Literature Review and Recommendations

EMS Spinal Precautions and the use of the Long Backboard

EMS Bureau Protocol Review Steering Committee

Background

Field spinal immobilization using a backboard and cervical collar has been standard practice for patients with suspected spine injury since the 1960s. The backboard has been a component of field spinal immobilization despite lack of efficacy evidence. While the backboard is a useful spinal protection tool during extrication, the use of backboards is not without risk, as they have been shown to cause respiratory compromise, pain, and pressure sores. Backboards also alter a patient's physical exam, resulting in unnecessary radiographs.

Question

Because backboards present known risks, and their value in protecting the spinal cord of an injured patient remains unsubstantiated, should the EMS Treatment Guidelines be amended to recommend a more judicious use of the device?

Method

Key words used: cervical spine; backboard; cervical collar; extrication, EMS, pre-hospital, spinal immobilization

Search engine(s) used: MEDLINE (PubMed up to January 2015), and Cochrane Library (Cochrane up to January 2015)

Review process used: A review of the literature was conducted using two electronic medical literature databases. Medical Subject Headings, keywords and a pre-hospital search filter were used to yield relevant literature.

Number of articles reviewed: Eighteen

Number of articles deemed to be relevant and fully read: Twelve

Articles cited and used to draw conclusions or formulate recommendations: six including one prospective cohort study, two retrospective chart reviews, and one retrospective analysis of penetrating trauma patients

Results

A 1966 report by Geisler et al persuaded the medical community to subscribe to the belief that patients with blunt-force trauma (primarily from motor vehicle crashes) should be immobilized on rigid devices to minimize the risk of delayed paralysis in the setting of occult spinal column injury. [1]

Farrington, in 1968, described the placement of a cervical collar and a long or short backboard as necessary to keep the head and neck from sagging during extrication. [1] The backboard was designed to assist in minimizing spinal movement during complex extrication maneuvers by freeing the hands of rescuers from actively holding spinal precautions.

In 1971, the American Academy of Orthopedic Surgeons advocated the use of spinal immobilization using a backboard and cervical collar for trauma patients with signs and symptoms of spinal injury. [2] The feeling of the medical community at this time was that providers would further injure the patient if they did not fully immobilize them with a cervical collar and spine board. Protocols were written that made this technique the standard of care.

As stated, older studies champion the use of cervical collars and backboards as a useful spinal protection adjunct during extrication, when the patient must be moved by multiple rescuers from a position of injury to a position of safety on the ambulance cot. However, the benefits of the backboard as a spinal protection adjunct once the patient is on the ambulance cot are less clear and are not well described in the literature.

A 5-year retrospective chart review was carried out at 2 university hospitals. All patients with acute blunt traumatic spinal or spinal cord injuries transported directly from the injury site to the hospital were entered. None of the 120 patients seen at the University of Malaya had spinal immobilization during transport, whereas all 334 patients seen at the University of New Mexico did. There was less neurologic disability in the non-immobilized Malaysian patients. This corresponded to a <2% chance that immobilization has any beneficial effect. Results were similar when the analysis was limited to patients with cervical injuries. [3]

A prospective cohort study of children presenting to the emergency department (ED) for evaluation following trauma over a 13-month period was conducted. Children were eligible if they underwent spinal immobilization prior to physician evaluation or if they met the American College of Surgeons (ACS) guidelines for spinal immobilization but were not immobilized. They compared children who were immobilized with those who were not immobilized for self-reported pain, use of radiography to evaluate the cervical spine, ED length of stay, and ED disposition. The study concluded that despite presenting with comparable PTSs and GCSs, children who underwent spinal immobilization following trauma had a higher degree of self-reported pain, and were much more likely to undergo radiographic cervical spine clearance and be admitted to the hospital than those who were not immobilized. [4]

A retrospective analysis of penetrating trauma patients in the National Trauma Data Bank using multiple logistic regression with mortality as the primary outcome measure was conducted. Patients with pre-hospital spine immobilization were compared to those without prehospital spine immobilization, using patient demographics, mechanism (stab vs. gunshot), physiologic and anatomic injury severity, and other prehospital procedures as covariates. The study found that prehospital spine immobilization was associated with higher mortality in penetrating trauma and should not be routinely used in every patient with penetrating trauma. [5]

Discussion

While the backboard can be an important spinal protection adjunct during extrication, use of the backboard has side effects. Numerous side effects have been previously investigated.

Pain is not limited to areas of contact with the backboard, as backboards can also cause pain in the lower back and cervical spine due to the anatomically incorrect positioning caused by a flat backboard. Existing painful conditions can be exacerbated and new pain can develop in areas that were not painful prior to the application of the backboard. Pain may improve or resolve for some patients once they are removed from the backboard. Lower back and cervical pain has been reported to persist in previously pain-free, healthy volunteers 24 hours after being subjected to only one hour on a backboard.

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. Unnecessary radiological studies carry their own risks including prolonged lengths of stays in the emergency department and increased cost of evaluation.

Studies of healthy, nonsmoking males show that straps tightened across the torso have a restrictive effect. For those patients with injury to the chest wall and lungs, backboard straps further interfere with respiratory mechanics; removal of these straps improves ventilation even in the face of such injuries.

Because the backboard is a rigid appliance that does not conform to a patient’s body, patients develop pressure sores because of being immobilized on the backboard.

Recommendations
The EMS Bureau Protocol Review Steering Committee recommends that the following wording be added to the NM EMS Treatment Guidelines; this wording is from the National Association of EMS Physicians and the American College of Surgeons Committee on Trauma recommendations on EMS spinal precautions and use of the long backboard.

- 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. Utilization of backboards for spinal immobilization during transport should be judicious, so that the potential benefits outweigh the risks.
- Patients with penetrating trauma to the head, neck, or torso and no evidence of spinal injury should not be immobilized on a backboard. Spinal precautions can be maintained by application of a rigid cervical collar and securing the patient firmly to the EMS stretcher. Whether or not a backboard is used, attention to spinal precautions among at-risk patients is paramount. These include application of a cervical collar, adequate security to a stretcher, minimal movement/transfers, and maintenance of inline stabilization during any necessary movement/transfers.

The scope of practice is quite vague, however it does mention the term “spinal immobilization” for all levels. Based on the findings of this literature review, the EMS Bureau recommends the following changes to the Scope of Practice wording:

- Spinal Precautions when indicated

We recommend this change occur at each of the following locations in the current rule containing the Scope of Practice (Supplemental Licensing Provisions; 7.27.11 NMAC):

- 7.27.11.8 K 1 (g)
- 7.27.11.8 L (1) (g)
- 7.27.11.8 M (1) (g)
- 7.27.11.8 N (1) (g)

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