

A Fatal Case of Cervical Spine Injury

R. Ravi kumar*, Kalai Sevi L. T.**

Abstract

The magnitude of the spinal injury problem is unknown. There have been a number of clinical reports that focused on the classification and descriptions of cervical spine fractures and dislocations with some providing hypotheses on the mechanism of injury. In the present article we have discussed a case where the person was driving the four-wheeler and struck by the other vehicle and died on the spot. C1-C2 cervical spine fracture dislocation with ring fracture noted at the base of the skull. The mechanism of injury is due to combined effects of whiplash and indirect blow to the skull.

Keywords: Cervical Spine; Spinal Cord; Whiplash Injury; Ring Fracture.

Introduction

Injuries of the cervical spine can occur in many situations like road traffic accidents, fall from height, diving etc and it can be direct violence or indirect violence. Hyperextension is the most common cause for spine injury [1].

Incidence of spinal injuries are increased and become more common now a days due urbanization, mainly by vehicles, construction works, violence etc. Extension and flexion injuries of the cervical spine, which occur during accelerated motion as in traffic accidents and falls, are characterized by a backward or a forward thrust of the head exceeding the movable range [2]. In particular, whiplash injury is typical in drivers and passengers involved in traffic accidents [3]. However, fatalities due to high energy trauma, such as motor vehicle collisions or a fall from a significant height, usually exhibit multi-system injury such as fractures of the head and the chest. The combined

injuries mask the severity and mortality of the cervical injury; furthermore, enrolled forces on a body experiencing poly-injuries are complicated [4].

Case Report

As per the investigating officer's report the deceased, a male child of 23 years, who was driving the four wheeler struck by the other vehicle and died on the spot. The next day postmortem was done. At the time of postmortem examination, a laceration of 2.5 x 0.5 x bone deep [fig 1] was noted over the chin and an abrasion of 3 x 0.5 present over front and left side of upper part of chest and bleeding noted over both the ears. No other external injuries are found over the body. On internal examination, after reflection of scalp blood extravasations noted over left temporal and left occipital regions. skull shows fissure fracture extending from left side of middle cranial fossa running across sella tunica up to the right middle cranial fossa and running around the foramen magnum. [fig 2]. Meninges were torn at the fracture sites, brain shows diffuse subdural and subarachnoid haemorrhage including the base of cerebellum. Cervical spine fractured and dislocated at the junction of C1- C2 with underlying spinal cord is served. Both lungs were edematous. Blood noted in the passage of trachea [fig 3] and bronchioles [fig 4]. No other internal injuries were present.

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Fig. 1

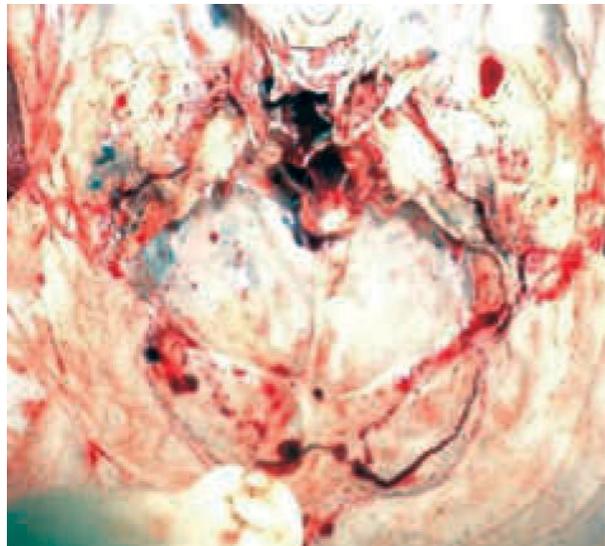


Fig. 2



Fig. 3

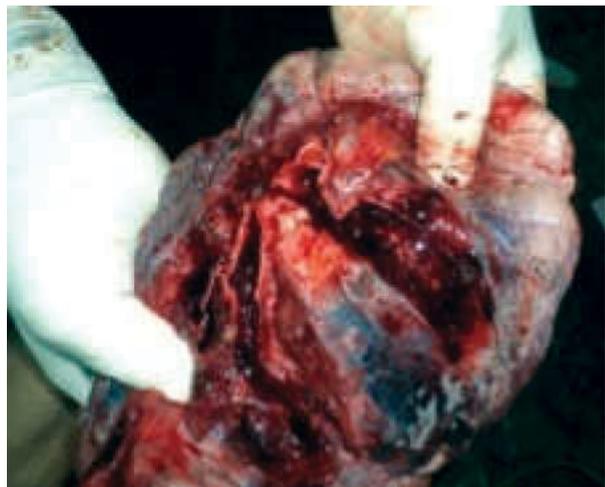


Fig. 4

Discussion

The cervical spine or the neck is usually subjected to several forms of injuries that are not seen in the thoracolumbar spine. Injuries to the upper cervical spine, particularly at the atlanto-occipital joint, are considered to be more serious and life-threatening than those at the lower level. The atlanto-occipital joint can be dislocated either by an axial torsional load or a shear force applied in the anteroposterior direction, or vice versa. A large compression force can cause the arches of C1 to fracture, breaking it up into two or four sections. The odontoid process of C2 is also a vulnerable area. Extreme flexion of the neck is a common cause of odontoid fractures, and a large percentage of these injuries are related to motor vehicle collisions [5].

Injuries to the spine and spinal cord occur usually accidental, occasionally homicidal and rarely

suicidal. Danger of life from fracture dislocation of spine depends upon the associated damage to the spinal cord; hence higher up the cord is damaged, the more dangerous will be the result. Death can occur immediately if the medulla or the upper part of the spinal cord is damaged. Injury to the spinal cord above the 3rd cervical vertebra especially in case of forward dislocation of the atlas upon axis, even without fracture of the odontoid process, will become fatal due to crushing of the vital centers in the medulla and spinal cord with paralysis of respiratory muscles [6].

Mainly two types of injuries are noted in the cervical spine. They are Hyperflexion and hyperextension Injury. hyperextension is much more dangerous in causing spinal damage, possibly because flexion is protected by contraction of the strong posterior neck muscles, whereas the weak

anterior longitudinal ligament is incapable of preserving the integrity of the cervical spine during hyperextension. In frontal or rearward motor vehicle crashes, which comprise 80 per cent of accidents, there is usually a hyperflexion and hyperextension component to the spines of the occupants, though head restraints and seatbelts restrict the range of movement. Where a car undergoes violent frontal deceleration, the subject's head will swing down into hyperflexion and, unless restrained, will then strike the fascia or windscreen, and rebound into hyperextension. When the vehicle is struck from the rear, the head will fly into hyperextension first unless a head-rest is available; such collisions often then smash the vehicle into the one in front, when a deceleration hyperflexion takes place. Whatever the cause, a whole range of lesions can follow, both in the cervical, and to a lesser extent into the thoracic and lumbar segments. Fracture of the odontoid peg of the axis can occur from a variety of violent movements of the head on the neck, and is sometimes associated with fracture of the skull or mandible. Where gross injury to the spinal column is inflicted such as a relatively high-speed motor vehicle or railway accident the cord may be transected by a guillotine action of the two displaced fragments.

Road traffic accidents most common cause of cervical injury at present day. The injuries are caused to occupants while they are inside the vehicle (non ejection crash injury) or when they are thrown out of the vehicle (ejection crash injury) or both. Whiplash injury mainly occurs to the driver and front seat passengers. They sustain a fracture dislocation of cervical vertebra due to impact or jerk resulting in initially hyperflexion of neck and then hyperextension causing fracture of the cervical vertebra at the level of C2-C3 or C3-C4 [7].

Whiplash is the term used to describe the acceleration-deceleration forces on the neck which may occur in rear end or side impact motor vehicle collisions. These forces may result in painful injuries to the muscles, ligaments and joints of the neck and other spinal areas.

However, sometimes they result in no injury or pain at all. Symptoms may appear immediately after the incident or have a delayed onset of a few hours or days. The nature of injury and the number and severity of symptoms vary between different people [8].

These types of traumas are most often associated with automobile collisions, however, they can also result from falls, bicycle accidents, horse riding injuries and a host of other sporting and recreational occurrences.

Conclusion

In our case there is fracture dislocation of C1-C2 along with the ring fracture. The deceased is front seat driver. The C1-C2 fracture is due to whiplash injury that is hyperflexion followed by hyperextension during hyperflexion he hit on the steering by his chin where the force is carried through the mandible and he sustained the ring fracture. Extravasations of scalp in occipital region and abrasion over the chin explains the mechanism. In this case injury is due to combined mechanism of both whiplash and indirect blow to the skull. Cause of death due to respiratory failure due to fracture dislocation of the upper cervical vertebra associated with head injury. By this article we want to conclude that while doing postmortem examination by examining the injuries we can determine the mechanism by it is caused.

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