Helmet Removal and Spine Boarding

Orthopedic Surgery

Pre-Season Athletic Coverage

CARILION CLINIC

Objectives

- Initiation of emergency action plan (EAP)
- Review indications for immediate helmet/shoulder pad removal
- Review cervical spine injury detection and management in the field
- Review spinal motion restriction
- Techniques for equipment removal

Helmet on or off?

- Controversial with conflicting studies
- Consider:
  - Current medical status
  - Familiarity with equipment
  - Training level of personnel

Concerns

- Cervical spine injury
  - Can be associated with traumatic spinal cord injury (SCI)
  - High rate of morbidity and mortality
  - Sports injuries 4th leading cause of SCI
  - >250 new cases each year

NATA update 2020

- Have an emergency action plan (EAP) with local EMS in place
- Conduct a pre-event time out
- Spine-injured athletes
  - Transported to facility equipped to handle SCI
  - Hospital should be determined before the event
- Equipment removal done by highest level of training and experience
  - At discretion of on-site providers

NATA Update 2020- Removal of Helmet and Shoulder Pads

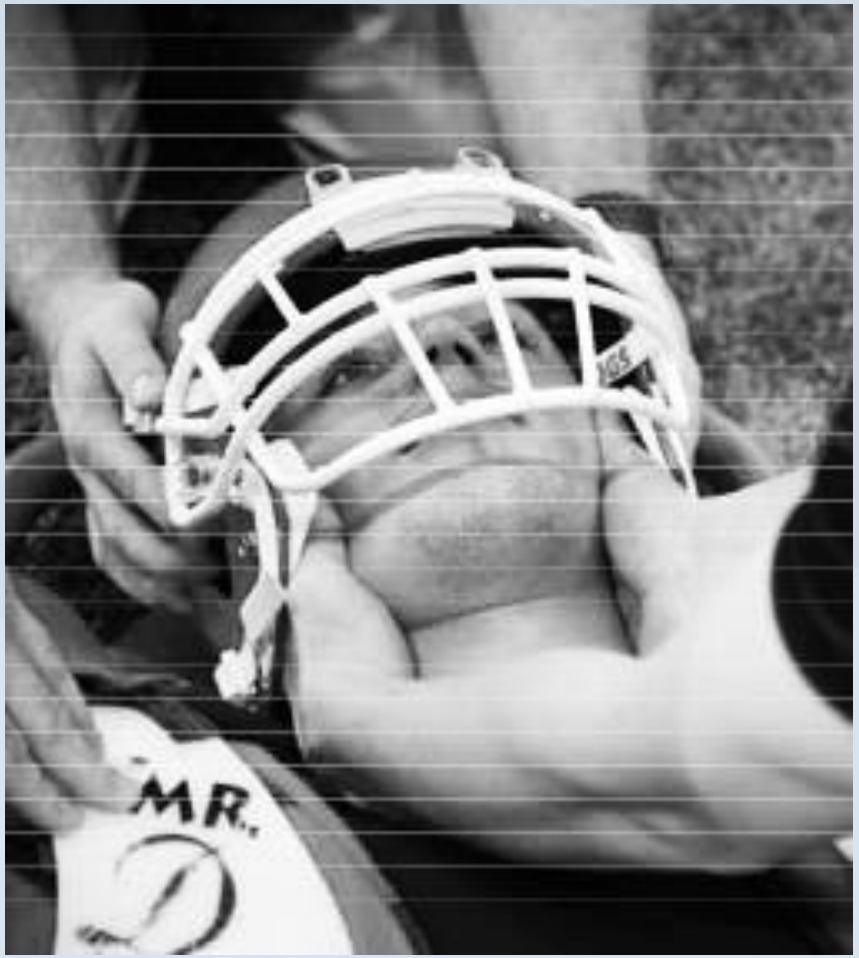
- Can occur in the emergency room or on the field
- Advantages to on field removal:
  - Improved airway management
  - CPR/AED
- Emergency Medicine Procedures recommend:
  - Leave helmet and shoulder pads on unless
    - Athlete is unconscious or impairs lifesaving measurements

Ultimately a Case by Case Basis

- Decision for equipment removal before transport based on:
  - Medical status athlete
    - CSI, airway, cardiac emergencies
  - Type of equipment worn
  - Number of on-site rescuers
  - Experience of personnel
- Ultimately up to discretion of on-site team

Spine Motion Restriction Criteria

- Indicated when:
  - Blunt trauma
  - Altered level of consciousness
  - Cervical spine pain or tenderness
  - Loss of cervical range of motion
  - Neurologic complaint or findings
  - Anatomic deformity of the spine



Recommendations in Patient with Suspected SCI

- C-Spine alignment is highest priority
  - Immobilized in neutral position/ normal axial alignment
  - Avoid active manipulation of spine
    - Especially if decreased level of consciousness
  - Stop immediately
    - Increased pain
    - Neurologic deterioration
    - Resistance to movement
  - Instead, stabilize in current position

Indications for Equipment Removal

Equipment should be removed if:

- Compromised circulation, airway, and breathing
- Decreased level of consciousness
  - Should be treated as though they have a SCI until proven otherwise

Team Effort

- Not an individual task
- One provider must always maintain C-spine
  - Leads team movements
- Number of personnel available is key
- Have a plan before the event begins

Techniques

Face Mask Removal

- Variety of face masks and helmets
  - Be familiar with various equipment prior to start of game
- Have immediate access to cordless screwdriver and cutting device
- Combined-tool approach very successful

Face Mask Removal

- Rescuer 1 (R1) maintains C-spine stabilization superior to the patient's head
  - Allow for access to lateral screws
- Rescuer 2 (R2) using a cordless screwdriver, remove top screw first
- Proceed to remove lateral screws

Helmet Removal-Two-Person Technique

- R1
  - Positioned at the head stabilizes C-spine
- R2
  - Positioned at side of athlete cuts helmet chin strap
  - Cuts the jersey and shoulder pads in front using T-cut
  - Sleeve to sleeve and collar to waist

Helmet Removal Two-Person Technique

- R2 assumes C-spine control from anterior position
  - Anterior to posterior stabilization technique
  - Bottom hand cradles the cervical spine and occiput while the top hand grips the chin and jaw
- Communication is key handing off C-spine from R1 to R2
- R1 gently removes helmet

Shoulder-Pad Removal Multi-person Lift (9 Rescuers)

- After helmet removal
- R1 resumes control of C-spine and team
- Ensure all Jersey and all straps adequately cut to aid in removal
- On R1 command: Rescuer team (R2-7) lifts athlete off the ground in unison
  - About 12 inches to allow shoulder pad removal

Shoulder-Pad Removal Multi-person Lift (9 Rescuers)

- R8 slides the board beneath the athlete
- R9 carefully removes the shoulder pads sliding the pads superior and posterior
- Cervical collar place under athlete
- Athlete is lowered to the board in unison
- Cervical collar applied

Shoulder-Pad Removal Log-Roll Technique (5 Rescuers)

- R1 controls C-spine
- R2-4 perform a supine log roll- pausing at top of the roll
- R5 cuts back jersey and shoulder pads
- R5 positions the long spine board
- Athlete is lowered onto the board on command of R1
- R5 cuts front jersey and shoulder pads
- R2-3 removes shoulder pads removed from each side
- Cervical collar placed

Shoulder Pad Removal- Flat Torso Technique (3 Rescuers)

- R2 controls C-spine from anterior position
- Jersey and shoulder pads cuts from front
- On command of R2, R1 and 3 carefully slide and remove shoulder pads from either side of the athlete
- R1 resumes C-spine control
- Cervical collar placed

Transport in Patient with Suspected CSI

- Airway access should be established before transport
- This often requires facemask removal
  - Always have a fallback
  - Two methods to remove
- Minimize time on spine board to expedite transport

Take Aways

- Have an EAP!
- Discuss the EAP before every game
- Safety First
- Helmet and protective equipment MAY be removed on site, prior to transport if necessary
- ABCs
- Protect the C-spine

Questions?

- Thank you!

References

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Table. Best Techniques for Transferring a Patient With a Spine Injury[a]

Technique	Athlete Position	No. of Rescuers Needed	Comments
Supine log roll	Supine	Minimum of 5	In some instances, the log roll may be completed with fewer rescuers.[23]
Prone log-roll-push	Prone	Minimum of 5	If available, additional rescuers positioned on both sides may use a hybrid prone log-roll push-pull technique.
Prone log-roll-pull	Prone	Minimum of 4	Advantageous in confined spaces
Multiperson lift (field)	Supine	Minimum of 8	
Multiperson lift (ED)	Supine	Minimum of 7	May not require rescuer for spine board in ED
Scoop stretcher	Supine	Minimum of 3	
Airway-access techniques			
Face-mask removal	Supine	Minimum of 2	Combined-tool approach
Helmet removal	Supine	Minimum of 2	
Access to airway must be obtained before transport regardless of respiratory status.			
Helmet-removal techniques			
Anterior-posterior stabilization	Supine	Minimum of 2	
Medial-lateral stabilization	Supine	Minimum of 2	May require helmet cheek-pad removal
Shoulder pad-removal techniques			
Multiperson lift (field)	Supine	Minimum of 9	Additional rescuer positioned near head and trunk removes the shoulder pads once the athlete is elevated.
Multiperson lift (hospital)	Supine	Minimum of 8	May not require rescuer for spine board in ED
Elevated torso or tilt	Supine	Minimum of 3	Should not be used with suspected concomitant injury to the thoracic or lumbar spine
Flat torso	Supine	Minimum of 2	
Supine log roll	Supine	Minimum of 5	In some instances, the log roll may be executed with fewer rescuers.[23]
Over the head	Supine	Minimum of 4	May be used when it is not possible to cut shoulder pads in front; should not be used with suspected concomitant thoracic or lumbar injury
The helmet should be removed first, followed by the shoulder pads.			

Conclusions	Recommendations
Question 1. What facilities are associated with the best outcomes for an athlete with a suspected CSI?	
Level I and II trauma centers are designated to provide acute urgent care for the most seriously injured and potentially seriously injured patients.	A procedure should be developed to ensure that an athlete with evidence of a spinal column injury is transported to a designated Level I or II trauma center as expeditiously and safely as possible.
Question 2a. Are outcomes after CSI likely to be better when face masks are removed prior to transport?	
Using proper equipment, skilled personnel can remove the face masks of American tackle football players with minimal motion of the cervical spine.	1) In athletes with suspected CSIs, airway access should be established before transport. 2) American tackle football face masks should be removed before transport in athletes with suspected CSI. 3) Appropriate tools and trained personnel should be available for face-mask removal.
Question 2b. Are outcomes after CSI likely to be better when the helmet or shoulder pads are removed before transport?	
a) Removal of helmets without concurrent removal of shoulder pads may result in cervical spine malalignment in American tackle football, men's lacrosse, and ice hockey athletes. b) Removal of helmets and shoulder pads creates small but statistically significant amounts of spinal movement in American tackle football, men's lacrosse, and ice hockey players. c) The clinically significant amount of cervical spine motion during equipment removal is unknown. d) Cervical spine alignment is statistically equivalent when the helmet and shoulder pads are on versus when the helmet and shoulder pads have been removed.	1) The highest priority is maintaining cervical alignment. 2) Helmet and shoulder-pad removal should be left to the discretion of trained personnel at the scene. 3) If the helmet and shoulder pads are to be removed, the procedures should be done by trained personnel who are competent in equipment removal while minimizing cervical spine motion. 4) If the athlete is found with the helmet off and shoulder pads in place, then the head should be supported to maintain cervical spine alignment.
Question 3a. What criteria should be considered when deciding to remove face masks from an athlete with a suspected CSI?	
The research group reached no conclusions regarding specific criteria to consider when deciding whether to remove a face mask.	1) The highest priority is maintenance of circulation, airway, and breathing (CAB). 2) Airway access should be ensured before transport. 3) Any athlete with a suspected CSI who is transported should have the face mask removed for airway access. 4) The condition of the face mask, specific hardware, available equipment, and training of available personnel should be considered before face-mask removal. 5) Care providers should have >1 method available for face-mask removal.
Question 3b. What criteria should be considered when deciding to remove helmet/shoulder pads with a suspected CSI?	
a) When considering helmet and shoulder-pad removal, the highest priority is maintaining CAB. b) Items that can be considered when deciding whether to remove the helmet and shoulder pads: • athlete weight • sport • equipment make and model • types of immobilization devices available	1) The highest priority is maintenance of CAB. 2) Trained personnel should remove the helmet and shoulder pads from athletes with compromised CAB or a decreased level of consciousness. 3) When deciding whether to remove the helmet and shoulder pads before transport, the following should be considered: athlete height and weight; the make, model, and condition of the equipment; and the types of immobilization devices available.
Question 4. What method of transfer and spinal-motion restriction (SMR) is associated with the best outcomes for athletes with suspected CSI, both in supine and prone position?	
a) Log-roll–push techniques are superior to log-roll–pull techniques when turning prone injured athletes. b) The 8-person lift and slide results in less spinal movement than the log roll. c) A full-length rigid spine board and full-body vacuum immobilization are equivalent in the degree of cervical spine immobilization.	1) The highest priority during any transfer technique is maintaining cervical spine alignment. 2) The medical professional in charge at the scene must apply clinical judgment to determine the best transfer technique. 3) For suspected CSIs, an 8-person lift-and-slide technique for supine athletes and a log-roll–push technique for prone athletes should be implemented during transfer when feasible. 4) In supine nonathletes, a scoop stretcher is an acceptable device for minimizing spinal motion. 5) To provide the best on-scene care, the medical team should be proficient in multiple transfer techniques. 6) The athlete's size may be a factor in selecting the appropriate SMR equipment (ie, standard versus oversized long spine board).
Didactic, hands-on, practical, scenario-based training improves the ability of health care personnel to care for an athlete with a suspected CSI.	1) The highest priority is that all on-site personnel are adequately trained and have rehearsed the techniques necessary to protect the spine of the athlete with a CSI. 2) Training should be scenario based and practical, simulate emergency conditions, and encompass all members of the interdisciplinary health care team. 3) Venue-specific training and rehearsals (including practice facilities and game sites) should occur at least annually. 4) Sports medicine teams should conduct a prepractice and pre-event review of emergency action plans, including equipment, roles, and communication. 5) Sports medicine teams should conduct a pre-event "medical time out."
Question 6. When immobilizing the head and neck, is it better to leave the head in the position in which it is found or apply gentle axial distraction to align the head with the cervical spine?	
No conclusions were reached.	1) The highest priority is maintaining CAB while minimizing cervical spine motion in athletes with suspected CSIs so as to minimize further neurologic impairment. 2) Alignment should be sufficient to maintain a patent airway. 3) In an awake, responsive, and cooperative athlete, trained medical personnel should employ clinical judgment and discretion before attempting to gently, actively or passively, attain in-line cervical spine stabilization before transport. 4) Active spinal manipulation should be avoided if the athlete has impaired consciousness, unless deemed necessary by trained medical personnel to maintain CAB. 5) If increased pain, neurologic deterioration, or resistance to movement occurs, cervical spine realignment procedures should be abandoned and the neck stabilized in the current position.
Question 7. How many trained personnel does it take to remove a face mask/helmet/shoulder pads on the field?	
a) No studies have addressed this question regarding face-mask removal. b) The number of people necessary to remove a helmet is unknown. c) Data are insufficient to indicate the number of personnel needed to remove the shoulder pads.	1) Trained on-site medical personnel should use clinical judgment and discretion in determining the number of people necessary to safely remove the face mask based on its type. 2) Ideally, 2 people should be involved in removing the face mask: 1 maintains in-line stabilization and the other removes the face mask. 3) Trained on-site medical personnel should use clinical judgment and discretion in considering the equipment design and determining the number of trained personnel necessary to safely remove the helmet and shoulder pads. 4) The number of trained personnel recommended to remove the helmet and shoulder pads depends on the equipment, the technique used, and the athlete's size. 5) At least 2 trained personnel should be involved in removing the helmet: 1 maintains in-line stabilization and the other removes the helmet. 6) For the torso-tilt method, at least 4 trained personnel are needed to remove the shoulder pads. This method should not be used in a patient with a suspected thoracic or lumbar injury. 7) For the flat-torso method, at least 2 trained personnel are needed to remove the shoulder pads.
Question 8: Once the athlete with a suspected CSI is moved from the field to the ambulance stretcher, should the spinal-motion restriction equipment be removed before transport or on arrival at the emergency department?	
a) If a cervical collar has been placed on a patient with a suspected CSI, it should stay in place during transport. b) The athlete-specific literature does not address this question. c) Based on nonathlete data, SMR equipment should be left in place for transport of a patient with a suspected CSI. d) Based on nonathlete data, if a long spine board is used, time on the board should be minimized. e) The SMR equipment may include a long spine board, scoop stretcher, Kendrick Extrication Device, vacuum immobilization, cervical collar, straps, head blocks, and tape.	1) The highest priority is protecting the spine of the athlete with a suspected CSI. 2) The decision to transport using spinal precautions should be at the discretion of trained on-site personnel and local emergency medical services. 3) If a cervical collar has been placed after a suspected CSI, it should remain during transport. 4) If SMR equipment is in place after a suspected CSI, it should remain in place during transport. 5) If a long board is used, time on the board should be minimized. 6) Once a patient is safely positioned on an ambulance stretcher, transfer or extrication devices may be removed if an adequate number of trained personnel are present to minimize unnecessary movement. Restriction of spinal motion must be maintained.