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Fatal and Non-Fatal Head Trauma Amidst Cranial Fracture and Haemorrhage Patterns and Depressed Fractures Fundamental Restoration

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Abstract

Background: Head trauma are a widespread problem. The concept of a head injury includes fracture of the cranial and facial bones, and injury to specific sensory and brain regions. The outcome in terms of surviving in such traumatic brain injury circumstances depends on the kind of weapons utilized, the kind and position of the skull fracture, and cerebral haemorrhage.

Material and Methods: 176 head injuries were studied prospectively. The investigation was conducted at Department of Forensic Medicine and Toxicology, Kakatiya Medical College, Warangal, Telangana, India where 13 to 75-year-olds were affected. The study beginning with June 2021 to May 2022. Cases divided into non-fatal head injuries (Group A) and Fatal head injuries (Group B). Every case was assessed for age, sex, residency, trauma, effect, treatment, fate, and complications. The Chi Square test was used to compare categorical variables, while the ANOVA test was used to examine the age variable across the two research groups. Both tests required a P value of 0.05 or less. SPSS Software version 16 was used.

Results: Group A had 44.4% men, Group B 55.6% and 56.3% women in Group A and B with 43.7%. Group A blunt trauma was 65.8% while group B was 34.2%. Rural areas have more blunt trauma cases. 80 blunt trauma patients in Group A and 91 cases in Group B had lacerated wounds. Temporal bone fractures occurred in 42 non-fatal Group A and 10 fatal group B patients. Group A had 43 depressed fractures (95.6%), while group B had 2 (4.4%). 39 group A (62.9%) and 23 group B (37.1%) instances have subdural haemorrhage. Complications is seen in 17 cases after conservative treatment and 27 cases after trephine.

Conclusion: Light weapons are insufficient to cause fatal head injuries, there is a significant difference between the sexes in head injury fatality and outcome, getting older is linked to a poor outcome. Head injuries are more common in rural areas than in urban areas, and there is a very high mortality rate in rural areas due to a lack of facilities. The new investigation supports these and other conclusions.

Keywords: Head trauma, cranial fracture, medical-legal autopsy, depressed fracture, cerebral hemorrhage.

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Introduction

A trauma to the head, which may or may not include the brain, is what's meant by the term "head injury." It is a significant contributor to the morbidity and mortality rates all around the world, and it can be caused by either blunt, chop or penetrating injuries.[1,2] Every year, thousand of individuals are affected with head trauma, and young guys are most commonly

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affected, most likely as a result of the increased activity associated with this demographic variables. Accidents involving motor vehicles, physical violence, falls from great heights, and stab wounds are some of the most common causes of brain injuries.[3] Even in civilian settings, injuries to the head caused by a penetrating object have a greater death and morbidity rate than injuries caused by blunt force. Penetrating injuries have a greater case fatality rate than closed injuries across the board, regardless of age, gender, or cause of injury. The temporal region and the orbit, both of which have weak bones, are the most often injured areas in the head.[4]

There are two categories of skull fractures: those that affect the vault of the skull and those that affect the base of the skull. These sorts of fractures are extremely prevalent, and it is essential to be aware of them.[6-8] Vault fractures are prevalent. One more way to classify him or her is according to whether the fracture is open or closed, depressed or non-depressed, or non-depressed and open. Vault fractures frequently result in epidural haemorrhages as a secondary complication. It's possible that these epidural hematomas are venous or arterial in origin. In most cases, arterial hematomas are the result of bone fragments from a fracture ripping the middle meningeal artery. In most cases, venous hematomas are the result of leaking from the fracture edges. Venous hematomas also have a tendency to expand more slowly than arterial hematomas.[4,5]

Elevation of the patient's head, removal of all bone fragments, and delayed cranioplasty are the components of the conventional treatment for compound depressed skull fractures. The closed depressed skull fractures, also known as CDSFs, are often managed without surgery because, in most instances, surgical intervention provides little to no benefit. The existence of a hematoma, apparent dural rupture, and an unsatisfactory cosmetic appearance is the only indication that has been identified for surgical repair of CDSF.[5,6]

Material and Methods

A prospective study was conducted, and 176 cases of head injuries were included in it. The investigation was carried out in Department of Forensic Medicine and Toxicology, Kakatiya Medical College, Warangal, Telangana, India. Cases ranged in age from 13 to 75 years. The study was conducted from June 2021 to May 2022.

Medical records, eyewitness accounts from police reports, and an accurate, thorough post-mortem investigation in cases of death were used to document the damage. Cases were split into two categories:- Cases of non-fatal head injuries (Group A) and cases of fatal head injuries (Group B). Every case was evaluated for age, sex, residency, kind of trauma, effect of trauma, treatment, fate, and complications.

In group (A), each case underwent a thorough medical examination on its own, medical documents from the hospitals were gathered, and all recorded tests, including X-rays and CT scans, as well as any neurosurgery advice, were completed. For group (B), a full post-mortem was performed on each case, whether it occurred right after the trauma or on patients who passed away in the hospital. The autopsy was meticulously performed to remove any artefacts, with sufficient attention paid to the associated meninges, and the vaults and bases were thoroughly checked for fractures.[5,6]

To contrast categorical data in between 2 categories under study, the evaluated data were analysed statistically using the Chi-square test. The age parameter was compared between the groups under study using the ANOVA test. P value < 0.05 is regarded as significant. The statistical analysis was conducted using SPSS version 16 statistical software.

Inclusion criteria

1. Cases of both gender
2. Cases only where the injury has been clearly documented

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3. All of the instances had head injuries brought on by accident and assault, with no other body parts being hurt.

RESULTS

Table 1: Gender distribution

	Group (A)	Group (B)	P
Male	71 (44.4%)	89 (55.6%)	0.096
Female	9 (56.3%)	7 (43.7%)	

Male in group A were 44.4% and in group B were 55.6%. whereas female population in group A were 56.3% and group B was 43.7%.

Table 2: Trauma type

	Group (A)	Group (B)	P
Blunt	80 (46.8%)	91 (53.2%)	<0.01**
Heavy sharp	0 (0%)	4 (100%)	
Firearm bullet	0 (0%)	1 (100%)	

Blunt injury cases in group A were 46.8% and in group B it was 53.2%. In Group B, heavy sharp trauma were noticed in 4 cases.

Table 3: Trauma type in relation to residence

	Blunt	Chop Injury	Firearm	P
Rural	90 (94.3%)	4 (2.3%)	1 (0.6)	0.02**
Urban	81 (100%)	0 (0%)	0 (0%)	

In rural higher blunt cases were observed and also in urban areas most cases persisted for blunt (86.4%).

Table 4: Distribution of types of injuries

			Non fatal	Fatal
Types of Injury	Type of trauma	Blunt	80	91
		Heavy sharp	0	4
		Firearm bullet	0	1
	Scalp injuries	Lacerated wound	80	91
		Chop wound	0	4
		Bullet Injury	0	1
	Type of skull fracture	Fissure	27	20
		Depressed	43	2
		Comminuted	0	4
		Perforating	0	1
		More than one type	4	67
		No fracture	6	2

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	Sites of fractures	Frontal	15	2
		Parietal	2	12
		Temporal	42	10
		Occipital	7	0
		More than one site	8	70
		No fracture	6	2
	Sites of hemorrhage	Extradural	30	8
		Subdural	39	23
		Subarachnoid	0	7
		More than one site	11	58
	Types of brain lesion	Brain laceration	0	79

Blunt trauma had most of 80 cases in group A and 91 in Group B. Lacerated wound showed cases in 80 cases and 91 in Group B. Temporal fracture was seen in 42 cases in non fatal group and 10 cases in group B. In Group B, in 70 cases fractures were seen in more than one site. Depressed fracture were seen in 43 cases in Group A and 2 cases in group B.

Table 5: Type of fracture

	Group (A)	**Group (B)**	**P**
Fissure	27 (57.4%)	20 (42.6%)	<0.01**
Depressed	43 (95.6%)	2 (4.4%)	
Comminuted	0 (0%)	4 (100%)	
Perforating	0 (0%)	1 (100%)	
More than one type	4 (5.6%)	67 (94.4%)	
No fractures	6 (75%)	2 (25 %)	

Depressed fracture cases in group A were 43 (95.6%) and in group B were 2 (4.4%). In Group B, 67 cases had more than one type of fracture.

Table 6: Type of haemorrhage

	Group (A)	**Group (B)**	**P**
Extradural	30 (78.9%)	8 (21.1%)	<0.01**
Subdural	39 (62.9%)	23 (37.1%)	
Subarachnoid	0 (0%)	7 (100%)	
More than one site	11 (15.9%)	58 (84.1%)	

Subdural haemorrhage is present in 39 (62.9%) cases in group A and 23 (37.1%) cases in group B.

Table 7: Incidence of complications

	Complications	**No complications**	**P**
Conservative treatment	17	21	<0.01**
Trephine	27	0	

Complications is seen in 17 cases after Conservative treatment and 27 cases after trephine.

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DISCUSSION

Brain damage is the cause of mortality in approximately fifty percent of all cases where trauma can be connected to a person's death, according to some estimates. Automobile collisions are the leading cause of most forms of brain injury. However, in recent years there has been a significant rise in the incidence of brain injuries that have been caused by violent acts. For diagnostic imaging tests, the use of computed tomography or magnetic resonance imaging is preferred whenever possible. There is a correlation between one's age and the risk of experiencing unfavourable results.[7,8]

The current study unambiguously indicated the prevalence of the use of blunt weapons and the common availability of these blunt weapons as murder weapons in consistent with other study findings.[4,5] This study is contrast with the findings of Memchoubi et al., who came to the conclusion that firearms were the most frequently used murder weapon in their research.[6] The findings of the study indicate that there is mild detectable gender difference in the lethality or prognosis of head injuries. This lends credence to the findings of researchers, which demonstrated that the death rate of patients with acute head trauma is not much affected by gender.[8,9]

The study found that male individuals accounted for 91% of all occurrences. This was due to the fact that conflicts between men were more prevalent than those between women, which led to this phenomenon. This finding is in line with the findings of a study carried out by other researcher, who discovered that males sustained more severe head injuries than females. In addition, we found that 74% of patients were male and 26% were female. This was in line with the findings of other study, who the ratio of males to females was three to one, which can be explained by the fact that men spend more time outside and are, as a result, more likely to become involved in altercations, trips, and other accidents.[9,10] Trauma both fatal and non fatal were common in the rural areas. This is in contrast to urban areas (21%), where the frequency of head injuries was significantly lower. In a study conduced by authors, who indicated that the incidence was almost two times more in the rural areas than in the urban ones. Chop and firearm injury was also reported in rural area. This was a reference to the higher rate of firearm ownership in rural areas compared to those in metropolitan areas. The high fatality rate that has been found in rural areas could possibly be caused by the lack of facilities and surgeons that are present in rural medical institutions.[6,10,11]

The highest occurrence rate among all types of trauma was found for blunt trauma, which had a survival rate of 53.2%. This finding is in line with that of other researchers, who showed that blunt objects were most frequently employed as attack weapons in cases with fatal head injuries. Their findings are backed further by the fact that the mortality rate associated with gunshot wounds to the head was thehighest of any and all sorts of head injuries.[10,11] According to the findings of this latest study, comminuted fractures are by far the most common kind of fatal skull fractures that occur in situations that end in death. This is in line with the findings of others, who discovered that any and all instances that involved fractures to the skull and/or substantial brain injury were considered to be fatal injuries. Researchers discovered that the concomitant laceration to the brain was the reason why all cases of comminuted fracture resulted in an instantaneous death.[10-12] The findings of the current analysis suggest that a greater number of people who had depressed fractures, in particular those who had temporal and parietal fractures, were among the cases that managed to flee. According to research done by McHugh and colleagues, isolated skull fractures are not considered to be particularly dangerous injuries and, on their own, have very few clinical ramifications. The only exception to this is when the fracture involves the brain's basal arteries. According to the findings of this analysis, the percentage of escaped cases that had depressed fractures was significantly higher.[11-13]

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According to the findings of this study, the patients who did not ultimately pass away as a result of their injuries had significantly greater rates of extradural and subdural haemorrhage than the other patients in the study. On the other hand, subarachnoid haemorrhage and cases with numerous bleeding sites were more common among those cases that resulted in death.[12,13] Therefore, it is plausible to draw the conclusion that the likelihood of death has a negative correlation with the magnitude of the haemorrhage that has occurred in the cerebral cavity of the patient. Also, demonstrated that while there is no common surgery by main restoration, the treatment was still only trephine procedure exiting a skeletal gap, that is not in accord with Nayak and Mahapatra, who stated that the principle of main restoration was to near the deformity and retain the anatomy barrier, to protect much farther complications.[13]

CONCLUSION

This research found a greater frequency of all kinds of head trauma including firearms head wounds. According to the report, 56.1 % of victims were fatal. Blunt head trauma were the main cause. Blunt objects, surface and weapons caused most head and facial wounds. Blunt head trauma were the most prevalent fatal wounds, following by chop injuries and firearm. Blunt traumas were also frequent in nonfatal cases, resulting in 43 depressed fractures.

Additional study must be done on patients with comminuted skull fractures and or subarachnoid haemorrhage to find innovative techniques of treatment to reduce death in such situations, as they have the highest death rate among all forms of head trauma. The principle of main restoration to protect much farther complications by undertaking decompressive craniotomy alongside main cranial bone repair may reduce problems.

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