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Surgical outcome of poor GCS patients of acute subdural hematoma with decompressive craniotomy alone v/s decompressive craniotomy with cisternostomy

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ABSTRACT:

Aim and Objective: To evaluate the outcome of the poor GCS patients operated for Acute subdural hematoma with decompressive craniotomy alone vs decompressive craniotomy with cisternostomy.

Materials and Methods:Fifty four consecutive cases of poor GCS of Acute SDH were operated at Medical College Hospital by decompressive craniotomy alone vs decompressive craniotomy with cisternostomy in order to assess the outcome.

Observation and Results:Fifty four patients divided in 2 groups of 27 patients each consisting of 21 males and 6 females in each group were randomly selected. Mean age of the patients in group A was 42.25 years (Range: 19 - 72 years) and Group B was 50.33 years (Range: 28 - 71 years).In group A mortality was 33.33% and in group B mortality was 11.11%.

Conclusion: We may conclude in our study that patients with cisternostomy with decompressive craniotomy have better prognosis than patients with decompressive craniotomy alone in view of mortality and morbidity.

Keywords:Cisternostomy; Decompressive craniectomy; Tentoriotomy; Osmotic therapy Traumatic brain injury.

1. Introduction

Road traffic accident with injury to the brain is more common in the underdeveloped and developing countries, where the high velocity injuries with polytrauma is one of the leading

cause with mortality.Subdural hematoma is a neurosurgical emergency, it is having a high mortality rate. If the patients are treated early and scientifically , itcan vary the mortality and morbidity by decreasing the secondary effect of the head injury. With better ICU care and availability of the neurosurgeon at remotest hospital the outcome of head injured has improved.We at our institution tried to evaluate the outcome of the patients by providing them the earliest treatment with decompressive craniotomy alone in one groupand decompressive craniotomy with cisternostomy in other group.

To our knowledge, the manuscript contains the first description of indications and technique of craniotomy was mentioned by Berengario da Carpi was an Italian physician and teacher of Anatomy at the Bologna University. he wrote in 1518 "Tractatus de fractura calve sive cranei" (1). He reported three cases of brain injury successfully operated on, with 1 year follow up. One of these patients underwent also DC.The use of "large" DC for patients with raised intracranial pressure following TBI was firstly reported by Kocher in 1901. The decompressive craniotomy was later discouraged and then again came into role in 1985 to 2000 and was considered the rebirth of the decompressive craniotomy(2,3,4,5) . we added cisternostomy as the cisternostomy has improved the outcome of the patients when done by trained neurosurgeons(6).The results of this procedure has been compared with the results of decompressive hemicraniectomy and has been proven beyond doubts to be superior to decompressive hemicraniectomy(6).

2. Patients and Methods.

Fifty four consecutive cases of poor GCS of Acute SDH were operated at Medical college Hospital by decompressive craniotomy alone and decompressive craniotomy with cisternostomy in order to assess the outcome of the patients , the patients were divided in 2 groups of 27 patients each, consisting of 21 males and 6 females in each group which were randomly selected. The initial assessment was conducted by resident and the neurosurgeon in the emergency room at the time of arrival and other associated injuries were ruled out. The patients were monitored of their GCS, pupil size, blood pressure, pulse, and other important vitals. Only patients with GCS of 7 or less than 7 was part of the study, Mean age of the patients in group A was 42.25 years (Range: 19 - 72 years) and Group B was 50.33 years (Range: 28 - 71 years). In group A mortality was (9/27) 33.33% and in group B mortality was (3/27)11.11%.

In group A, 6 patients died those had left sided acute SDH and 3 patients which had right sided acute SDH where as in group B all the patient who died had left sided SDH and all had a GCS of 3.

The Glasgow outcome scale (GOS) was used to evaluate patient'soutcome at the time discharge from the hospital and after a period of 6 months at follow up. TheChi-square tests were used for statistical analysis and a p-value < 0.05 with a 95% confident interval was considered as statistically significant.

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3. Results:

Fifty four patients were examined, 27patients in the Decompressive craniotomy group[A group] [Table 1], and 27 in the Decompressive craniotomywith Cisternostomygroup [B group] [Table 2].Compared with Decompressive craniotomy alone, the Bgroup was associated with significant shorter duration of mechanical ventilation $\{4 \pm 3.2$ days and 3 ± 1.2 days$\}$ and ICU stay $\{14.9 \pm 9.2$ and 12.3 ± 4.2 days$\}$, as well as better Glasgow coma scale at discharge. Mortality rate was significant high in A group than group B as evident from table 3 and table 4.

Days on ventilation ,intensive care unit stay , number of patients requiring osmotherapy, mean brain outward herniation was significantly low in the group B. [Shown in the table 5] The surgical procedure was slightly longer in the group B [103 ± 43min] compared with the group A[72 ± 32min].

At 6-month, the proportion of patients with favorable outcome was higher in patients with B group than A group [14.81% vs. 7.4%] . Patients in the DC with AC group also had significant lower average post-surgical ICP values, higher PbO_2 values and required less osmotic treatments as compared with those treated with DC alone.

S.No	Age	Sex	**GCS**	**Midline shift in mm**	**Pupil**	**Duration between the trauma and surgery in hrs .**
1	40	M	7	10	Unilateral dilated	3
2	38	M	6	8	Unilateral dilated	2.5
3	26	M	5	12	Unilateral dilated	2
4	32	M	6	7	Unilateral dilated	4
5	21	F	4	11	Unilateral dilated	2.5
6	28	M	5	12	Unilateral dilated	3.5
7	58	F	7	10	Unilateral dilated	4.5
8	72	M	7	4	Unilateral dilated	4
9	62	M	6	12	Unilateral dilated	4.5
10	47	M	6	11	Unilateral dilated	3.5
11	52	F	7	8	Unilateral dilated	3.5
12	23	F	3	9	Unilateral dilated	4.5
13	19	M	4	7	Unilateral dilated	2
14	26	M	5	10	Bilateral dilated	6
15	54	M	7	7	Unilateral dilated	5
16	28	M	3	8	Bilateral dilated	4
17	38	M	5	6	Unilateral dilated	3.2
18	42	M	7	5	Unilateral dilated	6.2
19	57	F	7	8	Unilateral dilated	3
20	54	F	6	4	Bilateral dilated	4

21	43	M	5	8	Unilateral dilated	3.5
22	51	M	6	4	Unilateral dilated	2.5
23	46	M	5	10	Unilateral dilated	6
24	48	M	5	12	Unilateral dilated	3
25	43	M	4	13	Bilateral dilated	4
26	42	M	4	14	Bilateral dilated	6
27	51	M	7	15	Bilateral dilated	3

Showing the details of the patients in group A [Table 1].

S.No	Age	Sex	**GCS**	**midline shift in mm**	**Pupil**	**Duration between the trauma and surgery in hrs .**
1	37	F	6	3	Bilateral dilated	2
2	45	M	7	5	Unilateral dilated	3
3	48	M	6	4	Unilateral dilated	4
4	54	M	7	7	Unilateral dilated	5
5	56	F	5	7	Unilateral dilated	2
6	52	M	4	7	Unilateral dilated	4
7	65	M	5	7	Unilateral dilated	3
8	62	F	7	7	Unilateral dilated	2
9	48	M	6	6	Unilateral dilated	6
10	47	M	4	5	Bilateral dilated	4
11	28	M	5	3	Bilateral dilated	3
12	29	F	4	3	Bilateral dilated	2
13	52	M	4	6	Unilateral dilated	4
14	47	M	7	6	Unilateral dilated	6
15	48	F	6	6	Unilateral dilated	3
16	45	F	7	7	Unilateral dilated	2
17	48	M	5	6	Unilateral dilated	4
18	52	M	7	7	Unilateral dilated	4
19	40	M	5	6	Unilateral dilated	3
20	42	M	5	6	Unilateral dilated	3.5
21	51	M	7	7	Unilateral dilated	2.5
22	54	M	7	7	Unilateral dilated	3.5
23	58	M	6	5	Bilateral dilated	4.5
24	71	M	5	5	Unilateral dilated	3.5
25	65	M	3	6	Unilateral dilated	4.5

26	66	M	4	4	Unilateral dilated	6
27	49	M	6	4	Bilateral dilated	3.5

Showing the details of the patients in group B [Table 2]

Score	Definition	No. of patient / total patients	Percentage
1	Dead	9/27	33.3%
2	Permanent vegetative state	9/27	33.3%
3	Severe disability , dependent	4/27	14.8%
4	Moderate disability , independent	3/27	11.11%
5	Good recovery	2/27	7.4%

Shows the outcome of the SDH patients with respect to Glasgow coma scale in group A. [Table 3]

Score	Definition	No. of patient / total patients	Percentage
1	Dead	3/27	11.11%
2	Permanent vegetative state	11/27	40.74%
3	Severe disability , dependent	5/27	18.51%
4	Moderate disability , independent	4/27	14.81%
5	Good recovery	4/27	14.81%

Shows the outcome of the SDH patients with respect to Glasgow coma scale in group B. [Table 4]

Characteristics	DC (27 pts) A Group	DC with AC (27 pts) B Group	
Preoperative characteristics			
Mean age (SD)	42.25 ± 11	50.33 ± 17	
Male/female	21/6	21/6	
Mean GCS at admission	5.51	5.56	

Characteristics	DC (27 pts) A Group	DC with AC (27 pts) B Group	
Unilateral pupillary dilation	21	21	
Bilateral papillary dilatation	6	6	
Primary surgical procedure	11 (50%)	13 (72%)	
Length of surgery in min (SD)	72 ± 32	103± 43	
Postoperative characteristics			
Days on ventilation	4 ± 3.2	3 ± 1.2	[early tracheostomy was done in all patients on 2nd day.]
Intensive care unit stay	14.9 ± 9.2	12.3 ± 4.2	
No. of patients requiring osmotherapy	20	3	
Early mortality	3(11.1%)	2(7.4%)	
Mean brain outward herniation in cm	1.2 ± 0.332	0.47 ± 0.56	

Clinical, radiological, and outcome characteristics[Table 5]

4. Discussion.

The overall mortality in our study in the groupA was higher than the group B , the recovery rate is much better in group B.A S Saribekian et al surgical treated 110 patients with severe craniocerebral trauma with tentoriotomy. As a result, lethality in the group of patients subjected to tentoriotomy decreased as correlating with our study(7).

Acute SDH leads to severe brain odema which forms a vicious cycle thus obliterating the CSF pathways and further increasing the brain odema, which along with reading others articles lead me opening the cisterns(8) initially it was very difficult as the brain was odematousbut with due cource of time it went easy.

Cisternostomy was also carried out in the mild head injury as a prophylactic measure in patients with acute SDH associated with mass effect and midline shift.Basal cisternosotomy (BS) was introduced by Cherian I, *et al.*(6,8,9,10)

Studies have shown that prophylactic craniectomy for TBI favors lower therapeuticintensity scores and shorter intensive care unit days as evident in our study [Table 5]as evident by Cherian I, *et al.*(6) and denial et al.(11).

The protocol was started off with a standard modality of treatment, which was decompressive craniectomy and then the cisternostomy was added to it in subsequent patients, After cisternostomy, brain was quite lax which lead to the postoperative early recovery of the patient.

Cisternostomy along with decompressive craniotomy has the added advantage that the use of the osmotic agents is reduced which prevent the patient from the renal damage and the electrolyte disturbances, over all the length of the stay in ICU and the ventillatory support is decreased .

The best surgical treatment for severe TBI still so far has been decompressive craniectomy. However, cisternostomy with decompressive craniotomy could replace decompressive alone for the same indications.(6)

The main drawback is that the neurosurgeon should be well worsed with the technique of the cisternostomy and the microscope availability at the center should me must.

5. Conclusion. Our primary single data indicate that cisternostomy with decompressive craniotomy is beneficial for the management of severe traumatic brain injury and is associated with better clinical outcome. There is requirement of microscope which most of rural practicing neurosurgeons don't have, training in skull base for trauma care surgeons would avoid the potential complications associated with this delicate procedure and the procedure can be done improving the results of the surgical procedure.

6. Conflict of Interest:The authors declare that they have no conflict of interest.

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