

Abstract of Doctoral Thesis

Title : Evaluation of center of pressure indices in single-leg forward stepping and their relationship with foot alignment and ankle injury in college baseball players

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Introduction and purpose

Single-leg standing (SLS) ability is related to foot alignment (FA), ankle injury, and athletic characteristics, which is evaluated using sway indices during the holding period and several seconds after landing. Baseball requires playing immediately after a single-leg forward step (SLFS), which cannot be evaluated using the available methods. This study investigated the effect of foot loading, throwing training, and ankle injury on SLFS center of pressure (COP) indices and their relationship with FA during the acute phase (AP) and stable phase (SP) in college baseball players.

Relationship between SLS COP indices and FA during AP and SP

The relationship between SLS COP indices and FA under three conditions revealed that foot loading, but not FA, affected SLFS COP during AP. Furthermore, SLFS COP during SP was affected by forward shift of the center of mass (COM) and was associated with the forefoot transverse arch (FTA).

Effect of throwing training on the relationship between SLS COP indices and FA

The relationship between SLS COP indices and FA of the pivot/lunge leg (LL) during pitching revealed that repeated pitching from the mound affected the relationship between FTA of LL and SLFS stabilization time.

Effect of a previous lateral ankle sprain (LAS) on the relationship between SLS COP indices and FA

The relationship between SLS COP indices and FA revealed that LAS affected COP during both phases. A decreased FTA reduced SLFS stability during SP. Moreover, FA had no effect on COP during AP, with or without LAS.

Conclusion

This study revealed that foot loading and LAS affected SLFS COP indices, but not FA, during AP. Additionally, the COM direction, athletic characteristics, LAS, and FA are found to be related during SP. Moreover, repeated pitching from the mound might affect the FTA of LL and contribute to early COM stabilization.