

Research Article**Management of Extradural Hematoma at the First Neurosurgical
Facility of Punjab Province: A Retrospective Experience
of 5 Years at Mayo Hospital, Lahore**

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ABSTRACT

Introduction: Extradural hematoma exhibits a great fountain of preventable mortality. 1-2% of head injury cases includes it. Urgent craniotomy and evacuation of the epidural blood clot is the management of extradural hematoma. Conservative management with perfect clinical and radiological outcome usually remains the mainstay of smaller EDH. Frequently audit of EDH presentation and outcomes in tertiary care setting improves treatment plan and formulate policies.

Material and methods: A retrospective study was conducted analyzing past records of the patients in department of Neurosurgery, Mayo Hospital from July 2012 to July 2017 with diagnosis of extradural hematoma with or without other traumatic brain pathology. All patients except the patients with brain death, associated poly trauma, spinal injuries were excluded from the study. Total sample of 600 of EDH either operated or conservatively managed were observed for their presentation and outcome using standard protocol.

Results: Mean±SD age of patients was 33.8±12.7 years with 31 years median age and 3-89 years of range. Majority of the cases were from age group 15-45 years (69.2%). Alleged case of fall (25%) was the most common mode of injury and FAI/BLAST accounted for only 5%.

Altered sensorium accounted for two third of the cases which 340 patient complaining for headache and vomiting. Unilateral and bilateral pupil changes were seen in 11.7% and 1.7% respectively. Most common site of EDH was unilateral temporal hematoma (39.3%) whereas posterior fossa EDH accounted for only 2% cases. 1.4% cases had other associated brain injuries like SDH/ ICH and contusions.

Overall mortality was 15% (90) and 10% (n=60) cases needed assistance for living after being discharged from the hospital.

Conclusion: Good outcomes in EDH were good presenting GCS, early transportation and early surgery in indicated cases. Conservative treatment should be tried is volume is minimal and if serial CTs are readily available.

Keywords: EDH, craniotomy, conservative, middle meningeal artery.

INTRODUCTION

Traumatic head injury is a serious global problem with global incidence ranging from 108 to 332 admitted to hospital per 100000 population per year.¹ The incidence is more propound in low and middle income countries and major cause being

transport related injuries.² Total death accounts for 39% and total GOS unfavorable outcomes account for 60% of total traumatic brain injury.¹ Prognosis in patient with head injury is determined by age, presenting post resuscitation

GCS, mode of injury, CT findings and surgical lesions.³ Avertable mortality is included as a major portion of extradural hematoma. It includes 1-2% of head injury cases.⁴ EDH is very uncommon in elderly people. Fatality rate ranges from 10-40%.⁵ It is an indicator of alertness and efficiency of health care and hospital set up. It includes collection of Blood between duramater and bone, generally sparing the brain.

Treatment options of significant extradural hematoma (EDH) includes immediate craniotomy and clearing out of the epidural blood clot. Perfect clinical and radiological outcome is achieved by treating smaller EDH conservatively. A brief linear contact force to the calvaria that results in partition of the periosteal dura from bone and eruption of intermeddle vessels owing to shearing tension results in EDH. In adults, Skull fractures exhibits in 85-95% cases. They are much less prevailing among children due to flexibility of the immature calvaria. Rapid expansion of hematoma occurs if venous or arterial structures are compromised. Moreover, involving the venous sources may result in delayed exhibition. Suture lines usually limits the expansion of the hematoma due to the firm approximation of the dura at these sites. Current studies have revealed that EDH may actually extend across the suture lines in small number of cases.⁸

Like other countries there is burden of head trauma in Pakistan. Pakistan is a developing country which is still fighting for infectious disease. The slow epidemiological transition has led the country to multiplies disease strain, i.e non communicable and communicable disease at the same time. Head injury being a non-communicable disease is rampant in Pakistan due to road traffic accidents, suicides, homicidal attempts etc. Mayo hospital is a tertiary center in capital of Pakistani state of Punjab, Lahore. Many severe head injury cases come to this hospital. Being a tertiary care center lots of referred cases from periphery are also dealt here. The purpose of this retrospective study is to analyze the pattern of cases and our management experience at Mayo

Hospital in past 5 years (July 2012-July 2017) under standard protocol.

MATERIAL AND METHODS

A retrospective study was carried out analyzing past data of the patients admitted in department of Neurosurgery, Mayo Hospital/ King Edward Medical University, Lahore from Nov July 2012 to July 2017 with diagnosis of computed tomography (CT) proven extradural hematoma (EDH). King Edward Medical University founded in 1860 is located in Lahore, Pakistan⁹. Until 2006 it was a medical college and was elevated to degree awarding institution then. The university is named after the Edward VII and its attached hospital Mayo Hospital was erected in 1870. The department of Neurosurgery where this study was conducted was 1st Neurosurgical center to open in Punjab Province of Pakistan, the most populated and developed province of Pakistan which harbors the cultural city, Lahore. Establishment of King Edward Medical College, as Lahore Medical College was done in 1860. Among the oldest medical schools in South Asia, after Medical College Kolkatta (January 28, 1835), Madras Medical College, Chennai (February 2, 1835) and Grant Medical College, Bombay (1845)⁹, it exhibits the fourth position.

All patient with EDH irrespective of presenting Glasgow coma scale (GCS) with intact brain stem reflexes were admitted to Neurosurgery depart of the hospital through emergency floor during the study period were sample population. Excluding patients with brain death, associated poly-trauma, spinal injuries total of 600 cases were managed either conservatively or surgically which was the sample population. Since it was a retrospective study that analyzed the data from the past records of the patients and the study was not active when the patients were getting treatment, therefore there is no issue of consent. Approval from concerned department and hospital was enough which was taken before commencement of the study.

After surgical floor completed resuscitated the patients call was attended from Neurosurgery

department to assess Neurological status. After ensuring intact brain stem reflexes and ruling out polytrauma neurological examinations were performed. Proper history, mode of injury was noted and examinations relevant to head injury were performed. CT plain brain with bone window was advised. As the CT film arrived all baseline investigation were performed. After arrival of the CT scan, the decision was made whether to operate or not. The surgical candidates were immediately shifted to emergency operation theatre where General Anesthesia (GA) fitness was obtained from department of anesthesia whereas non surgical candidates were managed conservatively in Neurosurgery ward/ ICU. The surgical candidates joined the conservative subjects in the Neurosurgery ward/ ICU. after neurosurgical intervention was done. All patients were followed for the research purpose for 7 post admission/ operative day after which if patient if didn't get discharged were dealt outside the research.

Standard proforma was designed to collect all relevant information of the patient from patient record books. These data were transferred to SPSS 20 version. Possible mistakes in data entry were corrected then analysis was performed. Data were represented in the form of either mean (SD), median (Range) for continuous variables like age or frequency (percentage) for categorical variables.

RESULTS

The purpose of this retrospective study is to evaluate the pattern of cases including our management experience at Mayo Hospital in past 5 years (July 2012-July 2017) under standard protocol.

Total of 600 patients of either sex were study subjects where 438 (73%) were male and 162 (27%) were female (Table 1).

Mean±SD age of patients was 33.8±12.7 years whereas median age was 31 years and patient ranged from age group 3 to 89. Age group stratification showed; 5 patients below 5 years of age, 90 (15.0%) patients in between 5 to 15 years

and 90 (15.0%) belonged to age group more than 45 years. Major chunk was taken by people between 15 to 45 years which constituted 69.2% (n=425) (Table 2).

Majority of the patient sustained fall injury (25%), whereas FAI/ Blast accounted for 30 patients (5%) in terms of mode of injury (Table 3).

Two third (66.7) patients experienced altered sensorium after the head injury despite any mode of injury. More than half (340) of the patients complaint of headache and vomiting whereas 11.7% had unilateral papillary changes and 1.7% (10) patients had bilateral papillary changes on clinical examination (Table 4).

On CT scan most of the patients had unilateral temporal hematoma (n=256, 39.3%) followed by temporoparietal bleed (122, 20.3%) and least had posterior fossa EDH (2%) (Table 5).

There were 86 (14.3%) other associated brain injuries where more frequent were acute SDH/ICH/Contusion (7.7%) (Table 6)

Overall mortality was 15% (90) and 10% (n=60) cases needed assistance for living after being discharged from the hospital.

Table 1: Sex

Male n (%)	Female n (%)	Total n (%)
438 (73%)	162 (27%)	277 (100)

Table 2: Age in years

Mean	SD	Median	Range
33.8	12.7	31.0	3-89
Age group	Number	Percentage	
<5	5	0.8	
5-15	90	15.0	
15-45	425	69.2	
>45	90	15.0	

Table 3: Mode of Injury (n=600)

Cause of Injury	Number	Percentage
Fall	150	25
Physical Assault	108	18
RTA	312	52
FAI/ Blast	30	5

Table 4: Clinical features of patients (n=600)

Signs/symptoms	Number	Percentage
Lucid Interval	120	20
Headache/Vomiting	340	56.7

Altered sensorium	400	66.7
Neurological deficit	218	36.3
Bdycardia	140	23.3
Pupillary changes (unilateral)	70	11.7
Pupillary changes (Bilateral)	10	1.7

Percentage can be more than 100% because of multiple Signs/symptoms in the same patient

Table 5: Distribution of cases per site of hematoma (n=600)

Site of Hematoma	Number	Percentage
Temporal	256	39.3
Frontal (unilateral)	180	30
Frontal (bilateral)	22	3.7
Temporoparietal	122	20.3
Occipital region	8	1.3
Posterior fossa	12	2

Table 6: Associated brain Injury with EDH (n=600)

Associated Injuries	Number	Percentage
Bilateral EDH	6	1
Counter-coup contusion	34	5.7
Acute SDH/ICH/Contusion	46	7.7

DISCUSSION

In our study the highest number of victims was in their most active period of life with an average of 33.8 years age. This age is comparable with the age mentioned in studies of Ozkan U et al.¹⁰ and Cheung PS et al.¹¹, who found the mean age of patients with traumatic extradural hematoma as 26.9 years and 37.7 years respectively in their series. Babu ML¹² in his experience of 300 EDH cases noticed the third decade as the most frequent age group which was later reproduced in 2008 by Chowdhury NK SM¹³ in his study of 610 patients. In our series of 600 patients, 438 were males and 162 were females with a male to female ratio 2.7:1. Much higher male predominance Of 13:1 was reported in a Pakistani study on 38 patients at Pakistan Institute of Medical Sciences, Islamabad by Mushtaq et al¹⁴. In the larger series the ratio of male to female ranges from 3.18:1 to 6.27:1 that can be comparable with our result.

In literature, about 15-22% of patients have anisocoria prior to surgical evacuation of

EDH.^{12,13} Our result with 11.7% of patients with anisocoria is comparable with these studies.

On CT scan most of the patients had unilateral temporal hematoma (n=256, 39.3%) followed by temporoparietal bleed (122, 20.3%) and least had posterior fossa EDH (2%). There were 86 (14.3%) other associated brain injuries where more frequent were acute SDH/ICH/Contusion (7.7%). Cheung PS¹¹ in his study in Hong Kong showed 5 patients out of 89 (5.6%) to have associated intracranial injuries in traumatic EDH cases. In the relatively larger series of 300 patients, Babu ML et al¹² got a higher i.e. 14.3 % cases with associated injuries along with EDH. Later in 2008, Chowdhury NK SM et al¹³ published still a higher percentage of 32.4% (in 610 patients) for associated injuries. While comparing, our result the largest of all showed 13.5% associated traumatic injuries is somewhat in between these two larger series. Our result is very comparable with the study at Saudia Arabia¹⁵, in which 73% had EDH alone and 27% had additional intradural Injury.

There are multiple studies^{10,11,12,13,16,17} in the literature explaining the possible factors on which the surgical outcome of extradural hematoma depends in which the following five have special importance: Associated intracranial injuries, Anisocoria, time between injury and surgery, hematoma volume and pre-operative GCS.

In the present study the surgical outcome of EDH was measured by Glasgow outcome scale (GOS). Overall mortality was 15% (90) and 10% (n=60) cases needed assistance for living after being discharged from the hospital. Mushtaq et al¹⁴ got comparable postsurgical outcome i.e. 86.8% were in good scale and the remaining 13.2% were in poor scale. Similarly, Cheung⁶ experienced postsurgical good and poor outcome in 76.6% and 23.3% respectively. The mortality rate of 4.1% in our study is comparable to the 2.63% of Mushtaq's series¹⁴. Cheung et al⁶ reported a higher mortality of 13.3%.

Identification of other associated brain lesions as one of four distinct predictors for unpromising consequences after surgery in management of

EDH is done by Lee et al. It has also been verified by several others^{15,18}. Ozkan in his retrospective analysis¹⁰ published that mortality rate of 23.5% in patients having surgery later than 6 hours of injury can be reduced to 18.5%, if surgery is performed within 6 hours of injury.

CONCLUSION

Analyzing the 600 cases of Extradural hematoma in 5 years, an inference is made that better facilities of neurosurgery, appropriate and timely diagnosis associated with early CT diagnosis have been the mainstay of reducing fatality rate in EDH. IN addition to it, the factuality lies in proper transportation along with early reporting by the patient to neurosurgical centre where prompt assistances are available also have an effect on the final consequences in EDH management. If the patient is oriented and conscious level is promising, hematoma is small and at non-hazardous area, serial CT scan facility is readily available then Conservative treatment can be opted.

CONFLICT OF INTEREST

Authors declare no competing financial or non financial conflict of interest. The study is not funded by any pharmaceutical company directly or indirectly involved in production of medication, instruments used for the management of this condition.

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