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Original Research Article

Surgical Management and Outcomes of Depressed Skull Fractures (DSF)

Asman Ali[1], Prabhakar Narayan[2]

[1]Associate Professor, Dept. of Neurosurgery, CN Center, GMCH

[2]MCh Senior Resident, Dept. of Neurosurgery, CN Center, GMCH

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Corresponding Author: Dr. Prabhakar Narayan

Conflict of interest: Nil

Abstract:

Objective: To ascertain the results of surgical therapy in individuals with depressed skull fractures.

Study Design: Prospective Study

Place and Duration of Study: Conducted in the Neurosurgery Department of Guwahati Medical College and Hospital in Guwahati from March 15th, 2024 to December 15th, 2024.

Methodology: The study comprised 70 patients of both genders, ranging in age from 12 to 70 years. The patients' ages ranged from 12 to 70. After obtaining informed written consent from all patients/parents/guardians, detailed demographic information such as age, gender, BMI, cause of fracture, type of fracture, and fracture site were recorded. All patients underwent a CT scan. Patients were subjected to evaluation for 10 weeks. The Glasgow Coma Scale (GCS) was utilized to determine the final outcome. The data was analyzed using SPSS 27.0.

Results: Male patients constituted 45 (64.28%) of the total, while female patients made up 25 (35.71%). The study reordered 35 participants (50.00%) under 30, 25 (35.71%) between 30 and 50, and 10 (14.28%) over 50. The average body mass index was 22.04 ± 3.14 kg/m2.The most prevalent cause of injury was a traffic accident 47 (67.14%), followed by a fall from a height 23 (32.85%). 42 (60.00%) were complicated fractures, while 28 (40.00%) were closed fractures. 58 cases (82.85%) were treated surgically, whereas 12 (17.15%) were handled conservatively. 48 patients (68.57%) were fully healed, 12 (17.14%) were moderately impaired, 7 (10.00%) were severely disabled, and 3 (4.28%) died.

Conclusion: Most instances with complex depress skull fractures showed favorable results if treated immediately, although the prognosis of the depress skull fracture was dependent on the severity of the injury and the absence or presence of an intracranial lesion.

Keywords: Depressed skull fracture, Non-missile injuries, Compound skull fracture, conservative management.

Introduction

One common neurotraumatic symptom that follows an injury is a depressed skull fracture. A skull fracture is referred to as depressed when a fragment of skull bone is forced inside by a distance that is at least as great as the calvarium's breadth [1]. A skull fracture occurs when high- energy forces are applied to the head. The degree and kind of skull fracture depend on the impact force's direction, the impact's anatomic site, the hitting object's geometry, and the kinetic energy of the impacting object [2]. Accident-related skull fractures can happen with or without brain damage.

Conventional signs of DSF are more common in otherwise healthy patients in whom the fracture may be the only conclusive evidence [2]. DSF is called an open DSF if it is associated with a scalp laceration; otherwise, it is called a simple DSF [3]. Compound depressed fractures are surgical emergencies that can lead to meningitis and brain abscess following therapy, osteomyelitis of the skull following treatment, and epilepsy if not treated promptly and appropriately. Depending on the type of fracture, there are conservative and surgical treatment options available; however, complex fractures can be handled without surgery [4]. As in the case of falls or car accidents, the etiology is frequently post-traumatic. Twenty-five percent of patients with depressed skull fractures describe lax awareness [5] following the injury, and most report a loss of consciousness lasting less than an hour.

Important study techniques include C-T scan heads and skull X-rays, which can be used to identify brain injury, depression, and fractures of different kinds and locations. The degree of external communication, the severity of the depression, and the existence of neurological abnormalities will all influence how depressed skull fractures are treated. Complex depressed fractures, cerebrospinal fluid leakage, depression larger than the inner table of the non-depressed bone, local neurological deficits brought on by pressure of a depressed fragment, associated lesions other than the underlying blood pressure, and the presence of a depressed fracture on the head for cosmetic reasons are among the operating indications for depressed skull fractures [7, 8]. Until an infection or other complications necessitated additional surgical intervention, patients who did not require typical surgical therapy were treated with the same care as those who did, albeit with greater caution. In addition to helping to achieve the best possible functional and cosmetic rehabilitation outcomes, early diagnostic detection and treatment of skull fractures help to lower morbidity and mortality. This study's objective was to analyze the results of previous conservative or surgical treatments for depressed skull fractures.

Material and Methods

This prospective study was carried out between March 15, 2024 and December 15, 2024, at the Neurosurgery Department of Guwahati Medical College. A total of 70 patients, aged 12 to 70, of both sexes, were included in the study.

Detailed demographic information about the patient was documented following informed written consent. Excluded were those under 12 years old, those without a depressed skull fracture, and those who died prior to investigation. Causes of the fractured skull, length of time after the injury, fracture type, fracture site, cause of fraction clinical state, and CT scan results were noted. Every patient underwent a CT scan. Fractures over the sinuses, cosmetically disfiguring fractures, and DSF greater than 5 mm were treated surgically.

Depending on the type and location of depressed skull fractures, surgical procedures may involve S-shaped, linear, or horseshoe flap incisions; elevation of the depressed bone fragment; removal of the in-driven bone fragment; repair of the dural tear; evacuation of the hematoma; homeostasis; debridement of the wound margin; and primary repair. The patients received anticonvulsants and antibiotics. Results were evaluated by percent GCS and frequency. Standard deviation was used to calculate descriptive variables, whereas age was used to evaluate categorical variables. The SPSS 30.00 version was used.

Results

Twenty-five (35.71%) of the patients were female, while forty-five (64.28%) were male. In the study, twenty-five (35.71%) people between the ages of 30 and 50, ten (14.28%) people over 50, and thirty-five (50.0%) people under 30 were rearranged. This was the mean body mass index (20.04±3.14 kg/m2). Falls from heights of 23 (32.85%) and traffic collisions accounted for 47 (67.14%) of all injuries. (Table 1)

Table 1: Demographical details on presented cases. (n=70).

Variable	Frequency	%age
Gender		
Male	45	64.28%
Female	25	35.71%
Age(years)		
Below 30	35	50.00%
30 to 50	25	35.71%
50 to 65	10	14.28%
Mean Age	34.41±4.16	
Mean BMI	22.04±3.14	
Cause of fracture		
Road Traffic Accident (RTA)	47	67.14%
Fall from height	23	32.85%

Forty-two (60.00%) of the patients had complex fractures, while 28 (40.00%) had closed fractures.

Eighteen cases (25.71%) were frontal, fourteen cases (20.00%) were parietal, three cases (4.20%) were occipital, 32 cases (45.71%) were temporal, and three cases (4.20%) were other fracture locations. (Table 2) While 58 cases (82.85%) required surgery, 12 patients (17.15%) received conservative care (Table 3).

Forty-eight patients (68.57%) were entirely healed, three patients (4.28%) were killed, seven patients (10.00%) were severely disabled, and twelve patients (17.14%) were moderately disabled. (Figure 1)

Table 2: Types and sites of depressed skull Fractures. (n=70).

Variable	Frequency	%age
Types of fracture		
Compound	42	60.00%
Closed	28	40.00%
Sites of fracture		
Temporal	32	45.71%
Frontal	18	25.71%
Parietal	14	20.00%
occipital	3	4.20%
other	3	4.20%

Table 3: Mode of treatment. (n=70).

Variable	Frequency	%age
Mode of treatment		
Surgical management	58	82.85%
Conservative management	12	17.15%

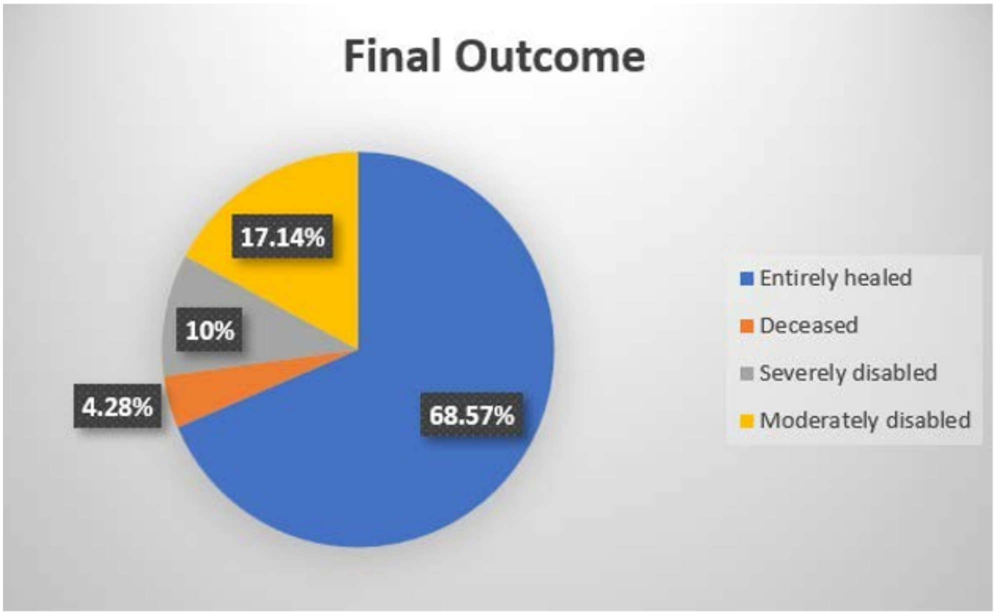

Figure 1: Final outcomes according to GCS

Discussion

Head injuries are still a major public health concern on a global scale, and they have a major role in high rates of morbidity, death, and long-term disability [11]. In the current investigation, 70 individuals of both sexes were included. The patients ranged in age from twelve to seventy. The majority of our study's patients were in the 12–30 age range. These results were comparable to the Mushtaq et al. study [12]. In the current study, there were 25 (35.71%) female patients and 45 (64.28%) male patients. 35 (50.00%) of those under 30, 25 (35.71%) of those between 30 and 50, and 10 (14.28%) of those over 50 to 65 were rearranged in the study and the BMI was 20.04±3.14 kg/m2 on average. Numerous earlier investigations found that road traffic accidents were the leading cause of depressed skull fractures, followed by falls from heights, and that male patients predominated [13, 14]. The pattern of skull fracture is usually influenced by two things. The impact force is the first component. The impact ratio is the other factor. Sometimes the impact rate does not result in a fracture of the skull, even if it is dispersed across large areas by high energy, as in the case of a head injury to a person wearing a motorcycle helmet. One of the main problems with intracranial injuries in developing nations is severe head injuries. It can be lethal to young people. [15, 16] Depending on aesthetics and practical considerations, these individuals can be treated with both conservative and surgical methods. Of the patients in our study, 28 (40.00%) had closed fractures and 42(60.00%) had complicated fractures. Twelve patients (17.15%) received conservative treatment, while 58 cases (82.85%) underwent surgery. Forty-eight (68.57%) of these patients healed fully.

Three patients (4.28%) died, seven patients (10.00%) had severe disabilities, and twelve patients (17.14%) had moderate disabilities. In our study, there was a favorable correlation between GCS arrival and the final functional outcome. These findings are consistent with earlier research [16]. GCS is a powerful predictor of GOS performance, according to studies [17–18]. These are useful instruments for assessing the initial neurological condition and the final result. In a research by Asif M et al. [13], they operated on 100 patients with depressed skull fractures and found that 55% of them had GCS [13–15]. In a 7-year examination of 98 cases with depressed fractures, Ali M and Ali L [19] established focal impairment in 14% of patients, whereas 9% had CSF leaks, 7% had extradural hemorrhage, and 15% had gross skull deformation. Clinical and radiological characteristics are also recognized as indicators of emergence following surgical elevations of depressed skull fractures. GCS patients typically have diffuse cerebral oedema or a localized intracraneal or parenchymal lesion that causes a persistently elevated intracranial pressure. Surgical debridement of an infected injury, uplifting of the depressed-kidney segment of the skull, removal or resection of an acute extradural or subdural hemorrhage, and hard repair in cases where the dural tear is absent are some of the reasons why urgent exploration, debridging, and elevation of depressed fracturing may be desired. The most frequent complication of DSF, according to our study, was CSF leakage, which was followed by unconsciousness. This incidence of complication is similar to many other studies where CSF was reported in 25–40% of patients, followed by unconsciousness [20–21].

Conclusion

In the frontal region, head injuries with DSF are frequent and frequently manifest as EDH. Patients with moderate-to-severe head injuries (where the fracture is greater than 5 mm) should be treated surgically, while those with mild head injuries should be treated conservatively. Antibiotics and anticonvulsants have proven to be useful in preventing infection and epilepsy during the perioperative period. In addition to reducing morbidity and mortality, early, conclusive diagnosis and treatment of skull fractures aid in maximizing functional and cosmetic rehabilitation. GCS is most useful when used in conjunction with CT results for early DSF management.

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