

Review

Traumatic brain injury: review of current management strategies

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Abstract

Head injury is a common condition with a high morbidity and mortality. Serious intracranial haematomas require early recognition and evacuation to maximise chances of independent outcomes. Recent organisational changes have promoted the development of trauma units and major trauma centres where patients can go through triage and be managed in an appropriate environment, and the development of management pathways in intensive treatment units has resulted in improvements in the outcome of traumatic brain injuries. Evidence for the treatment of cerebral perfusion pressure, and management of hyperventilation, osmotherapy, tracheostomy, and leakage of cerebrospinal fluid (CSF) has accumulated during the last decade and is important in the management of patients in all clinical settings. Since head injury is commonly associated with maxillofacial injuries, this review will be relevant to all who deal with this aspect of trauma.

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Contents

Introduction	299
Care pathways	299
NICE guidance	299
Pathology	299
Focal lesions	300
Acute extradural haematoma	300
Acute subdural haematoma	300
Chronic subdural haematoma	301
Intracerebral haematoma	301
Diffuse injury	302
Diffuse axonal injury	302
Intensive care treatment	303
Cerebral perfusion	304
Ventilatory variables	304
Osmotherapy	304

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Tracheostomy	305
Thromboembolic prophylaxis	305
Traumatic leakage of cerebrospinal fluid	305
Outcome and prognosis	305
References	305

Introduction

Head injury refers to any insult to the head region, and includes fractures of the skull and facial bones, intracranial injuries, and injuries to the special senses.¹ The commonest causes of head injury in adults are road traffic accidents (40%) and falls (37%). In children they are accidents with the child as a pedestrian (36%), and falls (24%).² Head injury is a major cause of morbidity and mortality across the globe at all ages, with an incidence ranging from 150 to 450 cases/100 000/year.^{3,4}

Initial assessment and management of these patients should follow the Advanced Trauma Life Support algorithm. Neurological examination should focus on the Glasgow Coma Score (GCS, Table 1), pupillary size and reaction, and focal neurology.^{5,6}

Care pathways

Some patients with head injuries require observation at a district general hospital while others with life-threatening injuries are best served in major trauma centres. Nationally, a regional trauma system for care is being established to improve outcome.⁷ This system aims to integrate various contributory services, which include public health (education and prevention), trauma units, major trauma centres, and rehabilitation units. Efficient triage of patients to a trauma unit (previously district general hospital) or a major trauma

centre is required. Subsequent timely discharge to an identified rehabilitation team follows. Any community follow-up is led by the general practitioner.⁷

Nathens et al. reported an 8% reduction in mortality for road traffic accidents over a 10-year period following the implementation of such a system in the US.⁸ Similar work in the UK has not yet yielded significant results.⁹

NICE guidance

The National Institute for Health and Clinical Excellence (NICE) guideline on head injury (2007) focuses on the early management of patients.¹⁰ The quality of the evidence that underpins the guideline is variable and is derived from worldwide sources, and some have expressed concern that the recommendations would over-burden low capacity tertiary centres,¹¹ but Patel et al. reported that patients with traumatic head injuries who were treated in a non-neurosurgical unit had 2.15 times the adjusted odds ratio of death compared with those treated in a neurosurgical unit.¹²

NICE recommends that patients who present to an emergency department with a minor head injury (GCS 15) should be assessed within 15 min of arrival and reassessed within a further hour. If the score is less than 15, immediate assessment is required. Criteria for imaging are shown in Fig. 1. Cases that should be discussed with a neurosurgeon include those with a surgically important lesion on computed tomography (CT), a GCS of 3–8 or a deteriorating score, confusion of more than 4 hours' duration, progressive focal deficit, seizure, leakage of cerebrospinal fluid (CSF), or a penetrating injury. When specialist care is not required, the patient should be observed. If the GCS is less than 15, neurological observations should be done every 30 min until the score reaches 15. Observations should continue to be half-hourly for a further 2 h, then hourly for 4 h, and 2-hourly thereafter.¹⁰

Various authors have commented on the lack of resources available to meet the indications for scanning,^{13,14} but a recent study has shown that it is possible to meet the NICE criteria.¹⁵

Pathology

Brain injuries can be classified as primary, secondary, focal, or diffuse. Primary injuries occur at the time of trauma and secondary injuries develop later. Focal injuries include cerebral contusions and haemorrhages (extradural, subdural,

Table 1
Glasgow Coma scale.

	Score
Eye opening	
Normal	4
To voice	3
To pain	2
None	1
Verbal response	
Normal	5
Confused	4
Inappropriate words	3
Incomprehensible sounds	2
None	1
Motor response	
Following commands	6
Localising to pain	5
Flexion to pain	4
Abnormal flexion to pain	3
Extension to pain	2
None	1

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