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Outcome of Surgical Management in Compound Depressed Skull Fractures With Primary Bone Fragment Replacement

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***Abstract**: Head injury is one of the most common causes of death worldwide & compound depressed skull fracture is an important cause of mortality & morbidity in this regard. Gradual urbanization and industrialization along with poor traffic control, use of over dated malfunctioning vehicles, poor and unplanned road traffic system and overall lack of awareness of the people regarding traffic system increase RTA (Road Traffic Accident) along with head injury. Besides this, assaults, fall from height, sports injuries, birth trauma etc are also important causes of head injury in our country. Health professionals are always facing these patients with head injury in their everyday practice.*

Modern imaging facilities support early treatment and lead the outcome of compound depressed fractures of skull towards zero mortality. But in developing country like us due to lack of good health infrastructure & neurosurgical service along with scarcity of neurosurgeons, communication problems, limited facilities and poverty of the people lead to a negative effect in the treatment of neurosurgical emergencies like compound depressed fracture. This ultimately increases preventable mortality & morbidity of head injured patients. The aim of the study will be to evaluate the ultimate outcome of primary bone fragment replacement in compound depressed fracture which will be managed with our limited resources and to find out a plan of management of these patients to reduce mortality and morbidity.

***Key words**: Head injury, Compound depressed fracture of Skull, RTA (Road traffic accident)*

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I. Introduction

Head injury remains one of the most common causes of death worldwide. Approximately 10 to 50% of patients with head injury developed disability at some point in their illness, and represent one of the most common brain casualty encountered by neurosurgeons. Report of Bangladesh Bureau of Statistics identified RTA with head injury as the major cause of mortality and morbidity.[1] Other causes of head injury like assaults, fall from height, industrial accidents, sports injuries, birth trauma etc also impart a significant proportion to this. From a study conducted by Kalyanaraman and Ramamurthy [2] it was found that among 830 patients with skull fractures about 50% presented with simple linear fractures whereas compound depressed fractures about 25%, simple depressed fractures about 6% and the rest constituted basilar fracture of skull.[2] Skull fracture in the matrix of head injury has complex and interrelated consequences in Bangladesh as it is globally.

Surgical intervention is required in 32% of head trauma patients; 50% of which have depressed fractures.[3] Compound depressed fractures having depression in the skull > 8-10 mm or more than the thickness of skull, most commonly found in the parietal and frontal bones and communicates with the external environment through scalp injuries or escape of CSF or brain matter from scalp wound, the nose or the ear [4]. Compound depressed fractures are surgical emergencies and unless treated promptly and properly, complications like meningitis, cerebral abscess, osteomyelitis of the skull or post traumatic epilepsy may supervene [5]. Treatment of compound fractures is more complicated because of dural lacerations and associated

cortical injuries. Elevation, debridement with appropriate measures to counter the underlying injury and repositioning of bone fragments are regarded as the surgical method of choice[6.] Traditional management consists of discarding of bone fragments to reduce the potential for infection with delayed cranioplasty.[7,8] Though removal of bone fragments often necessitates a second operation to repair the resultant calvarial defect with an expensive procedure and physical stress to the patient.

The secondary cranioplasty has significant drawbacks, which can be avoided by replacing the fractured bone fragments back into the wound after thorough cleansing. No increase in the infection rate has been observed with primary replacements of fragments. One of the major concerns in secondary cranioplasty is the risk of infectious complications involving the skin, bone / implant, epidural / subdural abscess, cerebrities and brain abscess. Metallic and plastic plates are foreign bodies that become encapsulated by host tissues. Sinus tracts between plate and skin, granulomas and pneumoencephaloceles have been reported[9]. Other complications include loosing of the plates and erosion through the skin, seizures and post operative neurological deficit. Autogenous bone use has further morbidity of two operative fields when donar sites are the rib or ileum, takes longer operative time, and difficulty of sculpturing the auto graft. There is always some tendency for the grafts to resorb, causing wound complications (pain, pneumothorax) and sometimes an unacceptable cosmetic result.

Compound depressed skull fracture comprised a large number of causalities in the field of Neurosurgery. So the objective of this study was to assess the outcome in terms of the rate of infectious complications after bone fragments were replaced primarily; regardless of the degree of wound contamination. The clinical outcome and cost effectiveness of surgical intervention has multiple effect in a poor country like us. So such study can provide a macro background for clinicians and researchers in the relevant field.

II. Materials & Methods

This prospective study was conducted with appropriate ethical clearance of total 60 patients of compound depressed skull fractures, selected from Neurosurgery department, Chittagong medical college hospital & some private hospitals of Chittagong for this study. All of the cases were diagnosed clinically and radiologically by plain x-rays of the skull & non-contrast C-T scan of Head and Bony window with 3D-reconstruction. The epidemiological data were recorded. All patients were treated surgically and operative findings with surgical outcome also recorded. Postoperative wound conditions, neurological status, functional recovery with associated morbidity & mortality assessed & recorded in every case as per Glasgow coma scale (GCS) and Glasgow outcome scale (GOS) score. Inclusion criteria were patients with clinical and image proven compound depressed skull fracture and undergone corrective surgery, patients attending OPD for follow up and admitted into indoor for post surgical complications with radiological proof and patients had undergone surgery adopting the same surgical procedure. Exclusion criteria were patients who undergone surgery for neurosurgical problem other than depressed skull fractures and patients who denied to be included or patients attending outpatient department and indoor for complications other than for depressed skull fracture and patient with prior disability and inadequate information. A preformat was prepared as protocol and all information of the patients were recorded on admission, prior to surgical intervention, on 8th POD (on discharge), at the 2nd week and at the end of 1st month follow up visit for every patient included in the study.

III. Results

Frequency measures for various characteristics of the patients are presented below:

Table-01: Distribution of age in groups (n=60)

Age in groups	Frequency	Percentage (%)
≤10 years	11	18.3
11-20 years	13	21.7
21-30 years	22	36.7
31-40 years	05	8.3
41-50 years	04	6.7
>50 years	05	8.3
Total	60	100.0

From the frequency of age distribution stated above, 36.7% of the patients were of 21-30 years has been affected by depressed fracture.

Table-02: Statistics of age in years (n-60)

Age	N	MEAN	SD	MEDIAN	RANGE
Years	60	21.40	17.10	18.00	01-64

From the statistical analysis of age in table no-02, among 60 patients; mean age was 21.40 years in the age range of 01-64 years which indicates that younger section of the population were the main victims of compound depressed skull fracture.

Table-03: Distribution of sex (n-60)

Sex	Frequency	Percentage (%)
Male	45	75.0
Female	15	25.0
Total	60	100.0

From the frequency of sex distribution in table no-03, 45 patients out of 60 were male which was 75% of the total.

Table-04: Distribution of occupation (n=60)

Occupation	Frequency	Percentage (%)
Student	26	43.33
Farmer	13	21.7
Businessman	8	13.33
Day labour	8	13.33
House wife	3	5.0
Service holder	2	3.3
Total	60	100.0

The frequency distribution of occupation of patients in table -04 shows that 26 patients (43.33%) were students.

Table- 05: Distribution of modes of injury (n=60)

Modes of injury	Frequency	Percentage(%)
Road traffic Accident(RTA)	27	45.0
Assault	17	28.4
Fall from height	11	18.3
Fall of heavy object over head	5	8.3
Total	60	100.0

From the frequency of mode of injury in table-05 we can see that 27 patients out of 60 had history of road traffic accident (RTA) which was 45% of the total.

Table-06: Distribution of types of scalp injury (n=60)

Types of scalp injury	Frequency	Percentage (%)
Lacerated	42	70.0
Incised	18	30.0
Total	60	100.0

The frequency distribution of scalp injury in table-06 shows that 42 patients (70%) presented with lacerated scalp injury

Table-07: Distribution of major presenting features (n=60)

Presenting Features		Frequency	Percentage(%)
Unconsciousness	Present	8	13.3
	Absent	52	86.6
Headache	Present	46	76.6
	Absent	14	23.3
Vomiting	Present	56	93.3
	Absent	04	6.6
Motor disability	Present	18	30
	Absent	42	70
Generalized seizure	Present	15	25.0
	Absent	45	75.0
Herniated brain & CSF leaking	Present	07	11.7
	Absent	53	88.3
Total		60	100.0

The frequency distribution of patients presenting with major features in table-07 shows 8(13.3%) patients presented with unconsciousness, 46(76.6%) with headache, 56(93.3%) with vomiting, 18(30%) with motor disability, 15 (25%) with generalized seizure and 07(11.7%) with herniated brain and CSF leaking.

Table-08: Distribution of patients according to pre-operative Glasgow Coma Scale (GCS) (n=60)

Pre-operative(GCS)	Frequency	Percentage (%)
Mild(13-15)	34	56.7
Moderate	18	30.0
Severe	8	13.3
Total	60	100.0

Frequency distribution of Glasgow coma scale (GCS) in table-08 shows that 34 patients out of 60 were in mild group whose GCS scale is 13-15; which was 56.7% of total. 18 patients were found within GCS 9-12 which constitutes 30% while 8 patients presented as severe head injury with GCS <8 which was 13.3%.

Table-09: Distribution of location of depressed bone (n=60)

Location of depressed bone	Frequency	Percentage (%)
Parietal	33	55.0
Frontal	18	30.0
Temporal	06	10.0
Occipital	03	5.0
Total	60	100.0

From the frequency finding of type of location of fractured bone stated above, 55% of patients presented with parietal depressed fracture, 30% with frontal depressed fracture, 10% temporal while 5% presented with occipital fracture.

Table-10: Distribution of patients according to time interval between admission and operation (n=60)

Time interval between admission and operation	Frequency	Percentage (%)
Within 72 hours	13	21.7
More than 72 hours	47	78.3
Total	60	100.0

Table-10 shows distribution of the patients according to the interval between admission and operation (n=60). 13 patients out of 60 were operated within 72 hours of admission into the hospital constituting only 21.7% whereas remaining 47 patients (78.3%) operated after 72 hours of admission due to various reasons including lack of awareness of patient's party regarding emergency operative intervention and unavailability of anaesthetic facilities.

Table-11: Distribution of per-operative findings (n=60)

Per-operative finding		Frequency	Percentage (%)
Dural tear	Present	21	35.0
	Absent	39	65.0
Haematoma & contusion	Present	18	30.0
	Absent	42	70.0
Venous sinus involvement	Present	02	3.3
	Absent	58	96.7
Total		60	100.0

The frequency distribution of per-operative finding in table no- 11 shows dural tear present in 21 cases (35%): haematoma and contusion in 18 cases (30%) and dural venous sinus involvement were in 2 cases (3.3%).

Table-12: Distribution of post- operative complications (n=60)

Post-operative complications		Frequency	Percentage
Motor disability	Present	18	30.0
	Absent	42	70.0
Infection	Present	7	13.3
	Absent	53	86.7
CSF leakage	Present	9	15.0
	Absent	51	85.0
Wound gap	Present	8	13.0
	Absent	52	86.7
Dysphasia	Present	5	8.3
	Absent	55	91.7
Post-traumatic syndrome	Present	5	8.3
	Absent	55	91.7
Seizure	Present	4	6.7
	Absent	56	93.3
Total		60	100.0

The frequency distribution of post-operative complications in table no-12 demonstrates motor disability were present in 18 cases (30%), infection were in 7 cases (13.3%); CSF leaking were in 9 cases (15%); wound gap in 8 cases (13%); Dysphasia were in 5 cases (8.3%); posttraumatic syndrome in 5 cases (8.3%) and seizure were in 4 cases (6.7%).

Table-13: Distribution of patients according to post-operative Glasgow outcome scale (GOS) after 1 month (n=60)

Post- operative	Frequency	Percentage (%)
5(Good recovery)	43	71.7
4 (Moderate disability)	11	18.3
3 (severe disability)	05	8.3
2 (Persistent vegetative state)	00	0.0
1 (Death)	01	1.7
Total	60	100.0

Table no- 13 shows distribution of the patients according to the post-operative Glasgow outcome scale (GOS) after 1 month. 43 patients out of 60 achieved good recovery i.e GOS-5 which is 71.7%. 11 patients developed moderate disability i.e. GOS-4 constituting 18.3%; 5 patients developed severe disability i.e. GOS-3 but no patients developed severe disability i.e. GOS-2, though 1 patient died from massive cardiac arrest postoperatively on 3rd post operative day, not related to the complications of compound depressed fracture of skull.

Table-14: Various outcomes (as per post-operative GOS) in different groups of patients (as per pre-**operative GOS) with (x^2) test significance (n=60)**

Groups as per pre-operative GCS	Outcomes as per post-operative GOS					Total
	Good recovery (5)	Moderate disability (4)	Severe disability (3)	Persistent vegetative state (2)	Death (1)	
Mild (13-15)	29	4	0	0	1	34
Moderate (13-15)	9	7	2	0	0	18
Severe (≤8)	5	0	3	0	0	8
Total	43	11	5	0	1	60
Pearson's chi-square (x^2) = 20.501; P value= 0.002; Significant statistically.						

Table-14 shows various outcomes (as per post-operative GOS) in different groups of patients (as per pre-operative GCS) with Pearson's Chi-square test significance. Pearson's Chi-square test result in between groups as per pre-operative GCS with outcomes as per post-operative GOS is 20.501 & P-value is 0.002 which was significant statistically.

Table-15: Various outcomes (as per post-operative GOS) in different groups of patients (as per interval between admission and operation) with x^2 test significance (n=60)

Groups as per time interval between admission and operation	Outcomes as per post-operative GOS					Total
	Good recovery (5)	Moderate disability (4)	Severe disability (3)	Persistent vegetative state (2)	Death (1)	
Within 72 hours	8	3	2	0	0	13
More than 72 hours	35	8	3	0	1	47
Total	43	11	5	0	1	60
Pearson's chi-square (x^2) = 1.708; P value= 0.635; Not Significant.						

Table-15 shows various outcomes (as per post-operative GOS) in different groups of patients (as per time interval between admission and operation) with Pearson's Chi-square test significance (n-60). Pearson's Chi-square test result is 1.708 where P-value is 0.635 which was not significant statistically.

Table-16: Various post- operative complications in different groups of patients (as per pre- operative GCS) with x^2 test significance (n=60)

Post-operative complications		Groups as per pre-operative GCS			x^2 test significance
		Mild (13-15)	Moderate (9-12)	Severe (≤8)	
Motor Disability	Present Absent	4 30	6 12	8 0	x^2= 24.146 p= 0.000 significant
Infection	Present	2	3	3	x^2= 5.85

	Absent	32	16	5	p = 0.054 not significant
CSF leakage	Present Absent	2 32	3 15	4 4	x^2= 9.942 p = 0.007 significant
Wound gap	Present Absent	1 33	2 16	5 3	x^2= 5.850 p = 0.054 not significant
Dysphasia	Present Absent	1 33	1 17	3 5	x^2= 4.385 p = 0.112 not significant
Post-Traumatic syndrome	Present Absent	1 33	2 16	2 6	x^2= 4.385 p = 0.112 not significant
Seizure	Present Absent	1 33	2 16	2 6	x^2= 5.116 p = 0.077 significant

Table-16 shows the associations between pre-operative GCS grading with various post-operative complications. X^2 tests were done to find out the strength of associations. However among them, some were found to be statistically not significant ($P > 0.05$), while the others were significant statistically ($p<0.01/0.001$).

Table-17: Various post- operative complications in different groups of patients (as per time interval between admission and operation) with x^2 test significance (n=60)

Post-operative complications		Groups as per time interval between admission and operation		x^2 test significance
		Within 72 hours	More than 72 hours	
Motor Disability	Present Absent	5 8	13 34	x^2= 0.566 p= 0.452 not significant
Infection	Present Absent	3 10	4 43	x^2= 0.060 p = 0.806 not significant
CSF leakage	Present Absent	2 32	7 40	x^2= 0.002 p = 0.965 not significant
Wound gap	Present Absent	3 10	5 42	x^2= 1.363 p = 0.2436 not significant
Dysphasia	Present Absent	0 13	5 42	x^2= 1.509 p = 0.219 not significant
Post-Traumatic syndrome	Present Absent	1 12	4 43	x^2= 0.009 p = 0.925 not significant
Seizure	Present Absent	1 12	3 44	x^2= 0.028 p = 0.867 significant

Table-17 shows the associations between time intervals from admission to operation with various post-operative complications. X^2 tests were done to find out the strength of associations. However, those were found to be not significant statistically ($P > 0.05$).

IV. Discussion

Head injury is one of the most common causes of death worldwide and compound depressed fracture of the skull comprises a large proportion of it leading to higher mortality and morbidity. From the frequency of age distribution of the population who have been affected by depressed skull fracture, it can be clearly seen that 36.7% of the patients were of age group 21-30 years whereas 21.7% were under the category of the age range of 11-20 years & 18.3% were within the age range 0-10 years. This shows that highest frequency falls into the younger age group. On the contrary, population aged over 30 years constitutes only 25.3%, this finding is in accordance with global finding[10]. A study conducted on 9855 patients in BSMMU also showed considerable percentage of the craniocerebral trauma patients were children and from young age group.[11]

Among the 60 cases majority were male which constitutes 75% of the total (table-3: pie chart-1). It was an obvious findings and relates with the data of Bangladesh bureau of statistics (BBS) and the study conducted in BSMMU showed majority of the craniocerebral trauma patients were male[11]. Based on age group and occupation of the patients majority of the patients were student (43.33%) followed by farmer (21.7%), day labourer 13.33% and businessman 13.33% respectively. This shows the problem involves people of all spheres of life. A study conducted on head injury in athletes showed considerable number of young groups had injury similar to this finding [12].

The incidence of Road Traffic accident (RTA) is high (45%) (table – 05) as in the study conducted on 9855 craniocerebral trauma patients attending the emergency unit of BSMMU, Dhaka also found that the road traffic accident was the prime cause of compound depressed fracture which is similar to this study[11] . The other causes we found in this study such as assault (28.4%), fall from height (18.3%), and fall of heavy objects over head (8.3%), was also quite similar to the above study. The major findings of scalp injury showed that the dirty lacerated injury constitute the largest part (70%) and were potential for infection, neurological deficit, and seizure. Though only 11.7% were presented with herniated brain & CSF leaking, but their clinical outcomes were grave.[13]

Among the presenting sign and symptoms the consciousness level was an important parameter and about 13% patients presented with GCS below 8 demonstrating the compromising status of the patients as it can eventually affect the clinical and postoperative outcome. In this study the mild GCS scale patients and the relationship with outcome was examined which showed the neurological outcome and clinico pathological profile is not consistent with GCS.[14] Our finding also suggest that as out of eight patients of severe presentation (GCS scale < 8) five patients were improved with remarkable neurological recovery consistent with Glasgow outcome scale 5. The location of the fractured bone can be easily related to text book references [15] as parietal fracture was found to be 55% and frontal 30% (table-10). 15 % patients showed generalized seizure pre-operatively and 6.7% showed post-operatively. It is difficult to comment whether pre and post- operative seizure has any correlation but our study shows a rise of generalized seizure in later operated patients and had shown that there is no difference in the incidence of epilepsy between treated and untreated patients.[16]

Regarding time lapse between admission and operation it was seen in our study that only 13 patients (21.7%) out of 60 can be operated within 72 hours of admission but the remaining 47 cases (78.3%) were undergone surgical correction after a variable amount of time lapse ranging from few days to few weeks. The unavailability of the neurosurgical services outside the tertiary hospital has a strong ground along with the lack of availability of the OT facilities & anesthesia and unawareness of the problem. Regarding preoperative finding dural tear accounts for highest percentage (21 out of 60 patients) that is 35%. While hematoma and contusion was present in 18 patients (30%) and sinus involvements in 2 patients (3.3%; table-11). Though no such data supported these finding directly, still several other studies showed that a significant number of closed head fractures can be presented with dural laceration and sinus injury though hematoma and laceration are usually presented with compound fracture.[17] The incidence of post operative complications like motor disability, infection, CSF leakage, wound gap, dysphasia, post traumatic syndrome, seizure was increased with delayed surgical intervention (table-12,16)

Regarding follow up visit about 50% patients were dropped out. As follow up depends on a range of factors that is affordability, distance, awareness; these needs careful further analysis on outcome. Majority of the patients came for follow up had a certain level of awareness of the impending consequences. Regarding postoperative complication 18 (30%) patients showed motor disability mostly in the form of limb weakness, postoperative infection and wound gap were 07(11.7%) and 08 (13.3%) respectively. A primary concern with a compound depressed fracture is the potential for intracranial infection. In this study 60 cases of compound depressed fracture of skull were selected irrespective of the degree of wound contamination and in all cases, bone fragments were replaced primarily after elevation, surgical toileting and adequate debridement. The overall infection rate was 11.7% which is comparable to the incidence quoted in the literature (2.5- 10.6%).[16] All cases were managed by subsequent dressing with appropriate broad spectrum antibiotic but no cases show osteomyelitis, meningitis or other intracranial infective complications. Some studies also demonstrated that the rate of postoperative infection was not altered even when grossly contaminated fragments were replaced primarily provided surgery was performed with early adequate debridement.[18]

Jennett and Miller[16] compared their results with wound debridement and fracture fragments removal followed by secondary cranioplasty in 153 patients with fracture fragments replacement at the initial operation in 155 patients. They found postoperative infection rate of 3.6% when the bone was replaced, compared with 4.4%, when the fragments were removed. They concluded that replacement of bone fragments was a better option even when surgery was delayed up to 48 hours and the wound was grossly contaminated.[16] This study is also supported by Al-haddad SA et al[19] In their study conducted on 73 patients in Walton centre for neurology and neurosurgery, Liverpool, UK. Which showed that in 64 (88.7%) cases bone fragments were replaced primarily where infection occurs in 6 cases (8.2%) & were unable to demonstrate a significant association between long operative period and infection rate.[19] This result is supported by the study that shows no correlation between the infection rate and time of operation or between infection and operative procedure.[20]

It is also supported by a published retrospective study with series of 31 patients of compound depressed fractures treated by bone fragments replacement regardless of the degree of wound contamination or dural tears. All patients received intravenous naficillin and ceftriaxone for 5-6 days, after which, they were discharged to take oral cephalosporin for another 5-7 days. There were no cases of osteomyelitis and in no case it was necessary to remove the bone fragments at a later date. (Blankenship JB 1990)[27]. In a study reviewing 85

patients with compound depressed fractures with primary bone fragment replacement. 9.2% infection rate was found in a 3- year follow-up.[21] Infectious sequele was not reported in a series of 32 patients treated with elevation and debridement of compound depressed skull fractures and primary bone fragment replacement within 72 hours.[22] Similar result with no infection was reported in cases of all degree of wound contamination and primary bone fragment replacement. Though the numbers of cases were 12 in that series which is small as compared to the present series.[23] In our study 11.7% infection rate is higher than most quoted studies but all patients in this series who developed infections had heavy wound contamination and delayed operative intervention as 47 cases out of 60 were operated after 72 hours of admission.

The practice of bone fragment replacement is further strengthened by a study carried out in the department of neurological surgery, College of Physicians and Surgeons, Columbia University, New York. The authors reported highly favorable results of a prospective study, in which post-craniotomy wound infections were managed with surgical debridement to preserve the bone flaps and avoid cranioplasty.[21] This study highlights the fact that if an established infection can be treated with debridement of bone fragments, without the need of discarding them, then probably severe degrees of wound contamination can be dealt with same manner. In a study it is recommended that dropping a bone flap during craniotomy can be replaced after disinfection that avoids the time and expense of cranioplasty.[24]

A critical review of clinical outcome of long term follow-up, after cranioplasty, observed a complication rate of 23.6% with a infection and material exposure being the most critical complication.[24] In another retrospective review of 28 cranioplasty, using patient's autogenous craniectomized bone flap, split calvarial graft, acrylic and titanium, an overall infection rate of 10% was reported. Autogenous bone had low infection rate.[25] No preservative method for bone yet equals the osteogenic capacity of a fresh auto graft. Fresh skull autografts remain the best kind of graft.[26] Other specific disadvantages of secondary cranioplasty include the creation of an interim cranial defect, seizures and increased predisposition of brain to injury. Cranioplasty may not yield good results in children because of continued skull growth. Moreover, cranioplasty is not a viable option in mass casualties in patients who come from remote areas, and those who are non compliant with follow-up. As all patients in this series and those in the articles quoted, received antibiotics, its value in preventing wound infection remains to be further elucidated by studies treating such patients by randomizing those that receive antibiotics and those who do not.

Head injured patients need early surgical intervention before deterioration of their consciousness level but most of the patients in this series transferred from remote areas of this region & surgical intervention were delayed. If operations could be done earlier then mortality and morbidity might be lowered. Head injured patients need multi disciplinary approach. But we have limited facility to give them in proper time. In our hospital we have no neurosurgical ICU. We could not arrange intensive support to needy patients. So the factors make the mortality and morbidity higher. So zero patients mortality from head injury is still far from us but not impossible to achieve.

V. Summary

Compound depressed fracture of skull is one of the common findings of head injury. Road traffic accident (RTA) is the most import cause of increasing mortality and morbidity in this regard. Surgical intervention is required to treat the head injured patients; 50% of which have depressed fracture. Mortality and morbidity after head injury is not only due to primary insult but also due to secondary brain damage which is preventable. Compound depressed fractures are surgical emergencies and prompt surgical management can results in favorable outcomes.

VI. Conclusion

It can be concluded from the findings of this study that a good surgical outcome can be achieved with correction of the compound depressed fracture of skull with primary replacement of bone fragments regardless of the degree of wound contamination. Timely surgery with appropriate procedure can reduce complications. Use of uniform scale in different centers is necessary to compare the outcome. Moreover there is no alternative to personal commitment, operative skill, and knowledge for better clinical outcome. This study will provide important information for further study by the researchers.

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