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A Review on Traumatic Brain Injury, Diagnosis and Its Treatment

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Review Article

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ABSTRACT

Traumatic brain injury is one of the major problems of brain tissue damage, which results, loss of memory, amnesia or may also lead to brain death. One of the major effected country, United States were most of the young people are reported with the brain injury, mainly because of the accidents. This review will mainly focus on current situation on TBI in major countries, its present day research on diagnosis and its treatment.

INTRODUCTION

Traumatic brain injury (TBI) is a severe damage to brain resulting from external force which leads to damage to brain tissue [1-3]. It occurs when the skull is stabbed by an object. It is a major public health problem and a leading cause of death worldwide mainly in children and young adults, males sustain TBI more than females. Consistently, around 1.5 million influenced individuals kick the bucket and a few millions get crisis treatment [4-8]. The vast majority of the weight (90%) is in middle and income nations.

Motor vehicular accident is leading cause of head injury worldwide. World health organization's world health day in 2004 was dedicated to road safety [9]. The level of attention to road safety underscores the global burden of road traffic injuries and the need for public health concern towards reducing this epidemic [10,11].

In United States (US), the incidence of head injury at the Emergency Department was recently reported to be 394 per 100,000 people, male: female ratio was 1.8:1 and mortality rate 19.3 per100, 000 people. The leading causes of TBI in US were reported as fall (28%), motor vehicular traffic accident (20%) and assault (11%) [12-16]. The highest incidence of motor vehicular traffic accident was found in the 15-19 year group, while fall was the leading aetiology in the 0-4 and >75 year groups. The traffic safety law and preventive measures in the US has reduced road traffic accident whereas fall is on the increase at the extremes of ages. Every year in the month of March, Brain Injury Association of America (BIAA) will conduct a campaigning on brain awareness month and the theme for 2015 to 2017 campaigning is **Not Alone** [16-20].

Another study done in the United Kingdom (UK) population on the attendance rate of head injury at an Emergency Department showed that head injury constituted 3.4% of the total attendance and the incidence was 453 per 100,000 [21]. Nearly 11% were moderate to severe head injury, implying that mild head injury (89.1%) was the most common type. Males were found to be at a higher risk for moderate to severe head injury than females. Thus, even in the regulated systems of the developed countries, head injury is still of special public health concern.

TBI is a major public health problem worldwide, any measure that would reduce mortality or morbidity associated with this injury even slightly could translate into very significant benefit in human and economic term [22-27].

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DIAGNOSIS

Clinical identification includes such as headache or neck pain, vomiting, confusion or disorientation, amnesia, loss of consciousness, other neurological abnormalities such as focal neurological signs, seizure or intra cranial lesion [28-30].

Symptoms are dependent on the type of Injury to brain (diffuse or focal) and the part affected. Symptoms may also dependent on the injury's severity [31,32]. There are a number of criteria for assessing severity of injury these include, the Glasgow Coma Scale Score, loss of consciousness or coma and post traumatic or retrograde amnesia.

Cranial CT is the preferred method of assessment on admission to determine structural damage and to detect (developing) intracranial haematomas [33-38]. Some studies have successfully identified risk factors for intracranial lesions, such as vomiting, age, duration of amnesia, the type of injury, neurological deficit, and anticoagulant therapy.

In the past, much attention was focused on radiographs of the skull to triage indications for CT, but these are no longer thought to be useful. Fractures of the skull can be seen adequately on CT in the bone-window setting, and three-dimensional reconstructions with volume rendering techniques provide a far superior insight into complex fractures [39-45].

MRI studies are occasionally done in the acute phase of TBI because more time consuming and do not certainly provide any further information for clinical results. However, MRI can be more useful if a strong injury with a wooden object is suspected [46-52].

Angiography might be utilized to identify vein pathology when danger elements, for example, infiltrating head injury are included. Functional imaging can quantify cerebral blood stream or digestion system, surmising neuronal movement in particular locales and conceivably foreseeing result. Electroencephalography and transcranial Doppler may likewise be utilized [53-55].

Management of TBI

The vast majority of patients presenting to emergency room with head injury fall under mild TBI (GCS score of 13-15) these patients are awake, may have amnesia, there may be a brief history of loss of consciousness [55-58]. Other signs of mild TBI include headache, nausea, vomiting, lack of motor coordination, dizziness, difficulty balancing, blurred vision, fatigue and changes in sleep patterns. Mental and emotional symptoms include mood or behavioural changes, confusion and memory disorders. Mild TBI symptoms may also be present in moderate and severe injuries [59-63].

Most patients go on to make uneventful recoveries, albeit with subtle neurological sequelae. However, about 3% of patients unexpectedly deteriorate and can become neurologically devastated if the decline in their mental status is not noticed early [64]. Management of patients with minimal sign includes admission for observation for 12 to 24 h after resuscitation [65].

For moderate risk group with initial signs such as vomiting, post traumatic amnesia or signs of basilar or depressed skull fracture, the recommended procedure includes extended close monitoring, cranial CT scan and neurological consultation [66-69]. However in those patients presenting with serious initial symptoms such as depressed or decreasing level of consciousness, neurological signs or penetrating injuries, a neurological consultation, in combined with an emergency cranial CT scan is recommended as patients may require surgical evacuation [70-75].

The management of these patients is described in five stages, (1) cardiopulmonary stabilization, (2) general examination, (3) neurological examination, (4) diagnostic procedure, (5) surgical intervention.

A crucial part of the management of severe TBI is in the Intensive care unit which involves a comprehensive and assessment outlined in the Advance Trauma and Life support. Patients should be stabilized before being transferred to intensive care unit. Secondary injury is anything that occurs to augment the primary injury; the prevention of this is predominantly where intensive therapy is aimed [76-79].

Apnea, atelectasis, aspiration, and acute respiratory distress syndrome are often associated with severe head injury; prolonged apnea may often be the cause of immediate death at the scene of accident [80]. All severely head injured patients should be intubated, in the process of establishing an airway the mouth and nasal passages must be cleared of all foreign body, secretion, blood or vomitus [81-86]. Emergency tracheostomy may be done in patients with severe maxillofacial injury in whom intubation may be precluded because of severe soft tissue swelling and distortion of airway anatomy [87-90].

During cardiopulmonary stabilization, the clinician conducts a rapid general examination looking for other associated injuries, like head and neck injuries, chest injury, abdominal pelvis and spinal cord injury [91-93]. Diagnostic X rays after cardiopulmonary stabilization include cervical spine, chest, skull, pelvis and extremities [94-96].

Traditionally a staircase approach to increasing intracranial pressure include achieving mild hypocapnia by ventilating patients to a PaCo2 between 3.5-4.0 kpa, use of mannitol and CSF drainage, followed by hypnotic coma with barbiturate or propofol to prevent coning. This approach should be tailored to individual patho physiology [97-99].

Management of patients with TBI in intensive care unit includes monitoring, monitoring of the oxygen saturation in the cerebral venous blood using fiberoptic technology which allows continuous assessment [100].

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CONCLUSION

There is need to continue research methodology and a better understanding of the molecular mechanisms contributing to brain injury, for effective pharmacological neuro protection.

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