THE RELATION BETWEEN MEDIAL LONGITUDINAL ARCH OF FOOT AND THE KNEE ALIGNMENT AT SINGLE-LEGGED LANDING MANEUVER

Miyauchi Shohei1, Miyakawa Shumpei1, Ugajin Nao1, Miyamoto Naoyuki1, Ogasawara Isssei2, Takemura Masahiro1, Mukai Naoki1, Shiraki Hitoshi1
(University of Tsukuba1, Japan Institute of Sports Sciences2, Japan)

High incidence of anterior cruciate ligament(ACL) injury is one of the most severe athletic-related problems today. Knee valgus motion was previously identified as one of the risk factors for ACL injuries. However, the relationship between knee valgus motion and arch height of the foot has not been well studied. The purpose of this study was to clarify the relationship between medial longitudinal arch of the foot and the knee alignment at single-legged landing maneuver.

Arch height ratio in the medial longitudinal arch of the foot was measured as follows. We measured foot length: F (mm) and height of navicular tubercle: N(mm) in single leg standing. Arch height ratio to divide N by F. Healthy 12 female athletes were divided into two groups. Low medial longitudinal arch group is called Low group (criteria was arch height of foot<0.2), and normal medial longitudinal arch group is called Normal group (criteria was arch height of foot>0.2). The subjects landed from 30cm height box to Footscan(footscan gait systems; RSscan) with right leg. Landing maneuver was captured with two video cameras to calculate knee joint angle. The stability of the center of plantar pressure was measured with Footscan.

Low group showed greater peak knee valgus angles than those of Normal group at single legged landing. There were no significant differences between both groups in peak knee flexion angle. These results suggested that lowering longitudinal arch increased knee valgus angle at single-legged landing. Lowering longitudinal arch may become a risk factor for ACL injuries.

Low group showed larger displacement magnitude of the center of plantar pressure in the frontal plane. There was no difference between Low and Normal groups with displacement magnitude of the center of plantar pressure in sagittal plane. In previous studies, the decrease in function of the longitudinal arch holding muscles was closely involved in instability of the center of gravity. These results suggested that lowering longitudinal arch was closely involved in the decrease in function of the longitudinal arch holding muscles.

For the future we need to observe the effect of insole to hold longitudinal arch or training of longitudinal arch holding muscles on the knee alignment of single-legged landing maneuver.

Keywords: Foot, 3D Analysis, ACL

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