

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

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ABSTRACT

Introduction: Traumatic epidural hematoma is a neurosurgical emergency and timely surgical intervention is the standard treatment. The rationale of this study is to highlight the importance of time of surgery on the surgical outcome of epidural hematoma particularly in patients with history of road traffic accidents.

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

Study Design: Descriptive Case Series.

Place and Duration of Study: Bolan Medical Complex Hospital and Sandeman Provincial Hospital, Quetta. From April 2010 to July 2011.

Patients and Methods: Sixty adult patients of either gender with H/O road traffic accident with epidural 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, 18 (90%) showed favorable and 2 (10%) showed unfavorable outcome. In group II, 14 (70%) showed favorable and 06 (30%) showed unfavorable outcome. In group III, 10 (50%) showed favorable and 10 (50%) showed unfavorable outcome. Significant association was found between outcome and time of surgery ($P < 0.05$).

Conclusions: Frequency of favorable outcome after surgical evacuation was significantly higher in patients in whom surgery was performed within one hour after the trauma.

Key Words: Epidural hematoma, neurosurgical emergency, time of surgery for epidural hematoma, Road traffic accident, Traumatic brain injury.

INTRODUCTION

Accumulation of blood in the potential space between dura and bone is called epidural hematoma (Figure 1). Epidural hematomas have their classical presentation: I. Brief post-traumatic loss of consciousness. II. A lucid interval for several hours. III. Obtundation, contralateral hemiparesis, ipsilateral pupillary dilatation.¹ The commonest mechanisms of injury are an accident involving a bike and a fall from height.² Epidural hematoma of the temporal region is the most common site of supra tentorial epidural bleeding; other

locations are considered atypical.³ Traumatic epidural hematoma is a neurosurgical emergency and timely surgical intervention for significant epidural hematoma is the standard treatment.^{4,5} 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.^{6,7} Patients who present early after road traffic accidents and with good GCS (13 – 15) have favorable outcome in 87% and unfavorable

outcome in 9%.⁸ 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 epidural hematoma so surgery can be life-saving when performed in a timely manner.¹³ It is generally perceived that patients with epidural hematoma present late either because of ignorance, negligence or lack of facilities in the vicinity.¹⁴ The main objectives of this study was to determine the impact of time taken on the surgical outcome of epidural hematoma in patients with road traffic accidents.



Figure 1: Non-contrast head CT demonstrates an acute traumatic epidural hematoma over the left parietal region.

METHODOLOGY

Study was conducted at Neurosurgery department Bolan Medical college Hospital, Quetta. It was a descriptive case series performed on sixty adult patients of both genders who had hematoma of more than 20 ml (calculated by the scale on axial images of CT scan

brain). Only those cases of Epidural hematoma (defined as a type of traumatic brain injury in which a buildup of blood occurs between the Dura mater and the skull) with H/O road traffic accident regardless of Glasgow Coma scale (GCS) score were selected through non-probability purposive technique. Extradural hematoma with evidence of diffuse axonal injury, subdural hematoma or brain contusions and those cases of EDH with H/O fall or assault were excluded from the study. Time taken was defined as the time from the occurrence of trauma to the surgical evacuation of hematoma. The outcome was classified into favorable and unfavorable at 03 months post operatively. Favorable outcome was categorized into good recovery (Able to return to work or school) and moderate disability (Able to live independently; unable to return to work or school). Unfavorable outcome was defined as severe disability (able to follow commands / unable to live independently), vegetative state (Unable to interact with environment; unresponsive) and death. Detailed history taken and thorough central nervous system examination performed to assess the preoperative status of patient and relevant investigations were done. All the patients who meet the inclusion criteria were included in the study. 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. After preoperative assessment, informed consent was taken for inclusion in study. All the 60 patients were allocated into three groups by randomization done by lottery method. Patients in group I were those in whom time from the occurrence of trauma to the surgical evacuation of hematoma was less than 1 hour, where time was more than 1 hour to 6 hours were allocated to group II and with more than 6 hours were allocated to group III. Final outcome assessed at 03 months of follow up for the favorable and unfavorable outcome. Follow up was ensured through telephone contact. Data collected on preformed proforma and results compiled. Data was analyzed on SPSS version 17.0. Frequency and percentage computed for qualitative variable like gender and final outcome among three groups. Chi square test was used to compare the impact of time taken on surgical outcome in 03 groups. P value < 0.05 considered significant.

RESULTS

In group I, there were 20 patients with mean age of 32.4 years \pm 13.37 Standard Deviation (SD). In group

II, there were 20 patients with mean age of 33.05 years \pm 10.36 SD. In group III, there were 20 patients with mean age of 34.6 years \pm 13.98 SD. Demographic results are shown in table 1. Final outcome assessed at 03 months of follow up for the favorable and unfavorable outcome. Follow up was ensured through telephone contact. Contingency tables were created which displayed the numbers of subjects in all the groups. In group I, out of 20 (100%) patients 18 (90%) showed favorable outcome as per our operational definition and 2 (10%) showed unfavorable outcome. In group II, out of 20 (100%) patients 14 (70%) showed favorable outcome as per our operational definition and 6 (30%) showed unfavorable outcome. In group III, out of 20 (100%) patients 10 (50%) showed favorable outcome as per our operational definition and 10 (50%) showed unfavorable outcome. Outcome results shown in table 2. Our null hypothesis was that Observed difference in percentages of favorable and unfavorable 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.

Table 1: Demographic profile of study population.

Groups	Mean Age (Years)	Standard Deviation (\pm 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

Chi-square test was employed to test the null hypothesis. Chi-square value was found to be 7.619 and *P*-value was 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

Table 2: Outcome of surgery.

Outcome	Group I	Group II	Group III	<i>P</i> -Value
Favorable	18 (90%)	14 (70%)	10 (50%)	0.022 ($<$ 0.05)
Unfavorable	2 (10%)	6 (30%)	10 (50%)	
Total	20 (100%)	20 (100%)	20 (100%)	

them is not statistically significant. In other words, frequency of favorable outcome was significantly higher in the group I (surgery within one hour). Results are shown in table 2.

DISCUSSION

EDH is an uncommon, but serious complication of head injury. While the exact incidence is unknown, it is found in 1 to 4% of traumatic head injury cases, and 5 to 15% of autopsy series.¹⁵ The rationale of this study was to highlight the importance of time taken on the surgical outcome of epidural hematoma particularly in patients with history of road traffic accidents. Our results are in concordance with the already published data on the subject. Haselsberger K, et al,¹⁶ in a series of 60 patients suffering acute epidural haemorrhage (EDH) after closed head injury accumulated during the years 1978 – 1985 at the University Hospital of Graz, evaluated the mortality rate and the grade of clinical recovery. The overall mortality in acute EDH 25%. Outcome was 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. An interval under two hours lead 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. Cohen JE et al,¹⁷ in their prospective trial determined whether the time between onset of anisocoria and surgery for hematoma evacuation in the Head – injured patient is a useful prognostic variable for outcome in the comatose patient with an acute epidural hematoma. Twenty – one patients with an acute traumatic epidural hematoma and an admission Glasgow Coma Scale score of less than 8 were analyzed. They found that Anisocoria was present in 14 (67%) patients. Mortality rate was three times higher in this group than in the patients without anisocoria; however, this difference was not statistically significant ($p = 0.21$, Fisher's exact test). None of the patients with an anisocoria – craniotomy latency of 70 minutes or less died and all of these patients had a good or reasonable outcome. Analysis of the anisocoria – craniotomy latency in ten patients revealed that a lapse of more than 90 minutes was associated with a greater mortality compared with patients with a latency of less than 90 minutes ($p < 0.05$). They concluded that in patients with

an acute epidural hematoma, reducing the anisocoria-surgery interval below 90 minutes is significantly associated with a better outcome ($P < 0.05$). Seelig JM et al¹⁸ in their study aimed to discover which factors contributed to recovery after surgical intracranial decompression, they reviewed the records of 82 consecutive comatose patients with traumatic acute subdural hematoma (ASDH) who were treated in a single center under a uniform protocol. The delay from injury to operation was the factor of greatest therapeutic importance. Patients who underwent surgery within the first four hours had a 30 per cent mortality rate, as compared with 90% in those who had surgery after four hours ($P < 0.0001$). Other important prognostic variables included results of the initial neurologic examination, sex, multimodality – evoked potentials, and postoperative intracranial pressure (ICP). They concluded that if all patients with traumatic ASDH were taken directly to hospitals equipped to diagnose and remove the hematoma within four hours of injury, mortality rates could be reduced considerably. Bricolo AP et al,¹⁹ in their prospective analysis evaluated the outcome after surgery in 107 consecutive cases of epidural hematoma treated during the last 3 years at the Department of Neurosurgery of the University Hospital of Verona (Italy). The overall mortality was 5%; 89% of the patients made a good recovery or had only moderate residual disability. The majority of their patients (57%) underwent operation within 6 hours of injury; 60% went into surgery with a Glasgow coma scale (GCS) score between 8 and 15. No deaths occurred among patients reaching surgery with a GCS score of 8 or better; all patients with scores of 8 to 15 made a good recovery (63 cases). Seventeen patients went into surgery while still free of neurological signs, and 8 had only one dilated pupil; all 25 made good recoveries. A flexion posture at admission cuts the chances of a good outcome by one – half; an extension posture cuts the chances to one – fourth. Ninety – five per cent of the patients had fractures of the skull; only 21% had the classical lucid interval. The cause of all 5 deaths was identified as stemming from avoidable errors in management in outlying hospitals (2 cases) or in their own department (3 cases). They concluded that zero mortality from epidural hematoma may be realistic goal for a modern, well – run care system for head – injured patients that includes prompt referral by community doctors and suitable hospital facilities for constant access to emergency neurosurgery. Cheung PS et al²⁰ determined the incidence and mortality of consecutive patients with traumatic EDH admitted to the Emer-

gency Department (ED) of Prince of Wales Hospital (PWH), a University Hospital Trauma Centre in Hong Kong. They concluded that Survival from traumatic EDH was 90% (80/ 89) and 91% (73/80) of survivors had a Glasgow Outcome Score of 4 or 5 (good or moderate). The combination of bilateral fixed dilated pupils and GCS 3 suggests severe primary brain injury. Emergency evacuation of intracranial haematomas is unlikely to improve the outcome for these patients. Even in an urban environment with short prehospital times and rapid access to neurosurgery, outcome in patients who are GCS 3 following EDH is likely to be poor.

ACKNOWLEDGEMENTS

We would like to thank Almighty Allah for His blessings during the period of research work and dissertation writing. We would also like to express a special gratitude to all patients who were the subjects of the study.

CONCLUSION

Frequency of favorable outcome after surgical evacuation was significantly higher in patients in whom surgery was performed within one hour after the trauma. It is pertinent to mention that time is not the only factor responsible for the favorable outcome, patients who present early but with poor GCS, in such cases time comes at the bottom of the factors responsible for favorable outcome.

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