Cervical Spine Motion during American Football Equipment removal Protocols: A Challenge to the All-or-Nothing Endeavor

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Context: The all-or-nothing endeavor related to equipment-laden athletes has recently been instituted within the NATA position statement with regard to acute management of the cervical spine injured athlete. However, research used to support the statement has not considered alternative protocols or measured spine movement throughout the equipment removal process. Objective: To determine the amount of cervical spine movement produced by BOC athletic trainers upon implementation of the all-or-nothing endeavor and to compare these findings to an alternative pack-and-fill-protocol. Design: Crossover study. Setting: Controlled laboratory setting that was similar to an on-field evaluation site in order to mimic real life scenarios with regard to the injured athlete. Participants: Eight male collegiate athletes and four selected BOC athletic trainers. The targeted population was football athletes all which met the availability of the study and provided anatomical differences which gave enough variability to the research in regards to body composition. The athletic trainers recruited for the study were all certified and proficient in their skill set and only required a ten-minute session prior to performing the removal protocols to provide more accuracy to the study. Interventions: Four different equipment removal protocols were employed and compared. Motion capture analysis was used to track the motion of the head relative to the sternum as the ATCs performed the removal protocols. Main Outcome Measures: Cervical spine motion (head relative to sternum); measured as translations and rotations. 4x4 ANOVAS with repeated measures were used to compare discrete motion variables (changes in position and total excursions) among protocols and athletic trainers. Results: Removal of the helmet and shoulder pads resulted in a mean 1.4 cm drop in head positioning, compared with a mean 0.1 cm drop when pack-and-fill was employed (p=0.002). Total angular and linear excursions during equipment removal were also different between the same two protocols, with pack-and-fill showing 3.7 degrees less angular movement (p=0.034) and 1.8 cm less vertical movement (p<0.001) than shoulder pad removal. Conclusion: The pack-and-fill method resulted in less overall motion than removal of the helmet and shoulder pads together when compared to the NATA statement regarding the all-or-none principle. These findings have the potential to replace the all-or-nothing endeavor. The methods used in this study may be applied to future research on sport specific or manufacture/model specific equipment to assess the potential benefits of the pack-and fill method with other protective athletic equipment. Another future direction is the investigation of the entire treatment process from initial assessment through spine boarding and transportation.

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