STATIC AND DYNAMIC ANALYSIS OF THE FOOT IN SOCCER PLAYERS SUSTAINING PROXIMAL 5TH METATARSAL STRESS FRACTURE

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INTRODUCTION: Stress fracture of the proximal 5th metatarsal (MT) is a well recognized entity among athletes. Identification of specific risk factors for this injury may play an important role injury prevention. Lateral oveloading in rigid cavus foot have been suggested as contributing factors (Williams, 2001). The purpose of our study was to characterize static variables of foot structure and dynamic variables of foot function in soccer players which sustained 5th MT stress fracture.

METHODS: 10 injured soccer players who regained full professional activity following a unilateral proximal 5th MT stress fracture, and 10 control uninjured soccer players participated in this study. Static variables of arch height and ankle flexibility were measured. In addition, plantar pressure was assesed during barefoot walking on an EMED platform. Plantar pressure variables were analayzed for four stance cycles. Because some of the variables did not fulfill the assumption of normality, a non-parametric approach was applied using the Wilcoxon signed ranks test for bilateral comparisons and the Mann-Whitney test for between samples comparisons.

RESULTS: Static foot parameters were not different in the injured foot either from the sound foot of the injured group or from the control group. Peak pressure (PP) under 5th MT was significantly lower in the injured limb compared to the sound limb in the injured group. PP was significantly lower in the injured limb compared with the control group in both 4th MT and 5th MT and higher compared to the control group in the 1st MT . PP of the sound limb in the injured group was significantly lower compared to the control group in both 3rd and and 4th MTs. Normalized pressure time integral was significantly lower in the 5th MT and higher in the 1st MT for the injured limb compared with the control group. As for the sound limb, this variable was significantly lower in the 4th MT compared with the control group.

DISCUSSION: In contrast to the lack of association between static and passive indices and 5th MT stress fracture, the dynamic evaluation revealed several general trends, which differentiate injured and uninjured feet. Contrary to the expectations, in both feet, injured subjects demonstrated a relative mean lateral forefoot unloading and relative mean medial forefoot increased loading compared with the control group. Moreover, peak pressure in the 5th MT of the injured limb was noticeably reduced compared with the sound limb as well as the control group. The findings can be interpreted either as representing an inherent loading characteristic, which may function as a causative risk-related factor, or as an adaptive foot function consequent to the injury. Stress reduction over a long period of time may result in a relatively weakened infrastructure (Wolff's law), and increased susceptibility to a stress injury.

CONCLUSION: Athletes who sustained proximal 5th MT stress fractures demonstrate a unique loading pattern of the forefoot. We recommend that future studies focus on understanding the dynamic function of the foot and on isolation of dynamic risk factors and disregard static measurements.

REFERENCES:

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