Quadraplegia in a Patient with an Undiagnosed Odontoid Peg Fracture The importance of cervical spine immobilisation in patients with head injuries

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SUMMARY: A 59 year old man was found collapsed and unconscious, tracheal intubation was performed without immobilisation of the cervical spine. Examination revealed signs of spinal cord transection with quadraplegia and a lateral cervical spine radiograph showed a displaced fracture of the odontoid peg. This case reinforces the importance of appropriate cervical spine management in all victims of trauma especially those with head injuries and is particularly relevant to the military situation.

Case Report

A previously fit and well 59 year old man was found collapsed and unconscious in the stock room of his shop. On arrival of the ambulance he was noted to be intermittently apnoeic, cyanosed and unresponsive. Attempts at intubation in the ambulance were unsuccessful and the patient was presented in extremis to the Accident and Emergency department of the Cambridge Military Hospital. Tracheal intubation was performed in the emergency room, following which, a superficial laceration was noted on the crown of the head. No other injuries were apparent on examination. In view of the presence of a head injury, the cervical spine was immobilised in a rigid cervical collar, tape was applied across the forehead and sandbags were placed on either side of the neck as recommended by the Advanced Trauma Life Support (ATLS) manual(1).

A lateral cervical spine radiograph revealed an odontoid peg fracture with posterior dislocation of 4 mm (Fig 1). After resuscitation the patient was admitted to the intensive care unit, where on clinical examination, signs consistent with a complete spinal cord lesion below the level of the second cervical vertebra were noted. Also of note were severe erosive arthritic changes in both hands and extensive plaques of psoriasis. Over the next three days there was no improvement in the neurological deficit, the patient's clinical course was complicated by neurogenic shock and bronchopneumonia from which he subsequently died.

Post mortem examination revealed no co-existing arthritic disease process affecting the odontoid peg or transverse ligament and no medical cause for his collapse

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was apparent. The spinal cord showed evidence of partial transection with haemorrhagic necrosis affecting the left side. Subsequent review of the lateral cervical spine radiograph did not suggest cervical spine disease.

Fig 1. Lateral cervical spine radiograph showing the odontoid peg fracture and posterior displacement of C1 in our patient.

Comment

We have presented a case of collapse of unknown aetiology the outcome of which was determined by injuries presumably sustained during the initial event. Collapse with unconsciousness is a frequent presentation

to Accident and Emergency departments. In this setting trauma resulting from the collapse may be overlooked especially if the patient is assumed to have a medical cause for collapse.

Dislocation of the cervical spine may occur as a result of minor trauma in the elderly population (2). Rheumatoid arthritis is well recognised to result in spontaneous fracture of the odontoid peg (3) and fracture of the odontoid peg has been reported following minor trauma in a patient with ankylosing spondylitis (4). In a series of 262 cervical spine injuries (5), those occurring in patients over 60 years of age were commonly caused by relatively minor falls, as in this patient.

Patients of any age group must however be assumed to have cervical spine injuries if they sustain head injuries, high impact injuries or any injury above the clavicle (1) (6). Para-medical personnel and doctors involved in the early management of such patients must be aware of potential for catastrophic cervical spine injury, no matter what the history suggests and regardless of the age of the patient. This is particularly important when such patients require urgent tracheal intubation.

The lessons learned from this case are important for military medical personnel as it reinforces the necessity for cervical spine immobilisation in any casualty with a head injury, serious multisystem trauma or injury above the clavicle. This is particularly relevant for the initial first aider because as many as 25% of cervical spine injuries may be caused by improper handling of patients before they arrive at hospital (7).

Many of the injuries sustained by military personnel are likely to involve blunt trauma due to vehicle accidents or falls either during training exercises or on operational tours. As in civilian trauma (8), these types of injury will subject the victims to significant force and increase the risk of cervical spine injuries. During a recent operational tour on OP GRAPPLE the majority of casualties that presented to the MST in Zepce had sustained blunt trauma as a result of vehicle accidents and many had head injuries (9).

Immobilisation of the cervical spine whilst attempting to secure the airway is mandatory in all casualties with potential cervical spine injuries. This is standard teaching on the British Army Trauma Life Support (BATLS) and British Army Resuscitation Techniques and Skills (BARTS) courses, which are based on the Advanced Trauma Life Support (ATLS) course of the American College of Surgeons (1) and use the airway, breathing, circulation (ABC) principles of resuscitation. These courses are however only taught to RAMC medical personnel and the standard teaching for regimental first aiders remains the "4 Bs" (breathing, bleeding, breaks and burns). Many training videos still use this system. It is simple and can be carried out as a reflex action by any soldier who has a large number of other drills and procedures to memorise. The great discrepancy between the "4Bs" and the ABC system is the lack of adequate

emphasis on cervical spine stabilisation. It is no longer acceptable for a casualty to sustain a spinal cord injury as a result of inappropriate management of the cervical spine during initial resuscitation efforts. The techniques and equipment are easily available and should be within the armamentarium of any rescuer. The management of the airway, breathing and circulation is still of paramount importance in the resuscitation of any casualty. However there must be concurrent management of cervical spine. It is a reflex action for a soldier to drag an injured comrade from a wrecked vehicle; however with a minimal amount of instruction the importance of immobilising the cervical spine can be appreciated (Fig 2). Appropriate rigid collars such as the NecLocTM or LaerdalTM varieties should become standard first aid equipment in all military vehicles along with the first field dressings and morphine. All soldiers should be familiar with their use and alternative improvisation techniques using equipment such as pieces of webbing should be suggested for situations where there are no rigid collars available.

Fig 2. Appropriate cervical spine management during extrication of a casualty from an armoured vehicle.

The patient in our case presentation probably sustained his spinal cord injury at the time of the accident however it may have been aggravated by inappropriate manipulation of the neck during initial attempts to secure the airway.

Conclusion

The lessons learned from this case presentation are relevant to a military scenario. All military personnel must be made aware of the hazards of excessive movements of the neck in patients who are at risk of unstable cervical spine fractures and take appropriate action to prevent them. It is essential that appropriate training is provided for all personnel who may be in the position to provide initial care of seriously injured casualties in the field. The protocols of the BATLS and BARTS courses should be standard teaching along with the provision of suitable equipment to deal with these patients at the scene of the injury.

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