Clinical Presentation of Patients with Acute Cervical Spine Injury

A retrospective review of 67 patients with acute cervical spine fracture and/or dislocation was conducted at two suburban community hospital emergency departments. The mean age was 39, and two-thirds of the patients were male. Motor vehicle accidents and falls accounted for more than 80% of all injuries. On emergency department evaluation, it was found that there was no history of loss of consciousness in 42 patients (63%), no associated cranio-facial injuries in 31 patients (46%), and a normal sensorimotor examination in 59 patients (88%). Thirty-four patients (50%) were evaluated for cervical range of motion, which was found to be normal in one-third of the cases. The absence of mental status changes, cranio-facial injuries, range of motion abnormalities, and focal neurological findings is, therefore, not uncommon in patients who have sustained cervical spine injury. [Walter J, Doris PE, Shaffer MA: Clinical presentation of patients with acute cervical spine injury. Ann Emerg Med July 1984;13:512-515.]

INTRODUCTION

Published studies on cervical spine injury for the most part have cited data derived from experience in tertiary care centers. These studies have concentrated on patients with injury to the cervical cord, detailing the types of associated cervical spine lesions, reviewing the mechanics of physical disruption of the cervical spine, and describing the neurological sequelae seen with cervical trauma. Controversies in treatment have received extensive discussion.1-4

Such data, however, may not be entirely applicable to emergency practice. In fact, the population bias of available studies may have led to significant distortions in our understanding of the clinical presentation of patients seen in primary care facilities with an acute cervical spine lesion.

Our study is a retrospective analysis of a series of patients who were evaluated in the emergency departments of two suburban community hospitals and diagnosed as having sustained acute cervical spine fracture and/or dislocation. The patient population and etiology of injury are described. Special attention is given to the clinical presentation of these patients.

MATERIALS AND METHODS

The charts of 67 patients with a hospital discharge diagnosis of cervical spine fracture and/or dislocation were reviewed retrospectively. These patients were evaluated and treated from 1977 through 1980 at two suburban community hospitals located approximately 30 miles from Chicago. The emergency departments of the two hospitals have a combined volume of 60,000 visits per year.

The patients' emergency department and hospital charts were analyzed retrospectively for age, sex, and etiologic event. Presenting symptoms were determined by reviewing information offered spontaneously by the patient or elicited in questioning by the triage officer and the examining physician. The physician's initial examination was reviewed carefully, with particular attention to data regarding mental status, neck tenderness, cervical range of motion, neurological findings, and associated injuries. If necessary, additional information concerning physical findings was obtained from the triage officer's notes and the consulting physician's summary. The results of all radio-
graphic studies of the cervical spine were recorded and classified according to distribution and probable mechanism of injury.

RESULTS

Of the 67 patients with acute cervical spine injury, 45 (67%) were male. The mean age was 39. Sixty percent of the injuries occurred in patients between 21 and 50 years of age.

Motor vehicle accidents were etiological in 45 patients (70%). Falls accounted for the injury in eight patients (12%). Five patients (7%) suffered sports-related trauma, three diving into shallow water, one attempting a back flip, and one hitting his head on the backboard while playing basketball. Three patients (4%) were pedestrians hit by a motor vehicle. In two inebriated patients, there was no obvious history or signs of trauma. One patient with breast cancer metastatic to the cervical spine sustained a fall and presented with neck pain of four days duration. One patient was status post cervical laminectomy and fusion with a recent increase in neck pain.

Analysis of the clinical presentations of this series of patients revealed that 42 patients (63%) presented without a history of loss of consciousness. Four patients (6%) had an equivocal history with regard to loss of con-
had a documented episode of loss of consciousness. Twenty-one patients (31%) had multiple injuries or at least multiple lacerations/contusions. However, four of these patients had altered mental status secondary to alcohol or trauma. The majority of the 12 patients had multiple injuries or at least multiple lacerations/contusions. Moreover, in four of these 12 patients some neck tenderness was discovered on careful palpation of the cervical spine [Table 1].

Thirty-one patients (46%) presented without evidence of cranio-facial trauma. In 59 patients (88%) a normal neurological examination (excluding mental status changes) was documented by the emergency physician. Thirty-four patients (50%) were evaluated prior to radiographic examination for cervical range of motion, which was found to be normal in one-third of the cases (Table 2).

In seven patients (10%) the diagnosis of cervical spine injury was not made on initial presentation to the emergency department because the radiographic examinations were inadequate or misinterpreted. The injuries missed in these seven patients were as follows: 1) two simple odontoid fractures; 2) odontoid fracture with associated Jefferson fracture; 3) C2/C3 subluxation; 4) C2 pedicle fracture with C2/C3 subluxation; 5) subluxation injury of C3/C4 and C4/C5 with an associated fracture of the posterior element of C4 and a compression fracture of the body of C5; and 6) C6/C7 unilateral facet dislocation.

Radiographic examination of the cervical spine revealed bony injury alone in 31 patients (46%), a purely ligamentous injury in 16 patients (24%), and a combined injury in 20 patients (30%). There were 62 fractures, of which 45% involved the vertebral bodies; 40%, the posterior elements; and 15%, the odontoid process. Of the total fractures, C2 injuries accounted for 26% and C5, C6, and C7 injuries for 56%. Subluxation injuries were rather evenly distributed, with C4/C5 affected most frequently.

Analysis of the radiographs, using the classification for mechanism of injury as proposed by Harris and Harris,5 revealed the presumed force of injury to be flexion in 36 patients (54%), extension in 22 patients (33%), and flexion/rotation and lateral flexion in one patient each.

**TABLE 2. Cervical spine injuries in the 11 patients with full range of cervical motion**

<table>
<thead>
<tr>
<th>Age (y)</th>
<th>Sex (M/F)</th>
<th>Etiology</th>
<th>Lesion</th>
</tr>
</thead>
<tbody>
<tr>
<td>33/M</td>
<td>Playing basketball, hit head on backboard</td>
<td>Posterior subluxation C1 on C2, fracture body C2</td>
<td></td>
</tr>
<tr>
<td>24/M</td>
<td>MVA</td>
<td>Anterior subluxation C4 on C5, fracture lamina C4</td>
<td></td>
</tr>
<tr>
<td>18/M</td>
<td>MVA</td>
<td>Fracture spinous process C7</td>
<td></td>
</tr>
<tr>
<td>79/M</td>
<td>MVA</td>
<td>Anterior subluxation C6 on C7, fracture spinous process C6</td>
<td></td>
</tr>
<tr>
<td>49/F</td>
<td>MVA</td>
<td>Anterior subluxation C6 on C7, fracture posterior element C6</td>
<td></td>
</tr>
<tr>
<td>32/F</td>
<td>MVA</td>
<td>Posterior subluxation C2 on C3</td>
<td></td>
</tr>
<tr>
<td>40/M</td>
<td>MVA</td>
<td>Posterior subluxation C5 on C6, fracture posterior element C6</td>
<td></td>
</tr>
<tr>
<td>21/M</td>
<td>MVA</td>
<td>Avulsion fracture anterior/inferior aspect C6</td>
<td></td>
</tr>
<tr>
<td>41/F</td>
<td>MVA</td>
<td>Posterior subluxation C3 on C4</td>
<td></td>
</tr>
<tr>
<td>27/F</td>
<td>MVA</td>
<td>Fracture spinous process C7</td>
<td></td>
</tr>
<tr>
<td>21/M</td>
<td>MVA</td>
<td>Anterior subluxation C2 on C3</td>
<td></td>
</tr>
</tbody>
</table>

*Patients with documented full range of cervical motion who also had no complaints of neck pain or stiffness on presentation.

The etiology of the injuries in our series, most occurring secondary to motor vehicle accidents and falls, is also similar to that attributed in prior studies.9,10 although an occasional series shows a higher frequency of athletic or missile-induced trauma.1 Analysis of the location and types of lesions found on cervical radiographs resulted in figures comparable to those noted in other studies.2,8,9,11,12 While the population, method of injury, and types of lesions in this series are similar to what has been reported previously, the clinical presentation of the patients is substantially different. The traumatic event was associated in fewer than 40% of patients with documented or suspected loss of consciousness. We also found that almost half the patients had no documented evidence of associated cranio-facial injury.

Eighty-eight percent of the patients had normal motor, sensory, and reflex findings, demonstrating that abnormal neurological signs may not be commonly encountered in patients with acute cervical injury seen in a primary care facility. A much higher incidence of neurological deficits has been cited previously, with 47% to 65% of patients in other series showing physical signs of cord or nerve root damage.2,7,10,13,14 In a recent study1 of 300 patients with acute fractures and dislocations of the cervical spine, 180 had some form of motor paralysis. We believe that this incidence of neurological damage may be secondary to the bias inherent in referral center populations, and is not representative of the general population suffering cervical spine injury. The emergency physician typically will see a much less dramatic presentation than that predicted by much of the literature.

The frequent discrepancy between clinical presentation and severity of injury is discussed. The etiology, clinical presentation, and radiographic findings are reviewed. Attention is directed to the diagnosis of cervical spine injuries in the emergency department and the etiology and distribution of these injuries are presented. The etiology of cervical spine injuries in the emergency department is discussed and the distribution of these injuries is presented.

**DISCUSSION**

We have presented a retrospective review of 67 patients with acute cervical spine fracture and/or dislocation evaluated initially in the emergency departments of two suburban community hospitals. In terms of patient population and etiology of injury, our series is similar to others reported in the literature.6-8

In the etiology of the injuries in our series, most occurring secondary to motor vehicle accidents and falls, is also similar to that attributed in prior studies,9,10 although an occasional series shows a higher frequency of athletic or missile-induced trauma.1 Analysis of the location and types of lesions found on cervical radiographs resulted in figures comparable to those noted in other studies.2,8,9,11,12 While the population, method of injury, and types of lesions in this series are similar to what has been reported previously, the clinical presentation of the patients is substantially different. The traumatic event was associated in fewer than 40% of patients with documented or suspected loss of consciousness. We also found that almost half the patients had no documented evidence of associated cranio-facial injury.

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the underlying lesion is highlighted by the fact that cervical range of motion was mistakenly assessed to be normal in one-third of the patients tested.

The presence of these signs and symptoms has been suggested as a basis for the decision to radiograph patients with suspected cervical spine injury. The absence of these signs and symptoms may have an even more important implication for emergency medicine practice. As we have seen, patients with serious injury to the cervical spine commonly will present with no history of mental status changes, without evidence of cranio-facial injury, and with a normal neurological examination. Some patients will not offer any spontaneous complaints of neck pain or stiffness. The presentation may not include any abnormalities on range of motion testing. Clearly a high index of suspicion must be maintained regarding the possibility of cervical spine trauma in patients known to be at risk.

Seven patients in our group (10%) had cervical spine fracture and/or dislocation that was missed on initial presentation because of inadequate or misinterpreted radiographs. This high frequency emphasizes the need for careful study of cervical spine films and for obtaining radiological consultation if any suspicion exists. That 18% of these patients had no complaints of neck pain or stiffness documented during initial questioning is a surprising finding, whether reflecting the patients' actual clinical presentation or current emergency department recordkeeping practices. Our retrospective study did not benefit from a checklist history or physical examination form, and the lack of such complaints may mean that they were not elicited or perhaps were elicited and not recorded. However, specific physical complaints were carefully documented in eight of these 12 patients. Neck pain was at least not a spontaneous complaint in these patients. Our data suggest that the painless cervical fractures alluded to in the literature may exist, especially in inebriated or confused patients, those with multiple organ system injury, or those with multiple lacerations/contusions. Whether the concept of the painless or occult cervical spine injury is an important clinical entity awaits a carefully monitored prospective study.

SUMMARY

After retrospectively analyzing 67 patients with cervical spine injury, we have detected a substantial difference between the experience reported from tertiary care centers and that seen in suburban community practice. The majority of cervical spine injuries in our series did not present with a history of loss of consciousness or with neurological deficits. Many had no evidence of cranio-facial trauma. Some of the patients exhibited full range of cervical motion when this was mistakenly assessed. The inebriated, the confused, and the multiply injured patients were especially likely to have clinically inapparent cervical spine lesions. Cervical spine injury commonly will have a more subtle presentation than heretofore realized.

REFERENCES

7. Dula DJ: Trauma to the cervical spine. JACEP 1979;8:504-507.