LETTERS TO THE EDITOR

Unnecessary Out-of-hospital Use of Full Spinal Immobilization

To the Editor: — Patients often present to an ED in full spinal immobilization (FSI), usually consisting of a rigid collar, lateral head restraints, a long backboard, and strapping. There is general agreement that FSI is appropriate when applied to trauma victims complaining of neck or back pain, showing a neurological deficit, having an altered mental status (head injury, alcohol/drug intoxication), or having a major distracting injury. Few studies have investigated the frequency with which FSI is applied to alert and cooperative patients with none of these complaints.

Our study had 2 goals: to determine the frequency of unnecessary FSI in alert, cooperative patients presenting to an ED who are not clinically intoxicated and do not have an obvious distracting injury; and to determine whether FSI alters the frequency of patient complaints concerning the neck or back pain.

Methods

Study Design: A prospective study was done on a convenience sample of ED patients presenting in FSI. Because of the noninterventional, simple questionnaire nature of the study, it was exempted from the formal institutional review board (IRB) approval process by the hospital IRB.

Setting and Population: The patients were seen at a Level-1 trauma center with an annual census of 70,000 patients. All emergency medical services (EMS) units had at least 1 paramedic on board. EMS personnel were not informed of the study, and data were always collected out of their presence. Only those patients presenting during the hours of duty of the 2 authors were included. Standard local EMS procedure is to immobilize patients based on mechanism of injury. Because "mechanism of injury" is so liberally interpreted, in practice almost every patient with any type of trauma is immobilized before transport to our ED. All ED patients who were ≥16 years of age and who presented in FSI were eligible.

Patients were excluded if they met any of the following criteria: an initial revised trauma score <12 calculated by paramedics at the scene; an initial Glasgow Coma Scale score <15 calculated by paramedics at the scene; any clinically obvious major distracting injury; any clinical signs of alcohol or drug intoxication; the presence of any neurologic deficits; a recent seizure; or pregnancy. A major distracting injury was defined as possible long-bone fractures, rib fractures, pelvic fractures, or clinically significant abdominal pain. Patients with a transient or questionable loss of consciousness were not excluded if they met no other exclusion criteria.

Measurements: Data collected from the patient included name, age, sex, and date of visit. On arrival to the ED and before any restraints were removed, participants were asked the 5 following questions: Does your neck hurt now? Did your neck hurt before the collar was put on? Does your back hurt now? Did your back hurt before you were placed on the backboard? Did the paramedic ask you if your neck or back hurt before you were restrained?

Data Analysis: The proportions of asymptomatic patients, as well as the proportions of patients stating they had neck, back, or no pain, before and after FSI, were compared using a Z-test for proportions, with a p-value <0.05 considered significant.

Results

A total of 129 patients were included in the study; there were 65 men and 64 women. Ages ranged from 16 to 85 years, with a mean age of 35.9.

Patient responses to questions concerning neck or back pain at the scene and in the ED are shown in Figure 1. Although the majority of patients (51.9%) initially were asymptomatic, some patients did complain of neck pain (17.1%), back pain (14.7%), or both (16.3%). Combining the patients with both neck pain and back pain into the appropriate categories, we found the following:

1. Sixty-seven patients (51.9%) stated they had neither neck nor back pain at the scene, decreasing to 46 patients (35.7%) by the time they arrived at the ED (p < 0.05). This was a decrease of 21 patients—a relative decrease of 31.3%.

2. Forty-three patients (33.3%) responded that they had neck pain at the scene, increasing to 57 patients (44.2%) by the time they arrived at the ED (p < 0.05). This was an increase of 14 patients—a relative increase of 32.6%.

3. Forty patients (31%) responded that they had back pain at the scene, increasing to 64 patients (49.6%) by the time they arrived at the ED (p < 0.05). This represented an increase of 24 patients—a relative increase of 60%.

From the time of FSI application to ED presentation, there were statistically significant decreases in the number of asymptomatic patients, and statistically significant increases in the number of patients complaining of neck or back pain. No patient ever had neck or back pain that disappeared subsequent to FSI application.

Many asymptomatic patients stated they had protested being placed in FSI, but were told it was "precautionary," "policy," or "they had to." Of interest, 17 patients (13.2%) responded they were not even asked about the presence of neck or back pain prior to FSI.

Discussion

Few studies have been done on trauma victims with no initial complaints of neck or back pain. In a recent prospective study of 549 alert, oriented, and clinically nonintoxicated adult trauma victims presenting to an ED with no signs or symptoms of neck injury, Velmahos et al.2 concluded that clinical examination alone
could reliably assess all patients for cervical injuries, even patients with distracting injuries. Although no cervical fractures were found in the entire group, institutional protocol required "radiologic clearance" before removing any collars from the patients, which required nearly 2,300 films and 78 CTs/MRIs, and added $242,000 to patient billings. Remember, none of these patients had any complaints of neck pain! The average stay in a cervical collar was 3.3 hours, with a range up to 72 hours. Seventeen patients were admitted for no reason other than radiographic clearance of an asymptomatic neck. The authors stated that "the absence of any palpation or motion neck tenderness during examination, the patient may be released from cervical spine precautions without any radiographic investigations." In other studies, similar combined cervical injury criteria have demonstrated excellent physician-to-physician and physician-to-paramedic interrater reliability. However, at least one study has shown less reliability between emergency physicians and emergency medical technicians in interpreting such criteria.

In another study, Domeier et al. prospectively studied 2,102 out-of-hospital patients, who had a total of 19 cervical and 46 thoracic-lumbar fractures. No cervical fracture occurred in any patient not having at least 1 of the 5 following signs: midline spinal pain or tenderness; alteration in mental status; neurologic deficit; evidence of intoxication; or a significant distracting painful injury. They concluded the absence of all these criteria could be used to identify patients not requiring rigid out-of-hospital spinal immobilization. In a more recent report, the same authors prospectively examined the same 5 criteria in 8,975 patients, 108 (1.2%) of whom had a cervical spinal injury. At least 1 of the criteria was documented on all but 1 of the injured patients; the authors stated "this patient would have been captured had a more thorough EMS history and examination been performed." The authors concluded "with careful assessment, absence of the study criteria can be used to identify trauma patients without significant spinal injury who do not require rigid spinal immobilization.

One prime reason advocated to continue the practice of immobilizing asymptomatic patients is to prevent injury from an "occult" cervical spine fracture. However, several recent reviews have cast serious doubt whether this injury even exists. In one review, Sweeney and Marx conclude that outside the context of an altered mental status or distracting injury "no case of acute, truly asymptomatic cervical spine fracture has been documented." Bell states "careful analysis . . . fails to corroborate the conclusion that the truly occult cervical spine fracture exists." Velmahos et al. state "we strongly believe that 'missed' cervical spine injuries in asymptomatic, alert, nonintoxicated, communicative patients are most likely due to superficial and unfocused clinical examinations rather than secret mysteries in the pathophysiology of disease.

Retrospective and prospective studies have both demonstrated that radiographic studies are not indicated in patients without neck pain or tenderness, neurologic signs, an altered mental status, or a distracting injury elsewhere. In a recent position statement, the American College of Radiology agreed unanimously that cervical spine radiographs were considered not appropriate in patients who are asymptomatic and alert, with a normal physical examination, with or without a cervical collar in place. In the recent trauma literature, Bell concludes "extensive retrospective and prospective evidence supports the position that in alert patients, not under the influence of drugs or alcohol; who have no complaints of neck pain on palpation of the cervical spine; who have no neurological findings on physical examination; and who do not have associated injuries of such magnitude that their presence would distract the patient from perceiving neck pain or other neurological sequelae, do not require roentgenographic evaluation of the cervical spine based on the mechanism of injury alone" [italics added]. The Chairperson of the American College of Surgeons Committee on Trauma has also written that "radiologic studies of the cervical spine are not necessary in patients who are awake, alert, sober, and neurologically normal and who do not have neck pain."

Standard backboard immobilization is not harmless and can cause significant pain, especially at the occipital prominence and lumbosacral areas. Within 10 minutes of being placed in FSI, Hamilton and Pons showed that volunteers developed moderate to severe pain. After 30 minutes in FSI, Chan et al. found 100% of volunteers complained of pain, with 55% of the group grading their pain as moderate to severe in quality. Interestingly, 29% of the subjects developed new symptoms over the course of the next 2 days. Chen et al. concluded that "the standard process of immobilization may complicate the evaluation of the trauma patient by generating additional symptoms . . . leading to unnecessary laboratory tests and radiographic studies, time of immobilization, and ultimately, health care costs." In addition to pain, FSI can cause changes in pulmonary function, can cause pressure ulcers of the buttocks,
scalp, or neck, and can increase the risk of aspiration after vomiting.\textsuperscript{13,14} Because standard FSI can compromise maternal and fetal circulation, it is relatively contraindicated in gravid women.

At least one state has established a spinal assessment program to teach out-of-hospital providers when FSI is not required.\textsuperscript{15} Upon completion of this program, out-of-hospital providers may transport patients to an ED without FSI if they have no cervical pain to palpation or motion, and if they have intact motor and sensory functions. In 1992, prior to establishment of this program, paramedics in Portland, Maine, immobilized 26% of patients classified as trauma; this fell to 11% in 1995, after institution of the spinal assessment program.\textsuperscript{15}

Who should be immobilized? A current textbook for out-of-hospital care\textsuperscript{16} states that "the rule of thumb for spinal immobilization is that it should be done for any trauma above the clavicles."\textsuperscript{17} We would substitute any victim of trauma with a complaint of neck or back pain, any patient with neurologic symptoms compatible with a spinal cord injury, and any patient having an altered mental status or distracting injury. Do patients with none of these signs or symptoms require transport in FSI? The literature demonstrates that simple out-of-hospital criteria can identify patients at risk of cervical injury; that unnecessary FSI increases discomfort and adds unnecessary expenses; that asymptomatic patients do not require radiographic clearance; and that occult cervical spine fractures do not exist, or are so rare as to be functionally nonexistent. If doubt exists, immobilize and transport the patient; otherwise, there is no longer a compelling reason to transport all asymptomatic patients in FSI.

Limitations

Our study had several limitations. First, no alcohol or drug levels were measured. Our decisions regarding intoxication were based solely on patient responses and cooperativeness, odor of alcohol on the breath, and physician judgment. Second, although previous studies have documented a temporal relationship with FSI-induced pain, we made no attempt to measure the duration of time our patients remained in FSI. Third, given a patient’s distress after a recent trauma, his recall of symptoms at the scene of the incident might not be optimal. However, most of our patients appeared calm, and expressed good recall of the incident and its aftermath. Fourth, no attempt was made to see whether certain paramedic crews were overrepresented in our samples. However, because the authors worked rotating shifts over several months, exposure to all EMS crews should have averaged out.

Conclusion

In this population of alert and cooperative patients with no obvious distracting injuries or clinical signs of intoxication, 52% had no complaints of neck pain or back pain yet were transported to the ED using FSI, which increased both their level of discomfort and their EMS charges.

REFERENCES


Substance Abuse and Emergency Medicine: Not So Benign Neglect

To the Editor.—The abuse of alcohol, tobacco, and other drugs (ATODs) accounts for millions of ED visits each year.\textsuperscript{1} This includes ED visits for treatment of the direct effects of ATODs as well as illnesses and injuries that complicate substance abuse. In spite of this fact, emergency medicine (EM) training devotes very little time to teaching the recognition, management, and prevention of substance abuse.\textsuperscript{2}

A review of the abstracts of the SAEM 1996 annual meeting in Denver revealed limited scholarly activity related