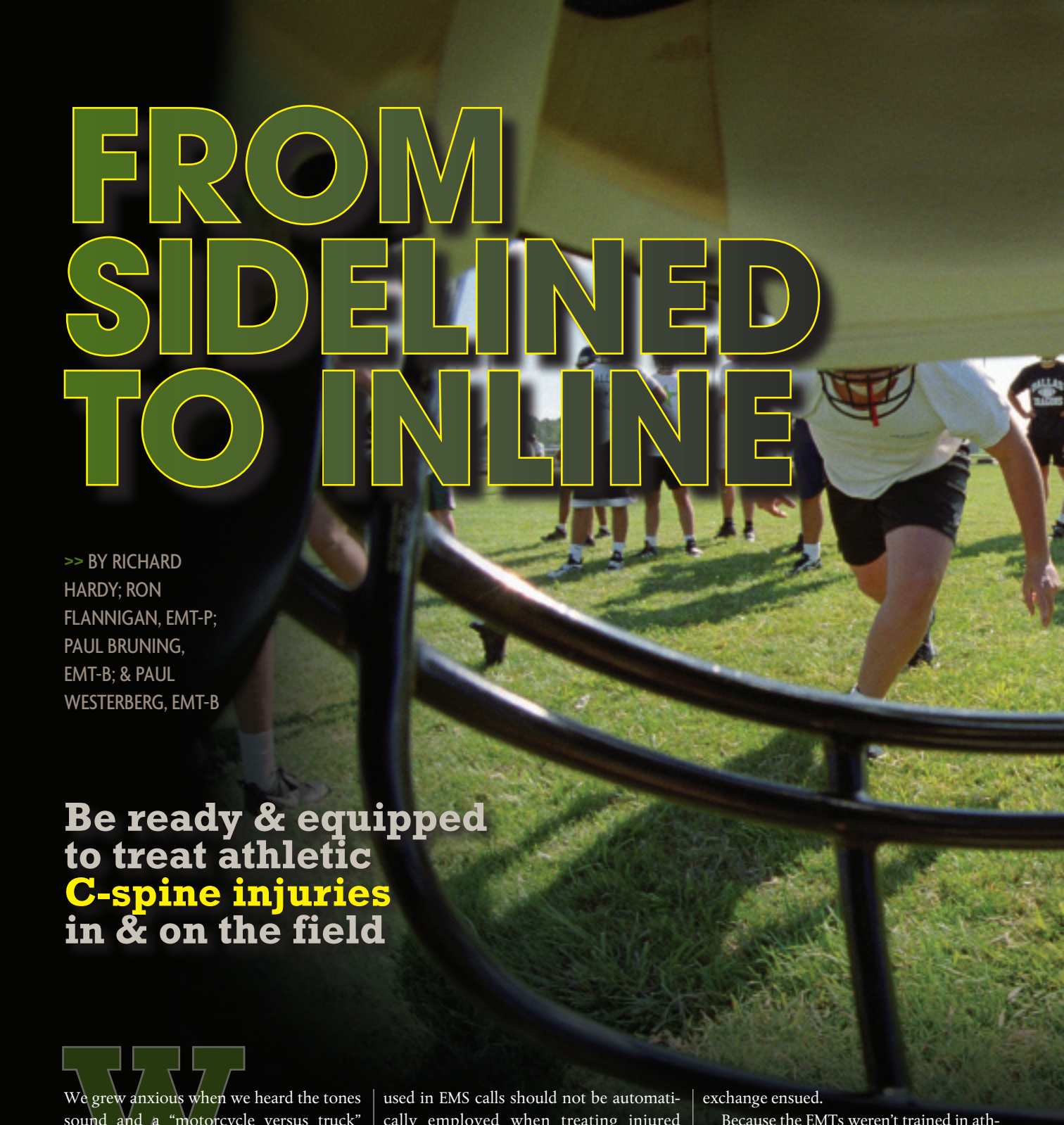
FROM SIDELINED TO INLINE

>> BY RICHARD HARDY; RON FLANNIGAN, EMT-P; PAUL BRUNING, EMT-B; & PAUL WESTERBERG, EMT-B



Be ready & equipped to treat athletic C-spine injuries in & on the field

We grew anxious when we heard the tones sound and a "motorcycle versus truck" dispatch. Our fears were confirmed when we assessed the scene of twisted metal; a mangled body lay before us. Cervical spine precautions were a must.

Our initial assessment showed that the patient's poorly fitted "full" helmet was loose, impeding adequate airway management. As trained, we stabilized the head and neck, rotated the helmet slightly forward and removed it superiorly.

This procedure is standard in EMS. However, C-spine precautions routinely used in EMS calls should not be automatically employed when treating injured players on an athletic field. Consider the following case.

An injured player lay on the football field. EMTs assessed for a possible C-spine injury and determined the facemask and helmet were possibly impeding access to the airway. Accordingly, they prepared to remove the helmet. The athletic trainers intervened, explaining that removing the helmet could potentially cause a catastrophic injury and claiming that the airway could be managed with the helmet left in place. A heated exchange ensued.

Because the EMTs weren't trained in athletic injuries, they were unaware of the dangers of removing a helmet from an injured football player with a suspected C-spine injury. Fortunately in this case, the athletic trainers successfully convinced their colleagues to keep the shoulder pads and helmet on the injured athlete, which safeguarded against more severe injury to the player until he could be further examined at the hospital.

It's crucial for EMS providers to understand how treatment differs for injuries

Although removing a helmet is a crucial step in assessing and treating a motorcycle collision patient, athletic helmets and padding are specifically designed to stay on in the event of C-spine injury.

D. HURST/ALAMY

related to motorcycle collisions and athletic events. A motorcycle helmet needs to be removed due to the neck being placed in flexion. (For more on motorcycle helmets, see sidebar, p. 75).

By contrast, the shoulder pads used in football, hockey and lacrosse are designed to keep the head and neck in an anatomically neutral position when the helmet and shoulder pads are worn and the patient is properly boarded.

When treating athletic injuries, it's imperative that EMS providers understand how to place the athlete on a spine board and gain

It's critical that EMS providers know how treatment differs for sports injuries and motorcycle collisions.

>> CONTINUED FROM PAGE 73

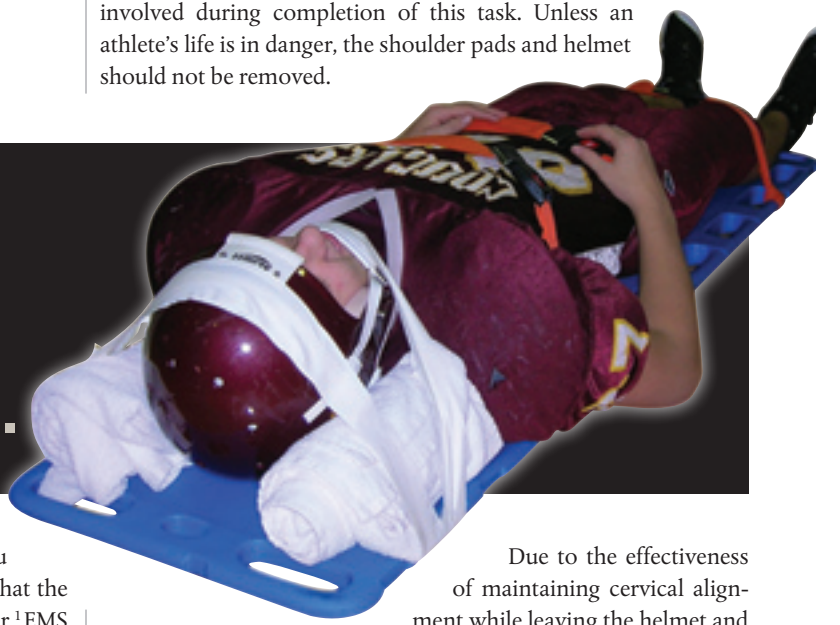
access to the airway without removing the helmet. The facemask, helmet and shoulder pads require special attention. And it's vital for providers to practice this protocol with a qualified individual, such as an athletic trainer.

EQUIPMENT CHECK

When preplanning to treat a patient with an athletic injury, you can anticipate that the facemask might impede your ability to establish a patent airway and may need to be immediately removed when a cervical injury is suspected. This removal process should be done on the athletic field regardless of patient's airway condition. Before you get to this step, though, you need to be sure you have the following tools on board:

- Cordless screwdriver;
- FM Extractor (made by Sports Medicine Concepts Inc., Rochester, N.Y.);
- Trainers Angel (Riverside, Calif.); and
- Pruning shears (purchased at any hardware store).

When possible, sports helmets and padding should be left on during C-spine precautions.



The cordless screwdriver can be effective; however, you need to have a separate cutting tool available in the event that the screwdriver fails due to a spinning T-nut or low battery power.[1] EMS personnel must carry the proper equipment because the shears providers typically carry won't remove an athletic facemask. Helmets and facemasks differ from manufacturer to manufacturer, so be sure to check with your local athletic teams to determine which is the best cutting tool to carry in your ambulance.

AIRWAY V. FACEMASKS

In football, the facemask can be easily removed by cutting the four plastic loops that secure it to the helmet. Cut all four loops rather than only the two lateral loop straps. Cutting only the lateral loop straps permits you to raise the facemask to allow airway access, but it increases the amount of movement within the cervical region.[2]

Hockey facemasks are designed to flip forward or upward to allow the player to wipe their face. The mask is typically attached to the helmet via two looped hinges at the center of the forehead shell. To prevent the mask from flipping up during play, the player uses a strap on both sides of the mask that attaches to the helmet near the mastoid process via a snap.

To quickly establish access to the airway, these straps need to be unsnapped or cut and the mask flipped upward. To completely remove the mask, use a cordless screwdriver to remove the looped hinges, unless they're rusty, in which case you'll need a cutting tool.[3]

Lacrosse helmets are similar in style to hockey helmets with a facemask that flips up. These are clipped in place with three to five loops that closely resemble those used in football. Screws can be removed using a screwdriver, and straps can be cut with a cutting tool. This will allow quick and adequate access to stabilize the patient's airway.[4]

Helmets and shoulder pads used in football, hockey and lacrosse are designed to keep the C-spine in an inline, neutral position when left on together.

Studies indicate that removing the shoulder pads while leaving the helmet on (and vice versa) compromises the C-spine by either increasing or decreasing the natural lordodic curve of the cervical spine.[5–6] This can disrupt the spinal cord due to the movement involved during completion of this task. Unless an athlete's life is in danger, the shoulder pads and helmet should not be removed.

Due to the effectiveness of maintaining cervical alignment while leaving the helmet and shoulder pads on, every effort should be made to provide appropriate treatment without removing this equipment. In the event the athlete needs CPR or defibrillation, the chest can be exposed by cutting the jersey down the body's midline and arms and cutting the rib straps and sternal fasteners.

When you approach an injured athlete wearing athletic equipment, ask yourself the following questions:

- Is the head secure within the helmet?
- Does the design of the helmet allow for removing the facemask and gaining access to the airway?
- Are we able to transport the patient in an appropriate position?

If the answer to all of these questions is "yes," keep the helmet on the athlete. However, if facemask removal consumes too much time, you may need to remove the helmet and shoulder pads to gain access to the airway.[2]

FULL GEAR REMOVAL

If it's deemed necessary to remove the helmet, the shoulder pads need to be removed as well—and with care. If you remove the helmet, you must remove the shoulder pads, and vice versa. If

the helmet and shoulder pads are removed in a careless fashion, it may cause more damage to the C-spine. Even well-qualified professionals can cause or increase an injury when removing the helmet.

The task of removing the helmet requires—at a minimum—two trained individuals. One individual maintains inline stabilization of the head, neck and helmet while the other cuts the chinstrap, removes accessible helmet padding, deflates the helmet (if the helmet has an air-cell padding system) and removes the helmet by sliding it off the head with a slight forward rotation. If the helmet doesn't move, slight traction can be applied by rocking it anteriorly and posteriorly, making sure not to move the head or neck.[2]

When removing the shoulder pads, the jersey and all shoulder-pad straps need to be cut off. While the athlete is lifted, remove the helmet and the shoulder pads by spreading the front sections near the sternum and pull them around the head. Then, lower the athlete onto a spine board. Lastly, secure the head and body to the spine board and repeat your PMS assessment.

To secure the athlete to the long board, use the six-man lift, scoop stretcher or log roll as local protocol allows. Once on the board, secure the patient and fasten the helmet to the board using head immobilization tools provided by your service.

Removing Motorcycle Helmets

The Crash Outcomes Data Evaluation System found that motorcycle helmets were 36% successful in preventing death and 65% successful in preventing brain injuries.[1] EMS providers may encounter three types of motorcycle helmets: full face, three quarter-shell and half shell. Full-faced motorcycle helmets provide the greatest protection due to greater head coverage, while half-shell helmets only cover the top of the cranium, providing the least protection. (Eye protection is also strongly recommended for all riders, if not required, and shouldn't impede EMS providers from securing a patent airway.)

Inline stabilization can't be achieved with motorcycle helmets in place due to the flexion of the C-spine, which compromises the spinal cord and/or the airway.

Steps for Removal of Motorcycle Helmets:

- Use an inferior approach to the C-spine, place hands at either side of the patient's head, attempting to gently secure stabilization with your fingertips spread and the middle fingers touching the apex of the ears;
- Rotate the motorcycle helmet interiorly, just enough for the posterior aspect of the helmet base to clear the occipital crown of the head; and
- Finally, remove the motorcycle helmet superiorly.

>> CONTINUED FROM PAGE 75

CONCLUSION

Leaving protective equipment on an injured athlete is always the best-case scenario, and it can be done for most injured athletes. Work proactively with athletic trainers to determine what's best for the patient. Working as a team can help prevent a catastrophic event and provide the patient with the best possible care and outcome. When the C-spine is damaged—whether in a motorcycle collision or a sporting incident—you have only one chance to offer correct care. Do it right the first time. JEMS

Richard Hardy is a certified athletic trainer with Heartland Orthopedic Specialists who's contracted by the University of Minnesota Morris as an athletic trainer and instructor. He's been training EMS departments on proper C-spine management of padded athletes since 2001. Contact him at rhardy@HeartlandOrthopedics.com

Ronald Flannigan, NREMT-P, is a critical care instructor and examiner and a graduate nurse. He currently serves as the ALS mobile simulation lab program coordinator for Ridgewater College in Hutchinson, Minn. He's been actively involved in EMS since 1981 and is a certified ambulance task force leader, ACLS, ACLS-EP, PALS instructor trainer and dive master.

Paul Bruning, MA, ATC, was an EMT for 20 years on both ALS and BLS ambulance services, serving as an EMT instructor and examiner for more than 15 years. He is currently the coordinator for clinic and sports medicine at TRIA Orthopaedic Center in Minneapolis, Minn. He has presented on C-spine injuries in athletics locally, regionally and nationally.

Paul Westerberg, MA, ATC, OTC, is a certified athletic trainer at Heartland Orthopedic Specialists in Alexandria, Minn. He works in the clinic outreach capacity as a physician extender in the clinic and as an athletic trainer at Alexandria Jefferson High School. He has been a certified athletic trainer since 1999.

REFERENCES

1. Decoster LC, Shirley CP, Swartz EE: "Football face-mask removal with a cordless screwdriver on helmets used for at least one season of play." *Journal of Athletic Training.* 40(3):169–173, 2005.
2. Kleiner DM, Almquist JL, Bailes J: *Prehospital Care of the Spine-Injured Athlete: A Document from the Inter-Association Task Force for Appropriate Care of the Spine Injured Athlete.* National Athletic Trainers' Association: Dallas, Texas, 2001.
3. Waninger KN: "Management of the helmeted athlete with suspected cervical spine injury." *American Journal of Sports Medicine.* 32(5):1331–1350, 2004.
4. www.uslacrosse.org/safety/pdf/facemaskremoval.pdf
5. Palumbo MA, Hulstyn MJ, Fadale PD, et al: "The effect of protective football equipment on alignment of the injured cervical spine: Radiographic analysis in a cadaveric model." *American Journal of Sports Medicine.* 24(4):446–453, 1996.
6. LaPrade RF, Schnetzler KA, Broxterman RJ, et al: "Cervical spine alignment in the immobilized ice hockey player: A computed tomographic analysis of the effects of helmet removal." *American Journal of Sports Medicine.* 28(6):800–803, 2000.
7. National Highway Traffic Safety Administration: *Research Note: Further Analysis of Motorcycle Helmet Effectiveness Using CODES Linked Data.* www.nhtsa.dot.gov/people/ncsa/pdf/Codes_mc.pdf

For more on C-spine immobilization, read "Cervical Immobilization at the Expense of Proper Airway Management"
jems.com/trauma