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Autopsy Finding in Patients with Severe Head Injury

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Abstract: Brain damage in head injury results from either neural or vascular injury. Understanding the mechanisms of injury and their consequences is the foundation of management in head injured patient. This is a retrospective study of 216 cases with severe head injury that admitted and went under autopsy after death. From 216 cases, 81.9 were male and 18.1% female. The mechanism of trauma was traffic accident in 70.4%, falling in 18.8%, job accident in 6.1 and murder in 4.7%. Cases between 16-60 years old including 61.5% of all mortality. Cases whose death time was in 0-24 h after admission, consist of 27.7% of all mortality rate. The most common finding was linear skull fracture. Subdural hematoma was the most common extra axial lesion (45.4%). The most common intra axial lesion was contusion that was associated with skull fracture in 35.2%. The frequency of epidural hematoma was the same in all types of skull fractures. SAH was seen in 52.6% without any fracture.

Key words: Autopsy, head injury, skull fracture, epidural hematoma, subdural hematoma

INTRODUCTION

Sever traumatic brain injury is a devasting condition (Graham and Smith, 2001) and the leading cause of death and disability (Teasdale and Pettigrew, 1998). Traumatic brain injury is estimated to be the primary cause of death in one 3rd to one half of all traumatic death (Adams *et al*., 2001). The great majority of patients show several abnormalities in neuropathological investigation and most of the traumatic intracranial pathology are supratentorial in location (Chair, 2002). Understanding the mechanisms of traumatic brain injury and their clinical consequences is the foundation of the management of the head injured patient (Gennarelli, 1986). Several studies were performed to define the pathological finding in brain traumatic lesion, but significant differences in study method particularly in case ascertainment and inclusion criteria make study comparison difficult, particularly, among subgroup of traumatic brain injury patients.

Brain damage in head injury result from either neural or vascular injury (Gennarelli and Thibault, 1982). Patterns of damage can be either focal of diffuse. Also brain damage depending on the time is becoming primary by the forces of injury or secondary as a result of systemic complication (Thibault and Gennarelli, 1985; Hol Bourn, 1943).

Primary head injury is divided into 5 general categories: scalp damage, skull fracture, perforating wound, focal lesion and diffuse injury. Scalp damage may range from trivial contusion to total avulsions of the scalp.

Skull fracture is classified as linear or depressed. Linear fracture are divided in to cranial vault and basilar fractures (Simpson and Berson, 1987; McCrory and Berkovicsf, 2001). Vault fracture be sub classified as open or closed. Perforating wound (stab wound) and penetrating wound (missile wound) both are open fracture. Focal lesion consists of epidural hematoma, Subdural hematoma, intracerebral hematoma, contusion, subarachnoid and intra ventricular hematoma (Teasdale *et al*., 1990). Diffuse brain injury consists of concussion and diffuse axonal injury.

MATERIALS AND METHODS

This is a retrospective study of 216 cases with severe head injury that were admitted to Imam hospital between 1999-2004 and went under autopsy after death. In this study, all patients that died because of severe head injury either before or after admissions were considered.

Autopsy was done in the presence of anatomist. The aims of this study consist of better understanding the lesion leading to death, relationship between different lesion, prognostic role of clinical finding in 1st visit on emergency room, Importance of secondary lesion, mortality of different lesion and understanding of etiologic factors.

RESULTS

From 216, 80 cases (35.8%) before admittance and 136 cases (64.2%) after admittance died. From 216, 177 cases

Table 1: Frequencies of fractures

Total number	Without fracture	A	B	C	D	A+D	A+C	A+B	C+D	A+D+C
216	30.6%	6%	4.2%	26.4%	6.9%	5.1%	10.6%	0.5%	5.1%	4.6%

Basilar Skull fracture A; Linear fracture (< 5cm) B; Linear fracture (> 5cm) C; Depress fracture D

Table 2: Frequencies of extra axial lesion

Negative	Epidural hematoma	Subdural hematoma	Subarachnoid hematoma	Epidural+subdural	Subdural+subarachnoid
23.1%	3.2%	45.4%	8.8%	5.1%	14.4%

Table 3: Frequencies of intra axial lesion

Negative	Contusion (CON)	Brain Edema (BE)	Intravetricular Hematoma (IVH)	Intracerebral Hematoma (ICH)	Brain Laceration (BL)	(CON)+ (BE)	(CON)+ (IVH)	(CON)+ (ICH)	(CON)+ (BL)	(IVH)+ (ICH)
18.5%	64.4%	2.3%	0.9%	0.5%	1.9%	3.2%	0.9%	0.5%	6.5%	0.5%

(81.9%) were male and 39 cases (18.1%) were female. The mechanism of trauma was traffic accident in 70.4%, falling in 18.8% jab accident in 6.1 and murder in 4.7%. All of cases were divided in to 3 age groups.

First group consists cases between 0-15 years old including 11.3% of all mortality. Second group consists of cases between 16-60 years old including 61.5% of all mortality and 3rd group consists of cases over 60 years old including 27.2% of all mortality. Patients who die after hospitalization have been evaluated on the basis of respiratory status, blood pressure, papillary reflex, leak of CSF and Glasgow come scale in 1st visit. From 136 case admitted in hospital, 38% had hypoventilation, 1.6% had hyperventilation and 60.4% had normal ventilation. From 136 cases, 27.2% had hypo tension, 2.3% had hypertension and 70.5% had normal pressure.

From 136 cases, in 39.4% the pupils were midsize and reactive, in 29.5% unilateral midriasis without light reflex and in 31.1% the pupils were double midriasis without reflex. From 136 cases, 6.9% had leak of CSF and 93.1% had no leak.

All of patients admitted in hospital divided on the basis of GCS in 3 groups, that consists of 1st group with mild trauma (GCS=14, 15), 2nd group with moderate trauma (GCS=9-13) and 3rd group with severe trauma (GCS=3-8), with frequency of 1.4, 14.4 and 84.4% in order. All of patients admitted were divided on the basis of death time in 4 groups.

First group whose death time was in 0-12 h after admission, 2nd group whose death was in 24-72 h after admission, 3rd group with death in 4-20 days after admission and 4th group whose death time was over 20 days after admission.

The maximal mortality was in 1st group with 72.7% of all mortality rare. From 136 admitted, 56 cases go under operation that 11 had laparathomy and 45 cases had craniotomy.

At autopsy, all patients were assayed from skull fracture, which can be divided in 4 groups: basilar skull fracture, depressed fracture, linear fracture of skull vault greater than 5 cm and liner fracture of skull vault lesser than 5 cm.

From 216 cases, 66 cases without skull fracture, 13 cases with basilar skull fracture, 15 case with depressed fracture, 51 cases with linear fracture greater than 5 cm and 9 cases with linear fracture lesser than 5 cm (Table 1).

The frequencies of extra axial lesion at autopsy consist of 23.1% without lesion, 3.2% with epidural hematoma, 45.4% with subdural hematoma and 8.8% with subarachnoid hemorrhage (Table 2).

The Frequencies of intra axial lesion at autopsy consist of 18.4% without lesion, 64. 4% with contusion, 2.3% with brain edema, 0.2% with intraventricular hematoma, 0.5% with interacerebral hematoma and 1.9% with brain laceration (Table 3).

DISCUSSION

In our stady, 1/3 of patients died befor admission and 2/3 died after admission. Mortality in men was 4 times more than women because of their more and active presence in society. The GCS of paitients in 1st visit is a very important prognestic factor, as GCS lower than 6 is associated with more than 80% mortality.

In our study, acute subdural hematoma was the most common extra axial lesion and also was the most common cause of death. Cerebral contusion was the most common intra axial lesion that leads to death, although it doesn't need surgical management.

The frequency of epidural hematoma was the same in all types of skull fractures. In spite of epidural hematoma that was associated with skull fracture in most cases, Subdural hematoma was without any fracture in 1/4 of cases.

The other extra axial lesion was subarachnoid hemorrhage, that was seen in 52.6% without any fracture and linear fracture of skull vault was the most common type of fracture that was associated with SAH.

In patients without skull fracture, the most common intra axial lesion was brain edema. Intravetricular hemorrhage was seen in 50% with skull fracture and in 50% without skull fracture.

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