

## Cervical vertebral fracture: A report of two cases of “Near-Miss” C6 fractures

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### Abstract

Cervical spine injury is commonly associated with road-traffic accidents. The true incidence of cervical spine injuries is unknown due to under-reporting of such injuries. Cervical spine injury is associated with high morbidity and mortality if it is missed. With the advancement of imaging modalities, the number of missed cervical injuries has reduced. Nevertheless, some clinicians are dependent solely on imaging tools to rule out cervical spine injury in a trauma victim. We report two cases of “near miss” C6 fracture to highlight the importance of a detailed clinical history and clinical examination with imaging as an adjunct to rule out cervical injury.

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### Introduction

In Malaysia, over 6000 mortalities and thousands of injuries are due to road-traffic accidents (RTA) yearly.<sup>1</sup> The number of fatalities has increased by 10.8% within 5 years, from 6200 cases in 2005 to 6872 cases in 2010.<sup>1</sup> Spinal injury has been reported as an uncommon cause of death among the RTA victims. This is mainly due to under-reporting of spinal injuries as the more obvious traumatic brain injury is often used as a cause of death without further detailed investigations. A cross-sectional study by Zulkipli *et. Al.* in Kuala Lumpur reported up to 26.3% of the RTA are associated with spinal injuries.<sup>1</sup> More than half of these patients suffered from cervical spine injuries with pedestrians (73.7%) leading the list, followed by motorcyclists (54.8%) and car drivers and passengers (55.8%). Cervical spine fracture is associated with high mortality and morbidity. Missed cervical spine fractures in victims of RTA have been reported in the literature.<sup>2,3</sup> We present two cases of near-miss C6 vertebral body fractures which were detected on day 2 post-trauma.

### Case Report 1

Mr XY, a 24-year-old gentleman with no underlying medical illness, was involved in a RTA in which he fell from his motorcycle after being hit by a car. He was unsure of the mechanism of injury as he had loss of consciousness post-trauma until his arrival to the emergency department. He denied having any symptom suggestive of increased intracranial pressure. He denied having neck or back pain after regaining full consciousness. His recorded vital signs in the emergency department were normal. Systematic review of the head, chest, pelvic and extremities was unremarkable. There was no spinal tenderness elicited at the thoracolumbar region. Cervical spine examination was not performed and he was put on a hard cervical collar for cervical spine immobilisation. No neurological assessment of upper and lower limbs was documented.

The initial cervical spine radiographs (anteroposterior, lateral, and swimmers view) were reviewed as normal and the cervical hard collar was subsequently removed (Figure 1A). He was then admitted to the ward for observation due to cerebral concussion. He was well throughout the stay in the ward overnight. On day 2 post-trauma prior to discharge, he complained of numbness and burning sensation at his upper limbs bilaterally. He has no difficulty in breathing. A careful examination elicited tenderness at the lower cervical spine region with reduced muscle power and sensation affecting regions innervated by C6 nerve root and below.

Repeat cervical plain radiographs, computed tomography (CT) and magnetic resonance (MR) images showed a burst fracture of the C6 vertebral body with a score of 4 in Subaxial Spine Injury Classification (SLIC) system (Figures 1B & 1C). An anterior cervical plating of C5-C7 vertebrae was done without any complication (Figure 1D). After a period of intensive rehabilitation programme, he recovered well without residual neurological deficit.

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## Case Report 2

Mr W, a 53-year-old gentleman with no underlying medical illness, was involved in a RTA in which his car hit a stationary lorry parked at the roadside with his seat belt fastened in place. He sustained a flexion-extension injury of his neck. Post-trauma, he had no loss of consciousness and he was able to ambulate. No medical attention was sought on the day of trauma. He presented to the emergency department on day 2 post-trauma, complaining of persistent neck pain post-trauma. He denied having upper limb numbness or weakness. Clinically, tenderness was elicited at the lower cervical region with normal muscle tone, power, and sensation. Cervical plain radiographs showed a compression fracture of C6 vertebral body (Figure 2A). The cervical computed tomography scan confirmed the C6 vertebral body fracture without evidence of spinal canal narrowing, accompanied by fractures of C3, C4 and C5 spinous processes (Figure 2B). The disco-ligamentous complex was indeterminate as an MR imaging was not performed. The SLIC score for this patient was 2, hence he was treated conservatively. He was put on a Philadelphia collar for cervical immobilisation and he subsequently recovered well without complication.

## Discussion

Ruling out a cervical spine injury is of utmost importance in early assessment of trauma patients due to its ominous complications and even mortality.<sup>3</sup> With the advent of imaging modalities such as computed tomography (CT) and magnetic resonance (MR) imaging, the incidence of missed cervical spine injury has been reduced. However, on the other hand, the technology advancement has also blinded some clinicians as they consider imaging as the principle, if not the sole, method to rule out cervical spine injury. This condition has led to abundance of imaging requests without prior detailed history taking and proper physical examination. Unjustified imaging not only exposes the patient to unnecessary radiation, but also increases the health care cost in our country.

In the first patient, the decision to perform a cervical spine radiograph is justified as the patient has sustained a distracting injury with cerebral concussion. Multiple studies have highlighted indications for cervical spine imaging for patients who sustain RTA (Table 1).<sup>2</sup> Nevertheless, clinicians should be alert to the fact that 3-view (antero-posterior, lateral and odontoid view) cervical spine plain radiographs can only detect up to 36% of the cervical injuries.<sup>4</sup> Bailitz J et.al. proposed that with a sensitivity of 100%, CT scans should be performed in all of the patients to safely rule out cervical injury.<sup>4</sup> Indications for performing a cervical spine CT scan are highlighted in Table 2. However, in many developing countries such as Malaysia, CT facility is not available in some of the hospitals. Generally, a clinician equipped with a detailed clinical history, clinical examination and 3-view plain cervical radiographs can safely exclude cervical injury. When in doubt, cervical immobilisation is always indicated until further examination or imaging is done. For clinicians who are working at the rural areas, it is advisable to observe those high-risk patients for at least 24 hours and to reassess the patients' conditions before requesting for further imaging studies or discharging them home. Magnetic resonance imaging (MRI) is not a useful imaging tool for primary cervical spine clearance.<sup>5</sup> Nonetheless, MRI is an effective and non-invasive imaging tool that provides valuable information regarding cervical soft tissues such as ligaments, discs, and joint capsules.<sup>5</sup> It is particularly useful in evaluating the spinal cord to look for epidural hematoma, spinal cord edema and spinal cord compression.<sup>5</sup> By evaluating the disco-ligamentous complex, surgeons can assess the severity of the cervical injury based on the SLIC scoring system. Generally, an injury with SLIC score of less than 4 can be treated conservatively, an SLIC score of 4 can be treated either conservatively or surgically, whereas an SLIC score of more than 4 requires surgical intervention. In our first patient who has an SLIC score of 4, anterior cervical decompression, fusion and plating helped in the recovery of the patient.

**Conclusion**

A thorough evaluation of road-traffic accident victims, including a detailed history taking, physical examination with neurological status assessment, should provide adequate information as to whether further advance imaging modalities are warranted to rule out cervical spine injury.

**Table 1:** Clinical indications of cervical spine imaging.<sup>2</sup>

Midline cervical spine pain or tenderness
Unconscious post-trauma
Altered mental status
Intoxicated
Presence of painful or distracting injuries
Presence of neurological findings

**Table 2:** Relative indications of computed tomography of cervical spine

Obtunded patients
Symptomatic patients with negative 3-view plain radiographs
Equivocal 3-view plain radiograph in high risk patients*
Patients with severe head injury
Abnormal 3-view plain radiographs

\*High risk patients are defined as patients involving in high energy trauma.

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Figure 1A shows the initial cervical spine plain radiographs with visualisation of C1-C6 vertebrae which were labeled as “normal”.

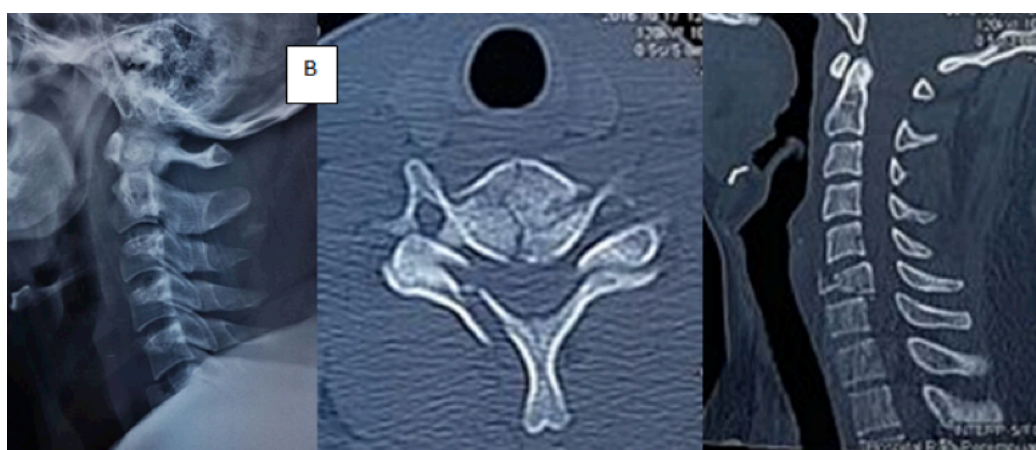


Figure 1B shows the burst fracture of C6 vertebral body on plain radiograph and CT images on day 2 post-trauma.

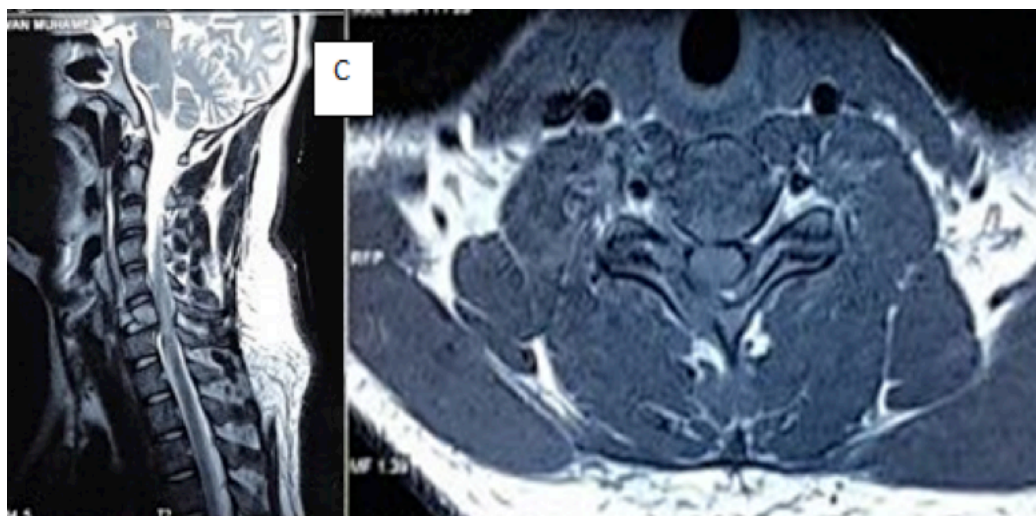


Figure 1C shows C6 fracture with associated cord edema on MR images.

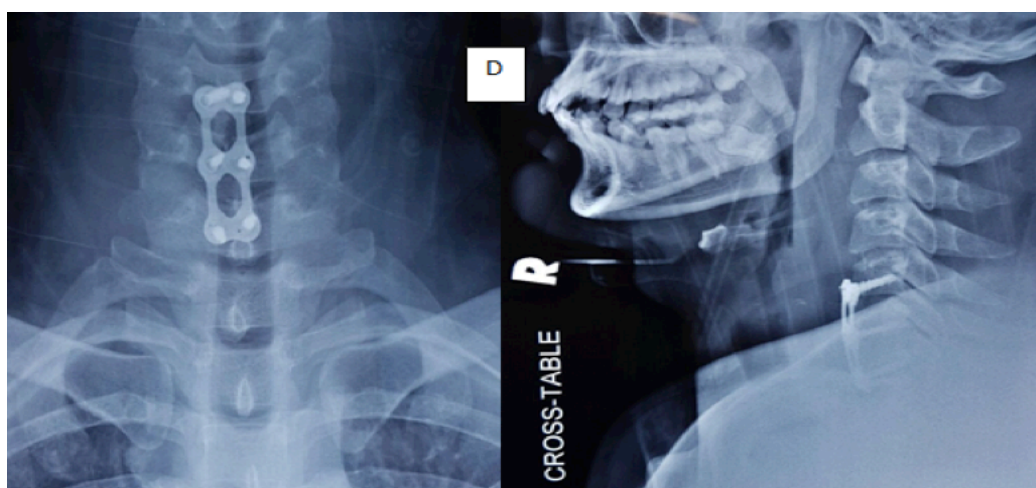
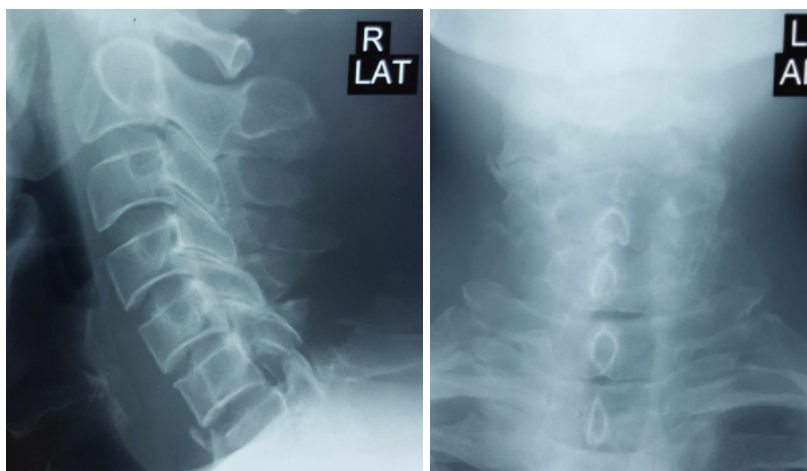
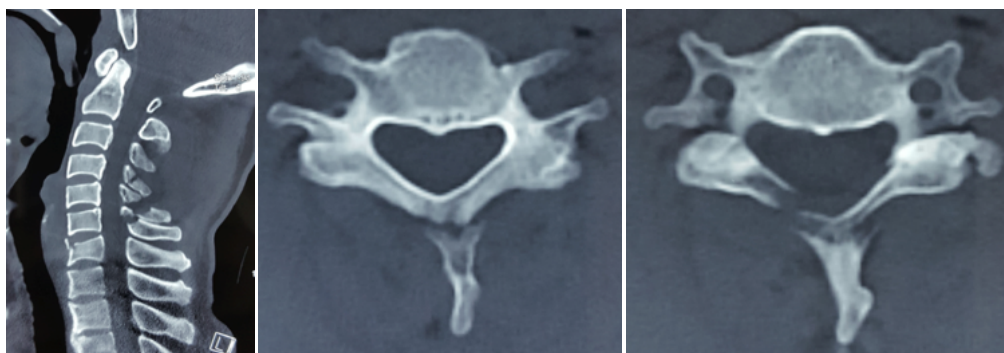


Figure 1D shows post-operative cervical spine plain radiographs of the patient.



**Figure 2A:** Plain radiographs of the cervical spine shows compression fracture of the C6 vertebral body.



**Figure 2B:** The computed tomography images show C6 vertebral body fracture involving the anterior column with spinous process fractures of the C3, C4, and C5.