Egyptian Journal of Medical Research

Print ISSN: 2682-4396 / Online ISSN: 2682-440X

Original article

Management of depressed Skull Fractures: An Institutional Experience

Yasser Ahmed Abdalraheem[1], Adham Rabie Abdalaziem[1] , Mohamed Ahmed Hewedy[2], Hany Mohailaba[1]

[1] *lecturer of neurosurgery beni-suef university faculty of medicine Beni-suef, Egypt*

[2] *assistant professor of neurosurgery beni-suef university faculty of medicine Beni-suef, Egypt*

Article Info

Article history:

Received 14 September 2024

Accepted 26 September 2024

Corresponding Author:

Yasser ahmed abdalraheem

yasserabdulrahim@med.bsu.edu.eg

Keywords

Depressed skull fracture

Blunt trauma

Road traffic accident.

Abstract

Objective: The aim of this review is to stand upon the frequency and the major causes of depressed fractures, assessment of factors that determine outcome in surgically treated cases and to develop a strategy for treatment of these depressed fractures. Also how to decrease the occurrence rate of depressed skull fractures. ***Methods:*** The study was done in the Neurosurgery department Beni-suef university hospitals, between May 2021 and May 2023. We reviewed the data of 60 cases that were admitted with depressed fracture and managed surgically. The patients included in this study from any group of age with palpable depressed fracture if possible and confirmed by brain CT scan with both soft and bone window. Glasgow outcome score was used to assess Outcome. ***Results:*** 60 cases were involved in the study. 45 cases (75%) were males and 15 case (25%) were females with mean age 30.5 years, between the 60 patients58.7% were aged between 15 and

40 years. the most common cause is Blunt head trauma mainly during street fight followed by road traffic accidents. Frontal bones are the commonest site of fracture it happened in 28 cases (46.7%), followed by parietal bone in 22 patients (36.6%). There was an obvious relationship between the mode of injury, Glasgow coma scale (GCS) score at the admission and discharge, and the presence of underlying brain injuries with the outcome. ***Conclusion:*** skull Depressed fractures are common neuro surgical issue. Early surgical maneuver gives excellent results and decrease both mortality and morbidity.

1 Introduction:

The Incidence of head trauma is increasing in both developing and developed countries especially in big communities because of high traffic flow. This made it a worldwide health and social problem (1). To consider The skull fracture is depressed, the outer table must lay below the normal anatomical position of the inner table (2).Skull depressed fracture can be classified into either simple or compound fracture according to the presence or absence of scalp wound which is considered potential passage between the intracranial and atmosphere (2). Skull fractures occur in about 10% of victims with severe head injury, and they are compound in the majority of cases ranging from 75-91% (2, 3). Skull Depressed fractures are often diagnosed by computed topographic scan brain non-contrast especially bone window which is considered the diagnostic method of choice (4). The fractures are either due to road traffic accidents, or other high-energy impacts as falling from heights (5). Surgical intervention is required in 32% of head trauma patients, 50% of these cases have skull depressed fractures (6). Compound fractures are surgical emergencies which should be treated early and competently. Early definitive diagnosis and management of skull fracture decreases morbidity and mortality (7).Outcome of cases with depressed fracture is variable and depends up one multi factors as, site and the size of fracture, presence or absence of other brain injuries and time interval between trauma and surgical

management.The aim of this study how to decrease the occurrence rate of depressed fracture if there are reversible causes and to identify suitable plan for management.

2. Methods:

This is study was done retrospectively , it included 60 cases with skull depressed fracture which were surgically managed between may 2021 and may 2023, at the neuro surgery department beni-suef university hospitals.

Inclusion criteria

Cases with documented depressed fracture by CT scan from any age or sex and had surgery were involved in the study.

Exclusion criteria

Patients suffered from other severe injuries that could increase the morbidity such as,

- Patients having bleeding tendencies or with a documented history of malignancy
- Known un controlled diabetic and hypertensive patients
- Multiple trauma patient (on clinical and radiological examination)

All patients in the review were subjected to:

1) **Clinical assessment:**

Taking history about the causative trauma .the time and the period between trauma and hospital arrival, short medical history, general examination and neurological evalution the GCS and if any neurological deficit.

2) Investigations:

A- **Radiological:** CT brain with both soft and bone windows. 3D CT skull and MRV if any depressed bone over dural sinus to determine degree of affection

B- **Laboratory:** Preoperative urgent investigations i.e. CBC, bleeding profile, renal function, random blood sugar. Also, blood grouping and cross matching

All cases in this review were managed by surgical intervention. Surgical options include restoration of depressed fracture, dural closure was done if dural tear was detected and evacuation of extradural or subdural hematomas if associated with the fracture. The results of surgical intervention were evaluated by using the GCS. The cases were subjected for neurological examination to detect any post- operative complications such as neurological weakness, CSF leakage or wound infection. The cases were discharged averagely between 3 –15 days, according to the degree of severity of head injury and post- operative Glasgow out-come scoring. The duration of follow up of all cases was carried out for one month

duration to accurately determine the results of surgical management and complications.

3. Results:

Part of these 60cases involved in this study, 45 patients (75%) were male patients while15 cases (15%) were females. The mean age of the studied cases was 30.5 with minimum age was 3years while the maximum age was 54 years.

In our study the first cause of injury was trauma due to blunt objects mostly during fight this was in 26 patients (43.3%) followed by motor car accidents in23 cases (38.3%) and finally falling from high surfaces in 11 cases (18.4%). Fig 1

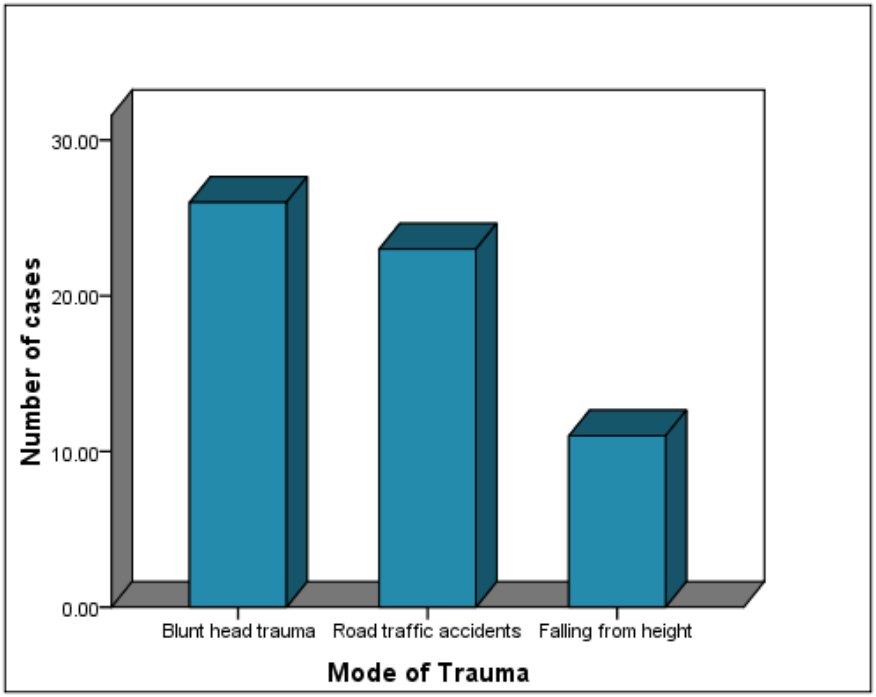

Fig 1: Mode of trauma

Frontal bones were the commonest bones to be involved in our review that was recorded in 28 patients (46.7%), with frontal air sinus fracture was included in 4 patients of them, followed by parietal bones in 22 cases (36.6%), the occipital bone fracture happened in 2 cases(3.3%), and also in the temporal bone (3.3%), and multiple involvement of skull bones was the presentation in 6 cases(10%). 8 cases(13.3%) had the fracture overlying the superior sagittal sinus. Fig 2

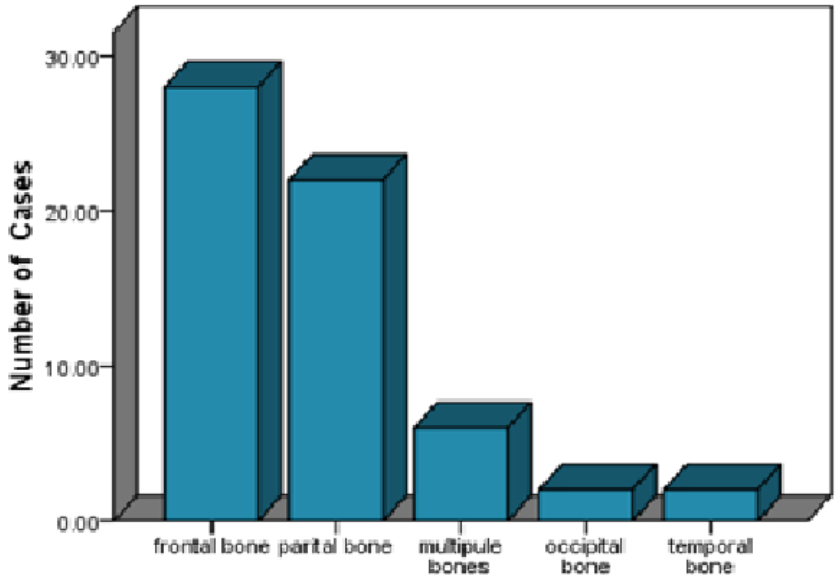

Fig 2: Site of fracture

In our review in twenty victims (33.3%) there was associated other forms of brain injuries such as extra dural hematoma, acute sub dural hematoma, brain lacerations and contusions , in some situations dural tear is associated with brain tissue herniation through the wound was detected.

Considering the Glasco score at the time of presentation , in 44 patients (73.3%) included in this study was GCS of 15\15, 8 patients (13.3%) their GCS was 14\15, three cases (5%) were 12\15, and 5 cases (8.3%) their GCS was less than 10\15. Good Glasco score at the time of presentation was noticed to be statistically prognostic factor for better outcome.

In most of cases surgery was done as early as possible ,within 8 hours from trauma 54 cases (90%), only 8 cases (10%) after 8hours.

We had Complications in eight patients (13.3%),three cases suffered from neurological deficit, three cases had surgical wound infection, and two cases suffered from meningitis. 3 patients

(5%) were lost in our review that were with bad GCS from the time of presentation due to occurrence of other sever brain injuries.

4. Discussion:

Trauma of the head is a common problem in both the developing and the developed communities. Head injuries are a major risk factor responsible for mortality and morbidity in young generation (8).). Depressed skull fracture is one of the commonly seen head injuries. Road traffic accidents one of the most common causes of depressed skull fractures, also falling from height and trauma by blunt objects. Skull depressed fractures may be associated with other brain pathologies such as, dural tear, extra dural hematoma, sub dural hematoma, brain lacerations and contusions (9). Computed tomography is very accurate in the identifying of fractures in the skull and any associated intracranial injury. Surgery is indicated in the following situations as frontal bone depressed fracture, accompanied with other intra cranial injury, dural tear, or compression on eloquent area. The mangement of penetrating injuries associated with depressed fractures in the skull has shown a gradual change over the past years A good debridement and trimming of the edges of the wound with closure of any tears in the dura was found to decrease the rate if infection and the subsequent mortality and morbidity from compound fractures in the skull (10).

In this review we had reviewed the data of 60 patients with skull depressed fractures who were managed surgically in the neurosurgery department of beni-suef university hospitals. Different items such as sex , age, Glasco score at the time of presentation, site of the fracture, if there is any associated other intracranial injuries , and finally the Glasco scores on discharge were studied and how they could affect and change final outcome of the patients with skull fracture.

In our study, the mean age of presentation was 30.5 years. Maximum number of patients (58.7%) was in the age between 15–40 years. In Manne, et al (12) study the mean age was 27.9 years. The mean age in the study of Irshad M et al (13) was 37.50 and the majority of cases (61.1%) belonged to age between 21-40 years. In our review, there was no significance effect between age and outcome, while in Jagger et al, study (15) it was stated that outcome is getting worse with increasing in age

In this review the majority of cases were males 75% of cases while females were

the rest 15% and this consistent with most of other studies such as Manne, *et al*. Where the females were13.3% of cases, Mumtaz *et al*. Study (11) 35.71% cases were women and 64.28% were men.

Direct head trauma due to blunt objects as during street fights was the first cause in our study (43.3%) followed by motor car accidents (38.3%) then falling from height (18.4%), this consistent with Swann *et al*.(14) in which street fights was the top cause of injury, also assault was the first cause in Hossain et al, study (16) also the same situation in AI-Haddad and Kirollos study (8) but In Manne, et al , road accidents was the top cause of injury (66.7%). Also Ozer FD et al.(17) stated road accidents as the first cause of depressed skull fractures followed by assault.

At the time of hospital presentation patients who had Glasco score of 15\15 were 73.3% and those with 14|15 were 13.3% these patients were well with preferred long-term results as against those with low Glasco coma score and this consistent with Manne, et al they had patients with Glasco.score of 13–15 (74%) at the time of presentation that did well with long term follow up. There is strong relation between the Glasco score at the time of hospital presentation and final result score.

In our review we found that the commonest bones to be fractured were the frontal bones in (46.7%) of cases the 2nd were the parietal bones in (36.6%) . Both occipital and temporal bones involvement were in two cases 3.3% and finally multiple skull bones affection were in sex patients (10%).The results of review were close to Manne, et al study as they found the first site of fracture was frontal bones (59.33%) the 2nd was the parietal bone (20.66%) and finally was the temporal bones (5.33%). In Shakeel Ahmad et al.(18) study the frontal bones were the first site of affection in 55.6% of cases then the occipital in 16.7%, and the parietal in 15.6% and finally the temporal in 12.2% of cases.

Considering the occurrence of other intracranial injuries is another important determinant factor in the outcome results of victims with skull depressed fractures. In our review twenty cases (33.3%) had other brain affections such as extra or sub dural hematomas, brain lacerations and contusions, dural tear with possibility of brain tissue herniation through the wound which could be detected at the initial presentation . Most cases who suffered from bad results were from the patients group who had other brain injuries. in our review

there were three mortalities with low initial Glasco score and mainly victims with other brain injuries which led to high intracranial pressure and brain tissue damadge. These findings were matching with a study by Manne, et al , that found 30 % of victims had contusions, 17.33% – EDH, 1.33% – SDH, and 4% – SAH. There were three mortality cases which had associated sizeable hematomas.

In this review the surgery time was within 8 hours from trauma that was achieved in 54 patients (90%), only 8 cases (10%) their time was more than eight hours (minimum duration of presentation was 2 hours while maximum duration 4 days). early surgical mangement decreases the morbidity rate specially the occurrence of infection. In our review were three cases with wound infection that were operated late after trauma, and there were two cases who had meningitis as a result to the presence of dual tear and CSF leakage and also from the group with delayed surgery This findings go with those result of the research performed by Jannett et al (19) who reported 5% infection with early surgery while incidence reached up to 37% with that of late surgery.

5. Conclusion:

Skull depressed fracture is a common neurosurgical problem in most communities. It is more common among young population. In our review we found blunt object causing head trauma mostly during street fight is the top cause followed by motor accidents, so restricted laws must be applied to prevent street fighting from occurring, also road safety campaigns are conducted to improve awareness among targeted populations. Specially about helmet usage as there is rising in motor cycles usage between younger populations we tried to determine the victims due to motor bikes but the registered date was not enough only mentioned road accidents but the helmet usage can significantly decrease the incidence . It was strong association between G score at hospital presentation and outcome. Also the occurrence of other intracranial injuries which strongly affect the final outcome .Early hospital transfer and management of skull depressed fracture is leading cause to lower the frequency of wound infection and its reflection in decrease of morbidity and mortality.

6. References:

1. Ali M, Ali L, Roghani IS. Surgical management of depressed skull fracture.JPMI 2003;17(1):116-123. URL: http://www.jpmi.org.pk/index.php/jpmi/article/view/812.
2. Blankenship IB, Chadduck WM, Boop FA. Bone fragment replacement for compound depressed skull fractures. J Col Phy Surg Pak. 2007;17:744-8.
3. Britt PM, Heiseman JE. Imaging evaluation. In: Head Injury. 4 th Ed. Cooper PR, Golfinos JG.McGraw-Hill, New York; 2000:63.
4. Manoz-Sanchez MA, Murillo-Cabezas F, Cayuela Dominguez A, Rincón-Ferrari MD, Amaya-Villar R, León-Carrión J. Skull fracture, with or without clinical signs, in mTBI is an independent risk marker for neurosurgical relevant intracranial lesion: a cohort study. Brain Inj. 2009;23:39
5. Foreman PM, Harrigan MR. Blunt Traumatic Extracranial Cerebrovascular Injury and Ischemic Stroke. Cerebrovasc Dis Extra. 2017;7(1):72-83. doi: 10.1159/000455391.
6. Fred HG, Paul NM. Traumatic skull and facial fractures. In: Renganchery SS, Richard GE(eds): Principles of Neurosurgery. 2nd Ed. Texas; 2005:329-31.
7. Fitzsimmons-Francis C, Morris P. Prehospital care: Triage and trauma scoring. Surg Int. 2001;52:25.
8. AI-Haddad SA, Kirollos R. A 5 year study of the outcome of surgically treated depressed Skull fractures. Ann R Coll Surg Engl. 2002;84:196-200.
9. Cooper PR, Skull fracture and traumatic cerebrospinal fluid fistulas. In: Head Injury. 3rd ed. Baltimore: Williams and Wilkins; 1993. p. 115-36.
10. Neville SI, Amorim RL, Paiva WS, Sanders FH, Teixeira MJ, de Andrade AF. Early surgery does not seem to be a pivotal criterion to improve prognosis in patients with frontal depressed skull fractures. Biomed Res Int. 2014;879286.
11. Mumtaz A, Ali L, Roghani IS. Surgical management of depressed skull fracture. J Postgrad Med Inst 2003;17:46-8.
12. Manne, *et al*.: Depressed skull fractures: Outcome study Asian Journal of Neurosurgery | Volume 14 | Issue 3 | July-September 2019
13. Irshad M et al. Int Surg J. 2018 Feb;5(2):538-543 International Surgery Journal | February 2018 | Vol 5 | Issue 2 Page 541

14. Swann IJ, MacMillan R, Strong I. Head injuries at aninner city accident and emergency department. Injury1981;12:274-8.
15. Jagger J, Levine JI, Jane JA, Rimel RW. Epidemiologic features of head injury in a predominantly rural population. J Trauma 1984;24:40-4.
16. Hossain MZ, Mondle MS, Hoque MM. Depressed skull fracture: outcome of surgical treatment. J Teachers Assoc 2008;21:140-46..
17. Ozer FD, Yurt A, Sucu HK, Tektas S. Depressed fractures over cranial venous sinus. J Emerg Med. 2005;29(2):137-139.
18. Ahmad S, Afzal A, Rehman L, Javed F. Impact of depressed skull fracture surgery on outcome of head injury patients. Pak J Med Sci.2018;34(1):130-134. doi: https://doi.org/10.12669/pjms.341.13184
19. Jennett B, Miller J. Infection after depressed fracture of skull. Implications for management of nonmissile injuries. J Neurosurg. 1972;36:333-9.