Helmet Fit and Cervical Spine Motion in Collegiate Men’s Lacrosse Athletes Secured to a Spine Board

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Abstract

Context: Proper management of cervical spine injuries in men’s lacrosse players depends in part upon the ability of the helmet to immobilize the head.

Objective: To determine if properly and improperly fitted lacrosse helmets provide adequate immobilization of the head in the spine boarded position.

Design: Crossover study.

Setting: Sports medicine research laboratory.

Patients or Other Participants: Eighteen healthy collegiate men’s lacrosse players.

Intervention(s): Participants were asked to move their heads through 3 planes of motion after being secured to a spine board under 3 helmet conditions.

Main Outcome Measure(s): Change in range of motion in the cervical spine was calculated for the sagittal, frontal, and transverse planes for both head-to-thorax and helmet-to-thorax range of motion in all 3 helmet conditions (properly fitted, improperly fitted, and no helmet).

Results: Head-to-thorax range of motion with the properly fitted and improperly fitted helmets was greater than in the no-helmet condition (P < .0001). In the sagittal plane, range of motion was greater with the improperly fitted helmet than with the properly fitted helmet. No difference was observed in helmet-to-thorax range of motion between properly and improperly fitted helmet conditions. Head-to-thorax range of motion was greater than helmet-to-thorax range of motion in all 3 planes (P < .0001).

Conclusions: Cervical spine motion was minimized the most in the no-helmet condition, indicating that in lacrosse players, unlike football players, the helmet may need to be removed before stabilization.

Key Words: stabilization, emergency management, protective equipment

Key Points
- In all 3 planes (sagittal, frontal, and transverse), range of motion between the head and thorax was greater in both the properly and improperly fitted helmets than in the no-helmet condition.
- Head-to-thorax range of motion in the sagittal plane was greater with the improperly fitted helmet than with the fitted helmet.
- Helmet-to-thorax range of motion did not differ between the properly and improperly fitted helmets for the 3 planes.
- Greater range of motion was available between the head and thorax than between the helmet and thorax, regardless of helmet fit, indicating that the head was moving inside the helmet.

The National Center for Catastrophic Sports Injury Research reported 3 catastrophic spinal cord injuries in collegiate men’s lacrosse players from 1982 through 2007, with 1 resulting in permanent paralysis.1 This incidence is remarkably lower than the numbers commonly seen in football or ice hockey players. However, given the high-velocity collisions that typically occur in lacrosse and the sport’s increased popularity, the potential for cervical spine injury exists.2 Thus, certified athletic trainers may find themselves caring for a lacrosse athlete who has potentially sustained a cervical spine injury.

Given the potential for significant injury in lacrosse players, it is imperative that proper emergency management techniques be identified to prevent secondary injury while care is being provided on the athletic field. To reduce motion of the cervical spine and maximize space for immobilization, immobilization of the cervical spine through neutral alignment of the head and trunk has been recommended as the best position during transport to a medical facility.3,4

The Inter-Association Task Force for Appropriate Care of the Spine-Injured Athlete (IATF)6 advised that in equipment-intensive sports (eg, football, ice hockey, and lacrosse), the helmet and shoulder pads should be left in place when immobilizing the athlete with a possible cervical spine injury. However, it was also recommended that the helmet or protective equipment be removed under certain circumstances; for example, if securing the helmet does not effectively immobilize the head because of either helmet design or fit. Determining if the helmet will immobilize the head presents a dilemma for the certified athletic trainer during on-field management of an athlete with a potential cervical spine injury who is wearing protective equipment. It is important to recognize whether the helmet design and the way in which the athlete wears the helmet allow for adequate spinal immobilization if spine-board immobilization is necessary. Although movement within a properly fitted football, ice hockey, or lacrosse helmet is speculated to be minimal, that claim has not been thoroughly researched.6 Additionally, the amount of allowable movement consid-