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Title

Longitudinal Foot Arch Detection via Convolutional Neural Network Based on Center of Pressure Trajectory.

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Summary

The aim of this study was to evaluate the accuracy of predicting the internal arch of the foot for individuals with variations in arch height using a center of pressure trajectory.

Introduction/ basics

The medial longitudinal arch is a supportive base for the entire body and its alteration has been associated with chronic pain due to musculoskeletal disorder. Foot disorders effects of changing center of pressure (COP) during walking. Many studies confirmed the association between COP and foot disorders. On the other hand, recent advances in the data collection and statistical analysis led to an increase in the volume of databases. Analysis of patient's data through the artificial intelligence can be used to explore the relationship between COP characteristics and foot disorder. This study aimed to investigate the relationship between COP trajectory and change the height of the arch.

Material method; implementation/ process

We analyzed 2648 subjects with pes-planus (PP), pes-cavus (PC) who were referred to a foot therapy clinic between 2015 and 2021. Subjects had to fulfill the following inclusion criteria: (1) no other musculoskeletal disorders in foot, knee, hip and spine, (2) same disorder in both feet. Medical archives of 2445 subjects were recorded retrospectively and all the subjects examined by an experienced physician. The coordinates X and Y of the COP for each foot were recorded. 24 data were detected for each direction in each foot. All data were stacked and selected as the input of a convolutional neural network (CNN). 20% of the data were selected as the test and 80% as the train.

Results

Results demonstrated 1152 subjects from 1050 (47.1%) of people who referred to the clinic with FDs were diagnosed as PP and 672 (27.48%) as PC. A CNN became run with six nodes. The CNN demonstrated 67% accuracy for PC and 69% accuracy for PP.

Discussion/ conclusion; conclusion for the practice

Data analysis showed that the network was able to achieve acceptable accuracy in this dataset and could predict longitudinal foot arch based on the image of the COP.

References

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