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Original Research Article

Management of traumatic extradural haematoma at tertiary referral centre: a prospective study

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ABSTRACT

Background: Extra dural haematoma (EDH) means collection of blood between skull and dura mater due to bleeding from extra-cerebral vessel which is a common complication of head injury, often fatal if not treated intime and can be managed by both conservatively and surgically, decision has made individually in each case depending on patient's age, hematoma size, location, patient's neurological status and course. Present study was done to study different ways of management of EDH and their prognostic outcomes and to predict outcome of conservative against surgical intervention at tertiary care centre.
Methods: Present prospective study was conducted in Surgery department at tertiary care centre for 2 years and 100 subjects included in study. Data was collected about wound mechanism, clinical features, occupation, Glassgow Coma score and thorough evaluation for evidence of traumatic sequelae. Data collected and entered in Microsoft excel, statistics were estimated by chi square test $p<0.005$ considered as significant. Ethical clearance was obtained.
Results: Out of 100 participants, 53% participants belong to age group 21-40 years with M:F ratio was 4.26:1.22% study participants students followed by drivers 17%. Most common mechanism of trauma was RTA (61%) and GCS score in range of 13-15 contributing 61%. The 88 study subjects managed conservatively whereas 12 cases were managed surgically. Mortality rate 8.33% in operative mode whereas 1.34% in conservative mode of management.
Conclusions: Present study concluded that when surgical treatment is indicated that time early surgical intervention is associated with the best prognosis. Many factors affect outcome of EDH surgery and most important is duration of time between incident/accident and operation in neurosurgical operation.

Keywords: Extradural hematoma, Glassgow coma scale, Brain injuries etc

INTRODUCTION

Head injury accounts for 3-4% of emergency department attendances, with around 1500 cases per 1,00,000 population per year in the UK. Annual mortality attributable to head injury is estimated at 9 per 1,00,000 and it remains the leading cause of death and disability as a result of head injury.[1] India is having a major burden of head injuries in which annually 15-20 lakhs get injured and out of those about 10 lakh lose their lives in it. Mainly causes of head injury are road traffic accidents (60%), fall from height (20-25%), violence (10%).

Significant traumatic brain injury can be considered a combination of the primary injury sustained on impact and secondary injury developing in the following hours and days. Understanding the importance of intracranial pressure and related parameters is key to minimizing secondary injury and improving outcomes.

Acute EDH is a neurosurgical emergency in which a collection of blood between skull and dura mater due to bleeding from extra-cerebral vessel which is common complication of head injury, often fatal if not treated intime and can be managed by both surgical and conservative management and decision has made individually in each case depending on patient's age, hematoma size, location, patient's neurological status and course.[2,3]

The peak incidence of EDH is in the second decade of life that is between 20 to 30 years of age whereas it is very rare in extremes of ages.[3] Approximately 1-3% of head injury patients are diagnosed as EDH in 5 to 15% of patientswith severe head injuries.[1]

Computed tomography (CT) scan remains gold standard test for diagnosis. Early diagnosis and treatment reduce morbidity, mortality and improves outcome.[4]

The standard recommendation for symptomatic patients is surgical intervention within the golden hours. However, due to lack basic healthcare infrastructure many cases remain with unfavourable prognosis. Prognosis is always dependent on Glasgow coma score (GCS), duration of presentation with deficits and the presence of other associated intracranial lesions.

Actually, EDH is considered among the most rewardingly responsive traumatic lesions treated by neurosurgeon. The early mortality rate was 86% which has reduced now by introduction of CT and proper resuscitative measures and timely surgical intervention to 5 to 12%.[5,7]

The present study was done to study different ways of management of EDH and their prognostic outcomes and to predict outcome of conservative against surgical intervention in management of EDH at tertiary care Centre.

Aims and objectives

Aim and objectives were to study different ways of management of EDH and their prognostic outcomes, to predict outcome of conservative against surgical intervention in management of EDH and to collect statistical data about distribution of incidence of EDH in factors like age group, sex and mechanism of cause of EDH.

METHODS

Present prospective study was conducted in department of surgery for 2 years at tertiary care centre that is at government medical college, Latur, Maharashtra, India. However, 100 subjects were included in study.

Inclusion criteria

All the patients diagnosed as EDH by CT scan and participants willing to participate were include in study.

Exclusion criteria

Patients not willing to participate in study were excluded from the study.

Pre-designed and pre-tested case record form was used as tool for data collection. All the patients with history of head injury admitted in tertiary care centre were assessed for eligibility for study. Eligible participants as per inclusion criteria were included in the study.

Clinical examination was done. Initial resuscitation of patients for airway, breathing, respiration and surgical management of wound was done. Patients were classified into minor, moderate to severe head injury according to GCS score.

Data was collected about mechanism of wound, clinical features, past medical history of comorbid conditions or anticoagulant medications and thorough evaluation for evidence of traumatic sequelae and associated neurological deficits, skull fractures, hematoma, lacerations, bradycardia, hypertension, CSF otorrhoea or rhinorrhoea, hemotympanum, GCS score, anisocoria, weakness, aphasia, visual field defects, numbness, ataxia was done among study subjects along with routine laboratory investigations.

Patients subjected to CT scan after initial stabilization. Data of CT scan report was recorded. Data was collected about type of heamtoma. All patients with EDH were included in study. Also, data about site of haematoma, size of haematoma, volume of heamatoma, midline shift and any other associated injuries were recorded. CT scan was performed using Siemens 16 slice machine.

Criteria for conservative management

Patients with an EDH less than 30 ml in supratentorial space and10 ml in infratentorial space, less than 15-mm in thickness, with less than 5-mm of midline shift and a GCS score greater than 8 without focal deficit candidates for selected non-surgical management with close observation and serial CT scans.[4]

Criteria for surgical management

EDH volume more than 30 ml supratentorial space and 10 ml in infratentorial space, thickness >15 mm, midline shift >5 mm and GCS score >8 with focal deficit.

Outcome evaluation

Long-term outcome is defined by the Glasgow outcome scale.[4] Good outcome was considered when patients had shown good recovery or moderate disability. Whereas, poor outcome was considered for patients with severe disability or persistentvegetative state or death.

Data analysis

All the data collected was entered in Microsoft excel. Descriptive statistics like means and percentages were estimated. Association between independent variables and EDH were estimated using chi square test p<0.005 was considered as significant.

Ethical clearance

Ethical clearance was obtained from institutional ethics committee. Informed consent was obtained from study subjects and their close relatives (In case of subject not in condition to give consent).

RESULTS

In the present prospective study, total 100 cases of TBI with acute EDH were included.

Out of 100 participants, majority of study participants belongs to age group 21-40 years contributing to 53 participants (53%) followed by 23 participants (23%), 14 participants (14%) and 10 participants (10%) in age group 41-60 years, ≤20 years and >60 years of age group respectively. Similarly, out of 100 cases, males contributing 81% and female 19% and M:F ratio 4.26:1.

In present study, if participants were distributed according to occupation, majority of study participants were students contributing 22% followed by drivers 17%, farmer 16%, housewife 16%, labourer 12% respectively.

Similarly, if participants were distributed according to mechanism of trauma, RTA was contributing 61% followed by self-fall 26% and assault 13%respectively.

Likewise, when cases were distributed according to chief complaints, headache was the most common presentation in 71% cases followed by vomiting 57%, dizziness 32%, ear bleed in 9 cases and CSF rhinorrhoea in 1 case.

Participants were classified into three groups according to GCS score. Minor brain injury (GCS score: 13-15) contributes 61 participants (61%) followed by moderate brain injury (GCS score: 08-12) included 34 participants (34%) and severe brain injury (GCS score: <8) contained 05 participants (05%) which is statistically significant and associated with outcome among study participants (Table 1).

Common site of EDH that in majority of subjects were parietal side contributing to 29%, followed by temporal 27% and frontal 13% and so on.

Table 1: Association between GCS score and outcome among studyparticipants, (n=100).

GCS score	Outcome				Total	
	Discharged		Died			
	N	%	N	%	N	%
≤8	03	60	02	40	05	100
8-12	34	100	00	00	34	100
13-15	61	100	00	00	61	100
Total	98	98	02	02	100	100

*# Fisher exact test p=0.00202 #significant at p<0.05

Table 2: Mortality among different modes of treatment, (n=100).

Mode of treatment	Total	No. of deaths	Mortality rate (%)
Conservative	88	01	1.34
Operative	12	01	8.33

Table 3: Association between occupation and EDH in accordance with gender, (n=100).

Occupations	Acute EDH				Total		P value#
	Males		Female				
	N	%	N	%	N	%	
Farmer	16	100	00	00	16	100	<0.0001
Driver	17	100	00	00	17	100	
Housewife	00	00	16	100	16	100	
Labourer	11	91.66	01	8.34	12	100	
Worker	07	77.77	02	16.67	09	100	
Employee	06	100	00	00	06	100	
Student	22	100	00	00	22	100	
Others	02	100	00	00	02	100	
Total	81	81	19	19	100	100	

Fisher exact test significant at p<0.05.

At the end, 88 cases (88%) were treated by conservative management and rest 12 cases (12%) were undergone and treated by operative management. Therefore, when study population were divided according to outcome of management, majority of study participants were discharged with stable haemodynamic condition contributing 98% whereas 2% of subjects died.

When the cases were distributed according to the mortality among different modes of treatment, mortality rate was higher in operative mode of treatment contributing 8.33% whereas it was 1.34% in conservative management of EDH (Table 2). But there is no significant association between mode of treatment and outcome among study participants (Table 1).

DISCUSSION

The present prospective study was conducted among 100 study participants with EDH at tertiary care center during 2 years period.

Age distribution of study subjects showed that, majority of study participants belongs to age group 21-40 contributing 53 (53%) followed by 23 (23%), 14 (14%) and 10 (10%) in age group 41-60, ≤20 and >60 group respectively. Similar findings were noted in a retrospective study including 253 patients operated for EDH in emergency in the Department of Neurosurgery of IMS BHU, Varanasi, India, a tertiary care center, between August 1, 2018, and November 1, 2019 was done by Singh et al.[6] In that study, it was seen that the most common patients operated for giant EDH were in the age group of 20-40. These findings are consistent with present study.

In the present study, it was observed that TBI was more common in productive age group conversely it is less common in extremes of age. This might be due to factor that this age group is more likely to exposed to RTA/ assault as compared to other extremes of ages. Similar findings were noticed in a study by Abosadekh et al showed that TBI was more common in young adult males in age group of 20-39 years.[7] Similarly, a study by Pate et al in Maharashtra showed similar findings in which it was seen that the peak incidence of head injury among 391 cases was observed in the age group of 21-30 years.[8]

Sex distribution of participants was studied in present study. It was observed that that majority of study participants were males contributing 81% and female 19%. M:F ratio was 4.26:1. A similar findings were observed in the study by Satapatty et al in north India in that a male:female ratio was 2.19:1.[9]

Distribution of participants according to occupation shown that majority of study participants were students contributing 22% followed by drivers 17, farmer 16, housewife 16, labourer 12 respectively. There is significant association between occupation and EDH in accordance with gender among study participants (Table 3). Proportion of occurrence of EDH among male Student, Farmer, Driver and laborers was high as compared to their female counterparts. This may be due to male dominance among these occupations.

Distribution of participants according to mechanism of trauma was studied in present study. It was seen that, in majority of study participants mechanism of trauma was RTA contributing 61 % followed by self-fall 26% and assault 13% respectively. Similar findings were seen in a study done by Singh et al that road traffic accidents (RTAs) were the most common cause (79.31%) of injury followed by assault (17.24%), leading to the development of giant EDH.[6] Likewise, a study by Kirankumar et al shown that, the leading cause of road traffic injury was motorcycle accidents (62.35%; n=154) followed by pedestrians (19.84%; n=49) and car accidents(14.57%; n=36).[10] Similarly, studies in India by Yatoo et al, Bhole et al, Rahman et al and Gupta et al it was concluded that RTA was the most common mechanism of injury.[11-14]

Chief presenting complaints among study subjects showed that headache as the most common presentation in 71% cases followed by vomiting 57%, dizziness 32%, ear bleed in 9 cases and CSF Rhinorrhoea in 1 case. Similarly, a study by Kirankumar et al shown 65% patients experienced loss of consciousness (LOC); 61% had 1 or more episodes of vomiting and 17% patients presented with bleeding from ear, nose or throat.[10] Seizures were noted in 8.9% patients. A study by Gupta et al and Kumar et al shown similar findings.[14,15]

Distribution of participants according to GCS score was studied in present study (Figure 1). It was seen in this study that majority of subjects presented with GCS score in the range of 13-15 (Mild brain injury) contributing 61% followed by 8-12 (34%) (Moderate brain injury) and ≤8 in 5% cases with (severe brain injury) respectively. Similar findings were seen in study by Kumar et al shown that at initial clinical examination 40% cases had GCS score of 15/15 (asymptomatic), 25% of 13-14 (mild head injury), 21% with range of 9-12 (moderate head injury), 8% with range of 8-5 (severe head injury), 6% with range of 3-4 (moribund state).[15]

Association between GCS score and outcome among study participants was studied in present study (Table 1). It was seen that there is statistical significant association between GCS score and outcome among study participants ($p<0.005$). This shows that GCS score is good predictor of outcome among patient with EDH. Likewise, in a study by Singh et al concluded that GCS at the time of admission or GCS before the surgery is the single most important predictor of outcome in patients with EDH undergoing surgery.[6]

Overall mortality rate in present study was 2%. Out of 5 cases presented with GCS score ≤8 (Severe brain injury),

2 died. Mortality was high (40%) in this group. There was no death in patients presenting with GCS >8.

Distribution of participants according to location of EDH was seen in present study. In our study it was seen that in majority of subjects parietal was the most common site of EDH contributing 29% followed by temporal 27%, Frontal 13%, FTP 11%, Perieto-temporal 11% respectively and similar findings were seen in the study done by Pathak et al, Chowdhury et al, Zkan et al and Coebodos et al shown that EDH is more frequently located in the temporo-parietal and temporal region as compared with other locations.[16-19]

All the study participants were managed conservatively or surgically as clinically indicated. Out of 100 subjects with EDH, 88 were managed conservatively and 12 were managed surgically. A similar findings were noticed in study by Kumar et al and Bhau et al.[15,20]

An association between mode of treatment and outcome among study participants was seen in this study (Table 1). It was observed that there was no significant association between mode of treatment and outcome among study participant as $p>0.05$. This may be due to majority of subjects were managed conservatively as clinically indicated rather than surgical management. Also, those patients managed conservatively were having GCS score in the range of 8-12 (Mild to moderate brain injury) as compared to patients having GCS score<8 (severe brain injury). Mortality in patients with EDH was observed in present study among different modes of treatment (Table 2). It was revealed that mortality rate was higher in operative mode of treatment contributing 8.33% whereas it was 1.34% in conservative management of EDH.

A study by Kumar et al shown that, surgical approach was considered in 57 patients while remaining 47 patients were managed conservatively out of 100 cases.[15] Outcome was assessed with Glasgow outcome scale. Good recovery was seen in 79% of patients. Moderate disability was seen in 11% of patients. Severe disability, vegetative state and death accounted only 10% of cases.

A study by Kirankumar et al revealed that majority (79%) of the patients were managed conservatively and only 21% were managed surgically.[10] Majority (93%) of mild TBI cases were managed conservatively and only 7% were treated surgically and cases with moderate and severe TBI 64% were managed conservatively and remaining 36% cases were treated surgically. Mortality was mainly seen in patients with severe head injuries, and there was no mortality in patients with minor head injuries. Mortality increases with the increase in the severity of TBI. A study by Lee et al revealed similar findings consistent with present study.[21]

Limitations

Data regarding time taken to reach hospital from incident of trauma was not recorded, which might influence the outcome of patients. Patients with polytrauma, which influence the outcome of patients were not included. Patients categorized as discharged outcome included referred out and DAMA patients. This might have influenced outcome. We have not followed the discharged patients further after their discharge from the hospital with disability.

CONCLUSION

India is undergoing major economic and demographic transition coupled with increasing urbanization and motorization. Among the 10 causes of mortality in the country, head injury was the 10th cause 20 years back. But with the increasing urban expansion and life style changes, trauma will occupy the 5th position in the list of major killers and third position among causes of disease burden in 2020.

Extradural haematoma is a well-recognized and most rewarding neurosurgical emergency. It is well recognized and evacuated early to prevent mortality and morbidity. From the present study, we concluded that when surgical treatment is indicated and early surgical intervention is associated with the best prognosis. Many factors affect the outcome of EDH surgery and the most important one is the duration of time between incident/accident and operation in neurosurgical operation.

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