

Decision making in head injuries - current concepts and guidelines

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Introduction

The simplest definition of a head injury is any trauma to the head, other than superficial injuries to the face [1]. Although a simple definition this encompasses injuries which can cause severe long term psychological and physical disability to those effected. This can have a devastating effect on the patient and society by the fact that most effected are young male adults during the most productive years of their life. The main aim of guidelines and implementation of these guidelines is for the identification, assessment and prompt execution of treatment for these patients to avoid secondary complications of head injury who can go on to suffer long term sequelae especially if definitive treatment is delayed.

In the UK 6.6% of all patients presenting to the accident and emergency department presented with head injuries. Of these 1% was admitted [2]. In the UK that amounts to approximately 5000 deaths per year. Some of these deaths are inevitable, some are potentially preventable. In Sri Lanka, data from an audit carried out retrospectively at the neurosurgical unit in Karapitiya, Galle, reported that in a three month period 37% of all admissions with trauma were head injuries [3]. Of the patients admitted the highest incidence was in the age range 20-40 years which agrees with the data from the UK. The male to female ratio was 5.3:1 again confirming that the young male has the highest risk. Interestingly there were only a small number of children involved which is significantly different to that of European evidence where half those admitted were children under the age of fourteen [4]. The principle causes of head injuries include road traffic accidents, assaults, and sports injuries and apart from guidelines with regards to management of secondary injuries this emphasises the fact that preventive measures are also extremely important and implementation of this can be essential when it involves road traffic accidents. Road traffic accidents although accounting for only 25% of the head injuries cause the more devastating injuries.

The initial assessment of those presenting with a head injury involves the use of the Glasgow Coma Score [5,6]. This is

adapted and changed for the assessment of children with head injuries. The Glasgow Coma score also enables the categorisation of the injury into mild (13-15), moderate (9-12) and severe (less than or equal to 8) according to the score given. This then enables initiation of the appropriate management.

What are guidelines? These are not standards of care but merely recommendations. Guidelines exist as the name suggests 'to guide' health professionals in obtaining the best outcome after a head injury for the patient. By no means are these set in stone and will take into account the population, demographics, incidence and resources available in each country. But in general the principle is the same throughout the world. In Sri Lanka guidelines have been established as part of the trauma resuscitation protocol (SLCOA National guideline) and by the College of Surgeons of Sri Lanka [13] (CSSL 2007). In the UK the first endorsement of guides was carried out by the Department of health in 1983 taking account the expansion of trauma services and the greater availability of CT scanning and since then evolution of the guidelines have taken place taking into account changes in management as more information with regards to available resources become available and evidence with regards to the best management of care. The National Institute of Clinical Excellence (NICE) in the UK have recently updated the guidelines [1]. Essentially the guidelines exist to optimise the early management of patients with head injuries to prevent secondary damage.

A knowledge of the pathophysiology is also essential in the management of head injuries this highlights the urgency of diagnosis and emphasises the importance of preventing secondary damage. Brain damage occurs both as a result of the direct impact and as a result of the development and progression of secondary complications. Impact damage is of two types which may coexist, cortical contusions and laceration and diffuse axonal injury. Secondary brain damage may occur at any time after the initial impact, these include intracranial haematomas, cerebral oedema, cerebral shift, ischaemia and infection. These are preventable sequelae which can be avoided. Avoidance of hypoxia to the cerebrum should be emphasised above all in the initial management again preventing secondary damage and is taken into account in the first line of any trauma management ABC.

The reported incidence of cervical spine injuries in head injured patients has ranged from 4-8 percent [7]. One

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study reported that those with the highest risk are those involved in road traffic accidents who present Glasgow coma score of less than 8 (that is a severe head injury) [8,9]. Although some controversy has been brought about by a study reported [10] in the British journal of surgery which reported a rate of approximately 3.5% association of cervical spine injuries with head injuries with an association to the severity of the head injury, it is important that cervical spine injury should be strongly considered in a head injured patient.

Guidelines

Initial assessment in the emergency department

Patients presenting to the emergency department should be assessed by a trained member of staff. The assessment and classification of patients who have sustained a head injury should be guided primarily by the adult and paediatric versions of the Glasgow coma score and thereby the Glasgow coma score. It is essential that the mechanism of injury is taken into account and the presence or absence of a cervical spine injury ascertained. Advanced trauma life support system followed in all adult patients and the Advanced Paediatric Life support system in children.

Further management depends on the severity of the injury.

Adult patients with any of the following signs and symptoms should be referred to an appropriate hospital for further assessment of potential brain injury:

- GCS<15 at initial assessment
- post-traumatic seizure
- focal neurological signs
- signs of a skull fracture
- loss of consciousness
- severe and persistent headache
- Vomiting
- post-traumatic amnesia >5 minutes
- retrograde amnesia >30 minutes
- high risk mechanism of injury
- coagulopathy, whether drug-induced or otherwise

The above applies to Paediatric head injury as well, but additional factors such as non accidental injuries should also be taken into consideration.

Indications for CT scanning

Early imaging can detect intracranial lesions before they produce clinical findings. Several studies were considered before guidelines were put forward, of these the Canadian CT study gained the most emphasis and attention. The CCT head rule combines high sensitivity (98.4%) and relatively high specificity (49.6%) [11,12]. By applying the CCT head rule very few head injuries will be missed.

Immediate CT scanning should be done in an adult patient who has any of the following features:

- eye opening only to pain or not conversing (GCS 12 or less)
- confusion or drowsiness, followed by failure to improve within one hour of clinical observation or within two hours of injury
- base of skull or depressed skull fracture and/or suspected penetrating injuries
- deteriorating level of consciousness or new focal neurological signs
- severe and persistent headache
- two distinct episodes of vomiting
- history of coagulopathy
- loss of consciousness, amnesia or any neurological deficits

In adult patients who are GCS<15 with indications for a CT head scan, scanning should include the cervical spine.

In children the initial assessment should be carried out by a healthcare professional that has training in the management of Paediatric trauma.

Immediate CT scanning should be done in a child (<16 years) who has any of the following features

- GCS?13 on assessment in emergency department
- witnessed loss of consciousness >5 minutes
- suspicion of open or depressed skull injury or tense fontanelle
- focal neurological deficit
- any sign of basal skull fracture.

Admission criteria after a head injury

- consciousness is impaired (GCS<15/15)
- patient is fully conscious (GCS 15/15) but has any indication for a CT scan
- patient has significant medical problems
- Patient has social problems or cannot be supervised by a responsible adult.

Children who have sustained a head injury should be admitted to hospital if any of the following risk factors apply

- any indication for a CT scan
- suspicion of non-accidental injury
- significant medical comorbidity
- difficulty making a full assessment
- child not accompanied by a responsible adult
- social circumstances considered unsuitable.

When admitted the patients should have close monitoring including behavioural monitoring. Any change in the GCS, neurological deficits and behavioural changes should be promptly acted on.

Criteria for discussion with the Neurosurgical Team

- when a CT scan in a general hospital shows a recent intracranial lesion
- when a patient fulfils the criteria for CT scanning but facilities are unavailable

- when the patient has clinical features that suggest that specialist neuroscience Assessment, monitoring, or management are appropriate, irrespective of the result of any CT scan.

Features suggesting that specialist neuroscience assessment, monitoring, or management are appropriate include

- persisting coma (*GCS score 8/15 or less*) after initial resuscitation
- confusion which persists for more than four hours
- deterioration in level of consciousness after admission (*a sustained drop of one point on the motor or verbal subscales, or two points on the eye opening subscale of the GCS*)
- focal neurological signs
- a seizure without full recovery
- compound depressed skull fracture
- definite or suspected penetrating injury
- a CSF leak or other sign of a basal fracture.

The hospital to Neurosurgical unit transfer should be carried out according to the guidelines set out by the colleges of anaesthesia and neuroanaesthesia. The head injured patient with impaired consciousness is a risk of physiological instability and secondary brain damage therefore transfer should be undertaken in a controlled safe manner.

Discharge of patients and follow-up care

Once patients have recovered from a head injury they can be discharged home. Clear advice must be given in written and verbal form prior to discharge. This should include symptoms to be expected such as recovery from concussion which can include problems with short term memory, concentration and headaches. Advice should also include symptoms that should prompt the patient to represent to hospital. Such as severe headaches, seizures and vomiting. It is essential that prior to discharge relatives are aware of symptoms and signs to look out for and instructions for readmission.

Discussion

Above article comprises a brief overview of guidelines for head injury management. The guidelines are recommendations and should be adapted taking into account resources available. The international guidelines are being constantly adapted and changed with the emergence of new evidence in head injury pathophysiology and new imaging techniques. The management of severe head injury is a complex topic and warrants a separate article in itself. This will take into account the complexities involved in maintaining cerebral perfusion and thereby avoiding secondary hypoxic injury. Intensive care management which is protocol driven for the optimising this care with the close management of intracranial lesions by the neurosurgeons ensure a better outcome for the patients. Paediatric care should be managed in a dedicated paediatric unit. Non accidental injury should be considered when the history doesn't fit in with the clinical sce-

nario. Child protection issues have to be broached in the overall management of the child. When ever a multitrauma patient is admitted remember always the ATLS and PALS guidelines and always the cervical spine.

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