Are Spinal Precautions Necessary in All Seizure Patients?


The purpose of this retrospective chart review study was to evaluate the necessity of spinal precautions in uncomplicated seizure patients. The population was all patients from the Emergency Department with a primary diagnosis of seizure over a 10.5-year period. The setting was a university-affiliated county teaching hospital with an annual patient volume of over 58,000. The key outcome measure was an association of spinal injuries to uncomplicated seizures. A total of 1,656 cases were reviewed. No spinal injuries were found. Three nonspinal fractures were associated with seizure activity. Transportation costs increased approximately 113% and nursing costs increased approximately 57% for patients with seizure placed in spinal precautions. Quality Assurance and Risk Management files showed no complaints or litigation secondary to missed spinal injuries. This retrospective chart review study seriously questions routine use of spinal precautions in uncomplicated seizure cases. If spinal precautions were not used in this group, there would be a significant potential cost savings without increased morbidity. A prospective study is needed to confirm these findings. (Am J Emerg Med 1995;13:512-513. Copyright © 1995 by W.B. Saunders Company)
Seizures
spinal precautions
spinal injuries.


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Several studies have reported an association of fracture with seizure/convulsion, either induced or noninduced. [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] Much of this information comes from data accumulated from earlier work investigating spinal injuries and fracture after electroconvulsant therapy (ECT). [11] Most of the fractures were compression fractures of the thoracic and lumbar vertebrae. These fractures seemed to produce a minimal amount of symptoms with virtually no permanent neurological or orthopedic sequelae or signs of Kummel's disease. [1] [5] [6] [8] [11] [12] [13] [14] Certain injuries, such as bilateral posterior shoulder dislocation or dislocation fracture, although rare, can be virtually pathognomonic of seizure. [4] [5] [7]

Further review of the literature involving several studies and thousands of patients with seizures, induced and spontaneous, shows that the reported incidence of compression fracture of the vertebral bodies varies greatly. However, most studies agree that these fractures are found almost exclusively in vertebrae T4 through T12. There were even fewer reported incidents of any kind of neurological or orthopedic complications. [1] [2] [4] [5] [6] [8] [9] [10] [11] [12] [13] [14] We found no reports of cervical vertebral involvement directly attributable to seizure without significant trauma.

Many seizure patients transported by emergency medical services (EMS) from the scene to the emergency department (ED) in our area are placed on spinal precautions using a backboard and cervical collar. [16] [17] This study was designed to answer the question "Are spinal precautions necessary in all seizure patients?" If the answer is negative for uncomplicated seizure patients, significant savings of time and money may be possible.

METHODS

This study was a retrospective chart review of ED patients who presented with uncomplicated seizures. The Institutional Review Board of the hospital granted approval before this study.

Patients were identified from ED logs or by computer search. The time involved was from January 1980 to July 1991. Seizure codes were assigned for each case according to the diagnosis given by the reporting ED physician using the International Classification of Diseases, 9th Edition, Clinical Modification (ICD-9-CM) codes 345.0 to 345.9 and 780.3. Any spinal injury or other fracture was coded according to ICD-9-CM codes 839 (vertebral dislocation), 952 (spinal cord injury) and 800.0 to 829.0 (fracture codes). Data were collected by medical record number, date of occurrence, patient age, gender, seizure type, injury type, seizure medications if any, admission status, and associated trauma. All charts and data were reviewed by the same physician.

All patient information was reviewed from a university-affiliated county teaching hospital with a current annual patient census of more than 58,000. Patients who were more than 5 years of age were included in this study. Febrile seizures were excluded. Patients with injuries such as fractures that were resultant of vehicular accidents, falls from great heights (over 10 feet), or other obvious major trauma mechanisms were considered complicated seizures and were excluded from the study. All other seizure patients were considered uncomplicated for this study. Minor trauma was considered attributable to seizure if the injury was incurred as direct result of seizure (ie, falling down during a seizure, muscle spasm causing fracture, etc).

Quality Assurance (QA) files were reviewed to determine if there were any complaints against missed spinal injury. Risk Management (RM) files were also examined to find any actions for missed spinal injury from patients in this institution or initially seen at this institution and diagnosed elsewhere with ensuing litigation.

RESULTS
A total of 1,656 cases were reviewed. The review revealed a total of 3 patients sustaining fracture associated with seizure. Patient No. 1 was a 29-year-old man who fractured his mandible during a seizure. Patient No. 2 was a 62-year-old woman who sustained a tibial fracture during a seizure. Patient No. 3 was a 41-year-old man who fractured his nose when he fell during a seizure. No other fractures or spinal injuries were found.

The incidence of spinal injury related to uncomplicated seizure for all patients in this study was 0% (0 of 1,656). The incidence of all fractures related to uncomplicated seizure was 0.18% (3 of 1,656). Even though no spinal injuries were found despite having over 1,600 cases of seizure, we calculated the maximum possible incidence of injury using the "rule of 3" (3 of n) for a 95% confidence interval. With this, the calculated range of incidence was from 0% to 0.18% (95% confidence interval). The range using a confidence interval of 99.9% was 0% to 0.41% (6.9 of n). [18]

QA and RM files showed no complaints, demands, or litigation secondary to missed spinal injuries.

In the EMS system, placing patients in spinal precautions increases the level of transports from a basic life support transport to an advanced life support transport. Transporting patients with seizure in full spinal precautions increased transportation charges from $150 to $320 (113% increase).

Nursing charges in our department increased from $45.50 to $71.50 (57%). This charge increase was secondary to advancing the level of nursing care and increasing the nursing time required for a patient with spinal precautions.

DISCUSSION

Kelly [5] investigated injuries related to ECT in 2,200 patients over a 10-year period, compiling over 37,000 induced convulsions. No cervical injuries were recorded. Twenty-one cases of thoracic and lumbar vertebrae were recorded (all from T4 to T12, with the exception of 1 patient with a L2,4 involvement). There were no permanent neurological lesions reported.

Finelli and Cardi [4] investigated 2,800 patients diagnosed with seizure. Seven patients had fracture resulting directly from seizure (0.3%). Fifteen patients diagnosed with seizure had fracture directly caused by trauma (0.5%). One C5-C6 subluxation of facets was noted in the trauma group. Unfortunately, there was no further information of patient outcome offered and "trauma" was not defined as more than "falls" so that further clarification and examination could not be performed. Vertebral compression fractures were not included in their study because of "diagnostic limitations."

Although fractures have been shown to result from seizure activity, we found no spinal fractures or spinal injuries associated with patients with a primary diagnosis of seizure. Our results showed no spinal injuries, which is consistent with the extremely low incidence that other studies have shown.

Because this study is of a retrospective chart review design, certain questions could not be answered. Why were all these uncomplicated seizure patients reported to the emergency medical services system and transported to the hospital? What was the total number of patients who had seizures in the same area who requested no aid or who refused aid? The true numerator is not known for the group studied. If the paramedical personnel arrived early in the postseizure period, the altered mental state may have dictated that the patient must be transported. With the time involved in transport and arrival in the Emergency Department, the altered mental state may have resolved in keeping with a normal postictal state. Because of the rate of resolution of the postictal state and true outcome of the patient, it would not be appropriate for the paramedics to wait on scene for this resolution.

All medical personnel remain concerned about the potential missed spinal injury or fracture that may cause permanent disability. What is the true cost of the decision to transport or not to transport the uncomplicated seizure patients similar to those in this study? A prospective multicenter study with a large sample size may be able to give a definitive answer for all of these questions.

CONCLUSION

Fractures induced by seizure have been reported. However, our literature search did not show any case report or other information relating acute cervical injuries directly to seizures without involving significant trauma. Minimal evidence was found to indicate that spinal injuries (with or without neurological deficit) are directly related to seizures. In this study, we
have examined over 1,650 cases with seizure as a primary diagnosis. No spinal injury attributable to seizure was found. With the rising cost of medical care today, physicians must become as cost efficient as possible without compromising patient care. If spinal precautions are applied unnecessarily, causing increased transportation and nursing costs, then valuable resources are being wasted. When patients have an uncomplicated seizure and resolve spontaneously without complaints or evidence of trauma, the use of spinal precautions is seriously questioned.

REFERENCES

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