

Impact of Operating Time on the Surgical Outcome of Epidural Hematoma in Patients with a History of Automotive Accidents: A Longitudinal Comparative Study

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Abstract

Aim: To determine the impact of operating time on the surgical outcome of epidural hematoma in patients with a history of automotive accidents

Study design: A longitudinal comparative study

Place and Duration: This study was conducted at Pakistan Institute of Medical Sciences Islamabad, Pakistan. From June 2020 to June 2021.

Methodology: In this study, sixty adults of either gender who were involved in a road traffic collision and had an epidural hematoma were included. Three groups of 20 patients were formed. These patients were in groups I, II, and III, where the period from a traumatic event to surgery was less than one hour, one to six hours, or more than six hours, respectively.

Results: Only four out of the 20 participants in group I (about 10%) had an adverse result. A total of 11 (30%) of the participants in group II had a positive result, while others had a negative result. There were 10 (50 percent) positive outcomes and 10 (50 percent) negative outcomes in group III. A P-value of 0.05 indicated a link between operation timing and patient outcomes

Conclusions: Patients who had surgery within an hour of the head trauma had a much greater success rate after surgical evacuation of epidural hematoma.

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

Introduction

Epidural hematoma is the medical term for an accumulation of blood outside the dura mater. There is a characteristic presentation for an epidural hematoma ¹. An episode of transient amnesia occurs after the event. It is a period of lucidity lasting many hours. Opposite side hemiparesis, obtundation, and ipsilateral pupillary dilation are some other presentations. Accidents involving a bicycle or a fall from a great height are the most prevalent causes of injury. Other areas of supratentorial epidural hemorrhage, such as those seen in the temporal region, are regarded anomalous. The conventional therapy for a large epidural hematoma in a trauma patient is immediate surgical intervention.

Glasgow Coma Scale score or state of consciousness upon admission, age, and accompanying intradural lesions, as well as the period of time it takes to evacuate a hematoma once a patient is transferred to a neurosurgical unit, are the most important variables impacting the prognosis ². Total 87 percent of patients who arrive at the hospital soon after a car accident and having a good GCS (13 to 15) have a good result, whereas 9 percent have a bad score ³. The period of time it takes from the moment of injury until the hematoma is surgically removed is referred to as the "time is taken". When the condition is diagnosed and treated early, the risk of death and long-term illness is minimized. If surgery isn't done quickly enough, most individuals with epidural hematomas can die. Epidural hematoma patients are often thought to appear late due to their lack of knowledge, neglect, or lack of services in the immediate area ⁴. Our study's key goal was to see whether the length of time it took to perform surgery on patients with epidural hematoma from car accidents affected the surgical result.

Methodology

This study was conducted at Pakistan Institute of Medical Sciences Islamabad, Pakistan. From June 2020 to June 2021. Permission was taken from the ethical review committee of the institute. The study included sixty adult patients of either gender with an epidural hematoma volume greater than 20 mL. (Calculated by the scale on axial images of CT scan brain). Patients with epidural hematoma (a kind of traumatic brain injury in which blood accumulates between the dura mater and the skull) who were involved in road traffic collision were selected using non-probabilistic purposive procedures regardless of the Glasgow Coma Scale (GCS) score. Patients with diffuse axonal injury, subdural hematoma, or brain contusion, as well as cases of EDH associated with the history of fall or assault, were excluded from the study. Trauma to hematoma surgical evacuation was defined as a time period beginning with the occurrence of the damage and ending with its surgical removal. Three months following surgery, the results were divided into two categories: favorable and unfavorable. A favorable outcome was defined as a good recovery (ability to return to work or study) or a minimal handicap (Able to live independently; unable to return to work or school). Serious handicap (inability to accept commands/inability to live independently) was classified as a bad outcome, as was a vegetative state (inability to engage with the

environment; inactivity). The patient's medical history was thoroughly reviewed and a comprehensive evaluation of the central nervous system was conducted to determine the patient's preoperative condition. Recorded GCS scores were used to categorize patients into mild, moderate, and severe head injuries, respectively, based on their GCS scores. Informed consent was obtained for participation in the study after a preoperative evaluation. All 60 patients were randomly assigned to one of three groups based on a lottery system. Those in group I was who had less than one hour from the time of the injury to surgery to remove the hematoma. Those in groups II and III were those who had more than six hours between the time of the injury and surgery to remove the hematoma. Following a three-month follow-up period, the final result was evaluated to determine if it was positive or not. Telephone contact was used to assure follow-up. A premade proforma was used to gather data, and the findings were produced. SPSS version 23.0 was used for data analysis. For qualitative variables like gender and ultimate result, the frequency and percentage were calculated across three groups. We performed Chi-square tests in three groups to examine the influence of surgery time on their outcomes. Statistical significance was defined as a p-value of 0.05 or less.

Results

In group I, there was 20 patients with a mean age of 32.4 years and a standard deviation of 13.37. (SD). The 20 patients in Group 2 had a mean age of 33.05 years plus a standard deviation of 10.36. Twenty patients in group III had an average age of 34.6 years and a standard deviation of 13.98. The outcome is analyzed three months later to determine if it was positive or negative. According to our operational definition, 18 (90%) of the 20 patients in group I had a favorable outcome, whereas two (10%) had an adverse outcome. A total of 14 (70%) of the 20 (100%) patients in group II had a favorable outcome, while six (30%) had an unsatisfactory outcome. Ten (50%) of the twenty patients in group III had a satisfactory outcome, whereas ten (50%) had an unsatisfactory outcome. We assumed for our null hypothesis that the observed difference in the percentages of favorable and unfavorable outcomes across groups is statistically independent.

A chi-square test was used to evaluate the null hypothesis. The P-value of 0.022 (0.05) supported the rejection of the null hypothesis that the row and column variables are unconnected (that is, just randomly related) and that the observed difference between them is not statistically significant. The value of 7.619 for the chi-square was found. That is, the group I had a much higher percentage of favorable outcomes (surgery within one hour).

Discussion

Concussion-related epileptic delirium hypertension (EDH) is a rare but dangerous side effect of brain trauma. About 1 to 4 percent of people who have a severe brain injury, and about 5 to 15 percent of those who died, have this finding.⁵ The purpose of this research was to demonstrate the impact of operating time on the surgical outcome of epidural hematoma in patients with a history of automotive accidents. Our findings are in line with previous research. An investigation on the mortality and clinical recovery of 60 patients with acute epidural hemorrhage (EDH) after a closed head injury was conducted between 1978 and 1985 by Haselsberger K and his colleagues⁶. Acute EDH has a 25 percent fatality risk (Rehman, et

al., 2007)⁷. Before surgery, a patient's preoperative level of consciousness and any brain lesions was shown to have a significant impact on the patient's prognosis. There were 17 deaths and 67 excellent recoveries in our research, whereas there were 65 deaths and 13 great recoveries after a two-hour period of time. When an acute epidural hematoma caused comatose patient Cohen JE et al⁸ to investigate whether the time interval between the beginning of anisocoria and hematoma evacuation operation was a meaningful predictor of prognosis. In this study, 21 patients with an acute traumatic epidural hematoma had a Glasgow Coma Scale admission score of less than 8 (Islam, 2011)⁹. In 14 (67 percent) of the people tested, anisocoria was found. Patients with anisocoria exhibited a threefold increased death rate compared to controls ($p = 0.21$, Fisher's exact test), however, this difference was not statistically significant. One patient died, but everyone with an anisocoria – craniotomy delay of fewer than 70 minutes survived. Individuals with a delay of more than 90 minutes between anisocoria and craniotomy died at a higher rate ($p 0.05$) than those with a latency of fewer than 90 minutes. According to the researchers' results, patients who have had an acute epidural hemorrhage may benefit from a shorter anisocoria surgery delay (90 minutes or less). Seelig JM et al¹⁰ investigated patients who had surgical intracranial decompression (SID) at the same institution in order to discover which characteristics led to their recovery. They examined the medical records of 82 consecutive individuals who received SID following the same procedure at the same facility. The time between injury and operation was an important aspect of the healing process. Patients who had surgery within the first four hours had a mortality rate of 30 percent, compared to 90 percent for those who had surgery after four hours. Among other factors, gender, multimodality evoked potentials, and postoperative intracranial pressure were all significant predictors of outcome (ICP)¹¹. Patients with traumatic ASDH should be moved to hospitals that can identify and remove hematomas within four hours after the event, according to the researchers¹². This would significantly lower the fatality rate. Researchers from the University Hospital of Verona's Department of Neurosurgery evaluated 107 consecutive instances of epidural hematoma over a period of three years in order to determine the surgical outcomes¹³. Total 5 percent of patients died, and 91 percent were able to return to their normal lives with few residual disabilities. 57 percent of their patients were operated within six hours after their accident, and 60 percent had a GCS score of 8 to 15 when they entered surgery. Patients who underwent surgery and had a GCS of 8 or above did not die; in fact, all patients who had surgery and had a GCS of 8 to 15 recovered completely (63 cases). A single dilated pupil was used for surgery on 25 patients, and all of them were able to fully recover¹⁴. When patients are admitted to the hospital, their chances of a positive result are reduced by half or fourfold if they are flexed or extended. Only 21% of the patients had a lucid period after the accident, despite the fact that 90% suffered skull fractures. Patients died in all five instances because of unnecessary mistakes committed by hospital personnel at outpatient facilities (in two cases) and inside their own department (3 cases)¹⁵. There is a possibility of zero mortality from epidural hematoma if a contemporary system of treatment for head-injured patients is implemented, including prompt referral by community physicians and enough hospital capacity for continuous access to emergency neurosurgery¹⁶. In PWH, a Hong Kong University Hospital Trauma Center, Lawton et al.¹⁷ analyzed the incidence and mortality of traumatic EDH at the emergency department (ED). Total 90% of the patients who survived severe EDH had a

Glasgow Outcome Score of 4 or 5, according to the researchers (good or moderate). In the presence of GCS 3, significantly early brain damage is indicated by bilaterally fixed dilation of pupils¹⁸. Patients with cerebral hematomas who undergo emergency evacuation are unlikely to benefit from surgery¹⁹. The prognosis for GCS 3 EDH patients, even with the shortest feasible prehospital stay and early access to neurosurgery, remains low²⁰.

Conclusion

Patients who had surgery within an hour of the trauma had a much greater success rate after surgical evacuation. For those who appear early but with bad GCS, in those cases time is not the sole element influencing a positive result; in these circumstances, other considerations must take precedence.

Funding source

None

Conflict of interest

None

Permission

Permission was taken from the ethical review committee of the institute

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