

Impact of Time Taken on the Surgical Outcome of Extradural Hematoma in Patients with Road Traffic Accidents

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Abstract

Background: To determine the impact of time taken on the surgical outcome of extradural hematoma in patients with road traffic accidents.

Methods: Sixty adult patients with history of road traffic accident with extradural hematoma on axial images of CT scan brain were included. All patients were allocated into three groups with 20 patients in each group. Patients in Group I were those in whom time from the occurrence of trauma to the surgical evacuation of hematoma was < 1 hour, 1 to 6 hours in group II and > 6 hours in group III.

Results: In group I, majority (90 %) showed favourable outcome. In group II, 70 % showed favourable outcome. In group III, 50 % showed favourable outcome. Significant association was found between outcome and time of surgery ($p < 0.05$).

Conclusions: Frequency of favourable outcome after surgical evacuation was significantly higher in patients in whom surgery was performed within one hour after the trauma ($P < 0.05$).

Key Words: Extradural hematoma, Neurosurgical emergency, Time of surgery.

Introduction

Accumulation of blood in the potential space between dura and bone is called extradural hematoma. Extradural hematomas have three classical presentation. First, brief post-traumatic loss of consciousness. Second, a lucid interval for several hours. Third, obtundation, contralateral hemiparesis, ipsilateral pupillary dilatation.^{1,2} The commonest mechanisms of injury are an accident involving a motorbike and a fall from height.^{3,4} Extradural hematoma of the temporal region is the most common site of supra-tentorial extradural bleeding; other locations are considered atypical.⁵

Traumatic extradural hematoma is a neurosurgical emergency and timely surgical intervention for significant extradural hematoma is the standard

treatment.⁶ The most significant factors influencing outcome in our patients are Glasgow Coma score or consciousness level on admission, age, and associated intradural lesions and also time taken in evacuation of hematoma due to transfer of patient to neurosurgical unit.^{7,8} Patients who present early after road traffic accidents and with good GCS (13-15) have favorable outcome in 87% and unfavorable outcome in 9%. Time taken is defined as the time from the occurrence of trauma to the surgical evacuation of hematoma.^{9,10} Mortality and long-term morbidity are low with early diagnosis and prompt treatment.^{11,12} Clinical deterioration is quick, especially in posterior fossa to become fatal in most of patients with extradural hematoma so surgery can be life saving when performed in a timely manner.¹³⁻¹⁶ It is generally perceived that patients with extradural hematoma present late either because of ignorance, negligence or lack of facilities in the vicinity.^{17,18}

Patients and Methods

This descriptive study was carried out in Department of Neurosurgery, Pakistan Institute of Medical Sciences, Islamabad, for six months. It included sixty cases of extradural hematoma (sample size was calculated using WHO sample size calculator keeping level of significance 5%, anticipated population proportion (P1: 87%), absolute precision required: 10%). Favourable outcome was defined as ability to carry on normal activity and to work; no special care needed. Unfavourable outcome was defined as inability to care for self; requires equivalent of institutional or hospital care. Inclusion criteria was all the patients with age from 15-45 years, patients of either gender, size of hematoma more than 20 ml (calculated by the scale on axial images of CT scan brain) and only those cases of EDH with H/O road traffic accident regardless of GCS score. Exclusion criteria was age under 15 years or more than 45 years, size less than 20 ml when patient is stable, spinal extradural hematoma (because only head injured patients are included in study), extradural hematoma

with evidence of diffuse axonal injury, subdural hematoma or brain contusions and those cases of EDH with H/O fall or assault. Patients were enrolled from Neurosurgery Department of Pakistan Institute of Medical Sciences Islamabad. All patients were allocated into three groups with 20 patients in each group. Patients in-group I were those in whom time from the occurrence of trauma to the surgical evacuation of hematoma was < 1 hour, 1 to 6 hours in group II and > 6 hours in group III. Their GCS recorded. Patients matched for GCS in each group into mild (GCS: 13-15) moderate (GCS:9-12) and severe(GCS:3-8) head injury on the basis of GCS score . Final outcome assessed at 03 months of follow up for the favourable and unfavourable outcome. Follow up was ensured through telephone contact. Chi square test was used to compare the impact of time taken on surgical outcome in 03 groups. P value < 0.05 considered significant.

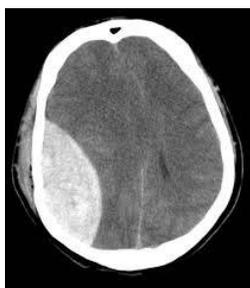


Figure 1:Right parietal extradural hematoma with significant



Figure 2: Right frontal extradural hematoma

Results

Majority of the patients were young (Table 1).Patients matched for GCS in each group into mild (GCS: 13-15) moderate (GCS:9-12) and severe(GCS:3-8) head injury on the basis of GCS score.

Table 1: Demographic profile of study population

Groups	Mean Age (years)	Standard Deviation (±years)
Group I (< 1 hour)	32.4	13.37
Group II (1-6 hours)	33.05	10.36
Group III (> 6 hours)	34.6	13.98

Favourable outcome was maximum in Group I, where evacuation of haematoma contemplated very early (Table 2).

Table 2: Outcome of surgery

Outcome	Group I	Group II	Group III	P-Value
Favourable	18(90%)	14 (70%)	10 (50%)	0.022 (<0.05)
Unfavourable	2 (10 %)	6 (30 %)	10 (50%)	
Total	20(100%)	20 (100%)	20 (100%)	

Observed difference in percentages of favourable and unfavourable outcome in different groups are statistically independent, i.e. the observed difference in the column and row variables is not significant and is just a random phenomenon. The p- value was found to be 0.022 (< 0.05) providing sufficient justification for rejecting the null hypothesis that the row variable is unrelated (that is, only randomly related) to the column variable and the observed difference between them is not statistically significant. Frequency of favorable outcome was significantly higher in the group I (surgery within one hour).

Discussion

Traumatic extradural hematoma is a neurosurgical emergency and timely surgical intervention for significant extradural hematoma is the standard treatment.¹⁻³ The most significant factors influencing outcome are Glasgow Coma score or consciousness level on admission, age, and associated intradural lesions and also time taken in evacuation of hematoma due to transfer of patient to neurosurgical unit.⁴⁻⁷ Patients who present early after road traffic accidents and with good GCS (13-15) have favourable outcome. Time taken is defined as the time from the occurrence of trauma to the surgical evacuation of hematoma.⁸⁻¹⁰ Mortality and long-term morbidity are low with early diagnosis and prompt treatment.^{11,12} Clinical deterioration is quick, especially in posterior fossa to become fatal in most of patients with extradural hematoma so surgery can be life saving when performed in a timely manner.¹³⁻¹⁵It is generally perceived that patients with extradural hematoma present late either because of ignorance, negligence or lack of facilities in the vicinity.¹⁶⁻¹⁸ The rationale of this study is to highlight the importance of time taken on the surgical outcome of extradural hematoma particularly in patients with history of road traffic accidents.

Outcome is usually found to be predominantly influenced by the preoperative state of consciousness, associated brain lesions, and, in comatose patients, the duration of the time interval between onset of coma and surgical decompression. ¹ An interval under two

hours leads to 17% mortality and 67% of good recoveries (90% in our study) compared to 65% mortality and 13% of good recoveries after an interval of more than two hours. Prasad GL et al studied the outcome by dividing the patients in two groups. In one group they did the surgery and in the second they managed the patients conservatively. In surgically treated group the outcome was favourable and there was no mortality. Our study exhibits the same results.² Zhao X et al studied the importance of CT guided evacuation of the extradural hematoma thus emphasizing the importance of surgery in the favourable outcome.³ Balik V et al studied the surgical outcome of posterior fossa extradural hematoma. Though rare in occurrence but surgery is helpful.⁴ Lu Z et al managed the extradural hematoma in close proximity to transverse sinus, surgery helped in the favourable outcome.⁵ Wang W et al studied the minimally invasive puncture and aspiration performed in 59 cases of acute epidural hematoma with various hematoma volumes (13–145 mL. Mortality rate was higher in aspiration as compared to surgical outcome.

In a study by Flaherty BF et al Patients undergoing surgery were more likely to have an altered mental status (17 vs. 72%, $p < 0.001$), but there were no other significant clinical differences between the groups.¹⁰ The mean initial EDH thickness and volume were 8.0 mm and 8.6 ml in the observed group and 15.5 mm and 35 ml in the surgery group, respectively ($p < 0.001$ for both comparisons).

Mezue WC et al in their prospective analysis of 817 head injuries, 69 (8.4%) had EDH, a mean of 9.9 patients per year.¹⁷ Causes were road traffic accidents (57%), assault (22%) and falls (9%). Twenty-six (38%) patients presented within 24 hours of injury and only one patient presented within 4 hours. The average time lag before presentation was 94.2 hours. The most common location of hematoma was temporal (27.5%). Forty (59%) patients had surgery while 14 (20%) were managed conservatively. Ten patients (14.5%) died and of these 70% had GCS < 8 and 60% had a seizure. They concluded that early appropriate treatment of EDH results in good high quality survival (Glasgow Outcome Score 4 or 5). Low GCS should not be an absolute contraindication for surgery.

According to Khan MB et al¹⁹ on univariate analysis, admitting GCS score, patient's age, the time from injury to admission and injury to surgery, anisocoric pupils at presentation and effacement of basal cisterns were significantly associated with the outcome of GOS score.¹⁹ They concluded that Lower GCS at

presentation, younger age at trauma, increased time since trauma to surgery and admission, anisocoria and effacement of basal cisterns are statistically significant variables in surgically treated pediatric patients of EDH that confer a poorer prognosis. A timely surgical intervention can result in excellent outcomes. According to Sencer A et al PFEDH in children can be treated in experienced centers with excellent outcome, and there is no need to avoid surgery when it is indicated. This study also highlights the importance of early surgery.²⁰ According to Han J et al, preoperative GCS score and thickness of hematoma on brain computed tomography are important determinants of prognosis, almost comparable results with our study.²⁴ Different studies demonstrate that, in children and adolescents with moderate and sTBI, lesions in multiple zones, total FLAIR lesion volume, and lesion volumes within specific brain zones correlated with long-term functional outcome.^{24,25}

Conclusion

Frequency of favourable outcome after surgical evacuation was significantly higher in patients in whom surgery was performed within one hour after the trauma ($p < 0.05$). 2. Time is not the only factor responsible for the favourable outcome, as is evident in patients who present early but with poor GCS.

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