



Missed Spinal Lesions in Traumatized Patients

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Abstract

Overlooked spinal injuries and delayed diagnosis are still common in traumatized patients. The management of trauma patients is one of the most important challenges for the specialist in trauma. Proper training and early suspicion of this lesion are of overwhelming importance.

The damage control orthopaedics, diagnosis and treatment algorithm applied to multitrauma patients reduces both morbidity and mortality in polytrauma patients due to missed lesions. Algorithm on its diagnosis and after on its treatment is necessary in order to decrease complications. Despite application of care protocols for trauma patients still exist missed spinal injuries.

We report four cases of missed spinal lesion in trauma patients. We propose perform a very exhaustive clinical and imaging study thorough all polytraumatized patient in order to minimize missed spinal injuries.

Keywords

Spinal lesions, Polytrauma patients, Missed lesions

Introduction

Diagnosis of spinal fractures in traumatized patients is one of the most important challenges for trauma specialist surgeons. Proper training and early suspicion of spinal lesions are of overwhelming importance, mainly in apparent asymptomatic patients including those having a fall with no apparent symptoms of lesions.

A missed injury can be defined as any not discovered nor suspected upon admission to either the intensive care unit or a hospitalization ward. Some authors, after reviewing the records of 567 patients (all trauma patients assessed by St Michael's Hospital trauma service from 1995 to 1997) found that 46 out of them (8.1%) had missed injuries diagnosed after hospital discharge, this patients were in most more severely injured and the majority of missed injuries were potentially avoidable with repeat clinical assessments and a high index of suspicion [1].

There are many guidelines for the management of multiple trauma patients, as outlined by the Advanced Trauma Life Support Course (ATLS) [2] by giving a very clear algorithm for the initial management of these patients. According to this, a second survey

will help in decreasing the number of missed spinal injuries, being claim that standardized tertiary trauma survey is vitally important in the detection of clinically significant missed injuries and should be included in trauma care, our misdiagnosis occurs at first or later examinations [3]. However despite even a third survey still many injuries are overlooked [4,5].

In this paper based on the case method, we discuss the diagnosis of missable spinal fractures within several traumatic settings.

Case Studies

Case 1

A 72-year-old male with the diagnosis of ankylosing spondylitis and diabetes, presented to the emergency department of our Institution with lumbar pain after having a severe staircases fall. Physical examination at that time revealed thoracolumbar pain without neurological symptoms and signs. Two plain, anterior and lateral x-ray projections of the thoracolumbar spine were taken and interpreted as with no traumatic signs, so no further studies were obtained and the patient was discharged home. Two weeks later, because he was still in pain and began to feel some weakness on both legs together with urinary retention, came again to the emergency department. He underwent two new x-rays and a magnetic resonance images (MRI) which revealed a T12-L1 fracture. He was duly operated on with a posterior thoracolumbar fusion with pedicle screw instrumentation. In a retrospective review of the initial x-rays a subtle rupture of the anterior intervertebral ligament between T12-L1 could be seen, together with lung shadows making difficult the diagnosis of his vertebral lesion (Figure 1, Figure 2 and Figure 3).

Case 2

A 26-year-old male presented to the emergency department after having a high speed motor vehicle accident. He complained of cervical pain, but since physical examination and cervical plain radiographs were reported as normal, he was discharged home. He returned 4 days later with progressive weakness of both hands and still in cervical pain. CT scan showed a left facet dislocation at C6-C7 level. He underwent emergent closed posterior reduction and anterior cervical discectomy together with C6-C7 fusion by means of plating and tricortical allograft. He dramatically improved few hours after surgery (Figure 4 and Figure 5).

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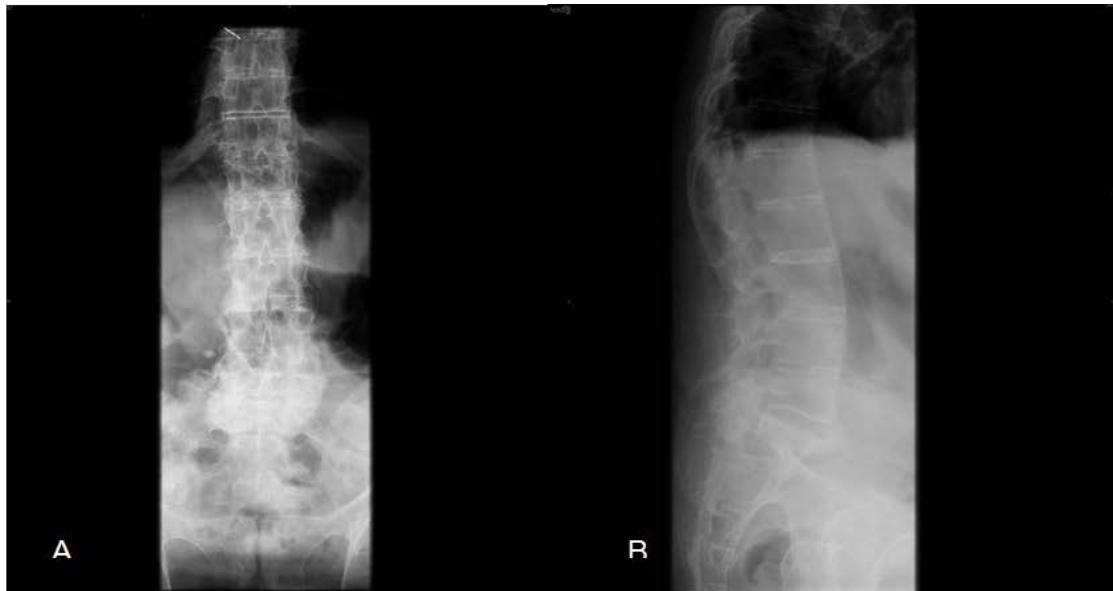


Figure 1: Anteroposterior (A) and lateral (B) spine radiograph on admission, the first time the patient came to Hospital

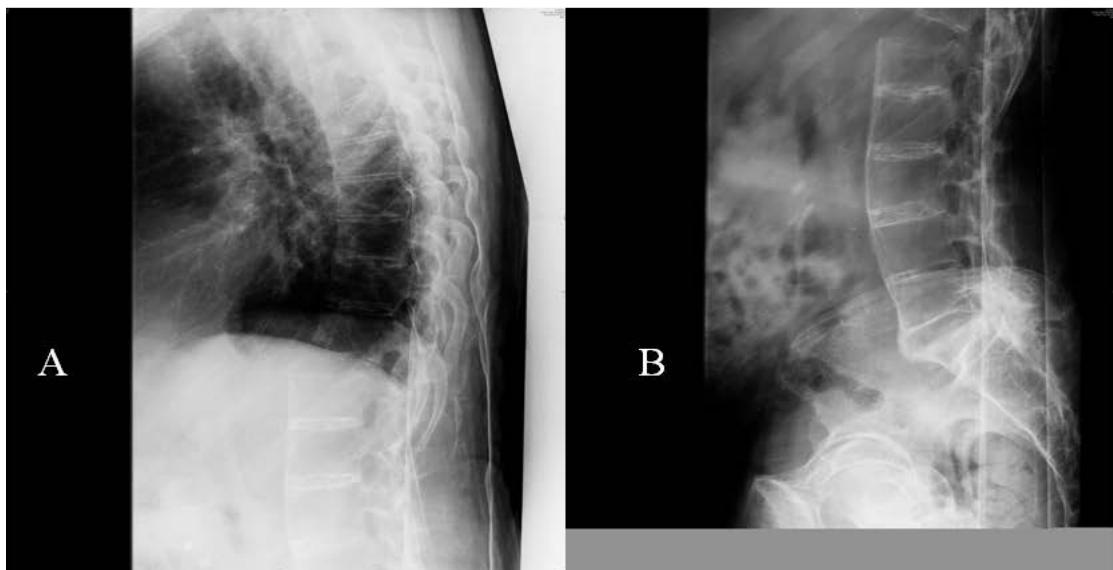


Figure 2: Lateral spine radiographs two weeks later, imaging studies at injury revealed an important unstable thoracolumbar fracture at T12



Figure 3: MRI of the spine, sagittal images of MRI, illustrated a T12-L1 fracture, with damage in the posterior aspect of T12 and the posterior longitudinal ligament is avulsed



Figure 4: Radiographs on admission, anteroposterior (A) and lateral (B) views does not illustrated the whole cervical spine



Figure 5: Sagittal (A,B) and axial (C) images of CT scan clearly shows the fracture facet dislocation at C6C7



Figure 6: Simple radiograph (A) and CT coronal and sagittal views (B,C) does not show the injury

Case 3

A 37-year-old male came to our hospital after a blow onto his head jumping into the sea. On neurological examination he presented some weakness and numbness on both hands together with neck pain. An anteroposterior and lateral radiograph projections, and a CT scan of the neck were performed and interpreted to be normal. During his stay at emergency upper limb weakness and pain, particularly in his left hand, worsened. A MRI was performed displaying a C4-C5 disc hernia with cord compression (Figure 6 and Figure 7).

Case 4

A 41-year-old male presented to the emergency department after a high-speed motorcycle accident. He was evaluated and treated for multiple leg injuries and a wrist fracture. He underwent

a posteroanterior and a lateral thoracic radiograph; both projections were reported to be normal. He was discharge home. Four weeks later he developed progressive legs weakness and also thoracic spine pain. A CT-scan and a MRI were performed, becoming evident a T5 fracture. He underwent a combined anterior and posterior surgical stabilization procedures. He also fully improved after surgery (Figure 8 and Figure 9).

Discussion

There are several reports in literature about missed spinal fractures in traumatized patients. It is well known the importance of CT in identifying fractures which otherwise may be missed on plain radiographs, particularly at the upper cervical and cervicothoracic spine junction.



Figure 7: Cervical spine magnetic resonance imaging (MRI) scanning show the C5 hernia disc and cord compression at this level

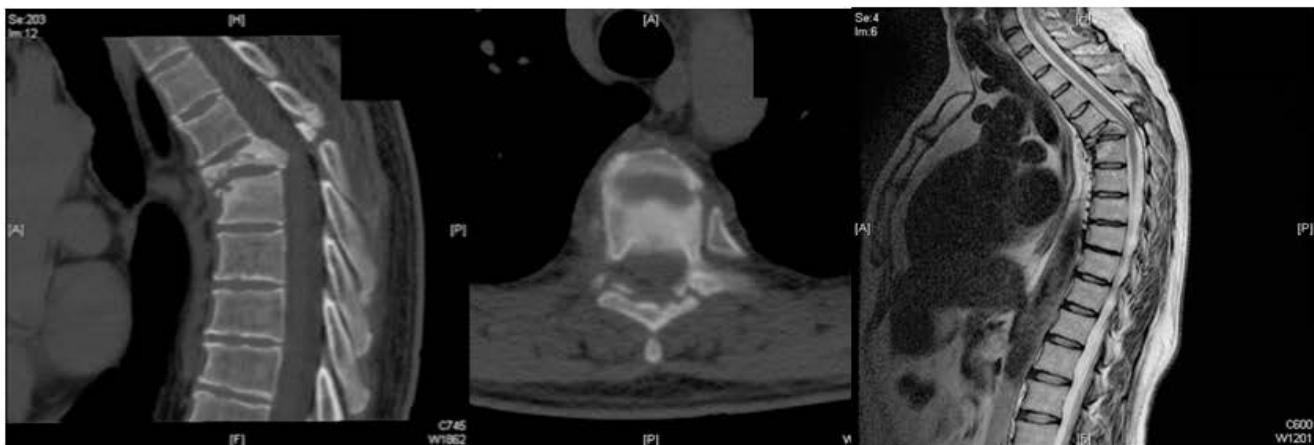


Figure 9: Axial and sagittal CT scan views (A,B) and MR sagittal image (C) show a thoracic injury at the T5 level

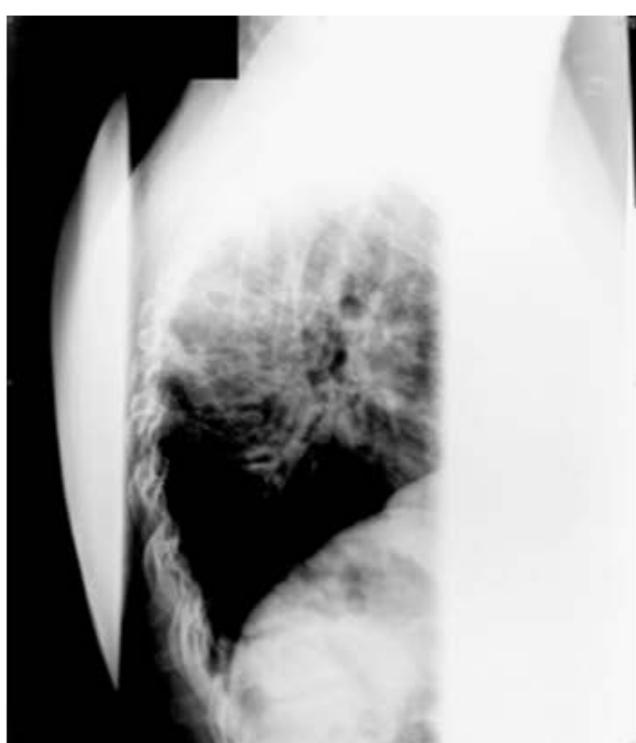


Figure 8: Lateral spine radiograph on admission included shoulders obstructing the view of the thoracic spine

There are some recognized useful guides for the evaluation and diagnosis of cervical spine injuries such as The National Emergency X-Radiography Utilization Study (NEXUS) [6] or the Canadian C-Spine Clearance Rule Study [7,8]. They provide guidelines when collars neck should be left in place for patients with normal examinations but with neck pain and the impossibility of carrying out adequate dynamics radiograph examinations in flexion and extension or MRI. Since patients conditions may change, a reevaluation should be performed by an experienced doctor with the intention of trying to avoid overlooked lesions [9]. Some authors [9,10-13], propose tertiary examinations (repeated head-to-toe examination and review of all laboratory and radiologic studies).

In cases of patients who are in a coma or have low levels of consciousness the reevaluation is critical and CT scan must be done in these cases [14,15] if there is a possibility at all of a cervical spinal injury. Special care must be taken in patients with traumatic brain injury [16] as they cannot cooperate during clinical examination, ranging the prevalence of cervical spine injury in these patients between 1.8 to 26% [17].

Another possibility which must be thought is the coexistence of multilevel spinal lesions. Once the diagnosis of a spinal injury is made, a thorough search for some other level lesions must be performed [18]. Hence in case of severe trauma patients (patients who have suffered a fall from height or a traffic accident) an early whole-body CT-scan must be taken [19,20], and should this diagnosis test fail in displaying spinal lesions under the suspicion that a spinal, particularly ligamentous, lesion exists, a MRI will be necessary to complete the study [21], because one of the most common reason for missed injuries is the insufficient imaging studies.

Patients with the diagnosis of ankylosing spondylitis are under an extremely high risk of fracture. Delaying the diagnosis may entail an unexpected catastrophic injury [22], consequently special attention must be paid in these patients as to undergo CT-scan. Cervical spine fractures and dislocations may be very difficult to be diagnosed under x-rays or even by CT-scan, especially at the cervicothoracic junction. Only 52% of cervical fractures will be detected in simple radiographs and under CT scan diagnosis increases up to 98% of the cases. However diagnosis of soft tissues injuries, such as ligamentous injuries, disc hernia, or cord injury, may become a problem in the cervical spine even under CT-scan. In these cases a MRI becomes essential. In any case, physical examination, if at all possible, may be the key in the case that all diagnosis tests are negative. For all patients suspected to have a spinal injury CT scans should be obtained as the initial imaging study [23,24]. Further imaging studies are required if CT-scan is negative and the patient still has spine pain. The Eastern Association for the Surgery of Trauma Practice Management Guidelines Committee (EAST) recommends in patients still on neck pain, leaving the collar in place until a MRI or dynamics flexo-extension radiographs are obtained, once a CT-scan study was normal [25]. Spine MRI has become routine for patients with neurological deficits or inability to cooperate with neurological examination due to coma or intubation.

The damage control orthopaedics, diagnosis algorithms applied to multitrauma patients reduces both morbidity and mortality, particularly those due to missed lesions [26].

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