

DEPRESSED SKULL FRACTURES- CASE SERIES OF 100 PATIENTSDinesh Shukla¹, Manish Jain²¹Assistant Professor, Neurosurgery, Department of Surgery, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh, India.²Professor, Department of Surgery, Urologist, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh, India.**ABSTRACT****BACKGROUND**

Depressed fracture is common following head injury and its management is controversial. These are often associated with considerable morbidity and mortality. This study aims to evaluate various aspects including outcome of depressed skull fractures.

MATERIALS AND METHODS

100 patients of depressed skull fractures were admitted in MLB Medical College, Jhansi over a period of three years from June 2014 to June 2017. These patients were evaluated with respect to age, sex, mode of injury, sites of injury, Glasgow coma score (GCS) at the time of admission, early and late epilepsy, focal neurological deficit, CT scan findings, infection and treatment.

RESULTS

There were 68 males and 32 females. 15-30 years (32%) was the most commonly affected group. RTA (50%) was the most common cause followed by fall (25%) and physical assault (25%). Most common site of fracture was in parietal region (55%). GCS was 13-15 in 80% patients. Fracture was compound type in 82% and simple in 18%. Favourable outcome was achieved in 98% patients especially in those with better presenting GCS.

CONCLUSION

Most patients with early and proper treatment of depressed fractures have favourable outcome. Good GCS score at admission correlated with better outcome.

KEYWORDS

Depressed Skull Fractures, Simple, Compound.

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BACKGROUND

There has been rapid increase in the number of head injuries resulting in increase in the incidence of depressed skull fracture. Skull fractures could be simple type with overlying Scalp intact or compound with overlying Scalp lacerations. Another variety is when fracture communicates with the paranasal sinuses or mastoid air cells.¹ There is increased risk of intracranial lesions like contusions and hematoma in cases where CT shows a skull fracture and these cases generally have poor outcomes.^{2,3}

Hippocratic literature advocated aggressive approach in treatment of skull fracture as compared to 'Edwin Smith papyrus' who opted for conservative and expectant management.^{4,5} Advent of CT scans and MRI in have increased our understanding of pathophysiology of head injury and its management.⁶

However, there are still many complications associated with compound depressed fractures like infections, seizures,

intracranial hematomas, contusions and resultant mortality and morbidity.^{7,8}

Present study aims to assess outcome of patients with depressed skull fractures in terms of infection, epilepsy, Glasgow outcome scale (GOS). Also, an attempt is made to correlate Glasgow coma scale (GCS) with GOS at 6 months.

MATERIALS AND METHODS

A retrospective study was conducted in patients of depressed skull fractures following blunt head trauma who were admitted in MLB Medical College, Jhansi between June 2014 to June 2017. MLB Medical College is a tertiary level referral centre and caters to vast population of nearby areas. Gunshot wounds, fracture involving skull base and patients with large intracranial hematoma with mass effect were excluded from the study. One or more fragments of bone were depressed by atleast the thickness of the skull.

After clearance from the institutional review committee, data was collected from the patient record files, operation notes and discharge summaries. Information which was collected are age, sex, mode of injury, sites of injury, Glasgow Coma Score (GCS) at the time of admission, early and late epilepsy, focal neurological deficit, CT scan findings, infection and treatment. GCS was categorized into mild (GCS 13-15), moderate (GCS 9-12) and severe (GCS<9) head injury. Follow up was done in OPD, by telephone and by OPD record register. Patient were evaluated in regard to GOS

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which was divided into favourable and (GOS 4, 5) and unfavourable (GOS 1-3).

RESULTS

Total of 100 patients were included in the study based on the inclusion and exclusion criteria. There were 68 males and 32 females in the study. Maximum incidence of depressed skull fractures was found in age group 15- 30 years (32%) followed by 30-45 years (28%). Most common cause of injury was Road traffic accident (50%) followed by fall (25%) and physical assault (25%). Most common site of fracture was in parietal region (55%) followed by frontal (29%), temporal (10%) and occipital bone (6%). About 78% patients presented to hospital within 12 hours of the incident, 11% within 12-24 hours, 7% within 24-48 hours and 4% within 48-72 hrs. GCS was 13-15 in 80% patients, 9-12 in 12% patients and 3-8 in 8% patients.

CT scan findings of these depressed fracture patients didn't reveal any intracranial abnormality other than depressed fragment in 58 % patients. In other patients, most intracranial finding on CT scan was pneumocephalus (50%) followed by contusion (20%), extradural hematoma (15%), acute subdural hematoma (10%), mixed findings and others (5%). There were 82% cases with compound fractures and 18% with closed fractures.

In 90 % patients, operative intervention was undertaken. Exploration and elevation of depressed fracture was done in 15% of simple and 30% of compound fractures. Dural tear was observed in 8% of simple and 15% of compound fractures. Wound debridement and suturing was done in 28% of patients with compound fractures.

Complications found in these patients were as follows: Infection 12%, early seizures in 4% and late seizures in 2% patients, focal neurological deficits were found in 10% patients. Of patients who developed infections, 30% had superficial wound infections, 18% had osteomyelitis and brain abscesses in few cases. Infection were treated with appropriate antibiotics according to culture and sensitivity.

GOS at 6 months was favourable in 98% cases and unfavourable in 2% cases. Patients with poor GCS at presentation were found to have worse GOS.

DISCUSSION

Head injury is rapidly increasing over the years and is a leading cause of morbidity and mortality in the world. There has been gradual improvement in management of head injury. ATLS (Advanced trauma life support) training has helped to drastically improve care of head injured trauma patients.⁹ Prevention and treatment of secondary brain injury is important in achieving a good outcome in patients with head injury.

Depressed fractures may be simple and compound. Compound skull fracture by definition have a skin laceration over the fracture site resulting in communication between external environment and cranial cavity. Compound fracture may be clean, contaminate or dirty. The presenting complaints in patients with depressed fractures is history of trauma, depression over the skull, neurological signs, seizure

and CSF leak. There may be leak of brain matter from the fracture. Investigations which are ordered in these cases include plain X-ray skull which may demonstrate the fracture, its various characteristics like location and degree of depression. Computed tomography is useful in demonstrating the depressed fracture along with any associated intracranial pathology.

Over the years there has been change in treatment of depressed fracture. Earlier in War time era, it was general consensus in treatment of compound fractures to completely remove all the indriven and fractured bone fragments as missile injuries were common that time. Later on as the cases of civilian injuries increased it became a common practice to replace the bone fragments as it achieved better cosmesis.¹⁰

However, management of compound depressed fracture is controversial with different clinical scenarios. Compound depressed fractures are usually operated when there is dural tear to clean the wound and prevent further infection by isolating the brain from external environment, elevating the depressed bony fragments to reduce late post-traumatic seizures and minimising cosmetic deformity. But this theory cannot be generalized to all the patients and further studies are needed in this regard. It has been suggested that in cases where there is depressed skull fracture of more than 10 mm with associated intracranial abnormalities like hematoma- epidural or subdural along with midline shift, operative intervention needs be done. Operations performed include craniotomy followed by simple elevation of closed as well compound depressed fractures and elevation with repair of dura, drainage of EDH or SDH. Along with this antibiotics, mannitol and anticonvulsants are given.

Defect in the skull following removal of bony fragments needs special consideration. Various materials have been used for reconstruction of the skull such as autogenous tissue like rib, calvarium and iliac crest, allogeneic implants like AAA- bone and alloplastic material like methacrylate, titanium implants and mesh. Balance has to maintained between retaining bits of bone fragments to prevent second surgery and risk of infection resulting out of such retention of bone. Wire ligatures are usually sufficient in repair of depressed fractures of skull. But when bone is broken into several small pieces, such repair by wiring is difficult. It is also possible to use bone fragment combined with titanium miniplates to repair the depressed skull fracture. Rigid fixation of bone fragments can be a problem in the repair of depressed skull fractures more so in cases where all bone fragments are not replaceable. In these cases, mini or microplates can be used. Likewise, titanium micro-mesh can be used in immediate reconstruction in the primary treatment of comminuted fractures with bone loss in on load bearing areas and treatment of contour irregularities.

In present study, there were 68% males and 32% females. Similar male preponderance is noted in other studies too.^{8,11} RTA was most common cause of depressed fracture (50%). However, some other studies implicate fall as the most common mode of injury.¹² This may be due to

poor traffic control and bad roads in this part of the world. In this study it was found that GCS is 13-15 in 80% patients. This is in accordance with other studies.¹¹

Early epilepsy was found in 4% patients and late epilepsy was found in 2% patients. In other studies, early epilepsy was found in 10% versus late in 15% patients.⁷ In the study by Jennet et al,⁷ early epilepsy (occurring within the first week after accident) was distinguished from late epilepsy (occurring more than seven days after the accident) as Authors thought early epilepsy needs separate consideration because it is less likely to persist and more likely to take the form of focal motor attacks. Also, there is less incidence of temporal lobe seizures in these cases. Jennet also observed that the risk of late epilepsy is more likely in cases with PTA lasting more than 24 hours.

CT scan revealed that in present study, most common site of fracture was parietal bone followed by frontal bone. This is in accordance with other studies.⁸ Fracture was of compound type in 82 % and simple in 18%. This is also in accordance with other studies where compound type was commonest.^{8,12}

Infection rate was found to 12%. In study by Jennet et al,⁷ postoperative infection rate of 4.6% was found in patients who did not have established infection initially but with overall infection rate of 10.6%. This is approximately same as in our study.

In present study, 98% cases were found to have a favourable outcome. In other study good functional outcome was found in 88.2%.¹

Nnadi MON et al¹ observed good functional outcome in 88.2% cases and Al-Haddad et al¹³ found good outcome in 68.5% and moderate disability in 9.6% (overall favourable outcome in 78.1%). Patients with good GCS were found to have a better GOS in present study as is also seen in study by Al- Haddad et al¹³ who also confirmed that lower GCS at presentation significantly associated with poor outcome ($p < 0.001$). But there was no association between the time of presentation to hospital and incidence of infection as is also observed by Al-Haddad et al¹³ who found no significant association between long preoperative period and infection ($p = 0.109$).

Limitation of the study

Limitation of study is small sample of population and it being a retrospective study. Further studies with a large sample size will be helpful in elucidating other features of patients with depressed fractures.

CONCLUSION

Most patients with early and proper treatment of depressed fracture have favourable outcome. Good GCS score at admission correlated with better outcome.

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