



# Changes in Emergency Care of the Spine Injured Patient

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# Clinical Question

When is spinal immobilization or selective immobilization appropriate in the treatment of a suspected c-spine injury?

# Learning Objectives

- Identify the difference between spinal immobilization and selective immobilization
- Identify adverse outcomes associated with full spinal immobilization with long boards
- Identify when spinal immobilization vs selective immobilization is clinically indicated

# Changes in Spinal Immobilization

- ▶ It is estimated that 3-25% of spinal cord injuries may be significantly worsened during the transport of early treatment, and therefore are preventable.
- ▶ Because of this subsequent injury, full spinal immobilization has remained the standard of care for EMS throughout most of the US.
- ▶ However more and more research is showing that full spinal immobilization may be causing more harm than good. When applied correctly, selective spinal immobilization can be a great tool for decreasing patient discomfort, encouraging reluctant patients to seek medical care and reducing patient-provider conflict.
- ▶ We will discuss the clinical reasoning for each method.

# Full Immobilization vs Selective Immobilization

## Full Immobilization

- ▶ Complete spinal immobilization includes the immobilization of the patient using:
  - ▶ Long board with straps
  - ▶ Rigid cervical collar
  - ▶ Head immobilization device (head blocks or towel rolls) secured to the board
  - ▶ Complete spinal immobilization may be applied to the supine patient, the standing patient or to the seated patient

# Full Immobilization vs Selective Immobilization

## Selective Immobilization

- ▶ Selective immobilization can include a cervical collar. A backboard maybe used to transport the patient to the stretcher. Then patient will then be strapped to the stretcher
- ▶ Selective immobilization can also not include a cervical collar and the patient may be able to ambulate to the stretcher.



## The Side Effects of the Long Backboards



- ▶ “The long backboard can induce pain, patient agitation, and respiratory compromise. Further, the backboard can decrease tissue perfusion at pressure points, leading to the development of pressure ulcers.”
- ▶ “It can be difficult for the receiving trauma team to distinguish between pain caused by injury and pain that resulted from application and use of the backboard. Clinicians may be forced to perform imaging studies on areas that are painful solely due to the backboard, and not due to the initial injury.”

**-THE NATIONAL ASSOCIATION OF EMS PHYSICIANS AND THE AMERICAN COLLEGE OF SURGEONS COMMITTEE ON TRAUMA**



# What Does the Research Say?

- ▶ In 2001, Stroh and Braude performed a retrospective chart review of 504 patients transported by EMS under a selective spinal immobilization protocol who were ultimately diagnosed with cervical spine injuries.
- ▶ They found that the selective spinal immobilization protocol was 99% sensitive in identifying patients with cervical injuries for immobilization

-Ahn et al, Journal of Neurotrauma (2011)





# What Does the Research Say?

- ▶ In 2005, Domeier et al. reported that, in a prospective study of 13,483 patients with mechanism of injury suspicious for spinal injury, EMS personnel using a selective spinal immobilization algorithm were able to identify and immobilize 92% of patients with spinal injuries.
- ▶ Of those not identified, none had spinal cord injuries. Adult patients with mechanism of injury suggestive of possible spinal injury but without altered mental status, intoxication, spinal pain or tenderness, focal neurologic deficits, or significant distracting injuries can be safely transported by EMS without using a backboard.
- ▶ Using easy-to-follow algorithms, many agencies now allow EMS providers to perform selective spinal immobilization in the field, providing spinal immobilization to those more likely to have spinal injury.”
  - ▶ -Ahn et al, Journal of Neurotrauma (2011)

# Research Continued.....

- ▶ High quality studies have shown that physicians in the ED can safely use the CCR (Canadian C-Spine Rules) and NEXUS (National Emergency Xray Utilization Study) criteria to rule of cervical c-spine injuries.
- ▶ Studies have shown that the CCR are more sensitive and specific than the NEXUS criteria and that using the CCR results in lower rates of radiological examinations.
- ▶ Further, the CCR can be used with similar accuracy and reliability by the triage nurses in the ED and paramedics in the prehospital setting.

# The Canadian C-Spine Rule

For alert (GCS=15) and stable trauma patients where cervical spine injury is a concern

## 1. Any High-Risk Factor Which Mandates Radiography?

Age  $\geq$  65 years  
or  
Dangerous mechanism\*  
or  
Paresthesias in extremities

No

## 2. Any Low-Risk Factor Which Allows Safe Assessment of Range of Motion?

Simple rearend MVC\*\*  
or  
Sitting position in ED  
or  
Ambulatory at any time  
or  
Delayed onset of neck pain\*\*\*  
or  
Absence of midline c-spine tenderness

Yes

## 3. Able to Actively Rotate Neck?

45° left and right

Able

No Radiography

Yes

No

Radiography

Unable

### \* Dangerous Mechanism:

- fall from elevation  $\geq$  3 feet / 5 stairs
- axial load to head, e.g. diving
- MVC high speed ( $>$ 100km/hr), rollover, ejection
- motorized recreational vehicles
- bicycle collision

### \*\* Simple Rearend MVC Excludes:

- pushed into oncoming traffic
- hit by bus / large truck
- rollover
- hit by high speed vehicle

### \*\*\* Delayed:

- i.e. not immediate onset of neck pain

Figure 11. National Emergency X-Radiography Utilization Study (NEXUS) Criteria

## Meets all low-risk criteria?

1. No posterior midline cervical-spine tenderness
2. No evidence of intoxication
3. A normal level of alertness
4. No focal neurologic deficit
5. No painful distracting injuries

YES

NO

No Radiography

Radiography

# Where Do We Go From Here?

- ▶ Education of prehospital personnel in the clinical clearance of the cervical spine has a large potential for improving management, with an estimated 40% reduction in cervical spine immobilization.
- ▶ The AANS (The American Association of Neurological Surgeons) and the CNS (The Congress of Neurological Surgeons) guidelines all state that c-collars are effective in limiting motion of the cervical spine and should be used until the patient is properly assessed and the c-spine is cleared.

# Disclaimer

- ▶ The following EMS protocol is that of SSM Cardinal Glennon Children's Medical Center, which is in line with the regional EMS protocols.
- ▶ Please remember that all EMS protocols can vary based upon whose medical direction they are under.

# When is Full Spinal Immobilization Appropriate

- ▶ Full Spinal Immobilization with spine board should be done if:
  - ▶ The patient is unable to safely self-extricate without worsening symptoms or they are not able to move or bear weight.
  - ▶ The patient is unconscious
  - ▶ More than a short distance to stretcher
  - ▶ Movement presents a strain to patient that may worsen symptoms
  - ▶ Unable to keep adequate stabilization with other movement options

# Selective Immobilization with a C-collar Criteria

- ▶ Selective Immobilization (cervical collar)
  - ▶ Focal neurological defect
  - ▶ If they fall into the high risk patient category
  - ▶ If they fall into the low risk patient category

**A long board will likely be used to transfer the patient to the stretcher and then the patient will be secured to the stretcher**

- ▶ High Risk Patients are:
  - ▶ Ejection from vehicle
  - ▶ Motorcycle crash >20MPH
  - ▶ Auto vs pedestrian or bike at > 20MPH
  - ▶ Axial load to the head
  - ▶ Falls from 3 times patient's height.
- ▶ Low Risk Patients are:
  - ▶ Have point tenderness on palpation of spinous process
  - ▶ Children with mechanism and complaint of neck pain
  - ▶ Are not at baseline level of alertness
  - ▶ Have evidence of clinical intoxication
  - ▶ Can't communicate adequately (Glasgow Coma Scale 15)



# Selective Immobilization without C-collar Criteria

- ▶ Selective Immobilization (no cervical collar)
  - ▶ Patients that this will delay transport
  - ▶ Conscious patients that tolerate them poorly due to anxiety or SOB and can maintain stabilization on their own
  - ▶ Patients that are difficult to intubate
  - ▶ Patients with no neuro findings
  - ▶ Patients with no spinal tenderness
  - ▶ Patients with no distracting injury
  - ▶ Patients that do not appear intoxicated

# These Changes Will.....

- ▶ reduce pain and suffering
- ▶ reduce complications
- ▶ decrease on scene times
- ▶ reduce injuries to crews who are attempting to carry immobilized patients
- ▶ reduce unnecessary imaging costs and radiation exposure

# NATA Recommendations

The NATA strongly urges ATs to:

- ▶ Contact local EMS provider(s) as soon as possible to professionally review, discuss and rehearse current protocols for immobilization and transfer of a suspected spine-injured athlete as recommended by their medical director and/or state agency, including equipment intensive patients
- ▶ Update Emergency Action Plans if necessary and be prepared for all aspects of the plan.
- ▶ Actively seek new evidence through advanced training, solicitation of expert advice and remain up to date on the latest scientific research in this important area

# Conclusions

- ▶ Remember that all EMS protocols are different so it is important to work with your EMS district to familiarize yourself with their protocols.
- ▶ A rigid c-collar may be used instead of full spinal immobilization when transporting possible c-spine injuries.
- ▶ A long board may simply be used to transport the patient to the stretcher.
- ▶ There are no new guidelines in regards to equipment removal at this time, however keep in mind that if a c-collar must be placed a helmet will need to be removed.

Questions???