

氣墊式膝支架對膝關節在不同動作時的生物力學影響**Effects of air cushion brace on biomechanics of knee joint during different movements**

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一、中英文摘要

膝支架主要提供不穩定之膝關節或接受膝關節重建手術後使用。然而，運動員常抱怨穿戴膝支架於活動期間會逐漸下滑。以往研究發現氣墊式支架(Air Armor 1)顯示較小的滑動且不影響速度及敏捷度，這結果加深了氣墊式膝支架應用的可能性。本研究目的在測試氣墊式膝支架對膝關節在不同動作時的生物力學影響。本研究延攬6位健康的受測者，隨機安排氣墊式支架或一般型支架，完成下蹲及急停跳躍動作。使用儀器包括三維動作分析系統(Vicon 512)與攝影機，結合二塊測力板同步收集參數，包括下滑度、膝關節活動角度、力板反作用力。結果顯示氣墊式膝支架比一般膝支架有較小的下滑度、膝關節內、外翻角度、及在垂直跳躍著地時有較小的地板反作用力($p < 0.05$)。結論：氣墊式膝支架能降低支架下滑，減少膝關節內、外翻，而且能在跳躍著地時自然地屈曲較大的膝關節達到緩衝的效果，進而降低關節的負荷。

關鍵字：膝關節、氣墊式支架、前十字韌帶

Abstract

The chief function of the knee brace often was used to support knee instability after ACL injury or reconstructive surgery. However, among the athletic community, a common complaint relates to the knee brace to gradually migrate down the leg during activity. The migration would undermine the protection of the knee brace, and increase the risk of sports injuries. Knee brace is providing to an unstable knee, by controlling the knee internal rotation, external rotation in order to achieve the effect of joint stability and avoid knee hurt again. Previous studies said that air cushion brace (Air Armor 1) does not affect the speed and agility. The results deepened the air-cushioned knee brace application possibilities. The purpose of this study was to examine the effects of air cushion brace on biomechanics of knee joint during different movements. The study recruited six healthy subjects, randomly arranged air-cushion or typical knee brace to complete squatting and vertical jumping movements. Instrumentation was included 3D motion analysis system and 6 cameras, combining two force plates to collect biomechanical parameters, including migration, knee joint angles, ground reaction forces (GRFs). Results showed air-cushioned knee brace has lower migration, knee varus and valgus angles, and vertical GRF than those of typical knee brace ($p < 0.05$). Conclusion, air-cushioned knee brace can reduce the migration and the varus and valgus angles of knee joint, The naturally larger knee flexion cushion GRF impact during landing, thereby reducing knee joint loadings .

Keywords: Knee joint, Air cushion brace, Anterior cruciate ligament