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The Importance of Evaluating All Seven Cervical Vertebrae in the Trauma Patient: A Case Report

Merih İŞ
Ayşe KARATAŞ
Fevzullah AKYÜZ
Ferruh GEZEN

Düzce University, School of Medicine, Department of Neurosurgery, Düzce, Turkey

ABSTRACT

The cervical spine is injured in approximately 3% of major trauma patients and 10% of patients with serious head injury. We present a patient in whom an unstable cervical spine, without neurological deficit, resulting from a traffic accident was misdiagnosed as normal in the emergency room. Although cervical spine pain or tenderness and neurological deficit have a sensitivity of 93% for cervical spine injury, asymptomatic patients or patients with mild symptoms can have spine injury. All trauma patients with a complaint of mild neck pain require a standard three-view radiological evaluation of the cervical spine demonstrating all seven vertebrae and the top of first thoracic vertebra even if their neurologic examination is normal.

KEY WORDS: Spine; Cervical Injury; Radiography; Trauma

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Correspondence Address
Merih İŞ
E-mail: merihis@yahoo.com

INTRODUCTION

Trauma constitutes a significant portion of emergency department practice. Such patients often have suspected cervical spine injuries necessitating cervical spine radiographs (10).The cervical spine is injured in approximately 3% of major trauma patients and 10% of patients with serious head injury (9). The initial emergency room trauma evaluation attempts to reveal cervical spine pain or tenderness, or a neurological deficit. These physical findings are reported to have a sensitivity of 93% for cervical spine injury, but a specificity of only 16% (8). Neck pain or tenderness is a highly sensitive sign of injury in the patient without a closed head injury (8). Neck discomfort without other positive signs and symptoms has a reported sensitivity of 86% (8).

Patients can be stratified clinically by the degree of risk of cervical spine injury using direct radiographic evaluation (8,10). The accurate diagnosis of cervical spine injuries remains a significant problem in evaluating seriously injured trauma patients. The three-view plain film cervical spine series is the standard of care for all seriously injured patients (2). All patients evaluated in the trauma service with a possible mechanism for cervical spine injury undergo a standard three-view cervical spine series (anterior-posterior, lateral, and odontoid) (2). The bone and soft tissue, all seven cervical vertebrae, and the top of the first thoracic vertebra should be visible in a good-quality roentgenogram (1). Studies evaluating the clearance of the cervical spine using plain radiographs have found that 15 to 30% of cervical spine fractures are missed, even after retrospective review (4,6). The lateral cervical spine radiograph is estimated to detect between 60 and 80% of cervical spine fractures (4,5).

Here, we present a patient in whom an unstable cervical spine, without neurological deficit, resulting from a traffic accident was misdiagnosed as normal in the emergency room.

CASE REPORT

A 36-year-old male was admitted to the Emergency Room (ER) after a traffic accident. He was oriented to person, place, and time. The Glasgow coma score was 15. He complained of mild neck pain. There had been no loss of consciousness, nausea, vomiting, or weakness.

On arrival in the ER, his temperature was 36.5°C, heart rate 80 beats/minute, respiration rate 20 breaths/minute, and blood pressure 130/80 mm Hg. There was no focal neurologic deficit and the strength of all extremities was 5/5. Careful examination by the attending emergency physician detected mild posterior midline cervical tenderness. An insufficient roentgenogram that showed only five cervical vertebrae was wrongly interpreted as normal by the ER resident (Figure 1). Since all trauma patients routinely undergo consultation by a neurosurgeon, orthopedic surgeon, and general surgeon before they are sent home, the neurosurgery resident examined our patient and his roentgenogram. The neurosurgeon ordered a new roentgenogram showing all seven cervical vertebrae and the C7-T1 junction. The new roentgenogram revealed C5-C6 dislocation (Figure 2) and computerized tomography (CT) was obtained. On CT, both pedicles, a left lamina fracture of C5, and C5-C6 dislocation were observed. The patient underwent anterior C5-C6 and C7 screw-plate fixation with a tricortical iliac autograft and posterior C4-C5-C6 lateral mass fixation after posterior correction of a locked facet. There were no problems in the postoperative period and the patient was discharged from hospital 7 days postoperatively. Five month postoperatively, his neurologic examination was normal and the patient was walking without difficulty.

Figure 1: Insufficient plain radiograph showing five cervical vertebrae only.

Figure 2: The second radiograph showing C5-C6 dislocation.

DISCUSSION

The diagnosis of cervical spine injuries remains a significant problem in many blunt trauma patients. Studies have suggested that the diagnosis is missed in 5 to 23% of patients with a cervical spine injury and that up to 30% of these patients may suffer

permanent neurologic sequelae (4,5). Studies evaluating the clearance of the cervical spine using plain radiographs have found that 15 to 30% of cervical spine fractures are missed, even after retrospective review (4,6). Several authors have examined the relationship between fractures missed on plain radiographs and cervical instability. Gerrelts et al. (5) found a delayed or missed diagnosis of cervical spine instability in 5% of patients. Davis et al (4) found that 29% of patients with a missed cervical spine injury developed permanent neurologic sequelae. Nunez et al. (6) reviewed 88 patients with cervical spine fractures and found that 32 were not revealed or were shown incompletely, of which one third were felt to be clinically significant (3).

Hyperextension injuries may show anterior disc space widening, focal lordosis, chip fractures of the anterior vertebral body cortex, and subluxation (3). White and Panjabi (7) suggested that focal kyphosis of more than 11° on a static radiograph is a sign of instability. There are five cardinal findings that may be demonstrated on radiography or CT that indicate instability: displacement, a wide interpedicle distance, a wide interspinal (interlaminar) distance, wide facet joints, and disruption of the posterior line of the vertebral bodies. The presence of only one of these findings is sufficient to make a diagnosis of unstable injury (4). The bone and soft tissues, all seven cervical vertebrae, and the top of the first thoracic vertebra should be visible in a good-quality roentgenogram (1).

All trauma patients with a complaint of mild neck pain require radiological evaluation of the cervical spine, even if their neurological examination is normal. A standard three-view cervical spine series must be obtained and it is important to ensure that the plain radiographs demonstrate all seven cervical vertebrae and the top of the first thoracic vertebra before reading them.

REFERENCES

1. Borenstein DG, Wiesel SW, Boden SD. Low back and neck pain. Comprehensive Diagnosis and Management 3 rd edn. Philadelphia: Saunders, 2004
2. Cox MW, McCarthy M, Lemmon G, Wenker J. Cervical spine instability: clearance using dynamic fluoroscopy. Curr Surg. 2001;58:96-100
3. Crim JR, Moore K, Brodke D. Clearance of the cervical spine in multitrauma patients: the role of advanced imaging. Semin Ultrasound CT MR. 2001;22:283-305
4. Daffner RH, Sciulli RL, Rodriguez A, Protetch J. Imaging for evaluation of suspected cervical spine trauma: a 2-year analysis. Injury. 2006; 37:652-8
5. Gerrelts BD, Petersen EU, Mabry J, Petersen SR. Delayed diagnosis of cervical spine injuries. J Trauma. 1991;31:1622-6
6. Nunez DB Jr, Zuluaga A, Fuentes-Bernardo DA, Rivas LA, Becerra JL. Cervical spine trauma: how much more do we learn by routinely using helical CT? Radiographics. 1996;16:1307-18
7. Panjabi MM, White AA. eds. Clinical biomechanics of the spine. 2nd edn. Philadelphia: Lippincott, 1990
8. Roberge RJ, Wears RC. Evaluation of neck discomfort, neck tenderness, and neurologic deficits as indicators for radiography in blunt trauma victims. J Emerg Med. 1992;10:539-44
9. Rockswold GL. Evaluation and resuscitation in head trauma. Minn Med. 1981; 64:81-4
10. Vandemark RM. Radiology of the cervical spine in trauma patients: practice pitfalls and recommendations for improving efficiency and communication. AJR Am J Roentgenol. 1990;155:465-72

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