Cervical Radiographic Evaluation of Alert Patients Following Blunt Trauma

The records of 333 consecutive alert patients admitted to a trauma service for neurologic observation after sustaining significant blunt head trauma were reviewed. All patients had class I level of consciousness (alert, responds immediately to questions, may be disoriented and confused, follows complex commands); those with significant acute alcohol and/or drug intoxication were excluded from this study. Cervical spine injury did not correlate with the presence of major concomitant injuries, skull fractures, or major intracranial injuries. Cervical spine injury correlated only with the presence of signs and/or symptoms of cervical injury. This correlation was highly significant (P < .05). Five of the 42 patients (11%) with signs and/or symptoms of cervical injury had cervical spine fractures. No patient without signs and/or symptoms of cervical injury had a cervical spine injury. These findings suggest that among alert patients with class I level of consciousness who have sustained blunt injury, only those who present with signs and/or symptoms of cervical injury require cervical radiographic evaluation. [Fischer RP: Cervical radiographic evaluation of alert patients following blunt trauma. Ann Emerg Med October 1984;13:905-907.]

INTRODUCTION

Cervical spine injury should be anticipated following certain types of major blunt trauma. In these patients cervical spine immobilization should be instituted at the scene and maintained during transport. Following major blunt trauma, cervical radiographic evaluation is essential for patients with decreased levels of consciousness and for alert patients who have signs and/or symptoms of cervical injury. It is unclear whether cervical radiographic evaluation is necessary for alert patients without signs and/or symptoms of cervical injury.

This study was designed to evaluate the necessity of cervical radiographic evaluation for alert patients with class I level of consciousness following blunt head trauma.

MATERIALS AND METHODS

During the 6-month study period, all patients who sustained significant blunt head trauma were admitted for overnight neurological evaluation. This study included 333 alert patients who had class I level of consciousness as defined by Ransohoff: Alert, responds immediately to questions, may be disoriented and confused, follows complex commands. Patients with significant acute alcohol or other substance intoxication were excluded from the study.

RESULTS

The patients' ages ranged from 22 months to 77 years, with a peak incidence in the second decade. The mechanisms of injury are summarized [Table 1]. Seventy-nine percent of the patients suffered loss of consciousness. Thirty-two percent were drinking prior to injury. Eighty-one percent were admitted solely for neurological observation, 19% suffered major concomitant injuries that mandated hospitalization. Forty-three patients (13%) had skull fractures, and eight of these had major intracranial injury (5, depressed skull fracture; 2, subdural hematoma; and 1, subdural hematoma and cortical lacerations).

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Three hundred thirty patients (99%) had radiographic examination of the skull. Although it was our policy to obtain cervical radiographs for all patients admitted for neurologic observation, this policy was poorly observed. Only 226 patients (68%) had such examinations. C-spine films did not routinely include flexion and extension views. Of the 107 patients who did not have cervical radiographic evaluation, none was subsequently determined to have cervical injury during a 3-year follow-up period.

Five patients had cervical fractures (Table 2). Cervical fracture correlated only with the presence of cervical signs and/or symptoms ($P < .05$). All five patients were among the 42 who presented with cervical tenderness and/or pain (11%). Cervical ligamentous disruption and/or dislocation was not identified among the patients without cervical fracture. No patient with a cervical fracture had neurologic findings suggestive of cervical injury, but three patients without a demonstrable cervical fracture, dislocation, or ligamentous injury presented with cervical spinal cord motor and/or sensory deficits. Cervical fractures were not more common among patients with concomitant major injuries that mandated hospitalization, or among patients with a skull fracture and/or intracranial injury.

DISCUSSION

Because of the obvious litigious and personal tragedies of inadvertent spinal cord injury, prehospital cervical immobilization is — most appropriately — liberally employed. The result has been a deluge of patients who present to our emergency departments in cervical immobilization devices. The emergency physician faced with a patient in cervical immobilization often feels that the only reasonable recourse is to obtain cervical radiographic evaluation. Despite a lack of data, this course has been encouraged and, in fact, expanded to the recommendation that essentially all patients who have sustained major blunt trauma should have cervical radiographic evaluation.

It is difficult to anticipate some cervical fractures, and the signs and symptoms of cervical injury may be partially obscured by concomitant painful injuries even in the alert patient. Painless cervical fractures have been described, but an occult cervical fracture — that is, a cervical fracture in an alert patient without cervical signs and/or symptoms — has not been reported. In one report of an “occult” cervical fracture the patient, who had been drinking, fell out of a rapidly moving vehicle and suffered loss of consciousness, a wrist fracture, a forehead laceration, and multiple abrasions. After the accident the patient went home. She presented to the emergency department six hours later with cervical tenderness. Cervical radiographs revealed a subluxation of C-4 on C-5 with fracture of the pedicle and neural arch of C-4. Another report included four patients, of whom three had both cervical pain and tenderness, and the fourth had cervical pain and numbness.

In the absence of head injury, substance abuse, or other causes of decreased level of consciousness, clinical suspicion reliably selects patients at risk for cervical spine injury based on the patient's complaints and the physical examination. In our experience this was true even for the eight patients who had a depressed skull fracture and/or a major intracranial injury.

Regardless of level of consciousness, a stable patient in effective cervical restraint, without major concomitant injuries, can undergo whatever cervical radiographic procedures are deemed necessary to evaluate the cervical spine. The clinical dilemma is the appropriate placement of cervical radiographic evaluation in the sequence of evaluation and resuscitation of critically injured patients — regardless of their level of consciousness — who have, or are likely to have sustained, major concomitant injuries. Although it has been urged, it is inappropriate to perform cervical radiographic evaluation as the initial radiographic procedure, as a matter of protocol, on all patients who have sustained major blunt trauma. The priority of cervical radiographic evaluation should be weighed against the urgency of known or likely major concomitant injuries.

Cervical radiographic evaluation that is complete enough to exclude cervical spine injury often is impractical in critically traumatized patients regardless of their level of consciousness. The portable lateral cervical radiograph, which is the best radiographic view, demonstrates only 86% of cervical spine fractures. Suspicious findings on this view, or on the anteroposterior and open-mouth cervical views, often necessitate further radiographic evaluation that, except for the swimmer's view, may be incompatible with the patient's immediate resuscitation and treatment needs because it cannot be performed in the trauma area.

Tragically avoidable deaths have occurred during the performance of low-priority radiographic examinations. This is particularly true for those that must be performed outside the trauma receiving area. The axiom is that effective cervical immobilization must be maintained until the possibility of cervical spine injury has been excluded. In critically injured patients in effective cervical immobilization, the radiographic evaluation of the cervical spine can and should be deferred until urgent resuscitation and treatment needs have been addressed.

CONCLUSION

Based on this study, alert patients with class 1 level of consciousness, without signs or symptoms of cervical injury do not require cervical radiographic evaluation. A reasonable approach for such patients is to perform a complete neurologic examination and, if no signs of cervical column or cord injury are found, to remove the cervical restraint carefully while maintaining the neck and head in the
neutral position. If palpation of the neck does not reveal tenderness, cervical restraint can be eliminated and cervical radiographic evaluation can be omitted. I have followed this course for the last seven years without regret.

REFERENCES