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Original Article

Prognosis of Patients Having Post Traumatic Extra Dural Hematoma with and without Lucid Interval

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ABSTRACT

Background: There is limited research in our country on the prognosis of patients with post-traumatic extradural hematoma, particularly in relation to the presence or absence of a lucid interval. Understanding this relationship is vital for effective surgical planning and family counselling.

Objective: The study aimed to assess the prognosis of patients with post-traumatic extradural hematoma, focusing on the impact of a lucid interval on patient outcomes.

Methods: This retrospective study, approved by the hospital's ethical committee, included 46 patients with post-traumatic extradural hematoma, both with and without a lucid interval. The study variables were age, gender, mechanism of injury, pupillary abnormalities, Glasgow Coma Scale (GCS) score upon admission, and presence of a lucid interval. Patient outcomes at discharge, including mortality, residual disabilities, and functional recovery, were documented. Data analysis was performed using SPSS 23, employing descriptive statistical methods.

Results: The average age of patients was 27.04±7.74 years, with the majority (52.2%) aged between 21 and 30 years. Males constituted 84.8% of the study group. Regarding the GCS score, 23.9% of patients scored below 8. The study found that 37.0% of the patients experienced mortality, 23.9% had residual disabilities, and 58.7% achieved functional recovery. Notably, functional recovery was 50.0% in patients who experienced a lucid interval, compared to 90.0% in those who did not.

Conclusion: The study concluded that patients with post-traumatic extradural hematoma who present without a lucid interval have a better prognosis than those with a lucid interval. The delay in timely management associated with a lucid interval leads to increased morbidity and mortality.

Keywords: Prognosis, Post-Traumatic Extradural Hematoma, Lucid Interval, Glasgow Coma Scale, Mortality, Functional Recovery.

INTRODUCTION

Head injuries are a significant concern in emergency departments, representing about 3.4% of all visits, with an annual incidence rate of approximately 450 cases per 100,000 people (1). These injuries often lead to traumatic brain injury (TBI), with an incidence rate of 20–40 per 100,000 individuals annually (2). Males are at a higher risk of mortality from TBI compared to females, particularly in the young adult demographic of 15 to 24 years (3). Common causes of TBI include falls, assaults, and road traffic accidents (RTAs) (4).

Epidural hematoma (EDH), a type of TBI, involves the accumulation of blood between the dura mater's outer layer and the inner table of the skull (5). This condition is potentially life-threatening and requires immediate attention. If not addressed promptly, it can lead to severe morbidity or even death (6). For favorable outcomes, rapid diagnosis and surgical intervention are crucial. Typically, patients with EDH experience an initial loss of consciousness, followed by a lucid interval, and then a rapid neurological decline. This pattern is observed in 14–21% of EDH cases (7).

Patients with isolated EDHs have a high chance of a functional recovery following surgical evacuation, especially if the lucid interval is bypassed. However, morbidity and mortality rates increase significantly with delayed diagnosis and treatment. Studies indicate that fatality rates can range from 41% in patients with a Glasgow Coma Scale (GCS) score of 8 or lower, to virtually none in those who are fully alert (8). Traumatic EDH is a neurosurgical emergency, and prompt surgical intervention is considered the gold standard

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for managing substantial EDH. Rosyidi et al. noted that the prognosis of EDH depends on factors such as the patient's age, pre-surgical clinical condition, and the presence of any extracranial injuries (9). Other risk factors for mortality include older age, a lower GCS score (10), a lucid interval of less than 24 hours, and higher Abbreviated Injury Scale (AIS) scores (11).

Scotter et al. reviewed the outcomes of patients with traumatic extradural or subdural hematoma who underwent surgery. They found that the mortality rate for extradural hematoma was 29.75%, with a favourable prognosis in 54.3% of cases (12). These findings suggest that with an aggressive surgical approach, successful recovery is possible, especially in cases of extradural hematoma. Gutowski et al. observed that the prognosis for EDH has improved over the years, likely due to advancements in trauma care (13).

In Pakistan, patient outcomes for extradural hematoma have improved, thanks to early treatment, better evacuation and rescue techniques, and advancements in diagnostic and monitoring tools, such as CT scans and standardized surgical procedures for cerebral hemorrhage removal. However, significant disparities in outcome quality exist across different institutions (13).

The aim of this study is to assess the prognosis of patients with post-traumatic extradural hematoma, both with and without a lucid interval. Since there is limited research on this topic in Pakistan, this study can provide insights into the role of the lucid interval in surgical planning and family counselling.

MATERIAL AND METHODS

This study, a retrospective and observational analysis, was conducted at JPMC from December 2021 to August 2022, following approval from the hospital's ethical committee. It focused on forty-six patients who had experienced post-traumatic extradural hematoma, both with and without a lucid interval. Participation in the study was contingent upon informed consent, which was duly obtained from the attendants of the patients.

The research encompassed a diverse patient group, irrespective of age and gender, all of whom presented with post-traumatic extradural hematoma as confirmed by a CT brain scan. However, the study excluded certain patients to maintain a specific focus. Those with polytrauma and concurrent injuries such as flail chest, pneumothorax, and bowel injuries were not considered. Additionally, individuals with a history of debilitating diseases like ischemic heart disease and chronic kidney disease were also excluded. This exclusion criteria ensured a more homogenous study population and clearer insights into the specific impacts of extradural hematoma.

A range of variables were meticulously recorded and analyzed. These included age, gender, the mechanism of injury, pupillary abnormalities, the Glasgow Coma Scale (GCS) score at admission, and the presence or absence of consciousness loss. Outcomes at discharge were a critical focus and were categorized based on mortality, the functional status of patients in terms of their ability to perform routine activities, and any residual disabilities, such as limb weakness, speech difficulties, or altered mentation or behavior.

For data collection, a comprehensive performa was meticulously designed. Patient admission records were thoroughly reviewed, allowing for the retrospective gathering of relevant information. This included demographic details (such as age and gender), comorbidities, injury mechanisms, pupillary abnormalities, GCS scores, and the occurrence of a lucid interval.

Data analysis was conducted using SPSS version 23. Descriptive statistics were employed to interpret the data, with a focus on establishing clear trends and correlations. A P-value of less than 0.05 was adopted as the threshold for statistical significance. For the presentation of the data, qualitative variables were expressed in terms of frequency and percentages, while quantitative variables were summarized using means and standard deviations. This approach enabled a comprehensive and nuanced understanding of the implications of post-traumatic extradural hematoma in the patient population studied.

RESULTS

In the study, the descriptive statistics highlighted several key findings about the demographics and clinical characteristics of the patients with post-traumatic extradural hematoma. Age-wise, the majority of patients fell into the 21-30 years age group, accounting for 52.2% of the cases. This was followed by both the 11-20 years and 31-40 years groups, each representing 19.6%, and the 41-50 years group comprising the smallest percentage at 8.7%. Regarding gender distribution, a significant majority of the patients were male (84.8%), while females constituted 15.2%. The predominant mechanism of injury was assault, accounting for 43.5% of the cases, followed by motor vehicle accidents (32.6%), falls (17.4%), and other causes (6.5%). In terms of the Glasgow Coma Scale (GCS) score, 47.8% of the patients had a score greater than 13, while 28.3% scored between 9 and 12, and 23.9% scored below 8.

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Table-1: Descriptive statistics of study variables

Study variables		Frequency	Percentage
Age Groups	11-20 years	9	19.6
	21-30 years	24	52.2
	31-40 years	9	19.6
	41-50 years	4	8.7
Gender	Male	39	84.8
	Female	7	15.2
Mechanism of injury	Assault	20	43.5
	Motor vehicle accident	15	32.6
	Fall	8	17.4
	Others	3	6.5
Glasgow Coma Scale Score	>13	22	47.8
	9-12	13	28.3
	<8	11	23.9
Volume of EDH	<30 ml	30	65.2
	>30 ml	16	34.8
Pupillary abnormalities	Anisocoric	10	21.7
	Reactive to light	25	54.3
	Non-Reactive	11	23.9
Lucid interval	Yes	36	78.3
	No	10	21.7
History of convulsions	Yes	10	21.7
	No	36	78.3
Surgery done	Yes	42	91.3
	No	4	8.7
Time from trauma to surgery	<24 hours	33	71.7
	1-4 days	10	21.7
	>4 days	3	6.5

The volume of the extradural hematoma (EDH) was less than 30 ml in 65.2% of the cases, and more than 30 ml in 34.8%. Pupillary abnormalities were observed in 45.7% of the patients, with 21.7% having anisocoria, 54.3% being reactive to light, and 23.9% non-reactive. A significant majority of the patients (78.3%) experienced a lucid interval. The history of convulsions was present in 21.7% of the patients, while 78.3% did not have such a history. Most patients (91.3%) underwent surgery, with 71.7% receiving surgery within 24 hours post-trauma, 21.7% between 1 to 4 days, and 6.5% after more than 4 days.

The cross-tabulation of prognosis variables revealed significant associations with the lucid interval. In terms of mortality, 17 patients (37.0%) died, with a higher percentage of mortality observed in patients who had a lucid interval (44.4%) compared to those who did not (10.0%). This difference was statistically significant with a p-value of 0.046. Regarding residual disabilities, 11 patients (23.9%) experienced them, all of whom had a lucid interval. This finding also reached statistical significance (p = 0.045). Functional recovery was observed in 58.7% of the patients, with a higher proportion of patients without a lucid interval (90.0%) achieving this outcome compared to those with a lucid interval (50.0%).

Table-2: Cross tabulation results of prognosis variables

Variables		Lucid interval		Total	p value
		Yes	No		
Mortality	Yes	16	1	17	0.046

Variables		Lucid interval		Total	p value
		Yes	No		
		44.4%	10.0%	37.0%	
	No	20	9	29	
		55.6%	90.0%	63.0%	
Residual Disabilities	Yes	11	0	11	0.045
		30.6%	0.0%	23.9%	
	No	25	10	35	
		69.4%	100.0%	76.1%	
Functional Recovery	Yes	18	9	27	0.023
		50.0%	90.0%	58.7%	
	No	18	1	19	
		50.0%	10.0%	41.3%	

This association was statistically significant with a p-value of 0.023. These results suggest that the presence of a lucid interval is significantly associated with higher mortality and residual disabilities but a lower rate of functional recovery.

DISCUSSION

In this study, a notable finding was the significantly higher mortality rate of 44.4% in patients presenting after a lucid interval, compared to a 10% mortality rate in those without a lucid interval. This difference underscores the critical nature of the lucid interval as a prognostic factor in extradural hematoma outcomes. Male patients predominated in the study, a trend consistent with wider demographic patterns in head injury incidents, likely due to increased male exposure to accidents and conflicts. The mean age of participants in this study was 27.04 ± 7.74 years, aligning with the findings of Prajapati et al., who also reported a similar mean age, highlighting the vulnerability of this age group to head injuries (1).

The crucial role of prompt detection and surgical decompression of hematomas in improving patient outcomes was evident. Aggressive use of computed tomography is recommended for timely intervention (14). The study also highlighted that the presence or absence of a lucid interval significantly impacts prognosis. Patients presenting after the passage of a lucid interval demonstrated poorer outcomes and increased disability despite surgical intervention, emphasizing the importance of early hematoma evacuation (15).

The correlation between lower Glasgow Coma Scale (GCS) scores and poor outcomes was also evident. An increase in head injury severity was associated with a reduced likelihood of functional recovery. These findings are in line with those of Sobti et al., who noted a decrease in mortality, residual disabilities, and functional recovery with the presence of a lucid interval (16). Moreover, timely management of extradural hematomas is crucial for preventing complications, a view supported by other researchers (17).

Pupillary abnormalities and the presence of a lucid interval were associated with a worse prognosis. Sakas et al. found that patients with extradural hematomas and bilateral fixed pupils at the time of surgery had a low functional recovery rate of 25% and a mortality rate of 18% (18). Cohen et al. reported that acute EDH patients with mydriatic pupils lasting more than 70 minutes had a 100% mortality rate (19). This further confirms the negative impact of lucid intervals on the complications and recovery process in patients with EDH.

The timing of surgery is a critical factor in the prognosis of patients with large extradural hematomas. In our study, the average time between the accident and surgery was within 24 hours, longer than the average time reported by Taussky et al., who observed a mean time of 3 hours (20). The first 24–36 hours post-injury are crucial for achieving optimal neurological recovery with decompressive surgery (21).

It's evident that extradural hematomas need rapid diagnosis and treatment to prevent the progression past the lucid interval, thereby maximizing the chances of functional recovery and reducing morbidity and mortality. The study's findings reinforce this, showing significant differences in mortality, residual disabilities, and functional recovery between patients with and without a lucid interval. The outcomes of patients with EDH are influenced by multiple factors, including age, hematoma location, GCS at presentation, hematoma volume, timing of intervention, and the presence or absence of a lucid interval.

The study had limitations, including a small sample size and data sourced from a single tertiary care hospital, reflecting the need for more extensive research in Pakistan on patients presenting with or without a lucid interval. Future studies should involve larger

cohorts and longitudinal data to better understand and address the complexities involved in the treatment of extradural hematoma patients.

CONCLUSION

In conclusion, the study found that performing surgical decompression within the first 24 hours after trauma is linked to better sensorimotor recovery in patients with extradural hematoma. The time from injury to decompression is a critical factor that can be adjusted to improve outcomes. Therefore, early decompression is strongly recommended for those with clinical indications, to minimize the risk of poor results. Patients with lower preoperative Glasgow Coma Scale (GCS) scores, pupillary abnormalities, larger extradural hematoma volumes, older age, and those presenting after a lucid interval are more likely to experience adverse outcomes. Consequently, it was determined that patients with post-traumatic extradural hematoma who experience a lucid interval face higher risks of morbidity and mortality compared to those who receive medical attention before this interval passes.

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