

Helmet and Shoulder Pad Removal in suspected Cervical Spine Injury Human Control Model

Paris M, Donaldson, W, Towers, J, Blanc R, Muzzonigro T *Spine*, 2001: Vol. 27, Number 9, pp. 995-999

Abstract

Study Design. Digital fluoroscopy was used to evaluate the motion in normal men during helmet and shoulder pad removal.

Objectives. To observe the amount of motion that occurs during the removal of helmet and shoulder pads in an uninjured spine.

Summary of Background Data. Removal of shoulder pads and helmet from a football player with suspected cervical spine injury can be particularly hazardous. Previous studies have been performed in cadavers with known created injuries. No control study in uninjured players has been done to show if there is similar motion with removal of football equipment.

Methods. Four people removed the helmet and shoulder pads with a technique consistent with that described by the National Athletic Trainers' Association (NATAL). Before positioning, with the helmet and shoulder pads on the subject and the subject lying flat on the table, one static lateral image was obtained as a baseline. With the neck stabilized and everyone in position, the torso, head and neck were elevated approximately 30-40° off the table bending at the waist. After elevation, continuous fluoroscopy was turned on as the helmet and shoulder pads were removed. Once the equipment was removed, the subject was carefully placed back down on the table and a final static lateral image was obtained. All images were saved digitally. Measurements were made for change in angulation, translation, distraction, and space available for the cord.

Results. The results for change in disc height, translation, and space available for the cord showed no significant change. The results for change in angulation also did not show any significant motion in either flexion or extension from baseline or between each step in the protocol.

Conclusions. In the conscious player with no cervical injury the protocol used by the NATA is effective in limiting cervical motion

Permission to reprint requested from Lippincott, Williams, & Wilkins

Editor's Summary and Comments:

Spine surgeons, orthopedists, and neurosurgeons need to have a basic understanding of "in the field" treatment of spine injuries as they may be faced with such situations, possibly as a volunteer team physician. Knowing what to do and when may help an athlete avoid a spinal cord injury or, if spinal cord involvement complicates a fracture/dislocation, may minimize worsening. The authors of this article are interested in providing some scientific support to the "what to do and when" issue.

In a previous article, the senior author studied the effect of helmet and shoulder pad removal on the unstable cervical spine in a cadaveric model. With known cervical pathology, the previous article disclosed "significant" increased motion at the injured spinal segments. They recommended that a protocol of equipment removal be done by 3 or 4 people according to a protocol established by NATA (National Athletic Trainers Association) or not moving the patient at all and cutting off the equipment with a cast saw and other tools. The cadaveric study was an incomplete evaluation of this clinical problem and the authors did the present study with live volunteers, radiologic studies, and the NATA method. The authors used four people to remove the face-mask, chin strap and earpieces then shoulder pad chest straps with each person assigned a task and one exclusively responsible for the neck. The subjects were studied with an static lateral x-ray before any maneuvering was done followed by serial fluoroscopic imaging and measurements during equipment removal.

The authors studied changes in disc height, translation, angulation and space available for the spinal cord. They demonstrated no significant change during the entire procedure aimed at limiting cervical spine motion. Other studies by Donaldson and Swenson et al, had demonstrated in cadavers with known cervical lesions and what happens when the helmet is removed without the shoulder pads and vice versa. It has been shown that helmet removal with an unstable C1-C2 segment can increase angulation in flexion. The authors found that in this study there was no significant change in angulation during any of the steps of the protocol.

The authors recognize that there are several unknowns still to be explored—how much translation, angulation, or narrowing is available for the spinal cord before neurological injury will occur, and that it is unlikely that such a study is forthcoming in awake subjects with unstable spines. Hence, some applicability of this study can be questioned.

Perhaps, a cadaveric study will be forthcoming using MRI that would further enlighten clinicians on tolerances to spinal motion. For now, it appears that the authors have shown that the NATA protocol is effective in minimizing cervical spine motion during the removal of helmet and shoulder pads following suspected cervical spine trauma.

Kenneth P Burres, MD