ORIGINAL RESEARCH

Factors influencing the management strategy and outcome of EDH

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ABSTRACT

Background: Extradural hematomas are neurosurgical emergencies and are one of the most common causes of mortality and disability after traumatic brain injury. This study aimed at evaluating the factors that influence management strategy and outcome in patients treated for EDH. **Method:** A total of 74 patients who were admitted in Neurosurgery Unit, S.N. Medical College and Hospital, Agra and diagnosed with EDH between 2018 to 2022 were included in this study. **Discussion:** 40 patients in group-1 managed conservatively out of which 36(90%) patients shows good outcome and 4(10%) patients shows poor outcome. 32 patients in group-2 treated by surgical evacuation of hematoma, 27 out of 32 patients shows good outcome, 4 patients shows poor outcome and in 1 patient mortality occurs. **Conclusion:** Good GCS score at presentation may be determining factor in deciding the management strategy.

Key words: Extradural hematoma, head injury, intracranial hematoma, outcome

INTRODUCTION

Extradural haematomas (EDH) occur in approximately 2% of all head injuries and account for a significant proportion of fatalities with mortality rates ranging from 1.2 to 33% [1]. It usually results from a brief linear contact force to the calvaria causing separation of the periosteal dura from bone and disruption of interposed vessels due to shearing stress, extension being limited by suture lines owing to their attachment, although in minority of young patients epidural hematomas may actually traverse suture lines [2]. The source of bleeding can be an injured middle meningeal artery, Diploic vein or venous sinus [3]. The usual cause of death is expanding hematoma leading to uncal herniation compressing brainstem causing respiratory arrest [4]. Thus, it considered to be the most serious complication of head injury, requiring immediate diagnosis and surgical evacuation [5]. As per the brain trauma foundation (BTF) recommendations EDH volume of greater than 30 cc warrants surgical evacuation irrespective of Glasgow Coma Scale but many a times it has been observed that not all cases of acute EDH require immediate surgical evacuation in cases with lesser than 5mm midline shift, no focal neurological deficits and GCS>8 and can be managed conservatively; the patient requires very close observation for any deterioration in GCS [6, 7]. The decision to perform a surgery in a patient with a traumatic EDH is dependent on several factors (neurological status, size of hematoma, age of patients, CT findings) and also depends on judgment of the treating neurosurgeon [8].

The aim of this study is to discover the most important factors influencing the management strategy and outcome of EDH.

MATERIAL AND METHODS

This prospective study was based on 72 patients in between 2 to 60 year of age group with EDH who ware admitted in Neurosurgery Unit, S.N. Medical College and Hospital, Agra. The duration of study was 2018 to 2022.

INCLUSION CRITERIA

- EDH volume equal to or more than 30 cc.
- Midline shift 5-10 mm.
- GCS must be > 8.
- No other intracranial injury or extracranial injury.
- Age group 2 year to 60 year.

EXCLUSION CRITERIA

- EDH <30cc in volume.
- Midline shift < 5mm or > 10mm.

- Extracranial injury and intracranial injury other than EDH.
- Patients of age group less than 2 years and >60 years.

Demographic data, the time and mechanism of head injury, neurological evaluation according to GCS before admission and the time of the first CT scan was documented. For EDH with a volume more than 30ml in the supratentorial space and, a midline shift 6-10 mm, with a GCS score > 8, without focal neurological deficit and pupillary abnormality, were attempted non-surgical management, with close observation and serial CT scanning. In the case of neurological deterioration, a new CT scan was achieved and surgical removal (delayed surgery) of the hematoma will be performed as soon as possible.

OBSERVATION

In our study we randomly divided patients in two groups. In both groups we have same type of patients with EDH volume ≥30cc, midline shift 5-10mm. and GCS>8. Group-1 had 40 patients, those ware treated conservatively and Group-2 had 32 patients, those ware treated by surgical management.

Table 1: Distribution of Cases According to Conservative Management (Group 1)

Location	No. of Cases	GCS Score			Outcome		
		≥12	11-9	≤8	GR	MD	SD
Frontal	19	9	10	0	9	7	3
Teporal	6	2	4	0	5	0	1
Parietal	8	8	0	0	6	2	0
Parieto-occipital	3	3	0	0	3	0	0
Fronto-parietal	4	2	2	0	4	0	0
Total	40	24	16	0	27	9	4
Mean±SD	8±5.76	13.13 ±2.81			5.8±1.17	1±1.26	1.2±1.17
P-Value	<0.05						

Table-1 shows total number of patients (40) were managed conservatively in which all patients had GCS >8 with different location of EDH. 27 patients shows good recovery, 9 patients mild disability and 4 patients showed severe disability which require delayed surgery.

Table 2: Outcome of Conservative Management

GCS>8	Good Outcome (GR, MD)	Poor Outcome (SD, PVS)
EDH Volume ≥30cc	36(90%)	4(10%)

Table-2 shows total 40 patients who ware managed conservatively in which 36(90%) patients shows good outcome and 4 (10%) patients' shows poor outcome.

Table 3: Distribution of Cases According to Surgical Management (Group 2)

Location	No. of Cases	GCS Score			Outcome				
		≥12	11-9	≤8	GR	MD	SD	PVS	D
Frontal	13	11	2	0	7	4	1	1	0
Teporal	6	4	2	0	4	0	1	1	0
Parietal	10	2	8	0	4	5	0	0	1
Parieto-Occipital	0	0	0	0	0	0	0	0	0
Fronto-Parietal	3	3	0	0	2	1	0	0	0
Total	32	20	12	0	17	10	2	2	1
Mean ± SD	6.4±4.67	13.13±2.63			3.4±2.33	2±2.09	0.4±0.49	0.4±0.49	0.2±0.4
P-Value	<0.05								

Table-3 shows total number of patients (32) were managed surgicaly in which all patients had GCS >8 with different location of EDH. 17 patients showed good recovery, 10 patients showed mild disability, 2 patients showed severe disability, 2 patients showed persistent vegetative state and 1 mortality.

Table 4: Outcome of Surgical Management

GCS>8	Good Outcome (GR, MD)	Poor Outcome (SD, PVS)	Death
EDH Volume ≥30cc	27(84.4%)	4(12.5%)	1(3.1%)

Table-4 shows 32 patients treated by surgical evacuation of hematoma, 27 out of 32 patients shows good outcome and 4 patients shows poor outcome. In 1 patient mortality occurs.

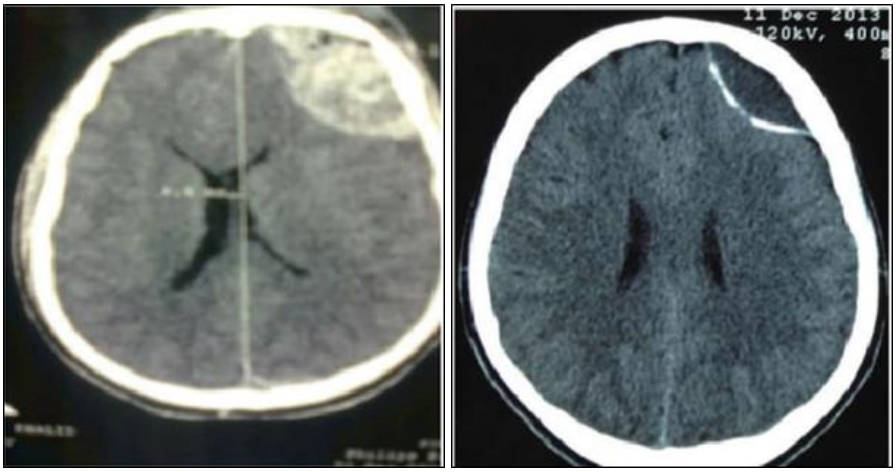


Figure 1: Pt. 26 yrs female presented to SNMC emergency with GCS 13 due to FFH. (a) EDH volume 35.8 ml in left frontoparietal region (b) CT repeated after 2 days showing resolving hematoma. (c) CT repeated after 22 days hematoma resolved further with improving GCS

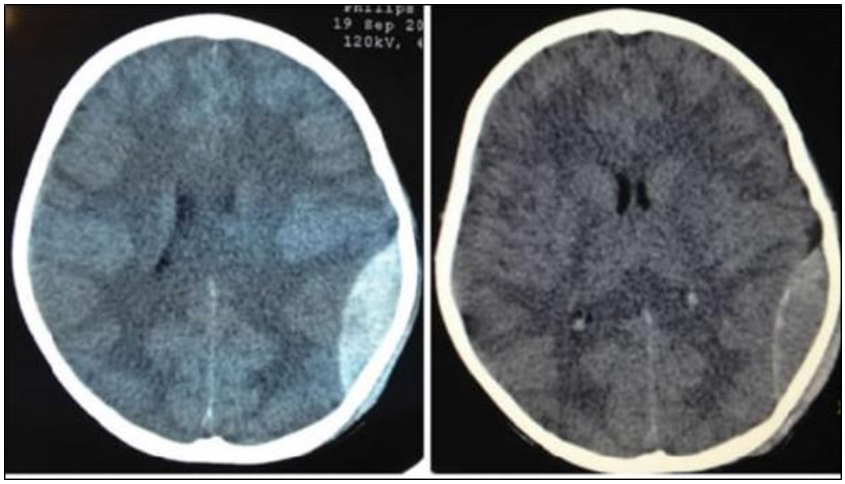
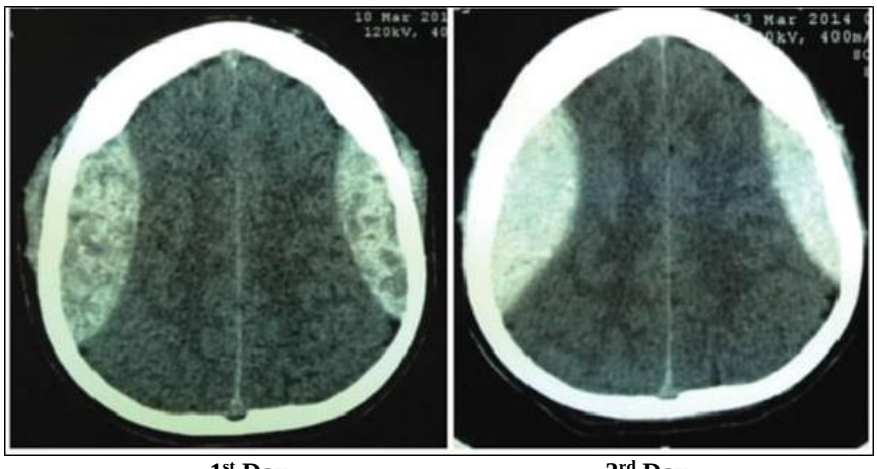
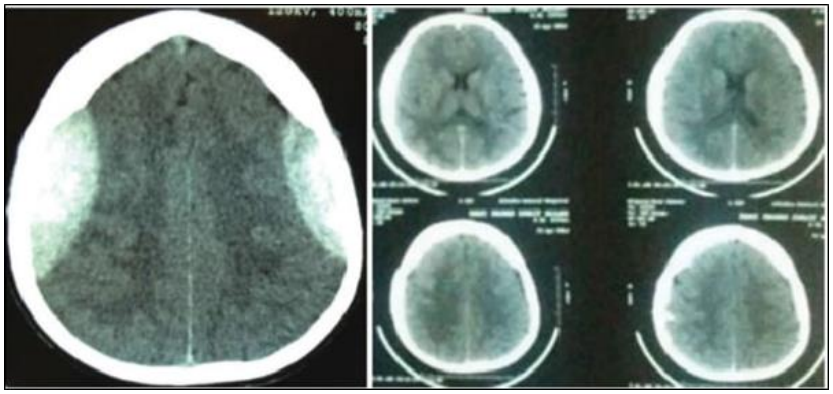


Figure 2: Pt. 56 yrs Male presented to SNMC emergency with GCS 10 due to RTA. (a) EDH volume 30 ml in left frontoparietal region (b) CT repeated after 2 days showing resolving hematoma. (c) CT repeated after 21 days hematoma resolved further with improving GCS



1st Day **3rd Day**



14th Day **35th Day**

Figure 3: Pt. 52 yrs male presented to SNMC emergency with GCS 12 due to RTA. (a) EDH volume 30 ml in left frontoparietal region. The hematoma at time of 1st day, 3rd day, 14th day and 35th day

DISCUSSION

Most traumatic EDH are not surgical at presentation. The decision to perform a surgery in a patient with a traumatic EDH is dependent on several factor (neurological status, size of hematoma, age of patients, CT findings but also depend on judgement of treating neurosurgeon [8]. Non operative management of EDH has been well documented [9]. Patient selection in therefore of utmost importance in conservative management of EDH [10].

For this study we selected 72 patients with traumatic EDH on CT scan documented with GCS >8, EDH volume ≥ 30 ml and midline shift 5-10 mm. We excluded those patients who were having associated other intracranial injury or extracranial injury, pre-existing cardiovascular disease, pulmonary or immunological disease and comatose patients.

In our study mean GCS is 13.13 and provide good outcome. Therefore, we can predict that a good GCS at presentation may be determining factor in deciding management strategies. Kulwant Sing *et al*., (2010) [50] stressed that the criteria for conservative management of EDH on GCS>12 and location of EDH other than temporal. Similar results was reported by Chavuet *et al*., [11].

In our study most common location of EDH was frontal, 19 out of 40 patients in group-1 and 13 out of 32 patients in group-2. Similarly in other study most of the EDH is frontal in location (Alok Gupta *et al*., [12]. Both groups according to site of EDH was statistically comparable and p value (>0.05).

40 patients in group-1 managed conservatively out of which 36 patients had good outcome. Despite presence of EDH volume ≥30 ml, midline shift 6-10 mm and GCS score >8. Conservatively managed patients having GCS >8 showed good recovery. Out of 40 conservative treated patients 4 had GCS deterioration. 1 patient has seizure during treatment so repeat CT had done which revealed increase in size of EDH volume, midline shift increases, so patient taken for delayed surgery due to deterioration of their neurological status. Craniotomy provides complete evacuation of the hematoma, identification and elimination of the source of bleeding. These results were statistically significant (P-VALUE<0.05) in study group of conservative treatment. These results are comparable with Sullivan *et al*., [13] in his study a large series of 252 consecutive patients were managed non-surgically with generally favourable outcome.

Offner *et al*., studied 84 patients with epidural hematoma and found that out of 64% of nonsurgical treated patients 87% of the patient were able to successfully managed without surgery [14-15].

In our conservative group no mortality documented, mortality rate 0%, which might be explained by advanced neurosurgical care and urgent surgery in patient with clinical signs of deterioration. In our conservative study volume of EDH was ≥30 ml and patients presented with good outcome and statistically significant (p>0.0001). Results are comparable with Bullock *et al*., [16] found the volume of 12-38 ml suitable for conservative management.

In our study group-2, 32 patient treated by surgery in the form of craniotomy which provide complete evacuation of hematoma, identification of source of bleeding prevention of the reaccumulation, out of 32 patients, 27 patients showed good outcome and 4 patients showed poor outcome. 1 patient mortality may be explained due to anesthetic effect, these are statistically significant (P<0.05).

CONCLUSION

We follow treatment of EDH in the form of conservative and surgery. In conservative management we observe GCS score, vital, consciousness, repeat CT scan of head. Surgery in the form of craniotomy provide complete evacuation of hematoma identification and elimination of source of the bleeding and prevention of the re-accumulation.

So, we concluded that even high EDH volume (≥30 ml) patients with large midline shift (5-10 mm) can be managed conservatively if patient had good neurological status (GCS >8) without any other intra-cranial or extra-cranial injury.

Therefore, we can predict good GCS score at presentation may be a determining factor in deciding the management strategy for EDH.

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