

PLANTAR PRESSURES IN RELATION TO FOREFOOT PAIN IN RHEUMATOID ARTHRITIS PATIENTS

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Abstract

The aim of the study was to compare pressures under painful and non-painful areas of the forefoot. 60 rheumatoid arthritis patients (57 female, 3 male) with forefoot pain were included in the study. Plantar pressure

measurement was performed with F-Scan system. Pressures under metatarsophalangeal joints were analysed. Metatarsophalangeal joint tenderness was assessed using a two-finger pressure technique. Pressures under painful joints were statistically significantly higher than under non-painful joints.

INTRODUCTION

Foot involvement occurs in 90% of people with rheumatoid arthritis (RA). The forefoot is most commonly affected, especially the metatarsophalangeal (MTP) joints. Inflammation of those joints can lead to pain, deformities, decreased joint mobility and stiffness, causing increased stress on the adjacent joints. Bony deformities and soft tissue atrophy change normal plantar pressure distribution. Increased pressure under the forefoot results in forefoot pain in RA patients.

METHODS AND SUBJECTS

Methods

Plantar pressures were recorded using the F-Scan system, version 5.0 (Tekscan Inc). The F-Scan allows the measurement of pressure due to vertical component of ground reaction force on foot during walking. Because they have been found to lose accuracy with prolonged use (1), new pair of sensor insoles was used for each patient. The sensors were cut to fit the shoes and calibrated using body mass as the applied force. Since the data are influenced by the temperature of the insole (2), the patients were given a warm-up period. Recording was performed while the patients walked along an open corridor at their normal walking speed. At least five left and right steps were recorded. The system software (Timing Analysis Module - TAM) was used to analyze pressures under MTP. The first and the last step were excluded from the analysis and the average peak pressures were computed from the remaining steps. A high reliability of the system has recently been proven in RA patients at our Institute (3).

MTP joint tenderness was assessed using a two-finger pressure technique. Results were analyzed using the SPSS

14.0.2 software. The average plantar pressures at painful and non-painful MTP joints for all the patients were compared for each foot using paired-samples t-test.

Subjects

60 RA patients (57 female, 3 male), average age 58.28 (SD 10.42, 35 - 84 years), were included in the study. Average duration of RA was 11.08 years (SD 8.78, 1 - 40 years). The disease activity at the time of investigation, assessed by DAS28, was mild to moderate (4.13, SD 0.69, 2.2 - 5.1). All the subjects signed an informed consent. The study was approved by the State Committee for Medical Ethics.

RESULTS

The average plantar pressures at painful MTP joints on both legs were higher (left median 196 kPa, interquartile range 92.5 kPa, right median 180 kPa, interquartile range 79.5 kPa) than at non-painful MTP joints (left median 156 kPa, interquartile range 107.5 kPa right median 140.5 kPa, interquartile range 79.5 kPa). The differences were statistically significant for the left ($p = 0.028$) and the right ($p = 0.005$) foot.

DISCUSSION

The study demonstrated that the average peak plantar pressures in RA patients were significantly higher at the painful than at the non-painful forefoot areas. Previous studies have confirmed the relationship between forefoot pressure and walking pain (4, 5). However, pain in those studies was assessed with a questionnaire (Foot Function Index), whereas in our study a clinical test was used. On the basis

of our results we may presume that with reducing excessive plantar pressures, foot pain could be extenuated.

CONCLUSION

Plantar pressures in RA patients are significantly higher at painful than at non-painful foot areas.

References:

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