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RESEARCH ARTICLE

SURVIVAL OUTCOME FOLLOWING DECOMPRESSIVE CRANIECTOMY IN TRAUMATIC BRAIN INJURY.

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Abstract

Traumatic brain injury is the leading cause of death and disability worldwide. Secondary brain damage has severe impact on the survival outcome. Decompressive Craniectomy helps in better survival outcome in traumatic brain injury.

Aim:-To study the survival outcome following decompressive craniectomy for traumatic brain injury in different age groups and in Mild, Moderate & severe head injury.

Methods:-Analytical study involving 80 patients falling under inclusion criteria with Traumatic Brain Injury admitted in trauma ward in Coimbatore medical college hospital during August 2014 to July 2015.

Results:-All patients with Traumatic brain injury falling under inclusion criteria underwent Decompressive craniectomy. The outcome was good in patients below 50 years. Lesser the age better the outcome. Survival outcome as a whole was best in Mild TBI (100%), better in patients with Moderate TBI (56%) and worst in patients with Severe TBI (11%). In total, survival outcome was 36.25%, Mortality was 63.75% in our study which includes patients from GCS 4 to 14.

conclusion:-Decompressive craniectomy in traumatic brain injury should be performed to prevent secondary brain damage with outcome improvement in specific Traumatic Brain Injury case groups.

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Introduction:-

Mortality rates is more than 50% in patients with Traumatic Brain Injury (TBI) in India and developing countries. Severe traumatic brain injury (GCS< 8) occurs in 60% of polytrauma and is associated with high morbidity and mortality. Diffuse brain swelling and multiple cerebral contusions are the most common cause of death after severe head injury. Although there has been progress in understanding the pathophysiological mechanisms involved in primary brain injury, treatment strategies have failed to produce anticipated result. But it has been understood that, to reduce the impact of primary injury very little can be done. Hence most of the therapeutic attention is focussed at prevention and treatment of secondary brain injury. Despite advances in modern medicine, improved emergency care of head injured patients and prompt surgery for evacuation of mass lesions , the mortality and morbidity remains very high for traumatic brain injury. Usually decompressive craniectomy is done as a salvage procedure, when medical treatment fails. J Hempenstall et al in 2012(1), concluded that an

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effective method of controlling raised ICP which is refractory to medical management in both TBI and stroke is decompression. There were favourable outcomes in traumatic brain injury, malignant cerebral artery infarction and in subarachnoid haemorrhage in decompressive craniectomy. Khalil I Mathai, SM Sudumbreakar et al in 2010(2) submitted a review article stating that decompressive craniectomy is an effective in the management of severe post traumatic brain edema. Shabbar F. Danish et al.(3) in 2009, studied the quality of life after hemicraniectomy for traumatic brain injury in adults. With the mortality rate for patients undergoing decompressive hemicraniectomy was 28%, when done for very high ICP. Amos Olufemi Adeleye in 2010,(4) in his descriptive study, selected cases of TBI with clinical and radiological evidence of intracranial hypertension for 'prophylactic' Decompressive Craniectomy. Howard JL et al in 2008,(5) used decompressive craniectomy as part of the treatment regimen for severe traumatic brain injury with particular attention to long-term functional outcome. Abrar A Wani et al. in 2009,(6) studied decompressive craniectomy in head injury and described the mechanism, various types, indications, prognostic factors and complications of this procedure. Jagannathan J et al in 2007,(7) examined the indications and outcomes following decompressive craniectomy in pediatric patient population with traumatic brain injury.

AIM:-

To study the survival outcome following decompressive craniectomy for traumatic brain injury.

Materials And Methods:-

The present study was an Analytical study involving the patients falling under inclusion criteria with Traumatic Brain Injury admitted in trauma ward in Coimbatore medical college hospital during August 2014 to July 2015.

Inclusion Criteria:-

Traumatic brain injury patients with

1. focal brain lesion with midline shift greater than 5 mm with or without cisternal compression on CT scan.
2. focal brain lesion with neurological worsening (a decrease of GCS score of ≥ 2 points) and aggravation of pupillary response to light during initial medical therapy
3. Bilateral fixed pupils with an intact brain stem reflex
4. Focal brain lesion includes subdural hematoma and/or parenchymal haemorrhagic contusion.

Exclusion Criteria:-

Patients without brain stem reflex.

Patients who went against medical advice or absconded from trauma ward.

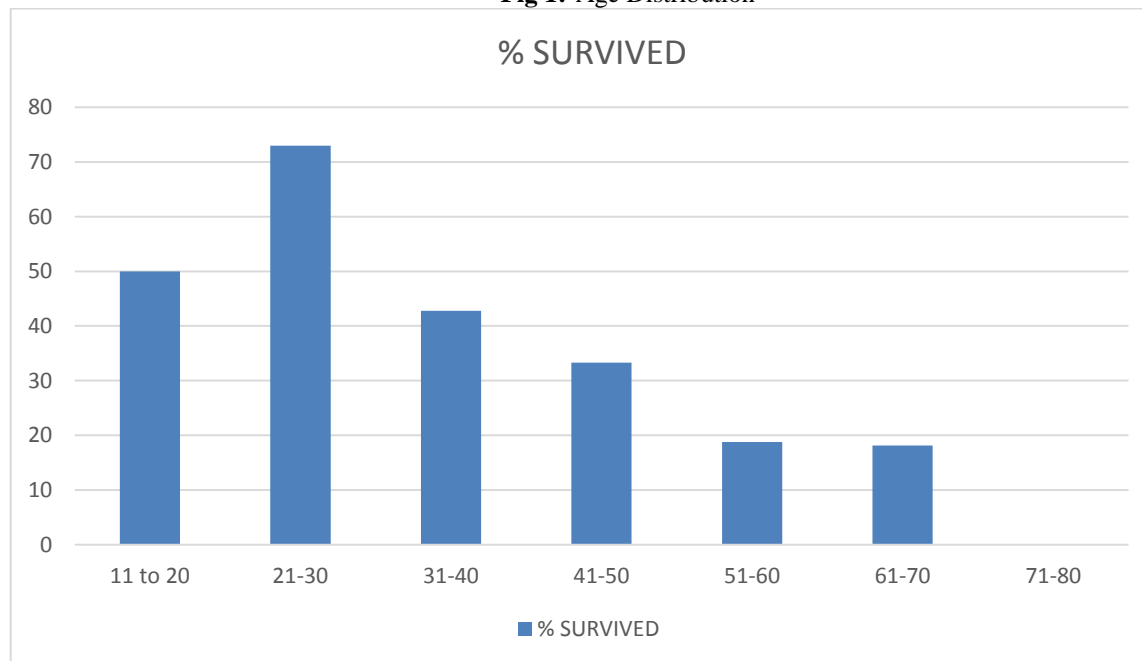
1. All patients admitted to trauma ward, Coimbatore Medical College Hospital, were examined with a detail history from patients or from reliable attenders and clinical examination was done. Mechanism of injury, alcohol intoxication, neurological deficits, seizures etc., were obtained by history. Any other associated trauma or external bleeding were thoroughly examined. All the patients with head injury were investigated with CT head, even for severely injured patients after resuscitation, after stabilising the vitals and securing airway if necessary.
2. On confirming the diagnosis, the patients were shifted to OT, if they fall in the inclusion criteria and decompression is done after obtaining informed consent in their own language from attenders.
3. Patient underwent hemicraniectomy or unilateral or bilateral frontal decompressive craniectomy, depending on the location of the lesion. Follow up CT brain taken for all patients in post operative period. Patients in need of prolonged ventilation underwent tracheostomy.
4. Patients outcome as to whether survived at discharge or declared during the course of post operative management were recorded and documented. Patients condition like good recovery, disability and vegetative state were not included in the study.

Results:-

Table 1:-Age Distribution And Outcome After Decompressive Craniectomy

AGE	TOTAL Pts	No. of Survived	% survived
11 – 20	2	1	50
21 – 30	15	11	73
31 – 40	14	6	42.8
41 – 50	18	6	33.3

51 - 60	16	3	18.75
61 – 70	11	2	18.13
71 - 80	4	0	00

Fig 1:-Age Distribution**Table 2 :- Mode Of Injury And Outcome**

MODE OF INJURY	TOTAL NUMBER	NO. SURVIVED	% SURVIVED
RTA	66	18	27.3
	6	5	83.3
		6	75

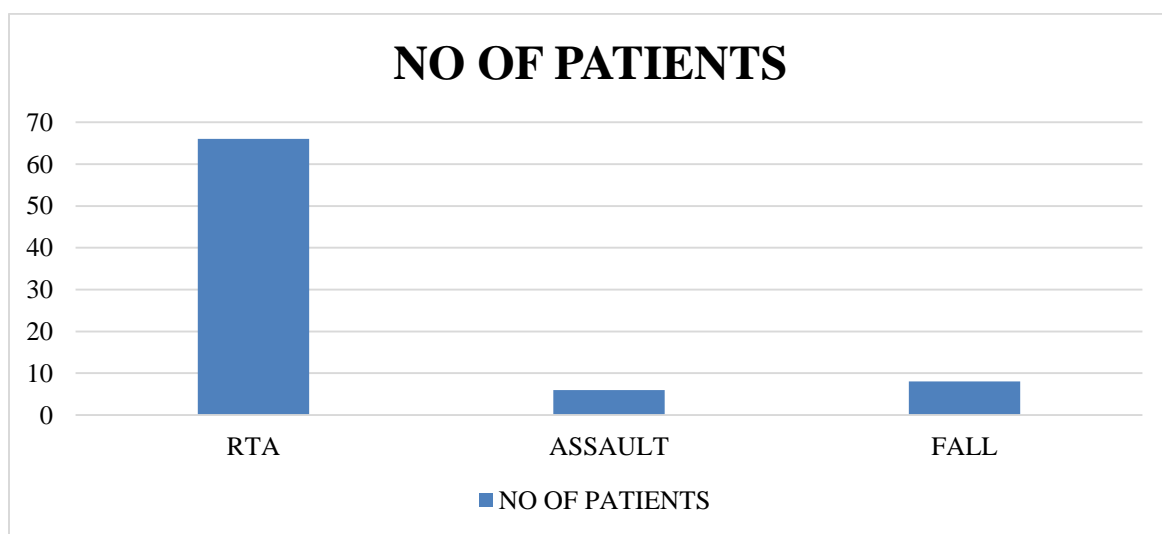
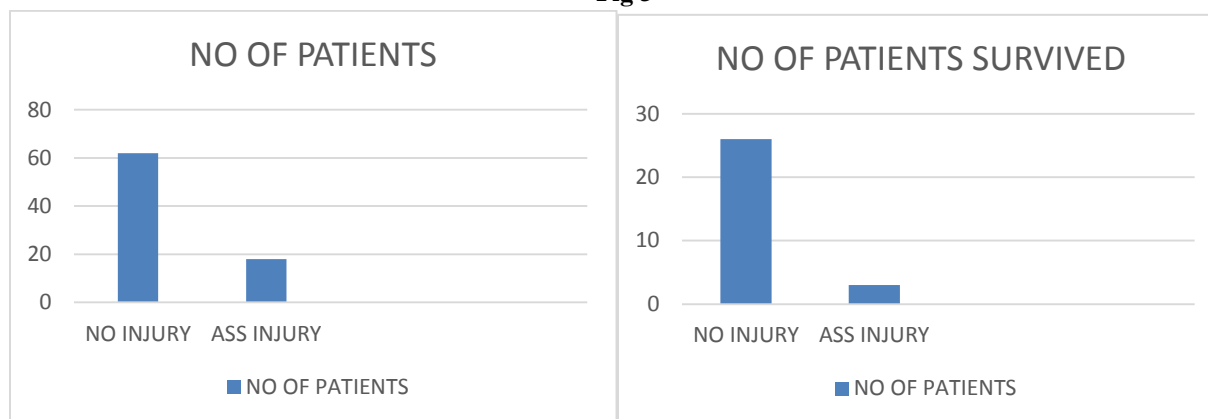


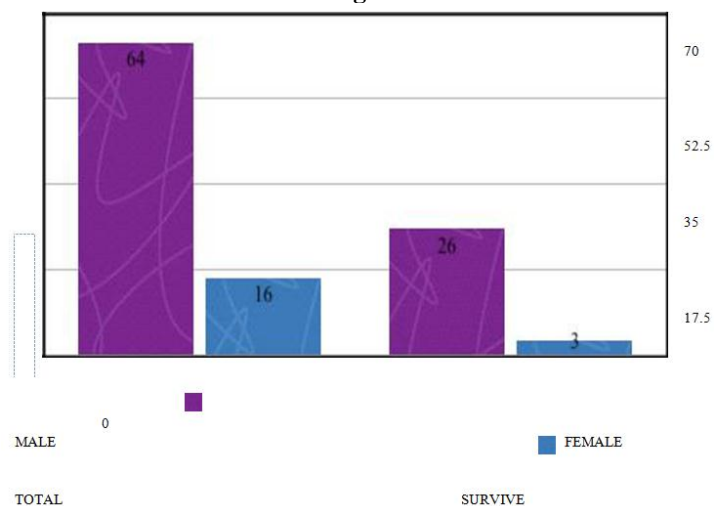
Table 3:-Associated Injury And Outcome

PRESENT	TOTAL NUMBER	NO SURVIVED	PERCENTAGE
			SURVIVED
CHEST	5	0	0
ORTHO	7	1	14.3
FACIAL	6	2	33.3
TOTAL	18	3	16.6
ABSENT	62	26	41.9

Fig 3**Table 4:-Sex Distribution**

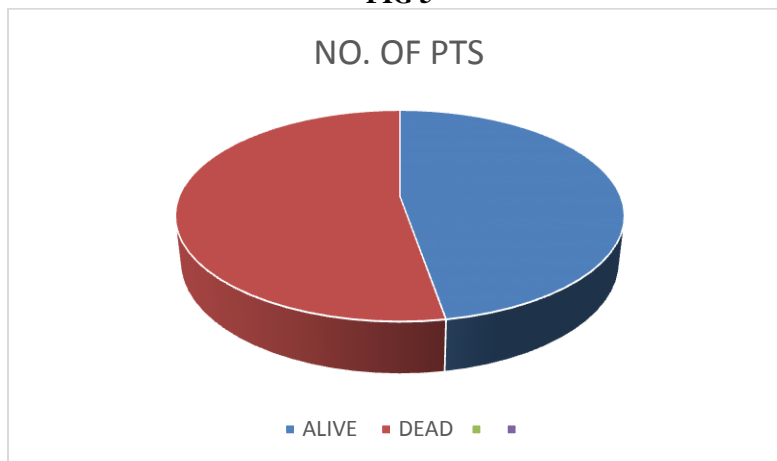
SEX DISTRIBUTION	TOTAL	SURVIVED	PERCENTAGE
			SURVIVED
FEMALE	16 (20%)	3	18.75
MALE	64 (80%)	26	40.6

Fig 4

**Table 5:-Outcome In Pts With Primary Decompression**

OUTCOME	NO OF PTS	PERCENTAGE
ALIVE	26	47.3
DEAD	29	52.7

FIG 5

**Table 6:-Type Of Decompression In Patients Survived With Mild Tbi**

TYPE OF DC	NO OF PTS	PERCENTAGE
PRI DC	8	100
SEC DC	1	100

Table 7:-Type Of Dc In Pts Survived With Moderate Tbi

TYPE OF DC	NO OF PTS	PERCENTAGE
PRI DC	8	100
SEC DC	1	100

Table 8 :-Type Of Dc In Pts Survived With Severe Tbi

TYPE OF DC	NO OF PTS	PERCENTAGE
PRI DC	8	100
SEC DC	1	100

Table 9:-Outcome In Patients With Mild Tbi

TYPE OF DC	NO OF PTS	PERCENTAGE
PRI DC	8	100
SEC DC	1	100

Table 10:-Outcome In Pts With Moderate Tbi

TYPE OF DC	NO OF PTS	PERCENTAGE
PRI DC	8	100
SEC DC	1	100

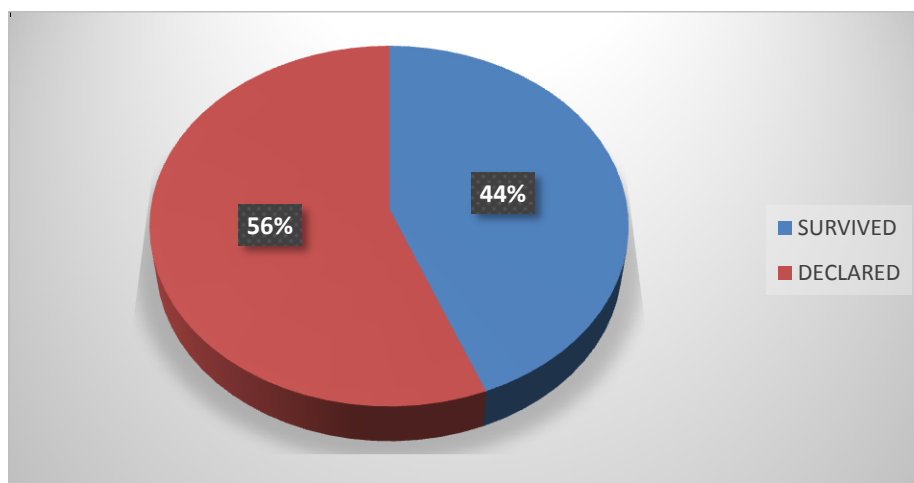
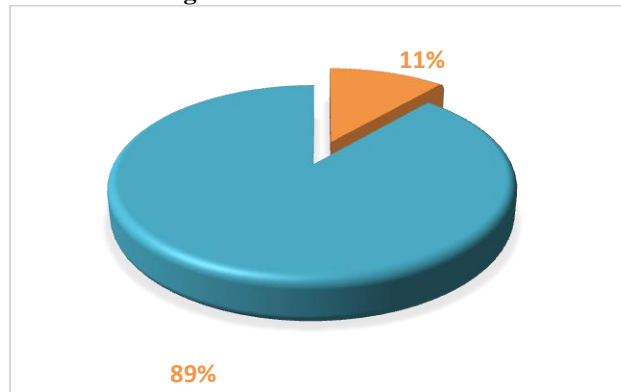
Fig 6

Table 11:-Outcome In Pts With Severe Tbi

OUTCOME	NO OF PTS	PERCENTAGE
SURVIVED	5	11.4
DECLARED	39	88.6

Fig 7:-Outcome In Severe Tbi**Table 12:-Survival In Patients With <8 Or More Than 8gcs**

GCS	< 8	>8	P value
NO OF PATIENTS	44	36	0.00046
SURVIVED	5	24	

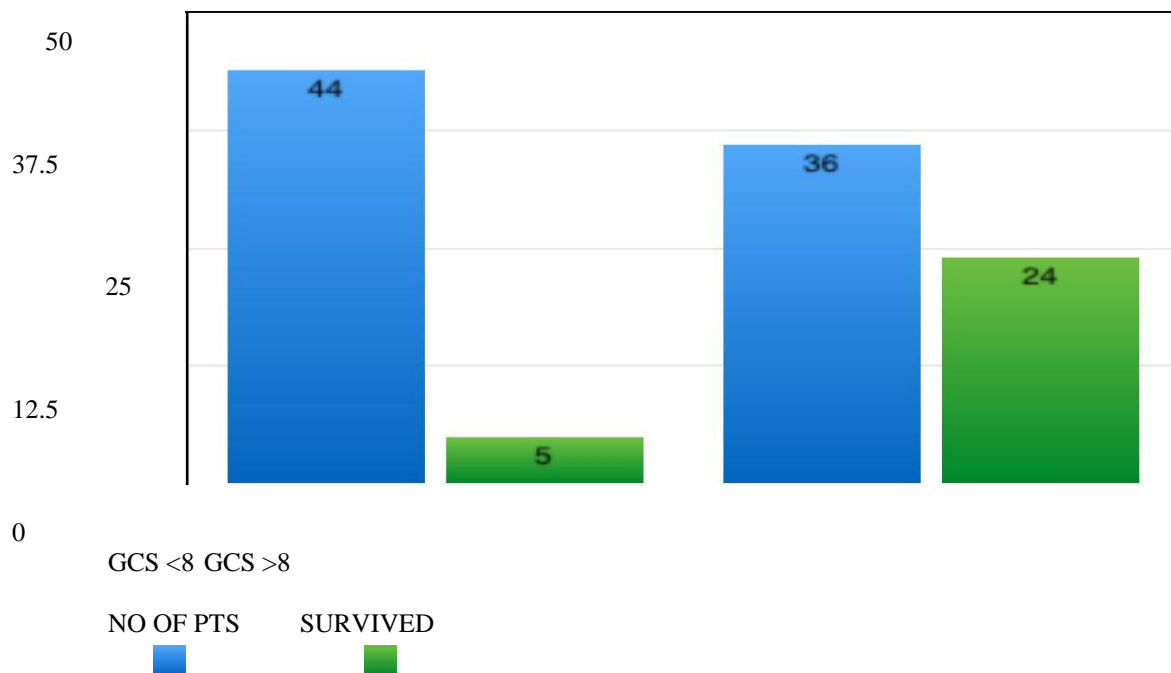
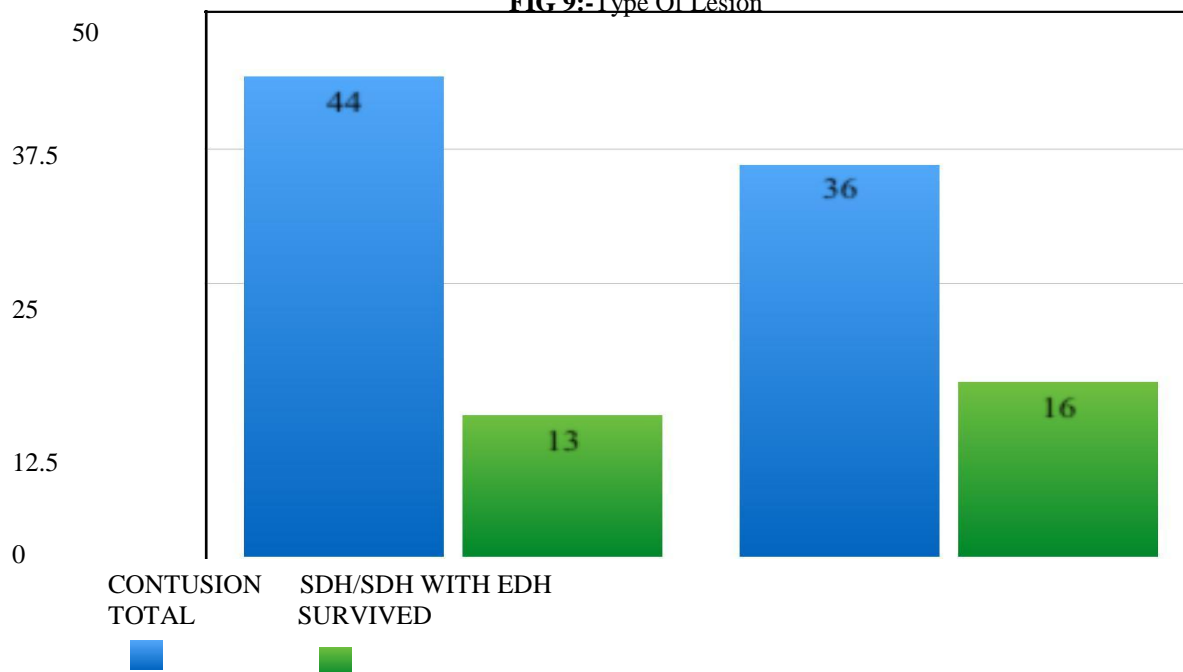
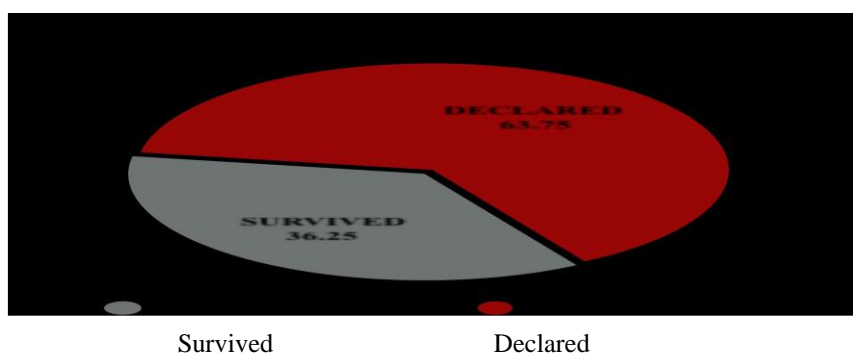
FIG 8 :-Survival In Patients With <8 Or more Than 8 Gcs

Table 13:-Associated Contusion And Outcome

TYPE OF LESION	NO OF PTS	SURVIVED	PERCENTAGE SURVIVED
CONTUSION	44	13	29.5
SDH / SDH WITH EDH	36	16	44.4

FIG 9:-Type Of Lesion**Table 14:-**Overall Outcome

	NO OF PTS	PERCENTAGE
SURVIVED	29	36.25
DECLARED	51	63.75

Fig 10 :-Overall Outcome

Analysis:-

1. In the study which included 80 patients, the outcome was good in patients below 50 years. The outcome was 73% in patients age group 21 - 30 . In patients age group 31-40 and 41 - 50 the outcome was 42.4% and 33.3% respectively. These show that young patients have better survival . In patients with 41 - 60 years the outcome was around 18%, which shows that older patients succumb to adverse effects more.
2. The survival rate for patients with associated injury was as low as 16.6 % when compared to persons with no associated injury. The patients who had only head injury had 41.9 % survival .
3. The survival was better in patients with Primary decompression (survival rate 47.3%) , when compared with secondary decompression (survival rate 12%) .The P value was 0.027, which is statistically significant.
4. Patients with mild TBI has 100% survival in our study. Out of 9 patients with MILD TBI , all 9 patients survived, irrespective of the timing of the Decompression. i.e., Patients survived with either Primary or Secondary Decompression if their GCS was 13-15.
5. 27 patients had Moderate TBI of which 15 patients survived. The survival rate was 56% and mortality was 44% in patients with Moderate TBI (GCS 9 - 12). 44 patients with Severe TBI underwent decompression, but only 5 patient survived, showing a mortality of nearly 89% if patients had severe TBI (GCS <8).
6. When all the patients in our study were analyzed , overall survival outcome was 36.25%., Mortality was 63.75% . This includes patients from GCS 4 to 14.
7. Survival outcome as a whole was best in Mild TBI (100%) , better in patients with Moderate TBI (56%) and worst in patients with Severe TBI (11%). In our study patients who underwent Primary Decompression survived better. Also, younger the patient better is the survival outcome and survival was better in patients who were below 50 years of age and mortality was more in patients with associated injuries.

Discussion:-

1. SS Dhandapani et al 8 studied to determine the impact of various age thresholds on outcome after TBI and found that age is an important prognostic indicator which is similar to our study. Age had significant association with grade of injury and mortality was also significantly associated with increasing age with 15% for age < 18, 44% for age between 18 and 59 years, and 52% in the age group > 59 years respectively.
2. As early as 1970, Heiskanen et al 9 in their study noted 78% mortality in patients above 60 years of age with severe TBI , and only 38% mortality in patients under 20 years. Though their overall mortality was 50 per cent, wide differences occurred in different age group with older age groups succumbing to death more.
3. When patient had associated injury, the survival rate for patients was only 16.6 % as compared to persons who had only head injury, survival was 41.9 % . This shows that if patients had associated injury, they succumb easily, to death due to the cumulative effect of all the injuries. Zeckey C et al 13 in their study also found that patients with head injury and polytrauma has worse outcome.
4. On seeing the sex distribution , there were more male patients (80%) when compared to female patients (20%), similar to the study done by Shameem Ahmed MS et al 10 (71.4% was male and 28.6% were female) and the study done by Navdeep Singh16 .
5. Even in study done in AIIMS , by Sumit Sinha, AmolRaheja et al 15 there were 81% male patients with TBI who underwent decompression. But the survival was better among male patients (40.6%) , when compared to female (18.75 %) patients in our study . The mortality was 51.06% for males and 43.75 % for females in study done by Navdeep Singh Saini et al 16.
6. Ojo OA et al 11 studied the effects of early decompression in patients with severe TBI. 60% of their patients survived in comparison to our study which was 11%. They concluded that early decompressive craniectomy is beneficial for selected groups of patients and most especially in settings where facilities are minimum.
7. Wang et al 12 did a meta-analysis to examine whether early decompressive craniectomy (DC) can reduce ICP and mortality in patients with TBI. Medline, Cochrane, EMBASE, and Google Scholar databases were searched until May 14, 2015. They found patients receiving DC had a significantly greater reduction of ICP and shorter hospital stay.
8. Patients with mild TBI has 100% survival in our study. Out of 9 patients with mild TBI , all 9 patients survived, irrespective of the timing of the Decompression , Also in the study done by Shameem Ahmed MS et al 10, the mortality rate for mild head injury was only 2%.
9. The survival rate was 56% and mortality was 44% in patients with Moderate TBI (GCS 9 - 12) in our study compared to study by Shameem Ahmed MS et al in which mortality was 12% in moderate TBI.
10. Bao et al 14 studied the effect of bilateral decompressive craniectomy for patients with malignant diffuse brain swelling after severe traumatic brain injury.

Conclusion:-

Decompressive craniectomy in traumatic brain injury should be performed to prevent secondary brain damage with outcome improvement in specific Traumatic Brain Injury case groups. Primary decompression gave better outcome, when compared to secondary decompression. Advancing age is a poor indicator of survival. Associated injury gives a cumulative effect for TBI on mortality..

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