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ANALYSIS OF CLINICAL PRESENTATION AND MANAGEMENT OUTCOME OF OPERATED TRAUMATIC ACUTE EXTRADURAL HEMATOMA: A PROSPECTIVE STUDY OF 253 PATIENTS IN TERTIARY CARE CENTRE

Neurosurgery

Rahul Singh Senior Resident, Department of Neurosurgery, IMS – BHU, Varanasi, India.

Anurag Sahu* Mch, Assistant professor, Department of Neurosurgery, IMS – BHU, Varanasi, India. *Corresponding Author

Kulwant Singh Mch, Professor, Department of Neurosurgery, IMS – BHU, Varanasi, India

ABSTRACT

Aims: To analyze the clinical presentation and management outcome of patients operated for extradural hematoma (EDH).
Materials and Method: This prospective study includes 253 patients operated for EDH in the Department of Neurosurgery of IMS – BHU, Varanasi, India, between 1 August 2018 and 1 November 2019. Each of the patients were evaluated in term of localization of haematoma, clinical presentation, CT findings, operative measures and outcome. Chi-square test and unpaired t-test were used for statistical analysis.
Results: In the present study, largest number of patients operated for EDH belong to age group of 31-40 years (26.09 %). Temporo-parietal (23.71%) was most common site and most recovered well with GOS of 5 (good recovery). GCS before surgery was the single most important predictor of outcome ($p < 0.05$).
Conclusions: The significant CT scan factors associated with unfavorable outcome are greater clot volume, greater clot thickness, midline shift and poor GCS.

KEYWORDS

Extradural hematoma, operated EDH, Outcome analysis

INTRODUCTION

Traumatic brain injury (TBI) causes high morbidity and mortality especially in young and working age group. Incidence of epidural hematoma (EDH) is 10.6% of TBI admitted to hospital [1, 2]. EDH accounts for 5 to 15% of fatal head injuries [3]

On an average 5.56 million accidents takes place in world per year with mortality of 1.2 million per year and 3400 per day, with India having highest rate of head injury worldwide [4]. Among TBI patients the incidence of EDH ranges from 2.7 to 4% [5]. Extradural hematoma is abnormal collection of hematoma between outer layer of dura and inner surface of skull caused usually due to ruptured middle meningeal artery. It can be due to ruptured venous dural sinus or bleeding from fracture lines. It is most exclusively caused by trauma [6].

The computed tomography (CT scan) is investigation of choice for diagnosis of extradural haematomas (Figure 1). CT scan is helpful in judging severity by providing insight to site, size, shape, volume and mass effect along with associated lesions. Earlier mortality rate of EDH was 86% [6, 7] which has reduced to 5-12 % [9] due to introduction of CT scan.

Among patients in coma, up to 9% harbored an EDH requiring craniotomy [5, 8]. Peak incidences of EDH are seen in young adults and is rare before age 2 years or after age 60 (since dura is more adherent to inner table in these groups) [9]. Male to female ratio is 4:1[9]. Mortality rate ranges from 10-40% and is indicative of efficiency and alertness of healthcare system in country.

Commonly used predictors of outcome include age, Glasgow Coma Scale (GCS), pupillary reaction, brainstem reflexes and CT findings [10, 11]. Neurological status at the time of admission is most important factor for prediction of outcome of patient. On analyzing all these factors mode of management is decided whether patient requires surgical or conservative management.

We analysed 253 operated cases of EDH from August 2018 – November 2019 to analyze clinical presentation and management outcome to determine the independent influencing factors and surgical outcome and also to evaluate our current management strategy in dealing with EDH.

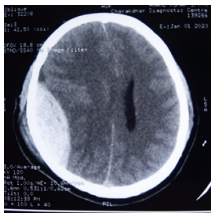

Figure 1: NCCT head axial section showing right parietal EDH with midline shift

MATERIALS AND METHODS

This prospective study includes 253 consecutive patients who underwent surgery for EDH in the Department of Neurosurgery of IMS BHU, Varanasi , India , a tertiary care centre, between 1 August 2018 and 1 November 2019. Each of the patients were evaluated in term of age, sex, mode of injury, localization of haematoma, clinical presentation, CT findings , operative measures and outcome.

Data was collected through a prescribed proforma from patients operated for EDH. Written and informed consent was taken from all the subjects or attendants for participation in study.

Patients with EDH volume ≥ 30mm3, GCS≤ 8 and anisocoria, thickness ≥15mm, midline shift ≥5mm or deteriorating neurological status were operated as per our institutional protocol. Low threshold for posterior fossa EDH was kept while deciding surgical evacuation. Both preoperative and postoperative ICU care was given.

Outcome of the patients was analysed by assessing clinical and neurological status (GCS) of patient using Glasgow Outcome Scale (GOS) at discharge.

The outcome was also evaluated according to the following categories: death (GOS 1), poor outcome (GOS 2–3), and good outcome (GOS 4–5); and also dichotomized in death/dependent (1–3) versus independent (4–5).

For dichotomous evaluation, the Pearson and Fisher Chi-square test were used; for categorical outcomes, an ordered logistic regression was performed; and for dichotomous outcomes with continuous exposure variables an unpaired t-test was used. $P < 0.05$ was deemed statistically significant.

RESULTS

In the present study, largest number of patients operated for EDH belonged to age group of 31-40 years (n = 66, 26.09%). Out of 253 patients, 85.77 % were males and 14.23 % were females. Male to female ratio was 6.03:1. Road traffic accidents accounting 81.42% were the most common mode of injury followed by fall from height (12.65%) and assault (5.93%). Majority of patients 67.98 % had GCS of 9-13 having moderate head injury. 21.34 % with GCS of 14-15 having mild head injury and 10.67% had GCS of 3-8 having severe head injury.

Altered sensorium (79.05%), headache/vomiting (67.98%) and presence of lucid interval (26.09%), were common presentations in these (Table 1).

Table 1. Clinical presentation

Signs/Symptoms	Number of patients	%
Lucid interval	66	26.09%

Bradycardia	46	18.18%
Headache/Vomiting	172	67.98%
Altered sensorium	200	79.05%
Neurodeficit	30	11.86%
Anisocoria	38	15.02%
Pupillary changes (B/L)	28	11.07%
Black eye	48	18.97%
Battle sign	32	12.65%
Hemotympanum	13	5.14%
Hypoxia/hypotension	26	10.28%

Most common operated site of EDH was temporo-parietal (23.71%) followed by frontal (19.37%) and parietal (16.99%) respectively (table 2). 52.57% had EDH on right side, 43.46% on left side and 3.97 % had Bilateral EDH.

Table 2. Site of EDH

Site	Number of patients	%
Fronto-parietal	17	6.72%
Parietal	43	16.99%
Parieto-occipital+ post fossa	1	0.39%
Frontal	49	19.37%
Occipital	3	1.18%
Posterior fossa	6	2.37%
Temporo-parietal-occipital	2	0.79%
Parieto-occipital	9	3.56%
Bilateral	10	3.95%
Temporo-parietal	60	23.71%
Fronto-temporal	13	5.14%
Fronto-temporo-parietal	11	4.35%
Temporal	29	11.46%

Clot volume of less than 30ml was found in 2 patients (0.79 %), 30 – 60 ml was found in 191 patients (75.5%) , 60 – 90 ml was found in 34 patients (13.44%) and more than or equal to 90 ml was found in 26 patients (10.27%). Midline shift was noted in 92 patients (36.36%) and was absent in 161 patients (63.64%). Brain herniation was present in 46 patients (18.18%) and herniation was absent in 207 patients (81.82 %).

In the present study, 199 patients (78.656 %) recovered well with GOS of 5 (good recovery). There was mortality of 11(4.35%) patients (GOS = 1) (Table 3).

Table 3. Glasgow outcome score (GOS)

Glasgow outcome score	Number of patients	%
5 (good recovery)	199	78.656%
4 (moderate disability)	31	12.253%
3 (severe disability)	8	3.16%
2 (persistent vegetative state)	4	1.58%
1 (Dead)	11	4.35%

Age and gender was not associated with the outcome according to GOS. When considering a binary outcome (death/dependent vs. independent), male gender was associated with a poor outcome ($P = 0.044$). In patients with GOS 1, pupillary changes (100%), low GCS at admission (4 ± 0.5), and severe brain injury (100 %) were more frequent ($P < 0.05$).

While analyzing dichotomized death/dependent (1–3) versus independent (4–5) outcome, based on GOS; greater clot volume ($p<0.0001$), greater clot thickness ($p<0.0001$), midline shift ($p<0.0001$) and poor GCS ($p<0.003$) were associated with death/dependant outcome.

DISCUSSION

NCCT scan is the investigation of choice for detecting intracranial injury after trauma [12]. It also identifies additional features such as midline shift, pupillary changes, clot volume and thickness that affect the outcome.

In this study, patients' age ranged from 2 years to 75 years. Highest numbers of the patients were in the most active period of life i.e. the fourth decade (n=66, 26.09%) closely followed by second decade (n=61, 24.11%). Only 5 patients (1.98%) were above the age of 60 years. In a reported study, 2 to 14 % of patients 60 years or older [13], peak incidence of EDH is in the 2nd decade and most patients with EDH are of age group between 20 to 30 years [10, 14]. Male to female ratio was 6.03: 1 that indicates that in our social culture, most of our females are nonworking and so are not susceptible to external works. The male dominance over female with EDH is reported in many series. [15, 16].

Road traffic accidents (RTA) was the commonest cause of injury comparable with many other published series [5,17,18,19] but is contrast to Baykenar et al [13], Ersahin et al [20]. In pediatric age group, fall was the leading cause of EDH. Other reported series, have also mentioned road traffic accidents as the most common cause of injury [21, 22]. But in contrast some authors had reported fall due to unspecified causes as the most common cause of injury [23, 24].

In many series, temporo-parietal and temporal region are the most common sites for EDH formation as compared with other locations [12, 13, 18, 22]. In this study, most common site of EDH is temporo – parietal region followed in succession by frontal, parietal and temporal region respectively. In this study, site of EDH was not correlated with mortality but in many reported series, temporal EDH is associated with higher mortality. [20, 25].

In reported series, "lucid interval" was seen in 20 to 50% of cases [26]. We observed it was present in only 26.09% cases (n =66). Bradycardia is an indicator of raised intracranial pressure but it can be present in absence of EDH. Mild neck stiffness with respiratory irregularities and associated bradycardia raises suspicion for posterior fossa haematoma.

Lee et al [19] identified associated brain lesions as one of four independent predictors of unfavorable outcome after surgery for EDH and this has been confirmed by several others [5,10,11] other three being low GCS, pupillary abnormalities and raised ICP [5] . GCS before surgery is the single most important predictor of outcome in patient with Extradural Haematoma undergoing surgery [5, 19]. Dubey et al. [27] reported GCS as the single most significant factor. The other significant factors in their study were age, clot volume and site of EDH. It is found the pupillary abnormality and lower GCS score (less than 9) was associated with poor outcome.

In this study, greater clot volume, greater clot thickness, midline shift and poor GCS ($p<0.05$) were associated with death/dependant outcome. Age and gender was not associated with the outcome according to GOS. The significant clinical factor associated with unfavorable outcome in this study was GCS of the patient at the time of presentation.

According to many authors, admission GCS or GCS before the surgery is the single most important predictor of outcome in patients with EDH undergoing surgery. [28, 29]

CONCLUSION

Extradural haematoma is a well-recognized and most rewarding neurosurgical emergency. It must be recognized and evacuated early to prevent potential mortality and morbidity. From our experience of 253 surgically managed cases we can conclude that when surgical treatment is indicated, early surgical intervention is associated with the best prognosis. The most important factor affecting the outcome is the duration of time between incident/accident and operation in neurosurgical Operation Theater; mortality can become near to nil if this time interval can be made as short as possible

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