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## Original Contributions

### DISTRACTING INJURIES IN PATIENTS WITH VERTEBRAL INJURIES

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□ **Abstract**—To describe the prevalence and types of distracting injuries associated with vertebral injuries at all levels of the spine in blunt trauma patients. A prospective cohort study was conducted at an urban Level I trauma center. All patients undergoing radiographic evaluation of the cervical, thoracic, or lumbar vertebrae after blunt trauma were enrolled. Patients had a data collection form completed by the treating physician before radiographic imaging and were evaluated for the following upon initial presentation: tenderness to the cervical, thoracic, or lumbar spine, distracting injuries, altered mental status, alcohol or drug intoxication, or neurological deficits. Patients with distracting injuries as the sole documented indication for vertebral radiographs were reviewed for the types of injuries present. A total of 4698 patients were enrolled in the study. There were 336 (7.2%) patients who had distracting injuries as the sole documented indication for obtaining radiographic studies of the vertebrae. Eight (2.4%, 95% CI 1.0–4.6%) of the 336 patients had 14 acute vertebral injuries including compression fractures (5), transverse process fractures (7), spinous process fracture (1), and cervical spine rotatory subluxation (1). There were 13 thoracolumbar injuries and one cervical spine injury. Distracting injuries in the eight patients with acute vertebral injuries included 13 bony fractures. Distracting injuries in those patients without vertebral injuries included bony fractures (333), lacerations (63), soft tissue contusions (62), head injuries (15), bony dislocations (12), abrasions (11), visceral

injuries (8), dental injuries (5), burns (3), ligamentous injuries (3), amputation (1), and compartment syndrome (1). In conclusion, in patients with distracting injuries, bony fractures of any type were important for identifying patients with vertebral injuries. Other types of distracting injuries did not contribute to the sensitivity of the clinical screening criteria in the detection of patients with vertebral injuries. © 2005 Elsevier Inc.

□ **Keywords**—distracting injury; vertebral injury; cervical spine; thoracic spine; lumbar spine; blunt trauma

#### INTRODUCTION

The presence of a distracting painful injury has been considered an indication for radiographic evaluation of the cervical spine (1–3). Distracting injuries rank second only to cervical spine tenderness as the most frequent indication for radiographic evaluation of the cervical spine among patients with cervical spine injuries (2). However, this entity can be very subjective. The current guidelines provided by the National Emergency X-Radiography Utilization Study (NEXUS) suggest the following as examples of distracting injuries: long bone fractures, visceral injuries, large lacerations, degloving or crush injuries, large burns, or any other injuries that distract the patient from cervical spine pain (4). However, these examples have not been validated.

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**Table 1. Locations of Vertebral Injury in those Patients Undergoing Vertebral Spine Radiography Solely Due to the Presence of a Distracting Injury**

Vertebrae level	Transverse process fracture	Compression fracture	Spinous process fracture	Rotatory subluxation
C1				1
T6		1		
T11		2		
T12	1	1		
L2	1	1		
L3	3		1	
L4	2			

One prior study defined types of distracting injuries in patients with cervical spine injuries (5). This study suggested that fractures and soft tissue injuries were the most common distracting injuries in patients undergoing cervical spine radiography. In addition, several studies have suggested that major injuries are an important indication for thoracolumbar imaging (6,7).

Our objective is to describe the prevalence and types of distracting injuries associated with blunt vertebral spine injuries at all levels of the spine.

## METHODS

### Study Setting and Population

The study prospectively enrolled all blunt trauma patients presenting to the Emergency Department (ED) of an urban Level 1 trauma center from August 1997 to November 1998 and underwent radiographic evaluation of the cervical, thoracic, or lumbar spine. Data was collected in conjunction with the NEXUS cervical spine study. This center has an annual census of 65,000 patients, including 12% who present after blunt trauma. The study was approved by the Human Subjects Review Committee.

### Study Protocol

The decision to obtain radiographic imaging was made by the emergency physicians involved in the care of the patient and was not determined by study protocol. Patients with penetrating trauma, non-traumatic indications for vertebral imaging, or those transferred from another facility were excluded. Patients with blunt trauma who did not receive a radiographic evaluation of the cervical, thoracic, or lumbar spine were followed clinically if admitted to the hospital or through trauma CQI committees to identify any patients with vertebral injuries that were not enrolled in the study.

Clinicians completed a standardized data collection form before radiographic imaging of all patients. Clinicians assessed each patient for the presence or absence of the following five findings upon initial presentation to the ED: midline tenderness involving the cervical, thoracic, or lumbar spine; the presence of any distracting injuries; altered mental status; alcohol or drug intoxication; or neurological deficits. Physicians were not provided with a detailed definition of distracting injury, but were instructed that a distracting injury was present if the injury had the potential to distract the patient's attention away from possible vertebral injuries. Altered mental status was defined as an abnormal Glasgow Coma Scale score, disorientation, or inappropriate response to external stimuli. The presence of alcohol or drug intoxication was based on the initial history and physical examination obtained by the treating physician.

This analysis consists of patients with distracting injuries as the sole documented indication for radiographic imaging. Therefore, all patients described in this study had a normal mental status, no vertebral spine tenderness, no apparent signs of intoxication, and a normal neurological examination. The specific types of distracting injury were obtained from the data forms when documented by the treating physician. For those patients whose specific types of distracting injuries were not

**Table 2. Findings in the Eight Patients with Vertebral Injuries and Distracting Injuries**

Age/sex	Mechanism	Distracting injury	Vertebral injury	Therapy
70/M	Fall 5 feet	Rib fractures	T12, L2-3 transverse process fractures	None
16/M	Fall 25 feet	Tibia/fibula, pelvis, radius, calcaneus, talus, cuboid fractures	T11-12 compression fractures	None
25/M	Motorcycle	Clavicle fracture	L3 spinous process fracture	None
20/M	Motorcycle	Femur fracture	T6 compression fracture, L4 transverse process fracture	None
82/F	Motor vehicle collision	Rib fractures	T12, L2 compression fractures	TLSO brace
21/M	Auto vs. Pedestrian	Tibia fracture	L3 transverse process fracture	None
41/M	Fall 20 feet	Rib fractures	L3-4 transverse process fractures	None
54/M	Motor vehicle collision	Humerus fracture	C1 rotatory subluxation	Refused therapy

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