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The Spine Journal 15 (2015) 398–404

THE SPINE JOURNAL

2014 Outstanding Paper Winner: Surgical Science

Cervical spine clearance protocols in Level I, II, and III trauma centers in California

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Received 1 December 2013; revised 2 December 2014; accepted 19 December 2014

Abstract

BACKGROUND CONTEXT: Cervical spine clearance protocols were developed to standardize the clearance of the cervical spine after blunt trauma and prevent secondary neurologic injuries. The degree of incorporation of evidence-based guidelines into protocols at trauma centers in California is unknown.

PURPOSE: To evaluate the cervical spine clearance protocols in all trauma centers of California.

STUDY DESIGN: An observational cross-sectional study.

PATIENT SAMPLE: Included from Level I, II, III trauma centers in California.

OUTCOME MEASURES: The self-reported outcomes of each trauma center's cervical spine clearance protocols were assessed.

METHODS: Level I (n=15), II (n=30), and III (n=11) trauma centers in California were contacted. Each available protocol was reviewed for four scenarios: clearing the asymptomatic patient, the initial imaging modality used in patients not amenable to clinical clearance, and the management strategies for patients with persistent neck pain with a negative computed tomography (CT) scan and those who are obtunded. Results were compared with the 2009 Eastern Association for the Surgery of Trauma (EAST) cervical spine clearance guidelines.

RESULTS: The response rate was 96%. Sixty-three percent of California's trauma centers (Level I, 93%; Level II, 60%; Level III, 27%) had written cervical spine clearance protocols. For asymptomatic patients, 83% of Level I and 61% of Level II centers used National Emergency X-Radiography Utilization Study criteria with/without painless range of motion. For those requiring imaging, 67% of Level I and 56% of Level II centers stated a CT scan should be the first line of imaging. For obtunded patients and patients with persistent neck pain and a negative CT scan, more than 90% of Level I and more than 70% of Level II trauma centers incorporated the 2009 EAST recommendations. No institution recommended passive flexion-extension radiographs for the obtunded patient.

CONCLUSIONS: Written cervical spine clearance protocols exist in 63% of California's trauma centers and only 51% of the centers have protocols that follow current evidence-based guidelines. Standardization and utilization of these protocols should be encouraged to prevent missed injuries

FDA device/drug status: Not applicable.

Author disclosures: ***MP:*** Research Support (Investigator Salary, Staff/-Materials): Stryker (F, Paid directly to institution). ***AAT:*** Nothing to disclose. ***RD:*** Nothing to disclose. ***RM:*** Nothing to disclose. ***RTM:*** Board membership: Northern California Orthopaedic Society (President. No compensation); Consultancy: Skeletal Kinetics, LLC (Unpaid Consultant), Advanced Biologics, LLC (Unpaid Consultant); Employment: TeamHealth (C per month, Paid directly to institution); Expert testimony: Various Law Firms; Grants/grants pending: Stryker (F, Biomechanical study with percutaneous fixation methods of L1 burst fracture); Patents (planned, pending or issued): Anthem Orthopaedics VAN, LLC (No royalties or payments), Total Connect Spine, LLC (No royalties or payments); Stock/stock options: Biomineral Holdings, LLC (No royalties or distribution payments), PDP Holdings, LLC (No royalties or distribution payments), Anthem Orthopaedics, VAN, LLC (No distribution payments), Total Connect Spine, LLC (No distribution payments).

The disclosure key can be found on the Table of Contents and at www.TheSpineJournalOnline.com.

The study has no funding source. None of the authors have a conflict of interest related to the study.

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http://dx.doi.org/10.1016/j.spinee.2014.12.142

and secondary neurologic injuries.

Keywords: Cervical spine; Clearance protocols; NEXUS; Blunt trauma; California; Cervical spine CT scan

Background

A cervical spine injury is estimated to occur in 3.7% of adults who sustain a blunt trauma [1]. Forty-three percent of these injuries are associated with instability, which if unrecognized may result in spinal cord injury [1]. Therefore, cervical spine clearance protocols were developed to standardize the process by which the cervical spine is safely cleared by reducing clinical practice variability and identifying potentially unstable injuries. As new imaging modalities have been developed and clinical outcome data have been reported, the guidelines on cervical spine clearance have evolved.

Since 1998, the Eastern Association for the Surgery of Trauma (EAST) has published guidelines based on literature reviews of cervical spine clearance [2]. Over the last 15 years, EAST changed and updated their guidelines in 2002 and 2009, as new literature was published. For example, in 2002, EAST recommended the use of passive flexion-extension fluoroscopy when clearing an obtunded patient. Since then, a number of studies reported the inadequacy, cost inefficiency, and safety concerns of this technique [3–8]. Thus, EAST updated their guidelines in 2009 to reflect these concerns and now recommends against the use of passive flexion-extension radiographs in obtunded patients [9]. Therefore, each trauma center should ideally update its protocols with the most up-to-date evidence. However, the extent to which trauma centers in California have adopted these guidelines based on the review of the available data is unknown.

The purpose of this study was to determine the current status of written cervical spine clearance protocols in Level I, II, and III trauma centers in California and their incorporation of the most current evidence-based guidelines by EAST from 2009.

Materials and methods

An institutional review board approval was obtained at our institution. Level I, II, and III trauma centers in California were identified through the Trauma Managers Association of California and the State of California Emergency Medical Services authority web site. The trauma managers at each trauma center were contacted via e-mail and phone calls and asked if their institution had a written protocol. If the answer was ''yes,'' each manager was then asked to send their cervical spine clearance protocol to the authors.

Once the protocols were received, they were reviewed to identify the clearance methods in four specific clinical scenarios:

1. The method used to identify patients who may not require imaging to clear the cervical spine after blunt trauma.
2. The preferred initial imaging modality used if a patient's cervical spine could not be cleared by clinical methods outlined in Question 1.
3. The management strategy for alert patients with persistent neck pain with a computed tomography (CT) scan negative for acute bony pathology of the cervical spine.
4. The management strategy for an obtunded patient with a CT scan negative for acute bony pathology of the cervical spine.

The results for each clinical scenario were then compared with the 2009 EAST guidelines to determine whether the centers were up-to-date with current evidence-based guidelines.

Results

At the time of the study, there were 56 trauma centers in California (Level I, 15, Level II, 30, Level III, 11). Although two of the Level I adult trauma centers stated they had a protocol, these protocols were not provided to the authors to analyze. A total of 54 (96%) adult trauma centers responded by either providing a protocol or stating that they did not have a protocol (Table 1). Overall, 63% of all trauma centers in California had a written cervical spine clearance protocol. Level I trauma centers had the highest percentage of protocols, whereas Level III centers had the lowest percentage of protocols (Table 1).

The clinical criteria used to identify patients who may not require imaging to clear the cervical spine after blunt trauma are presented in Table 2. National Emergency X-

Table 1
Summary of trauma centers' cervical spine clearance protocol statuses

Trauma center	With protocol	No protocol	No reply	With protocol (%)
Level I (n=15)	14	1	0	93
Level II (n=30)	18	10	2	60
Level III (n=11)	3	8	0	27
All trauma centers	35	19	2	63