Original Article

Outcome of Depressed Skull Fracture Among Patients Admitted in Teaching Hospital

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ABSTRACT

Objective: To assess the outcome and associated factors of surgically managed depressed skull fractures in patients.
Study Design: Cross sectional analytical study
Place and Duration of Study: This study was conducted at the department of neurosurgery, DG khan Medical College, Dera Ghazi Khan from January 2020 to December 2020.
Materials and Methods: The calculated sample size for study at 95% level of confidence, 5% margin of error and 17%[7] anticipated population proportion was 215. All the clinically and radiologically diagnosed patients of depressed skull fracture (DSF) in age group of 15-65 years operated for elevation were included by non-probability consecutive sampling. Data was collected by using predesigned questionnaire. SPSS version 22.0, was used to enter and analyze the data. Chi-square test was used to determine whether there is statistically significant difference between the groups and p value less than 0.05 was considered as significant.
Results: A total of 215 patients of depressed skull fracture which underwent surgical elevation of bone were included the study. The mean age of the patients was 28±10.6 years. Highest proportion of patients i.e. 57 (26.5%) with depressed skull fracture was in the age group of 10-20 years. The most frequent cause of depressed skull fracture among patients was road traffic accident 143(66.5%) followed by assault 45 (20.9%). The cause of depressed skull fracture and GCS at admission time was found to be associated significantly with outcome among patients with depressed skull fracture ($p<0.001$).
Conclusion: Road traffic accident is the most common cause and outcome among patients with depressed skull fracture was significantly associated with causes and GCS at the time of admission.

Key Words: Outcome, Skull fracture, Assault

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INTRODUCTION

Traumatic head injuries are major cause of morbidity, disability and mortality worldwide. Annually about 5.48 million people suffer from traumatic brain injuries globally. Any break in the cranial bones is referred as skull fracture.[1,2] The skull fractures are mostly accompanied with brain injures either directly or indirectly through extrdural or subdual hematoma but this not always the case.[3] The skull fracture is labelled as depressed fracture when skull bone in dentate or extends to brain cavity.

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The frequency of depressed skull fracture among patients with traumatic brain injuries is increasing day by day.[4] The management of head injuries including depressed skull fracture required trained human resource, well equipped trauma centers and medicines to reduce long term disability and mortality rate. The patients of head trauma with depressed skull fracture are frequently victims of high energy collision such as motorbike or car accidents and assaults. The advanced trauma life support training workshops in post-graduation training programs and for already practicing surgeons in trauma centers has played important role in better management of head injury patients and reduction in long term disabilities and mortality among these patients.[5]

Study conducted by Ahmed S et al. in Punjab Pakistan revealed that majority of patients admitted with depressed skull fractures male. About one third of the patients were below thirty years of age. The frontal region was most frequent site of fracture and overall mortality was 5.5%.[6] The study conducted by Parkash A et al. at Rajendra Institute of Medical Sciences, Ranchi found that frequency of depressed skull fracture was highest among adolescents and male cases predominate in hospital. Assault was found to be the

most common cause and frequently involved bone was parietal bone. About two third cases admitted with depressed skull fracture were with GCS 13-15. The fatality rate in patients of depressed skull fracture was almost 17%.[7]

In developing countries like Pakistan the mortality rate among patients with depressed skull fractures is high. Along with the improvement in management strategies for patients with head injuries at hospital level it is also needed that awareness and strategies must have developed for an individual and community level to reduce and ultimately eliminate such incidents. Construction of roads as per international standards, implementation of traffic rules and improvement in case management at trauma centers has significant impact on reduction of mortality. Adolescent age is the period of life in which there is urge of thrill and risk taking behavior is predominant. Majority of the cases with head injuries including depressed skull fractures are from adolescent age group.[8,9,10] This study specifically determined the outcome of depressed skull fracture in surgically managed cases and various factors which are associate with the outcome at neurosurgery ward of teaching hospital Dera Ghazi Khan.

MATERIALS AND METHODS

This cross sectional analytical study was conducted from January 2020 to December 2020 at department of neurosurgery, DG khan Medical College, Dera Ghazi Khan after taking ethical approval from institutional ethical review committee. With 95% level of confidence, 5% margin of error and 17%[7] anticipated population proportion the sample size determined for study was 215. All the clinically and radiologically diagnosed patients of depressed skull fracture (DSF) irrespective of gender between the age group of 15-65 years which were operated for elevation were included in the study by non-probability consecutive sampling method after taking informed consent. Patients with penetrating head injuries, skull fractures other than DSF and with minimal depression who were operated for intracranial traumatic lesions other than depressed skull fracture were excluded.

A predesigned, structured questionnaire was used for data collection. Data regarding patient age, gender, GCS at the time of admission, fracture site, and per-operative findings was collected. Outcome was assessed according to Glasgow outcome score. The outcome of the patients after traumatic brain injury is divided into five categorize by the Glasgow Outcome Scale (GOS) i.e. death, persistent vegetative state (minimal responsiveness), severe disability (conscious but disabled; dependent on others for daily support), moderate disability (disabled but independent; can work in sheltered setting) and good recovery (resumption of normal life despite minor deficits) labelled as group 1, 2, 3, 4 and 5 respectively. Unfavorable outcome comprised of group 1, 2 and 3 on Glasgow outcome score (GOS) and group 4 and 5 on GOS comprised of favorable outcome.

Statistical Package for Social Sciences (SPSS version 22.0) was used to enter and analyze data. For quantitative variables like age and GCS at admission time we calculated the mean and standard deviation and for categorical variables like gender and presence or absence of dural tear frequencies and percentages were calculated. Stratification of the outcome was done according to age, gender, causes of injury and presence or absence of dural tear. Post-stratification chi-square test was used to determine whether there is statistically significant difference between the groups and p value less than 0.05 was considered as significant.

RESULTS

A total of 215 patients of depressed skull fracture which underwent surgical elevation of the bone were included the study. The mean age of the patients was 28±10.6 years. Age distribution of the participants showed that highest proportion of patients i.e. 57 (26.5%) with depressed skull fracture was in the age group of 10-20 years. Total 198 (92.1%) male patients were admitted with depressed skull fracture (Table I).

Table No.1: Age and gender distribution of the respondents (n=215)

Variable	Frequency	Percentage
Age		
10-20 years	57	26.5%
21-30 years	38	17.7%
31-40 years	46	21.4%
41-50 years	41	19.1%
≥ 51 years	33	15.3%
Gender		
Male	198	92.1%
Female	17	07.9%

The most frequent cause of depressed skull fracture among patients was road traffic accident 143(66.5%) followed by assault 45 (20.9%) and fall from tree or roof 16 (07.4%).

Table No.2: Causes of depressed skull fracture among patients

Causes of depressed skull fracture	Frequency	Percentage
Road traffic accident	143	66.5%
Assault	045	20.9%
Fall from tree or roof	016	07.4%
Others (Falling object or Sports injury)	011	05.2%
Total	215	100%

Association of the outcome in relation to the age distribution of the respondents showed that 10 (17.5%) patients in the age group of 10-20 years had unfavorable outcome and outcome among patients with depressed skull fracture was not significantly associated with the age. The cause and GCS at admission time was significantly associated with the outcome among patients with depressed skull fracture (Table 3).

Table No.3: Association of depressed skull fracture outcome with age, gender, causes of injury and GCS at admission time

Variable	Outcome		p-value
	Favorable	Unfavorable	
Age			
10-20 years	47 (82.5%)	10 (17.5%)	
21-30 years	32 (84.2%)	06 (15.8%)	
31-40 years	41 (89.1%)	05 (10.9%)	**0.786**
41-50 years	37 (90.2%)	04 (09.8%)	
≥ 51 years	28 (84.9%)	05 (15.1%)	
Gender			
Male	172(86.9%)	26 (13.1%)	**0.235**
Female	013(76.5%)	04 (23.5%)	
Causes of fracture			
Road traffic accident	129 (90.2%)	14 (09.8%)	**<0.001**
Assault	40(88.9%)	05 (11.1%)	
Fall from tree or roof	09 (56.2%)	07 (43.8%)	
Others (Falling object or Sports injury)	07 (63.6%)	04 (36.4%)	
Dural tear			
Yes	109(92.4%)	09 (07.6%)	**0.680**
No	091(93.8%)	06 (06.2%)	
GCS at admission time			
3-8	15 (57.7%)	11 (42.3%)	**<0.001**
9-12	24 (80.0%)	06 (20.0%)	
13-15	157(98.7%)	02 (01.3%)	

DISCUSSION

In both developing and affluent countries trauma especially the head injury is the major contributor of morbidity and mortality. In Pakistan head injuries are increasing day by day which ultimately require large amount of resources to establish trauma centers for better management of these patients and improve outcome. Majority of the patients with depressed skull fracture present with history of road traffic accident. The treatment of patients who have had a depressed skull fracture is either conservative or surgical depending upon the neurological sign and symptoms. In this study we particularly assessed the outcome among patients with depressed skull fracture who were managed surgically for elevation of the bone and association of the outcome with various demographic variables.

The mean age of the patients was 26.48±12.7 years and more than one fourth of study participants were between 10-20 years of age. These findings are consistent with observations revealed in study by Ahemd S et al. in which mean age of patients with depressed skull fracture was 27.58±11.329 years.[6] The higher proportion of patients in younger age group may be attributed to the fact that implementation of traffic laws is very poor in our region especially in rural areas and bad conditions of the road. Adolescent age period is of crucial importance in the life of human being. It is period when behavior of an individual is shaped. The adolescents are more daring and fond of taking risks. Due to risk taking tendency they usually don't wear protective gauges like helmet and seat belts while driving which lead to severe injury in case of road traffic accidents.

In our study in more than two third of patients the reason of depressed skull fracture was road traffic trauma which is similar to the findings of Vala H et al. in which most frequent reasons were traffic accidents and assault.[11] Cross tabulation of the outcome among patients of depressed skull fracture with age, gender, cause of injury and GCS at admission time revealed that outcome among patients of depressed skull fracture is associated with the cause of injury ($p<0.001$) and GCS at time of admission ($p<0.001$). This may be attributed to the fact that most common reason of depressed skull among patients included in the study was road traffic accident and it is fact that low GCS score at admission time indicate that injury to the brain is severe. Urbanization and high speed traffic accompanied by the bad conditions of the roads along with poor implementation of traffic rules and regulation has contributed to rapid increase in cases of head injuries in general and in particular depressed fracture in developing countries including Pakistan. This rapid increase in head injury cases require trained human resource, fully equipped trauma centers to limit disabilities and save life of the patients.[12,13]

The bone of skull vault is folded downward into the brain parenchyma in depressed skull fracture. The common cause of depressed fracture is high energy impact to the skull and frequent site of the fracture is frontoparietal region. Depressed skull fracture usually occurs along with other injuries to brain parenchyma including pneumocephalus, leakage of cerebrospinal fluid through nose or ear, contusions, extradural and subdural hematoma. Prompt identification and treatment of these cases is helpful to limit disabilities among survivors and help to reduce mortality rate in head injury patients. But unfortunately due to non-availability of skilled human resource for management of these cases and lack of basic diagnostic facilities like computerized tomography scan at primary and

secondary healthcare level, the patients of head injury are referred to teaching hospitals and this delay in management of cases results in poor outcome.[14-16] Findings of our study suggest that avoidance of handing over vehicles to adolescent can reduce the head injury cases. Early approach to hospital when GCS of the patient is between 13-15 may further contribute to increase survival among patients with depressed skull fractures.

CONCLUSION

Road traffic accident is most common reason of depressed skull fracture and outcome among patients of depressed skull fracture is significantly associated with cause and GCS at the time of admission.

Author's Contribution:

Concept & Design of Study:	Malik Liaqat Ali Jalal
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Final Approval of version:	Malik Liaqat Ali Jalal

Conflict of Interest: The study has no conflict of interest to declare by any author.

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