients (AA, n=57; TTC, n=42) and 35 healthy volunteers with AOFAS scores, lateral and hindfoot alignment radiographs, as well as dynamic pedobarography. Median follow-up was 4 years. At the pedobarography, the contact time, peak pressure, maximal force (MF), pressure/force time integral (PTI/FTI) and the centre of pressure velocity were measured in three different areas of the foot (hind-, mid-, forefoot). The variables were categorized into six clusters (“load” and “velocity” in hind-, mid-, forefoot). We used mixed model analysis for the primary purpose as well a multiple linear regression model for the secondary purpose ach adjusted for the confounders body weight and walking speed.

Results
The cluster “load” in the midfoot was the most important pedobarographic predictor (odds ratio [OR] 100.4, confidence interval [CI] 13.1, 770.9) for belonging to the healthy, AA or TTC group. Within this cluster, the maximal force was the best parameter. Also the cluster “load” in the forefoot was a pedobarographic predictor (OR 24.3, CI 2.6, 228.1). The “load” in the midfoot was an independent predictor for the AOFAS score (interquartile range effect 5.1 points; CI 1.4, 8.8).

Conclusion
The interpretation of hundreds of pedobarographic parameters can be reduced to the evaluation of the cluster “load” in the midfoot. Within this cluster, the maximal force was the best parameter. This study is instrumental to make a clinical interpretation of pedobarographic data simple and quick.