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Paper #68

Extreme Loads, Generated by Ultramarathon Running Result in Temporary Pathological Meniscus Extrusion

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Summary:
Medial meniscus extrusion observed under extreme loads generated by a mountain ultramarathon is a temporary and reversible phenomenon in healthy athletes.

Abstract:

Purpose

A recently published ultrasound imaging (USI) study, including dynamic examination of the meniscus, showed that medial meniscus extrusion (MME) is weight-bearing and age depended. Therefore, MME might be a physiological phenomenon. The aim of the present study was to evaluate the influence of mountain ultramarathon running on the medial meniscus in healthy athletes. We hypothesized that MME occurs temporary under extreme loading conditions and is completely reversible.

Methods

Healthy athletes of the 2017 Gore – Tex® Transalpine run (7 stages with in total 270.5 km and 16453 m altitude gain) with non-symptomatic knee, and no history of knee injuries or surgeries were included. All athletes underwent standard knee examination, MRI to exclude further knee pathologies and USI for measurement of MME before the competition. Extrusion in USI was determined in supine position (unloaded) and in standing position with full weight bearing and 20° of flexion (loaded). After the 1st, 3rd, and 7th stage ultrasound measurements were repeated directly after the competition. For evaluation of recovery, function of the meniscus ultrasound measurement was performed two weeks after the race.

Results

18 athletes (mean age 37.4 ± 8.3 years, 5 females, 13 males) met the inclusion criteria. The mean USI MME before the race was 1.9 mm ± 0.3 mm in supine position and 2.4 mm ± 0.4 mm under full weight bearing. During the race the mean MME increased and at the final examination after 7th stage the mean MME in supine position was 2.7 mm ± 0.7 mm ($p < 0.001$) and under full weight bearing 3.1 mm ± 0.6 mm ($p < 0.001$). After two weeks of recovery medial meniscus demonstrated a complete reversibility of the extrusion to normal (N.S).

Conclusion

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Medial meniscus extrusion observed under extreme loads generated by a mountain ultramarathon is a temporary and reversible phenomenon in healthy athletes. This suggests, that the meniscus has elastic capacities showing short term adaptions to high loads, which are completely reversible over time.