THE ROLE OF THE AXIAL SKELETON DURING A PUNT KICK

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Introduction

Previous punt kicking research has concentrated on sagittal plane kinematics and has not examined the skill in three dimensions (3D) [1-3]. In addition, research has not described the influence of axial skeleton movements on punt kicking proficiency, despite suggesting that these actions have a crucial role in performance. The purpose of this study was to examine the role of the axial skeleton on punt kicking proficiency during a kick for maximum velocity.

Methods

13 semi-professional (SP) rugby players (91.7 kg ±12.3, 1.79 m ±0.06) and 17 recreational (REC) kicking sport athletes (80.9 kg ±12.2, 1.81 m ±0.05) performed 6 maximum velocity kicks. Data were collected using an infra-red motion capture system (500 Hz). A modified time frequency filter was used to smooth the data[4] prior to it being processed to develop a 7 segment 3D model of the trunk and lower limbs. Differences between groups were determined via Independent samples t-Test ($P<0.01$), while Pearson Product Moment correlation coefficients tested the relationships between axial skeleton movements and foot speed at ball contact (BC).

Results & Discussion

SP kickers had a greater rate of posterior pelvic tilt than the REC kickers ($P=0.003$). This action increased hip ROM during the kick, a proven indicator of kicking proficiency[1]. The SP kickers also had the greatest ipsilateral trunk ($P=0.001$) and contralateral pelvic rotation velocities ($P=0.011$). Each of these variables also correlated significantly with foot speed at BC. It was hypothesized that the pelvis and trunk counter-rotation represented a torso based stretch shorten cycle, a characteristic common to other open kinetic chain sports that utilize axial skeleton rotations to generate high end-point velocities.

Conclusion

This research showed that axial skeleton movements in the sagittal and transverse planes discriminated between kickers of varying ability. The possible utilisation of a torso based stretch shorten cycle by the SP kickers appears to be a key contributor to foot speed at BC during punt kicking.

References

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