

HIP ABDUCTION TORQUE IS NOT THE MAJOR DETERMINANT OF LATERAL VELOCITY IN SIDE-STEPS

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Introduction

In football, athletes do not move only in straight direction but also in lateral direction to defense an opponent or to run through a defense. In the field of biomechanics, many researchers have reported valuable insights regarding the mechanisms of explosive movements by examining movements in the straight direction such as vertical jump and sprint. However, the mechanism how humans explosively generate forces to the ground to move laterally remains unexplained. Therefore, the purpose of this study was to investigate how movements at each joint mechanically contribute to generate lateral velocity in side-steps.

Methods

Three-dimensional kinematics and kinetics data were recorded by the motion capture and force plate system while 9 healthy male performed lateral steps. They performed maximal effort side-steps, and side-steps of nine different distances from 20% to 100% of each subject's height. Joint torque and joint work during performing side-steps were calculated and compared. In addition, isometric hip abduction and knee extension torque was measured using a load cell to examine the relationship between peak lateral velocity and the isometric torques.

Results & Discussion

Hip extension torque was increased with increasing lateral velocity (V_y) of COM at take-off, but hip abduction torque was not (Fig.1). Also, there was no significant relationship between isometric hip abduction torque and the V_y of COM at take-off in maximal effort side-steps. These data suggest that hip abduction torque does not directly contribute to increase lateral velocity in side-steps.

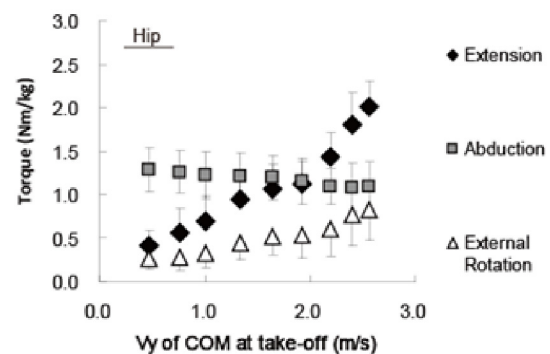


Fig.1. The relationship between lateral velocity of COM at take-off and peak joint torque

Conclusion

Even though the hip abduction movements are involved in side-steps, the contribution of hip abduction torque for increasing lateral velocity is smaller than extension torque.