

# Depressed Skull Fracture Management of 100 Cases at DHQ Teaching Hospital/Sahiwal Medical College Sahiwal

MUHAMMAD ASIF, AATIKA FATIMA

Department of Neurosurgery, SLMC, Sahiwal

## ABSTRACT

**Aims:** Aim is to study the presentation and management of patients with depressed skull fractures at DHQ Teaching Hospital/Sahiwal Medical College Sahiwal.

**Materials and Methods:** Elevation and repair of an open depressed skull fracture is often of as an emergency procedure. Common indications for emergency elevation of depressed skull fracture have been Dural tear, gross contamination, mass affect from depressed bone and/or sizable underlying extradural collection. Surgery may be performed if patient gets seizures and develops depression of skull especially frontal region which needs surgery for cosmetic reasons. Over a period of four years one hundred patients with depressed skull fractures were admitted in Neurosurgery department from July 2011 to June 2015. Mode of injury, clinical presentation, site and side of depressed skull fracture were noted. X-skull and C T scan brain was done in all cases to confirm the diagnosis and to see the underlying brain injury.

**Results:** Pre-operative GCS score was from 6 – 15. Focal neurological deficit was present in 16 cases. Surgical management done was wound debridement, elevation of depressed bone pieces, repair of Dura and evacuation of underlying hematoma. Fourteen patients developed different complications which were managed successfully.

**Conclusion:** Depressed skull fracture is a neurosurgical emergency which needs early operation to reduce the incidence of infection. Wound wash, debridement and elevation of depress fragment is treatment of choice along with Dural repair and/or evacuation of underlying hematoma as/if needed.

## INTRODUCTION

Head injury accounts for almost half of deaths from trauma.<sup>1</sup> Approximately two million head injuries occur each year in United States and as many as 56000 deaths per year.<sup>2</sup>

Depressed skull fractures, a very serious type of trauma occurring in 11% of severe head injuries, are fractures in which broken bones are displaced inward.<sup>3</sup> This type of fracture carries a high risk of increasing pressure on the brain crushing the delicate tissues. Approximately 25% of the skull fractures are compound and merit immediate attention.<sup>4</sup> Complex depressed fractures are those in which the dura matter is torn. The aetiology is usually post-traumatic following falls or road traffic accidents.<sup>5</sup> Approximately 25% of patients with depressed skull fractures don't report loss of consciousness and another 25% loose consciousness

for less than one hour. The presentation may vary depending on other associated injuries such as underlying hematoma, Dural tear, brain contusions and seizures.<sup>6</sup>

Dural tear with associated underlying brain injury in patients with depressed skull fractures has been reported variably.<sup>7,8</sup> X-rays skull and C T scan head are valuable investigating tools which will demonstrate the fracture, type, location, degree of depression and associated intracranial injuries.<sup>9</sup>

Treatment of depressed skull fractures depend upon the degree of depression, communication with the exterior and neurological deficits.

Indications of surgery in depressed skull fractures are.<sup>10,11</sup>

- 1 Compound depress fractures.
- 2 Cerebrospinal fluid (CSF) leakage.
- 3 Depression more than the inner table of non-dep-

ressed bone.

- 4 Focal neurological deficits caused by pressure of depressed fragment.
- 5 Associated other lesion like underlying hematoma.
- 6 For cosmetic reason especially if depressed fracture is on forehead.

Surgical treatment comprises of.<sup>18</sup>

1. Elevation of depressed fracture fragment.
2. Elevation of depressed fragment and primary reconstruction.
3. Evacuation of underlying hematoma.
4. Repair of dura, primary repair or by use of graft.
5. Repair of venous sinuses or haemostasis by gel foam.

The complications following surgery of a depress skull fracture are wound infection, CSF leak, seizures, cosmetic deformity, focal neurological deficits and post-traumatic hydrocephalus.<sup>10-13</sup>

## MATERIAL AND METHODS

This study was conducted in the Department of Neurosurgery DHQ Teaching Hospital/Sahiwal Medical College Sahiwal. One hundred patients were admitted and managed surgically during four years period from July 2011 to June 2015. Data with regard to clinical and radiological presentation, surgical procedure and post-operative complications was gathered. Decision of operation was taken following standard indications. Debridement of wound margins and primary repair. Elevation of depressed bone fragment. Repair of Dural tear. Evacuation of underlying hematoma. Haemostasis of bleeding from SSS with gel foam. Cranioplasty in frontal region for cosmetic reason.

All the patients were given prophylactic antibiotics and patients with underlying brain injury were given prophylactic antiepileptics. Patients developing post-operative complications were managed successfully. All the patients were followed up at least for one week post-operatively and then followed up in OPD.

## RESULTS

We operated a total of one hundred patients with depressed skull fractures.

The age ranged from 5 – 55 years. The age group most affected was paediatric age and teenage i.e. sixty five cases (65%).

There were 72 male and 28 female patients with a ratio of 5:2.

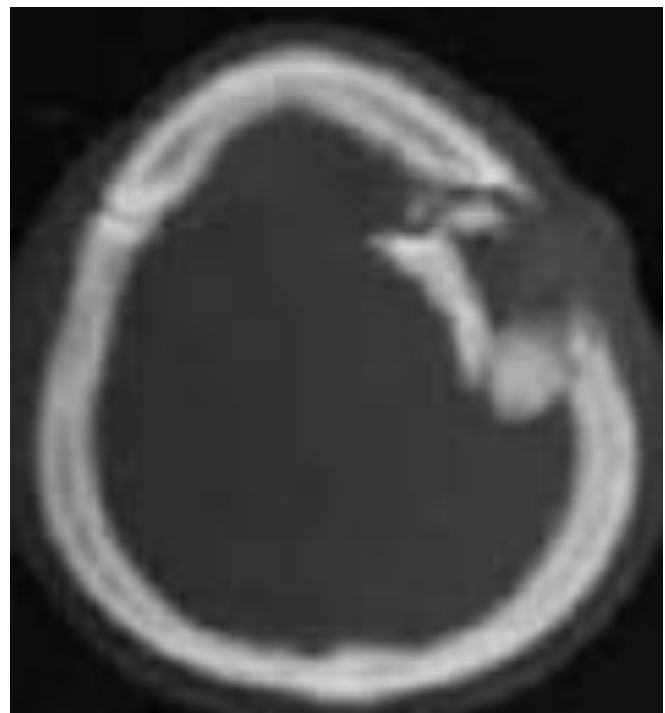
Road traffic accidents was main cause followed by falls and assault.

Out of one hundred patients thirty one cases (31%) were simple or closed depress fractures and sixty nine cases (69%) were compound or open depress fractures. In nine cases depressed bone crossed the midline over the superior sagittal sinus injuring the sinus itself.

Table 1: *Type of Depressed Fracture.*

	No of Patients	Percentage
Simple (close) type	31	31%
Compound (open) type	69	69%

Most common area involved was parietal region i.e. forty two cases (42%) followed by frontal region i.e. twenty five cases (25%). The right side was affected in majority of the cases (67%).



## Depressed Fracture

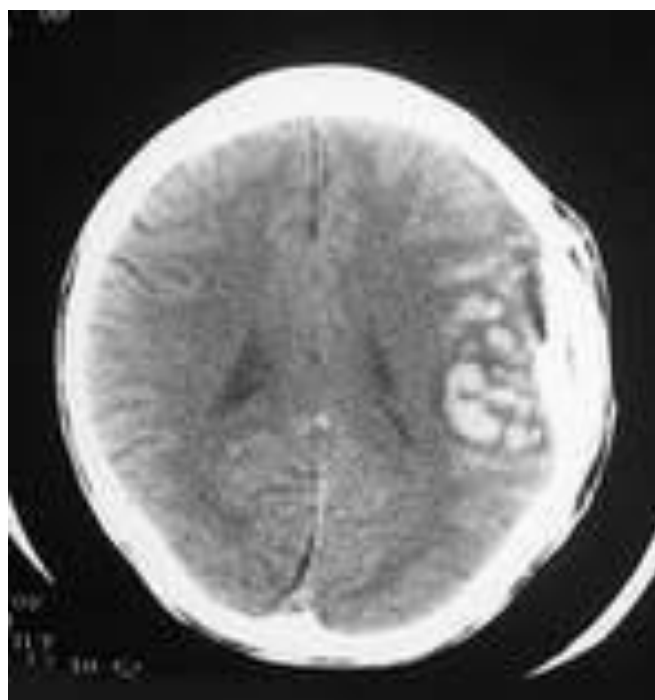
Fifty five patients (55%) had mild head injury with GCS 13 – 15, another thirty patients (30%) had moderate head injury with GCS from 9-12 and rest of fifteen patients (15%) had severe head injury with GCS 6 – 8.

Table 2: *Pre-operative GCS.*

Category	No of Patients	Percentage
13 – 15	55	55%
9 – 12	30	30%
3 – 8	15	15%

Majority of the cases (84%) showed no neurological deficit. Hemiparesis to hemiplegia occurred in twelve patients (12%), two patients had dysphasia. One young school going child developed weakness of one leg and one patient had paraparesis because of injury and fracture on the vertex – midline. Nine patients showed complete recovery and three patients showed incomplete recovery.

Dural tear was found in twenty seven cases (27%). Underlying brain contusions were noted in twenty three cases (23%) and seventeen patients (17%) had underlying variable sized collections.



### Depressed Fracture with Brain Contusion

While dealing with depressed fracture i.e. elevation of depress fractures, Dural tear was found in twenty seven cases which was repaired - primary repair and/or Dural grafting as per need of the patient. In seventeen cases underlying extradural collection was evacuated.

Table 3: *Associated Intracranial Injuries.*

Lesion	No of Cases	Percentage
Dural Tear	27	27%
Brain Contusion	23	23%
Extra Dural Hematoma	17	17%

Table 4: *Post-Operative Complications.*

Complication	No of Cases
Minor wound infection	7
Major wound infection	2
Osteomyelitis	1
Post-operative Seizures	2
CSF leakage	2

Patients with minor and major wound infections were managed with antibiotics, infected bone fragment was removed, anti-epileptics were given to patients with seizures and patients with CSF leakage were managed conservatively and successfully.

### DISCUSSION

Our study contained one hundred patients operated during four years period. This is large amount and reflects the trauma load on a newly established Neurosurgical Department, situated in between Lahore and Multan, with a wide catchment area and population of up to six districts.

In a depressed skull fracture the outer table of one or more of the fractured edges lies below the normal anatomical level of the inner table as determined by surrounding intact skull.<sup>14,15</sup>

The male to female ratio was almost 5:2 which coincides with the local study by Usman et al,<sup>16</sup> which was 3:1 and in a study by Ramzan et al,<sup>17</sup> this ratio was 4:1. It represents the cultural norms of our society where males have more freedom to work outdoor and engage in risk taking activities making them more vulnerable to accidents and falls leading to head injuries and depress fractures.

The most affected cases were among paediatric and teenage groups which was 65% in our study. This figure is quite comparable with the figures quoted in studies by Usman et al,<sup>16</sup> (64.5%) and Ramzan et al,<sup>17</sup>

(62.5%).

Most commonly affected areas were parietal and frontal making a total of 67% which is quite close to study by Usman et al,<sup>16</sup> i.e. 66.9%.

In our study thirty one cases (31%) had simple or closed type of fractures and sixty nine (69%) had compound or open depressed fractures. These figures coincided very well to study by M. Zahed Husain et al,<sup>18</sup> i.e. 36% and 64%.

The clinical status in the form of GCS, neurological deficits and other associated injuries are the main determinants of the patient's outcome.

The figures, as shown in the table, with regard to GCS are quite comparable to a study by M Zahed Husain et al,<sup>18</sup> i.e. 19%, 31% and 50%.

In our study sixteen patients (16%) had neurological deficits in the form of hemiparesis, hemiplegia, dysphasia and paraparesis. This figure coincides with the figures in a study by Usman et al.<sup>16</sup>

Infection rate was 9% including minor & major wound infection and osteomyelitis which was managed by antibiotics and removal of infected bone fragment. Infection rate is quite comparable to a study by M. Zahed Husain et al.<sup>18</sup>

## CONCLUSION

Depressed skull fracture is a neurosurgical emergency which needs early operation to reduce the incidence of infection. Wound wash, debridement and elevation of depress fragment is treatment of choice along with Dural repair and/or evacuation of underlying hematoma as/if needed.

Pre-operative antibiotics and anti-epileptics reduce the rate of infection and seizures.

Males are more at risk for suffering from accidents and depress fractures which reflects the norms of our society.

School going children and teenage groups are more affected and awareness about the preventive measures should be given to the society to reduce the incidence of such trauma ultimately reducing the socio-economic burden on the society.

*Address for Correspondence: Dr. Muhammad Asif  
Associate Professor, Neurosurgery SLMC  
Sahiwal*

## REFERENCES

1. Khan IU, Nadeem M. There is high incidence of skull fractures associated with extradural hematoma in patients with head injury. *Rawal Med J.* 2008; 33: 228-230.
2. Kraus JF, Mac Arther DL. Epidemiologic aspects of brain injury. *Neurologic Clinics*, 1996; 14 (2): 435-450.
3. Graham DI and Gennareli TA. Pathology of Brain Damage after Head Injury. In: *Head Injury*, Cooper P and Golfinos G. 4th Ed. Morgan Hill, New York, 2000.
4. Kayanaraman S, Ramamurthi B. An analysis of 3000 cases of head injury. Paper presented at the Fifth Asian Federation Congress of the International College of Surgeons.
5. Duman H, Devici M, Uygur F et al. Reconstruction of the contour and anterior wall defects of frontal bone with a porous polyethylene implant. *J Craniomaxillofac Surg.* 1999; 27: 298-301.
6. Nazer H Quresh. Skull fracture Department of Neurosurgery, University of Arkansas for Medical Sciences, 2008.
7. Oehmichen M, Auer RN, Konig HG. Forensic neuropathology and associated neurology. Google books, 2009: Page 478.
8. Ersahin Y, Mutluer S, Mirzai, Palali I. Pediatric depressed skull fracture ; Analysis of 530 cases. *Child Neurosyst.* 1996; 12: 323-331.
9. Khan AM, Tumbull I; MacDonald S. Skull fractures. 2007: (online) Available from <http://>
10. Ali M, Ali L, Roghani IS. Surgical management of depressed skull fracture. *JPMI.* 2003; 17: Record 23.
11. Al Hadad SA, Kirolos R. A 5 year study of the outcome of surgically treated depressed skull fractures; *Ann R Coll Surg Engl.* 2002; 84 (3); 196-200.
12. Rehman L, Ghani E, Hussain A, et al. Infection in compound depress fracture of the skull. *J Coll Physicians Surg Pak.* 2007; 17 (3): 140-143.
13. Al Derazi et al. Management strategy of depress skull fracture, *Panarab J Neurosurgery*, 2008; 12 (2): 80-85.
14. Cooper P R, Skull fracture and traumatic CSF fistulas. In Cooper PR (Ed). *Head Injury 3<sup>rd</sup> Ed.* Baltimore; Williams and Wilkins, 1993: 115-136.
15. Volmer DG, Dacey RG, Jane JA. Craniocerebral trauma. In Joynt RJ (Ed): *Clinical Neurology*, Vol. 3. Philadelphia; Lippincott, 1991: 1-79.
16. Usman et al. Management of depressed skull fractures: A study of 93 cases. *Pakistan Journal of Neurological Surgery.* Vol. 13, No 2, July – Dec., 2009.
17. Ramzan Hussain et al. Outcome of surgically managed depress skull fracture in a tertiary care hospital. *Pakistan Journal of Neurological Surgery*, Vol. 17, No. 2, Jul. – Dec., 2013.
18. M. Zahed Hossain et al. Depressed skull fracture; Outcome of surgical treatment. *TAJ* December, 2008; Vol. 21, No. 2.

**AUTHORS DATA**

<b>Name</b>	<b>Post</b>	<b>Institution</b>	<b>E-mail</b>	<b>Role of Authors</b>
Dr. Muhammad Asif	Associate Professor	Department of Neurosurgery, SLMC, Sahiwal	drasif2003@gmail.com	
Dr. Aatika Fatima				

Date of Submission: 18-07-2017

Date of Printing: 11-09-2017

Peer Reviewed by Dr. Babar Butt, Amir Aziz and Chief Editor Prof. Dr. Muhammad Anwar Chaudary and others.