

# Editorial

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## Protective Athletic Equipment and Cervical Spine Imaging

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**See related article, p. 26.**

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This issue of *Annals of Emergency Medicine* focuses on the topic of cervical spine radiographs in emergency department patients. As anyone who practices emergency medicine knows, defining appropriate indications for cervical spine films and optimal views can be extremely challenging. In fact, only recently have our colleagues begun to answer some of these important questions by carefully done scientific studies such as the National Emergency X-Radiography Utilization Study (NEXUS) Group investigation.<sup>1</sup> Not surprisingly, however, there remain many unresolved questions especially in certain patient groups.

In this issue of *Annals*, Davidson et al<sup>2</sup> address issues related to the care and imaging of football players with potential cervical spine injuries. With more than 2 million Americans playing organized football each year, and countless others playing other sports that require helmets and shoulder pads, this is an issue of practical importance. Current out-of-hospital care guidelines dictate that patients are brought to the ED with football helmet and shoulder pads in place.<sup>3</sup> This presentation, coupled with a mechanism of injury that might cause severe head and neck injuries, make the evaluation of these patients difficult. The recommendation of many sports medicine organizations, as well as orthopedic, trauma, and emergency medicine specialists, is that initial evaluation and cervical spine radiographs should occur with football helmet and shoulder pads in place.<sup>4-6</sup>

Because the adequacy of cervical spine radiographs in patients presenting with their football helmet and shoulder pads in place has not been well studied, Davidson et

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al<sup>2</sup> performed a prospective, paired, observational investigation that compares adequacy of a 2-view cervical spine series taken with helmet and shoulder pads in place and the same 2 views obtained without helmet and shoulder pads. The investigators conclude that "...the demonstrated difficulties of spine visualization with protective equipment in place would suggest a controlled, cautious removal of head and shoulder protective gear before cervical spine radiographic imaging." This is a substantially different approach than previously recommended.

Before we accept their conclusions, we must carefully scrutinize the internal and external validity of their study and, most importantly, the clinical use of their recommendations. As the authors<sup>2</sup> acknowledge, the main threat to the internal validity of this study is the frequent inadequacy of radiographs obtained without helmet and shoulder pads. The radiographic technicians were allowed to review the films they obtained and were permitted to repeat them if they considered them inadequate. Despite this, at least 1 of the 4 physician reviewers deemed the cross-table lateral view inadequate in 75% of the patients and the odontoid view inadequate in 55% of such cases. At least 2 physicians believed that the cross-table lateral view was not adequate in 60% and the odontoid view was not adequate in 25% of those patients who did not have the pads and helmet in place. This is an unacceptably low rate for adequate visualization in a control group. The authors do not describe the techniques used to get the shoulders out of the way, but whatever was done appears to be inadequate. Although the focus of this investigation was the difference between the control group and the helmet and shoulder pads group, it is possible that this difference is affected by the high frequency of inadequate films in the control group. This study does not document the adequacy of the radiographs of subjects wearing shoulder pads obtained by a technician who achieved near-perfect films in the absence of shoulder pads.

Perhaps of greater concern are issues of external validity. Most injured football players will be on a long board with the helmet on, face mask removed, chin strap fastened, and the shoulder pads in place. In many, if not most, instances, these patients will not present with a cervical collar in place. Cervical collars are currently not recommended, and it is virtually impossible to apply one without causing undue movement of the neck. We have never witnessed a cervical collar being placed on a helmeted, padded, football player in our many years of practice. Thus, results obtained in the helmeted, collared, shoulder-padded patients in the study<sup>2</sup>

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may not approximate results of immobilized, back-boarded, helmeted, shoulder-padded patients who present to the ED.

Finally, we consider the most important issue: clinical use. Emergency physicians cannot accept inadequate visualization of cross-table lateral cervical spine and odontoid views in their patients. When initial plain films are inadequate, the emergency physician has 2 choices: remove the football gear before the completion of adequate radiographs or leave the gear in place and further attempt to visualize the cervical spine.

The recommendation to transport patients with football helmet and shoulder pads in place is based on a multidisciplinary congress, the Inter-Association Task Force for Appropriate Care of the Spine-Injured Athlete, convened by the National Athletic Trainers Association (NATA) in 1998. The task force, using a combination of evidence and expert opinion (which, to their credit, were carefully delineated), concluded that neither the football helmet nor the shoulder pads should be removed unless it was a catastrophic life-threatening event.<sup>7</sup> In most instances, simply removing the face mask, which should be done on the field before transportation, allows access to the airway and the face of the patient should medical attention need to be directed to these areas.

The task force further recommended that only after radiographs have been obtained and reviewed should the helmet or shoulder pads be removed and only then by qualified medical personnel with training in removal of this type of equipment. These recommendations reflect the belief that maintaining spinal immobilization during removal of the football helmet and shoulder pads is quite difficult and requires training, practice, and multiple qualified personnel.

Although Davidson et al<sup>2</sup> are correct that the current recommendations are not truly evidence based, given the validity issues discussed previously, we do not find sufficient evidence in their study to revise the task force recommendations. We do not believe it is prudent to attempt to remove the head and shoulder protective gear before cervical spine radiographic imaging even in the ED. We believe a more appropriate approach is to try to obtain appropriate radiographs using standard techniques. If these views are not adequate, then supplemental maneuvers such as traction or different views might be used. Finally, the option of using computed tomography should be considered. Only as a last resort do we agree with removing the head and shoulder protective gear before radiographs, unless the patient can be cleared on clinical criteria.<sup>1</sup>

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Although our belief is not grounded in firm evidence, we all have a common goal to provide the safest environment for the athlete with such injuries. Protective equipment in athletes has always been a source of controversy in part because athlete equipment is so different from other protective equipment. Motorcycle helmets, for example, do not usually have removable face masks, are not always fitted snugly to the head, and are obviously worn without shoulder pads. It is appropriate that they be carefully removed when indicated before transportation so as to achieve proper spine immobilization. However, that is not the case with properly fitted athletic gear, especially the football helmet and shoulder pads. We would like to commend Davidson et al for bringing this important topic to the readership of *Annals*.<sup>2</sup> Their initial work demonstrates some of the challenges in scientifically scrutinizing such an important question. We believe that further study is warranted and, until definitive answers are scientifically validated, a prudent course of action is to follow a protocol of attempting to obtain adequate radiographs using various techniques and modalities before any equipment removal.

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