

ORIGINAL ARTICLE

Impact of Delayed Presentation on the Surgical Outcome of Epidural Hematoma in Traumatic Brain Injury Patients

ARSHAD IQBAL¹, TAIMOOR ALI², MUHAMMAD ANWARULLAH³, QAZI ZIAULLAH⁴^{1,2,3}Department of Neurosurgery, Lady Reading Hospital Peshawar, Pakistan.⁴Department of Neurology, Lady Reading Hospital Peshawar, Pakistan.Correspondence to: Arshad Iqbal, Email: arshadamc15@gmail.com, Cell: 03466888613

ABSTRACT

Objectives: To note the impact of delayed presentation on the surgical outcome of extradural hematoma in traumatic brain injury.

Study Design: A case-series study.

Place Duration of the Study: Department of Neurosurgery, Lady Reading Hospital Peshawar from July 2018 to June 2019.

Methodology: A total of 119 patients of both genders aged 15-45 years suffering from epidural hematoma with history of head trauma presented after 6 hours having size of hematoma above 30 ml (as per axial images of CT brain) were included. Frequency of favorable and unfavorable outcomes were noted after three months of follow-up. Outcome was termed as favorable if patient had good recover or moderate disability.

Results: Out of total 119 patients, 89 (74.8%) were male. Unfavorable outcome was noted in 37.8% (n=45) of total patients with delayed presentation to the hospital, while favorable outcome was noted in 62.2% (n=74) of patients. Good recovery and moderate disability were observed in 27.7% (n=31) and 34.5% (n=41) of total patients respectively. While, severe disability and vegetative state was recorded in 26.1% (n=31) and 7.6% (n=9) of patients respectively.

Practical Implications: Efforts should be made to increase awareness about timely presentation and interventions for better surgical outcomes among patients of extradural hematoma.

Conclusion: Frequency of unfavorable surgical outcome of extradural hematoma found to be 37.8% in head trauma patients with late presentation.

Keywords: Extradural Hematoma, Glasgow Coma scale, surgical outcome

INTRODUCTION

Extradural hematoma is the blood accumulation in the potential space between dura and bone.¹ Globally, extradural hematoma is considered to be a major cause of morbidity and mortality. The literature shows that around 15% of deaths taking place among 15-24 year age group are secondary to some kinds of a head injury.² Extradural hematoma is known to be a serious emergency and surgical intervention at time for significant extradural hematoma is considered as the standard treatment.³ Extradural hematomas have presented in three different patterns. Firstly, short-term post-traumatic loss of consciousness; secondly, a lucid interval for numerous hours; thirdly, obtundation, contralateral hemiparesis or ipsilateral pupillary dilatation.² The most common mechanism are road-traffic accident or fall from height.⁴⁻⁶

In Pakistan, not many studies have been performed looking for the presentation and outcomes of extradural hematoma. This study was performed to determine the surgical outcome of extradural hematoma in head trauma patients with late presentation. The findings of this study were thought to elaborate different factors linked with surgical outcomes of extradural hematoma among patients of head trauma presenting at a tertiary care hospital of Khyber Pakhtunkhwa. It is perceived that Glasgow Coma scale (GCS) at the time of presentation and other clinical characteristics as well as time between presentation and evacuation of hematoma could be associated with outcomes but no local data exists so this study was planned.

MATERIAL AND METHODS

This case series study was performed at department of Neurosurgery, Lady Reading Hospital, Peshawar from July 2018 to June 2019. The sample size was calculated to be 119 keeping the proportion of favorable outcome as 50% with 95% confidence level and 9% margin of error. A total of 119 patients of both genders aged 15 to 45 years suffering from epidural hematoma with history of head trauma regardless of GCS score presented after 6 Hours and having size of hematoma > 30 ml as per axial images of CT brain were enrolled. Exclusion criteria were patients coming with extradural hematoma with evidence of diffuse axonal injury, subdural hematoma or brain contusions. Patients with epidural hematoma requiring conservative management were also excluded. Approval was obtained from "Institutional Ethical

Committee". Informed/written consents were sought from patients or guardians/caregivers.

Demographic data was obtained in pre designed proforma. Patients were enrolled from neurosurgery department. Detailed history was taken and thorough CNS examination was performed to assess the preoperative status while necessary investigations were performed. The GCS of each patient was recorded and graded as per GCS scale. Time of presentation to the neurosurgery department from the time of head trauma was noted. Surgery was performed by a designated team of neurosurgeons in the supervision of a consultant and experienced neurosurgeon. Final outcome was assessed at 3 months of follow up as favorable and unfavorable outcome. Outcome was termed as favorable if patient had good recover or moderate disability while in cases having severe disability, vegetative state or death, the outcome was labeled as unfavorable. Follow up was ensured through telephone contact or at patient follow up visit.

Data was analyzed employing "Statistical Package for Social Sciences (SPSS)" version 26.0. Frequency and percentage were calculated for categorical variables while quantitative data were shown as mean and standard deviation (SD). Effect modifiers were controlled through stratification. Post-stratification chi-square test was applied considering $p \leq 0.05$ as significant.

RESULTS

Out of a total of 119 patients of head trauma, 89 (74.8%) were male. Overall, mean age was 28.1 ± 9.1 years while 66 (55.5%) patients were aged between 26-45 years. Overall, BMI was 23.55 ± 3.3 kg/m² whereas 70 (58.8%) patients had BMI between 19 to 25 kg/m². Marital status of 70 (58.8%) patients was married. Monthly family income of 58 (48.7%) patients was between 20,000 to 50,000 Pakistani Rupees (PKR). Mean GCS score at the time of presentation was 9.8 ± 2.1 . It was noted that 66 (55.5%) patients had GCS scores between 9-12 at the time of presentation at the healthcare facility. Mean time to present at healthcare facility was 9.06 ± 1.7 hours. Table-1 is describing baseline characteristics of patients.

Outcomes were reported to be favorable among 74 (62.2%) patients while remaining 45 (37.8%) patients had unfavorable outcomes. Detailed distribution of outcome among patients of extradural hematoma with head trauma is shown in figure-1.

Table-1: Baseline Characteristics (n=119)

Characteristics of Patients		Number (%) / Mean±SD
Gender	Male	89 (74.8%)
	Female	30 (25.2%)
Age in Years		28.1±9.1
BMI in kg/m ²		23.55±3.3
Marital Status	Married	70 (58.8%)
	Single	49 (41.2%)
Monthly Family Income in PKR	<20,000	41 (34.5%)
	20,000-50,000	58 (48.7%)
	>50,000	20 (16.8%)
GCS Score at the time of Admission		9.8±2.1
Time to Presentation in hours at Healthcare Facility		9.06±1.7
Volume of Hematoma (ml)		28.97±5.6

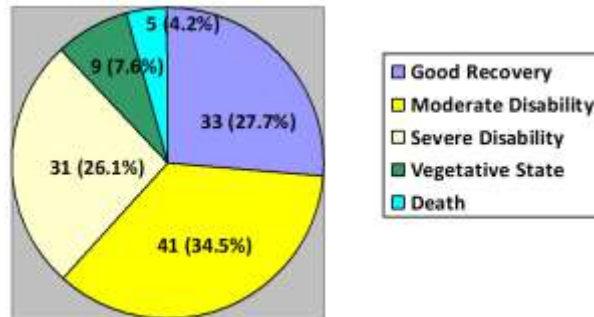


Figure-1: Distribution of Outcomes among Patients (n=119)

It was noted that 32 (71.1%) patients with unfavorable outcomes were between 26-45 years of age in comparison to 34 (45.9%) with favorable outcomes ($p=0.007$). All other study variables were not found to have any significant association with the outcomes. Stratification of study variables with respect to outcome is shown in table-2.

Table-2: Stratification of Study Variables with respect to Outcome

Study Variables		Outcome		P-Value
		Favorable (n=74)	Unfavorable (n=45)	
Gender	Male	54 (73.0%)	35 (77.8%)	0.5583
	Female	20 (27.0%)	10 (22.2%)	
Age (Year)s	15-25	40 (54.1%)	13 (28.9%)	0.007
	26-45	34 (45.9%)	32 (71.1%)	
BMI (kg/m ²)	<19	5 (6.8%)	5 (11.1%)	0.703
	19-25	44 (59.5%)	26 (57.8%)	
	>25	25 (33.8%)	14 (31.1%)	
GCS Score	≤8	30 (40.5%)	9 (20.0%)	0.067
	9-12	36 (48.6%)	30 (66.7%)	
	>13	8 (10.8%)	6 (13.3%)	

DISCUSSION

Extradural hematoma is an established secondary insult of traumatic brain injury.⁷ It is a neurosurgical emergency that mostly emerge at temporal region. The literature reports GCS at the time of presentation, age, associated intradural lesions as well as time between evacuation of hematoma because of transfer of the affected individual to neurosurgery unit as some of the most significant factors influencing outcomes among such patients.⁹⁻¹²

Rehman L et al following patients of acute traumatic extradural hematoma for duration of 3 months revealed that 24 (80.0%) cases had had good outcome, one (3.33%) had moderate disability (left sided weakness), one (3.33%) remained in vegetative state, while mortality was noted in 3 (10.0%) cases. Rehman L et al also observed that patients who had GCS scores between 13-15 had significantly better outcomes ($p=0.01$) while mortality was significantly among patients who had GCS scores between 3-8 ($p=0.01$).¹³ The findings of Rehman L et al are in accordance to our study findings.¹³ Our results are also in accordance with the study results presented by a recent study

conducted by Singh A et al where the researchers concluded that GCS scores at the time of presentation and time taken between surgery and incident of injury had significantly influenced the outcomes.¹⁴

Seelig JM et al observed that cases who had undergone surgical intervention within first 4 hours following injury had 30% mortality rate in comparison to 90% who were presented after 4 hours ($P<0.0001$).¹⁵ Our results are also showing similarity with the results presented by Sharif MM et al in their study. Their results elaborated that 90% of the patients who presented within one hour of injury had favorable outcome and those who presented more than 1 hour but less than 6 hour have 70% favorable outcome. They further evaluated that the patients who presented more than 6 hours, only 50% of the patients have favorable outcome.⁶

We also noted that 74.8% patients in this study were male. A local study analyzing surgical outcomes of acute extradural hematoma also noted that 82% of the study participants were male.¹⁶ As male subjects are more exposed to daily routine outdoor activities, they are more prone to have road traffic accidents and likely modes of head trauma which could be a clear reason behind this male predominance.

CONCLUSION

Frequency of unfavorable surgical outcome of extradural hematoma found to be 37.8% in head trauma patients. Efforts should be made to increase awareness about timely presentation and interventions for better surgical outcomes among patients of extradural hematoma.

REFERENCES

1. Soon WC, Marcus H, Wilson M. Traumatic acute extradural haematoma—Indications for surgery revisited. *Brit J Neurosurg*. 2016;30(2):233-234.
2. Ahsan A, Maqbool S, Ihsan A, Asghar A, Bhatti SN, Alvi N, et al. Burr hole evacuation of extradural hematoma in mass trauma. A life saving and time saving procedure: Our experience in the earthquake of 2005. *Turk Neurosurg*. 2016;26(2):205-208.
3. Tataranu L, Ciubotaru V, Paunescu D, Spataru A, Radoi M. Extradural Hematoma—Is Surgery Always Mandatory. *Rom J Leg Med*. 2014;22(1):45-50.
4. Zhao X, Jiang H, Liu G, Wang T. Efficacy analysis of 33 cases with epidural hematoma treated by brain puncture under CT surveillance. *Turkish Neurosurg*. 2014;24(3):323-6.
5. Balik V, Lehto H, Hoza D, Sulla I, Hernesniemi J. Posterior fossa extradural haematomas. *Central European Neurosurgery-Zentralblatt für Neurochirurgie*. 2010;71(04):167-172.
6. Sharif MM. Impact of time taken on the surgical outcome of extradural hematoma in patients with road traffic accidents. *J Rawalpindi Med Coll*. 2017;21(3):222-225.
7. Chen H, Guo Y, Chen SW, Wang G, Cao H, Chen J, et al. Progressive epidural hematoma in patients with head trauma: incidence, outcome, and risk factors. *Emerg Med Int*. 2012;2012:134905.
8. Wang W. Minimally Invasive Surgical Treatment of Acute Epidural Hematoma: Case Series. *Biomed Res Int*. 2016;2016:6507350.
9. Aromatario M, Torsello A, D'Errico S, et al. Traumatic Epidural and Subdural Hematoma: Epidemiology, Outcome, and Dating. *Medicina (Kaunas)*. 2021;57(2):125.
10. Kulesza B, Litak J, Grochowski C, Nogalski A, Rola R. The Initial Factors with Strong Predictive Value in Relation to Six-Month Outcome among Patients Operated due to Extra-Axial Hematomas. *Diagnostics (Basel)*. 2020;10(3):174.
11. Mezue WC, Ndubuisi CA, Chikani MC, Achebe DS, Ohaegbulam SC. Traumatic extradural hematoma in Enugu, Nigeria. *Niger J Surg*. 2012;18(2):80-84.
12. Sobti S, Goyari M, Harpanahalli R, Gupta LN, Choudhary A, Taneja A. Clinico-radiological Correlation with Outcome in Traumatic Pediatric Extradural Hematoma: A Single Institutional Experience. *J Pediatr Neurosci*. 2021;16(2):113-118.
13. Rehman L, Khattak A, Naseer A. Outcome of acute traumatic extradural hematoma. *J Coll Phys Surg Pak*. 2008;18(12):759-762.
14. Singh A, Kour A, Bindra G, Gehlot AK, Midha R, Nandra K. Surgical outcome of 60 operated patients with acute extradural hematomas based on the preoperative glasgow coma scale. *Apollo Med*. 2019;16(1):26.
15. Seelig JM, Becker DP, Miller JD, Greenberg RP, Ward JD, Choi SC. Traumatic acute subdural hematoma: major mortality reduction in comatose patients treated within four hours. *New Eng J Med*. 1981;304(25):1511-1518.
16. Hassan N, Azam F, Ahmad S, Usman M. Extra dural hematoma surgical outcome using Glasgow coma scale in a tertiary care hospital of Khyber Pakhtunkhwa. *J Postgrad Med Inst*. 2019;33(2):155-159.