

Clinical Study

Clinical outcome after traumatic spinal fractures in patients with ankylosing spinal disorders compared with control patients

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Abstract

BACKGROUND CONTEXT: The clinical outcome of patients with ankylosing spinal disorders (ASDs) sustaining a spinal fracture has been described to be worse compared with the general trauma population.

PURPOSE: To investigate clinical outcome (neurologic deficits, complications, and mortality) after spinal injury in patients with ankylosing spondylitis (AS) and diffuse idiopathic skeletal hyperostosis (DISH) compared with control patients.

STUDY DESIGN: Retrospective cohort study.

PATIENT SAMPLE: All patients older than 50 years and admitted with a traumatic spinal fracture to the Emergency Department of the University Medical Center Utrecht, the Netherlands, a regional level-1 trauma center and tertiary referral spine center.

OUTCOME MEASURES: Data on comorbidity (Charlson comorbidity score), mechanism of trauma, fracture characteristics, neurologic deficit, complications, and in-hospital mortality were collected from medical records.

METHODS: With logistic regression analysis, the association between the presence of an ASD and mortality was investigated in relation to other known risk factors for mortality.

RESULTS: A total of 165 patients met the inclusion criteria; 14 patients were diagnosed with AS (8.5%), 40 patients had DISH (24.2%), and 111 patients were control patients (67.3%). Ankylosing spinal disorder patients were approximately five years older than control patients and predominantly of male gender. The Charlson comorbidity score did not significantly differ among the groups, but Type 2 diabetes mellitus and obesity were more prevalent among DISH patients. In many AS and DISH cases, fractures resulted from low-energy trauma and showed a hyperextension configuration. Patients with AS and DISH were frequently admitted with a neurologic deficit (57.1% and 30.0%, respectively) compared with controls (12.6%; $p=.002$), which did not improve in the majority of cases. In AS and DISH patients, complication and mortality rates were significantly higher than in controls. Logistic regression analysis showed the parameters age and presence of DISH to be independently, statistically significantly related to mortality.

CONCLUSIONS: Many patients with AS and DISH showed unstable (hyperextension) fracture configurations and neurologic deficits. Complication and mortality rates were higher in patients

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with ASD compared with control patients. Increasing age and presence of DISH are predictors of mortality after a spinal fracture. © 2014 Elsevier Inc. All rights reserved.

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Introduction

Progressive ankylosis of the spine is a hallmark of two distinct diseases; ankylosing spondylitis (AS) and diffuse idiopathic skeletal hyperostosis (DISH). Ankylosing spondylitis is an inflammatory disease associated with the HLA B-27 gene. Chronic inflammation of the sacroiliac joints, intervertebral discs, and facet joints eventually leads to complete ankylosis of the spinal column. Typically, the disease starts in adolescence and predominantly affects males in a male:female ratio of 3:1. The prevalence of AS is relatively stable and ranges between 0.1% and 1.4% [1]. Several authors have reported AS patients to have a three to fourfold risk of spinal fractures during their lifetime, increasing with duration of the disease [2,3]. Neurologic deficits as a result of unstable spinal fractures are well known and notorious complications of longstanding AS [4]. Although an increasing amount of evidence suggests that patients with spinal ankylosis due to DISH are also at risk for unstable fractures of the spine (Fig. 1), the awareness for DISH is much lower among clinicians [5,6]. Diffuse idiopathic skeletal hyperostosis is considered to be a noninflammatory systemic condition that leads to ossification of ligaments and entheses, predominantly in the spinal column. The diagnosis DISH is established when flowing ossification over at least four contiguous vertebrae is present on conventional radiographs with sparing of the intervertebral disc space [7]. Its etiology is currently unknown, yet several authors have described associations with advancing age, obesity, and Type 2 diabetes mellitus [8,9]. Diffuse idiopathic skeletal hyperostosis also shows a male predominance (in a ratio of 3:2) and is rarely seen before the age of 50 years [10]. The prevalence has been reported to range from 2.9% in a Korean population to 25% in Caucasian males in the United States and is likely to increase because of its association with obesity and diabetes; conditions that rapidly become endemic in urbanized societies [11,12]. Physicians should, therefore, expect to admit increasing numbers of patients with DISH and spinal fractures.

Because ankylosing spinal disorders (ASDs) are often associated with pre-existing back pain of varying intensity, diagnosing spinal fractures can present a major challenge for physicians; especially because these fractures occur frequently after trivial trauma [13]. Furthermore, pre-existent abnormalities on spine radiographs may mask or obscure minimally displaced fractures [14]. Patients with fractures of the ankylosed spine often present with spinal cord injury due to gross displacement of the spinal canal [15]. Some patients, however, do not experience any neurologic deficit until a sudden deterioration occurs (this interval has aptly

been described the fatal pause) [16]. Secondary worsening of neurologic status may also occur due to inadequate immobilization, unwarranted transfers, or imprudent manipulation of this group of patients [17,18]. Lastly, patients with ASD and spinal fractures may display higher complication and mortality rates compared with non-ankylosed spine trauma victims [19,20]. Despite numerous case series and literature reviews, comparative cohort studies on the outcome and survival of patients with ASD sustaining a spinal fracture are absent. As a result, it remains unclear what exactly causes the poor outcome in this apparently vulnerable patient category. The primary purpose of the present cohort study was to compare neurologic deficits, complications, and mortality after a traumatic spine fracture, in patients with ASDs (AS and DISH) and non-ankylosed trauma patients. In addition, we investigated the association between ASD and mortality in relation to known risk factors influencing the outcome of trauma patients including age, comorbidity, severity of injury, and presence of neurologic deficit [21,22].

Materials and methods

Patient sample

This retrospective cohort study describes patients with traumatic spinal fractures admitted to our institution, a regional level-1 trauma center and tertiary referral spine center. Combining the databases of the Emergency Department and Department of Orthopedics assured identification and inclusion of all patients eligible for this study. Inclusion criteria were patients older than 50 years with a traumatic fracture of the spine (cervical/thoracic/lumbar) and admission date between January 1st 2003 and December 31st 2009. The minimum age criterion was imposed because ankylosing disorders of the spine are rare occurrences in younger individuals [3,23]. Exclusion criteria were isolated spinous process or transverse process fractures or exclusive ligamentous injury. On identification of all patients with traumatic spine fractures, the electronic medical record, radiographic examinations, and reports were reviewed to identify individuals with ASD. All relevant conventional radiographs, computed tomography, and magnetic resonance imaging available were reviewed by two authors to establish the diagnosis AS or DISH, record fracture level(s), deduct fracture mechanism, and classify the fracture. When consensus on the diagnosis or fracture characteristics could not be reached, a third observer was consulted.

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