

Evaluation of Extradural Haematoma in Rural Population of Central India

PRASHEELKUMAR PREMNARAYAN GUPTA¹, ANIL VISHNU AKULWAR², RANJEET KUMAR JHA³,
RICHHA PREMNARAYAN GOYAL⁴, DEEPAK PREMNARAYAN GUPTA⁵



ABSTRACT

Introduction: Traumatic Brain Injury (TBI) is one of the leading health problem in India. Road Traffic Accident (RTA) forms the major bulk for TBI. Extradural Haematoma (EDH) occurs in 1-3% of total TBI patients. Being a rural setup where the study was conducted, data regarding the TBI from central India was scanty. It is the need of the hour to get the vital statistics regarding EDH from central Indian population.

Aim: To evaluate EDH in TBI patients and to find the causes, clinical presentation, location of EDH and outcome in tertiary care setup of Central India.

Materials and Methods: This was a retrospective study from January 2014 to January 2020. Patients admitted with EDH in Neurosurgery Department were included in the study. Eighty-seven patients having EDH were identified and their records were retrospectively analysed. Various clinical parameters such as age, sex, duration of presentation to department after injury, clinical presentation, cause of injury, Glasgow Coma Scale (GCS) at time of presentation, location of EDH and management (conservative or surgery) were identified from case records. Descriptive statistical analysis was performed for above mentioned parameters in Microsoft excel 2016 along with SPSS 22.0 for applying chi-square test.

Results: Out of 1,325 TBI patients, 87 had EDH. There were 79 males and eight females in the study with male to female ratio of 9.8:1. The peak age incidence was in third decade of life with mean age of 34.6 years (SD=22.14 years). Only 12 patients were presented within 6 hours of incident, while 24 patients presented within 6-24 hours and remaining 51 presented >24 hours after the event. RTA was the most common cause for EDH. Most common clinical presentation was headache followed by altered sensorium and vomiting. Most of the patients presented with GCS ranging from 13-15 (n=34, 39.08%) while the percentage of patients with GCS 3-7 was 33.33% (n=29). The most common location of haematoma was temporal. Surgical intervention was considered in 53 patients. Mortality in our study was 14.9%. Amongst the dead, 62% had seizure history (8 cases). Five out of thirteen patients died shortly after admission while four patient died while on conservative management.

Conclusion: To conclude, RTA was the most common and preventable cause of EDH. Males had more chances of having EDH with peak age of incidence at third decade of life. Commonest location of EDH was temporal region. Early intervention in case of EDH can have good prognosis even in case of poor GCS. Poor GCS should not be the absolute contraindication for surgical intervention.

Keywords: Epidural haemorrhages, Intracranial epidural haematoma, Traumatic brain injury

INTRODUCTION

The TBI is the most important public health problem in India. In our country, RTA (60%) is most common cause of TBI followed by falls (25%) and assault (10%) [1]. Acute EDH comprises of 1-3% of patients with head injuries and 5-15% of patients having severe head injuries [2]. EDH is very rare in extremes of ages. Various studies have reported the mean age of patient with EDH somewhere between 20-30 years with peak incidence at second decade of life [3,4]. The mortality associated with EDH is between 5-50% [5,6]. EDH being the preventable cause of mortality, decision and timing for treatment of EDH has to be made individually in each case depending on patient's age, location, neurological status and course [7]. Hence, individual setup study is required, so that tailored approach can be made to deal with the cases of EDH depending on the individual setup. The present study was undertaken with an aim to find the causes, clinical presentation, location of EDH and outcome in tertiary care setup.

MATERIALS AND METHODS

This was a retrospective study conducted from January 2014 to January 2020 in Department of Neurosurgery Mahatma Gandhi Institute of Medical Sciences, Sevagram, Wardha Sevagram. Institutional Ethical committee permission was taken prior to study (IEC Ref. No. MGIMS/IEC/NEUR/88/2020). Cases that were diagnosed as Acute EDH on Computed Tomography (CT) scan

and continued treatment in our hospital were included in the study. Cases of TBI without EDH were excluded from the study. There were 1,325 patients of TBI recorded in the study period out of which 87 had EDH. The records of these 87 patients were retrospectively identified and clinical parameters such as age, sex, duration of presentation to department after injury, clinical presentation, cause of injury, GCS at time of presentation, location of EDH and management (conservative or surgery) were studied.

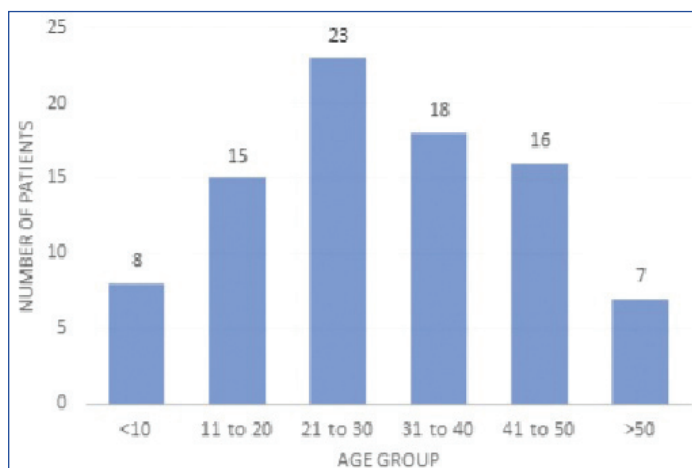
STATISTICAL ANALYSIS

Microsoft office excel 2016 (Microsoft Redmond, WA) for windows was used for analysing the descriptive statistics. SPSS 22.0 for Microsoft windows was used for applying Chi-square test.

RESULTS

Out of 1,325 TBI patients, 87 had EDH (6.5%). There were 79 males (90.80%) and eight females (9.19%) in the study with male:female ratio of 9.8:1. The peak age incidence was in third decade of life with mean age of 34.6 years [Table/Fig-1]. Only 12 patients presented within 6 hours of incident, while 24 patients presented within 6-24 hours and remaining 51 presented >24 hours after the event. RTA was the most common cause for EDH in the present study [Table/Fig-2]. Most common clinical presentation was headache followed by altered sensorium and vomiting [Table/Fig-3]. Most commonly patient presented with GCS 13-15 (n=34, 39.08%) [Table/Fig-4].

The most common location of haematoma was temporal followed by frontal and parietal area [Table/Fig-5]. Out of 87 cases, 38.4% of the cases presented as pure isolated EDH and 61.6% of cases presented with associated fracture or associated brain parenchymal injury. Surgical intervention was considered in 53 patients while conservative management was considered in 21 and 13 patients died (14.9%). Five out of 13 patients died shortly after admission while four patients died while on conservative management. Remaining four patients died in surgical intervention group. There was significant mortality in patients presenting after 72 hours to the hospital (10 cases) as compared to those presenting earlier (3 cases). By applying chi-square test p-value of 0.0186 was deduced which was significant [Table/Fig-6].



[Table/Fig-1]: Distribution of patients in various age groups.

Cause of injury	Number	Percent (%)
Fall	19	21.84
Assault	8	9.19
RTA	55	63.21
Unknown	5	5.75

[Table/Fig-2]: Cause of injury in patients.

Clinical presentation	Number (%)
Lucid Interval	13 (14.94%)
Headache	81 (93.1%)
Vomiting	74 (85.06%)
Altered sensorium	79 (90.80%)
Pupil changes	23 (26.43%)
Bradycardia	37 (42.53%)
Seizures	18 (20.69%)
Neurodeficit	23 (26.44%)

[Table/Fig-3]: Clinical presentation at the time of admission.

GCS	Number (n)	Percent (%)
3-7	29	33.33
8-12	24	27.58
13-15	34	39.08

[Table/Fig-4]: GCS of patients at the time of presentation to hospital.

Location of EDH	Number
Temporal	39
Frontal	31
Parietal	10
Occipital	5
Posterior Fossa	2

[Table/Fig-5]: Location of EDH.

Duration at presentation	Number of deaths	Percent of death
>72 hours	10	76.92 %
<72 hours	3	23.08 %
Chi-square test value	p=0.0186	

[Table/Fig-6]: Comparison of death based on duration of presentation to hospital.

DISCUSSION

In the present study, EDH represents 6.5% of the TBI presented to the institution during the study period. In various studies, the incidence of EDH reported varies between 1-3% of total head injury [8-10]. This number is significantly higher than the previous study. It could be because many mild TBI patients are managed in small centers and those patients who had EDH requiring intensive management are promptly referred to the institute. Although few other studies have reported similar incidences like the present study [11,12]. Lee JJ et al., in its study reported 4.25% of EDH cases out of total TBI cases (EDH=73 patients, TBI=1,716 patients) [13]. Male to female ratio in the present study was 9.8:1, it was comparable to other study [14]. Khaled CN et al., reported male to female ratio of 6.27:1 [15]. Some of the recent studies have reported male to female ratio of around 4:1 [12,16]. The most common cause of EDH in the index study was RTA accounting for more than 63% of EDH cases. RTA is one of the avoidable causes, which can bring down the number of cases significantly. Most common location of EDH in the present study was temporal region (44.83%). One Nigerian study also reported temporal region as most common region involved [12]. In our study, lucid interval was seen in 14.9 % of cases. This is consistent with other reports suggesting the presence of lucid interval in 10-27% of the patients [17].

Only 34 (39.08%) of the patients came with GCS \geq 13. On admission GCS is one of the most important prognostic marker and had excellent prognosis if the initial GCS is high [9,16]. In the present study, there was no mortality in patients with GCS \geq 13. Eight out of 18 patients (44.4%) who had seizure as one of the presenting complaint died while out of 13 patients who died, eight had history of seizures (62%). It clearly suggests that seizures as a chief complaint is a poor prognostic factor in outcome of EDH. The cause for poor prognosis in seizure could be explained due to the fact that such patients have additional brain injury on already raised intracranial pressure event. In case of seizure as the presenting complaint it should be dealt with utmost care and proper seizure prophylaxis should be given, while it should be given in all cases presenting with poor GCS.

The present study had a slightly higher mortality rate (14.9%), although it was comparable with other studies [12,18-20]. It could be due to the fact that only 13.8% patients presented within 6 hours after the injury and five of the patients died immediately after admission even before the intensive management initiation. There was significant mortality in patients presenting after 72 hours to the hospital (10 cases) as compared to those presenting earlier (3 cases) ($p=0.0186$, Chi-square test). However, 17 out of the 29 patients admitted with a GCS of \leq 7 in our study survived.

Hence, it can be perceived that active intervention in patients with EDH have good outcome even in case of poor GCS compared to other causes of head injury. As compared to other causes of TBI, patients with EDH have good chances of survival even in low GCS if managed early [11].

This study is first of its kind giving details about the epidemiological parameters about EDH for our region. Future recommendation is that proper prospective study should be performed where the details about alcohol intake, wearing of helmet and factors leading to delay of referral to the institute should be added so that exact idea about the influence of these factors on EDH can be studied.

Limitation(s)

It was a retrospective study. Further follow-up of patient after the discharge was not available. Factors leading to delay of referral of patient to tertiary hospital were not available.

CONCLUSION(S)

The EDH is one of the cause of TBI which have good outcome if managed early. Ambulance system and primary health centre referral system should be strengthened for transport of patient to hospital within six hours of accident. Seizure at time of presentation designates poor outcome hence seizure prophylaxis should be considered in all patients with poor GCS.

REFERENCES

- [1] Gururaj G. Epidemiology of traumatic brain injuries: Indian scenario. *Neurol Res.* 2002;24(1):24-28.
- [2] Mishra A, Mohanty S. Contre-coup extradural haematoma: A short report. *Neurol India.* 2001;49(1):49-94.
- [3] Bullock MR, Chesnut R, Ghajar J, Gordon D, Hartl R, Newell DW, et al. Surgical management of acute epidural hematomas. *Neurosurgery.* 2006;58(3):S27-15.
- [4] Pozzati E, Frank F, Frank G, Gaist G. Subacute and chronic extradural hematomas: A study of 30 cases. *J Trauma-Inj Infect Crit Care.* 1980;20(9):795-99.
- [5] Taussky P, Widmer H, Takala J, Fandino J. Outcome after acute traumatic subdural and epidural haematoma in Switzerland: A single-centre experience. *Swiss Med Wkly.* 2008;138(19-20):281-85.
- [6] Haselsberger K, Pucher R, Auer LM. Prognosis after acute subdural or epidural haemorrhage. *Acta Neurochir (Wien)* [Internet]. 1988;90(3):111-16. Available from: <https://doi.org/10.1007/BF01560563>
- [7] Korinth M, Weinzierl M, Gilsbach JM. Treatment options in traumatic epidural hematomas. *Unfallchirurg.* 2002;105(3):224-30.
- [8] Rehman L, Khattak A, Naseer A, Mushtaq. Outcome of acute traumatic extradural hematoma. *J Coll Physicians Surg Pakistan.* 2008;18(12):759-62.
- [9] Hooper R. Observations on extradural haemorrhage. *Br J Surg.* 1959;47(1):71-87.
- [10] Emejulu JKC, Shokunbi MT, Malomo AO. Determinants of outcome in operative treatment of traumatic extradural haematoma. *West Afr J Med.* 2008;27(1):32-36.
- [11] Cheung PSY, Lam JMY, Yeung JHH, Graham CA, Rainer TH. Outcome of traumatic extradural haematoma in Hong Kong. *Injury.* 2007;38(1):76-80.
- [12] Mezue WC, Ndubuisi CA, Chikani MC, Achebe DS, Ohaegbulam SC. Traumatic extradural hematoma in enugu, Nigeria. *Niger J Surg Off Publ Niger Surg Res Soc.* 2012;18(2):80-84.
- [13] Lee JJ, Segar DJ, Morrison JF, Mangham WM, Lee S, Asaad WF. Subdural hematoma as a major determinant of short-term outcomes in traumatic brain injury. *J Neurosurg JNS.* 2017;128(1):112-16.
- [14] Saxena RC, Bilodi AK, Mane SS, Kumar A. Study of pterion in skulls of Awadh area--in and around Lucknow. *Kathmandu Univ Med J (KUMJ).* 2003;1(1):32-33.
- [15] Khaled CN, Raihan MZ, Chowdhury FH, Ashadullah ATM, Sarkar MH, Hossain SS. Surgical management of traumatic extradural haematoma: Experiences with 610 patients and prospective analysis. *Indian J Neurotrauma* [Internet]. 2008;5(2):75-79. Available from: <http://www.sciencedirect.com/science/article/pii/S0973050808800044>
- [16] Rosyidi R, Priyanto B, al Fauzi A, Sutiono A. Toward zero mortality in acute epidural hematoma: A review in 268 cases problems and challenges in the developing country. *Interdiscip Neurosurg.* 2019;17(1):12-18.
- [17] Servadei F, Nanni A, Nasi MT, Zappi D, Vergoni G, Giuliani G, et al. Evolving brain lesions in the first 12 hours after head injury: analysis of 37 comatose patients. *Neurosurgery.* 1995;37(5):899-906.
- [18] Bricolo AP, Pasut LM. Extradural hematoma: Toward zero mortality. A prospective study. *Neurosurgery.* 1984;14(1):8-12.
- [19] Servadei F, Piazza G, Seracchioli A, Acciarri N, Pozzati E, Gaist G. Extradural hematomas.: An analysis of the changing characteristics of patients admitted from 1980 to 1986. Diagnostic and therapeutic implications in 158 cases. *Brain Inj.* 1988;2(2):87-100.
- [20] Zink BJ. Traumatic brain injury outcome: Concepts for emergency care. *Ann Emerg Med.* 2001;37(3):318-32.

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Neurosurgery, Mahatma Gandhi Institute of Medical Sciences, Wardha, Maharashtra, India.
2. Associate Professor, Department of Surgery, Mahatma Gandhi Institute of Medical Sciences, Wardha, Maharashtra, India.
3. Assistant Professor, Department of Neurosurgery, Shyam Shah Medical College, Rewa, Madhya Pradesh, India.
4. Associate Professor, Department of Surgery, Mahatma Gandhi Institute of Medical Sciences, Wardha, Maharashtra, India.
5. Resident, Department of Anesthesia, Mahatma Gandhi Institute of Medical Sciences, Wardha, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Anil Vishnu Akulwar,
Quarter Number 8, khs Campus, MGIMS, Sevagram, Wardha, Maharashtra, India.
E-mail: prasheel_gupta2002@rediffmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jul 16, 2020
- Manual Googling: Sep 02, 2020
- iThenticate Software: Sep 24, 2020 (09%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? No
- For any images presented appropriate consent has been obtained from the subjects. No

Date of Submission: **Jul 15, 2020**
Date of Peer Review: **Aug 01, 2020**
Date of Acceptance: **Sep 03, 2020**
Date of Publishing: **Oct 01, 2020**