# Post Traumatic Epidural Hematoma: Outcome Analysis in 68 Consecutive Unselected Cases

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Traumatic epidural hematoma when significant or symptomatic is a neurosurgical emergency that needs immediate surgical intervention.

This is a case series study of 68 patients (59 males, 87%) with epidural hematoma treated in B. P. Koirala Institute of Health Sciences, Dharan, Nepal between December 2008 and October 2009. Variables included in the analysis were age, mode of injury, occupation, risk factors such as alcohol intake or use of helmet, associated other intracranial or extracranial injury, hematoma site and severity of head injury by using Glasgow Coma Scale (GCS). At discharge the outcome were classified based on the dichotomized Glasgow outcome score (GOS) as favorable, unfavorable and death. Age ranged from 5 to 68 years with the majority in the 10 to 30 year group (57%).

The commonest mode of injury was road traffic accident in 41% followed by fall in 34%. With respect to the site, the majority of the EDH was the combined type (more than one lobar area) with 44%, followed by frontal in 28% and occipital in 15%. Surgical evacuation was done 62% which fulfilled the inclusion criteria and the rest conservatively managed. Using the dichotomized GOS the majority were in the favorable group (87%) and the rest in the unfavorable group (13%).

The results of this study showed that even in developing countries the outcome is good if managed early and with strict criteria for surgery.

**Key Words:** epidural hematoma, GCS, head injury, trauma

Traumatic epidural hematoma (EDH) is one of the common neurosurgical procedures in any centre worldwide. In the pre-computed tomography (CT) scan era the diagnosis was by angiography, pneumoencephalography or exploratory burr holes. With the wide availability of CT the diagnosis and outcome has greatly improved with minimal morbidity or mortality.

## Methods

This is a case series study of 68 patients 59 being males (87%) with epidural hematoma (EDH) treated in B. P. Koirala Institute of Health Sciences, Dharan, Nepal between December 2008 and October 2009.

Surgery was performed in all cases with EDH thickness of more than 1 cm, midline shift of more than 5mm, volume of hematoma more than 30 ml and in those cases with focal neurological deficits such as limb weakness, unequal pupils, signs of herniation, deteriorating GCS etc. Clinical details at presentation and computed tomographic (CT) scans were reviewed to define variables associated with outcome.

Variables included in the analysis were age, mode of injury, occupation, risk factors such as alcohol intake or use of helmet, associated other intracranial or extracranial injury, hematoma site and severity of head injury by using Glasgow Coma Scale.

At discharge the outcome was classified based on the dichotomized GOS as favorable (GOS 4-5), unfavorable (GOS 2-3) and death (GOS 1).

## Results

Total of 68 (59 males and 9 females) patients were operated during the study period. The age ranged from 5 - 68 years with the majority in the 10 - 30 year group (57%) .

Profession wise, the majority of them were laborers (34%) followed by famers in 26%, student in 28 % and the rest comprising of housewives and dependents (8%).

The commonest mode of injury was road traffic accidents (RTA) in 41% followed by fall (from stairs, mountain and trees) in 34% with the rest compromising of assault (gunshot, sharp weapon, blunt objects) and other causes **(Figure 1 A)**. With respect to the risk factor, alcohol intake was present in 22 % of cases and in those with RTA, 39% of the cases with motor vehicle accidents were not wearing the helmet at the time of accident. In the emergency room altered sensorium was present in 44% of cases, bleeding from either the ear or nose in 28% and sign of meningeal irritation in 11%. GCS wise, the majority were in the mild head injury group accounting 58%, moderate in 24% and severe in 18 %. Early (within one week) and immediate seizure was present in 6% of cases.

On CT scan, with respect to the site, the majority of the EDH was the combined type in 44%, (more than one lobar area), followed by frontal in 28%, occipital in 15%, temporal in 13% and parietal in 9% **(Figure 1 B)**. With respect to the side of the EDH the majority were on the right side (54%) and bilateral in only 6%.

With respect to the associated findings, skull fracture was present in 57%, scalp swelling in 32%, underlying contusion in 26%, acute subdural hematoma in 10% and intracerebral hematoma in 4%. Surgical evacuation was done in 62% which fulfilled the inclusion criteria and the rest managed conservatively **(Table 1)**. The GCS at discharge was mild in 93%, moderate in 3% and severe in 4%. With regards to the final outcome, morbidity was present in 9% (infection-4%, focal deficit -3% and chest infection in 2%) with the overall mortality rate of 4% (1secondary to chest infection and the rest due to severe head injury with bilaterally fixed and dilated pupils). Using the dichotomized GOS the majority were in the favorable group accounting 87% and 9% in unfavorable.

## Discussion

This study from a developing country has shown that the majority of the causes of head injury are still RTAfollowed by falls. The poor traffic control laws, improper planned roads, lack of proper vehicle control and awareness are some of the probable causes for these accidents. The lack of use of helmets (39% in this study) and use of alcohol (22%) are some of the other direct causes of head injury.

Falls from mountains while gathering fodder or from trees and roofs without proper safety barriers were the other causes. The majority are also in the productive younger age group showing that the younger generation is more prone to head injury. Only 6 % presented with early seizures in this study for which antiepileptic medication was continued for two weeks. The unit policy has been not to start on prophylactic antiepileltic drugs. The EDH had a slight tendency to be more common on the right side (54%) and the majority was the mixed type..

| **Mode of injury** | **Incidence** | **Percentage (%)** |
|---|---|---|
| RTA | 28 | 41.17 |
| Fall | 23 | 33.82 |
| Assault | 10 | 14.73 |
| Others | 7 | 10.28 |
| **Total** | **68** | **100** |
| **Age Group** | **Number** | |
| <20 | 28 | 41.18 |
| 21-40 | 29 | 42.65 |
| 41-60 | 9 | 13.23 |
| >60 | 2 | 2.94 |
| **Total** | **68** | **100** |
| **Sex** | | |
| Male | 59 | 86.70 |
| Female | 9 | 13.30 |
| **Total** | **68** | **100** |
| **Occupation** | | |
| Laborer | 23 | 33.83 |
| Farmer | 18 | 26.47 |
| Student | 19 | 27.94 |
| Housewife | 4 | 5.88 |
| Dependents | 4 | 5.88 |
| **Total** | **68** | **100** |
| **Mode of Injury** | | |
| RTA | 28 | 41.18 |
| Fall | 23 | 33.83 |
| Assault | 10 | 14.70 |
| Other | 7 | 10.29 |
| **Total** | **68** | **100** |
| **Site of EDH** | | |
| Combined | 27 | 39.70 |
| Frontal | 17 | 25.00 |
| Temporal | 9 | 13.24 |
| Occipital | 9 | 13.24 |
| Parietal | 6 | 8.82 |
| **Total** | **68** | **100** |
| **Associated findings** | | |
| Skull fracture | 39 | 57.3 |
| Scalp hematoma | 22 | 36.6 |
| Contusion | 18 | 26.4 |
| Subdural hematoma | 7 | 10.28 |
| Intracerebral hematoma | 3 | 4.4 |
| **Management** | | |
| Surgery | 42 | 61 |
| Conservative | 26 | 39 |
| **Total** | **68** | **100** |
| **GCS** | **Admission (%)** | **Discharge(%)** |
| Mild | 39 (58%) | 63 (93%) |
| Moderate | 16 (24%) | 2 (3%) |
| Severe | 13 (18%) | 3 (4%) |
| **Total** | **68 (100%)** | **68 (100%)** |
| **GOS (Discharge)** | | |
| Favorable | 59 (87%) | |
| Unfavorable | 6 (9%) | |
| Death | 3 (4%) | |

*Table 1: Showing the patient characteristics.*

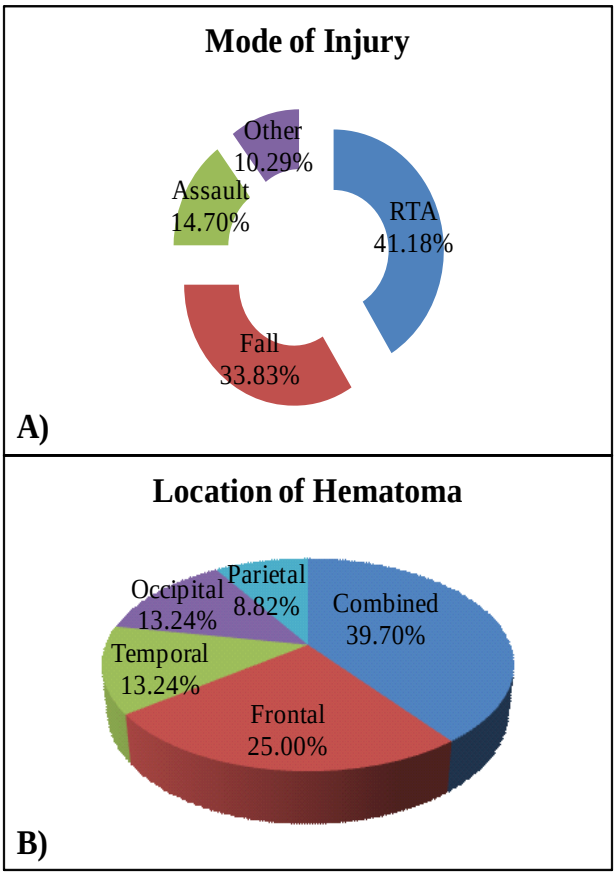


*Figure 2: A) Doughnut diagram showing mode of injury, B) Pie diagram showing location of hematoma.*

In a similar study from Germany with 38 cases, they found falls as the commonest cause of EDH (20/38) cases followed by RTA (14/38) cases.[1] Although the incidence of associated fractures was 90% in that study we found the incidence to be only 57%. The right side was more frequently affected in both these studies. In another study from Pakistan of 30 surgically operated cases the mortality was 10% with the majority in the favorable group (80%) at discharge.[2]

In another study from Hong Kong with 89 cases of EDH, surgery was performed in 34% with overall 91 %favorable outcome and 10 % mortality.[3] In comparison to these studies the mortality in our series is far less with only 4% **(Table 2)**.

RTA seems to be the leading cause in developing countries which is evident from this study and that from Pakistan and Hong Kong as well.

In this single tertiary centre study the final results showed GCS in the mild group in 90% with the majority in the favorable group of GOS (87%). These results are comparable with other studies.[4,5,6] Surgical management was done in 62 % of cases with no operative mortality. EDH

| Study/ Variables | HongKong[3] (N=89) (%) | Pakistan[2] (N=30) (%) | Germany[1] (N=39) (%) | Present Study (N=68) (%) |
|---|---|---|---|---|
| **Admission GCS** | | | | |
| Mild | 70 | 57 | 62 | 58 |
| Moderate | 10 | 23 | 15 | 24 |
| Severe | 20 | 20 | 23 | 18 |
| **Surgery** | 34 | 100 | 100 | 62 |
| **GOS** | | | | |
| Favorable | 91 | 80 | 100 | 87 |
| Unfavorable | 9 | 20 | 0 | 9 |
| **Mortality** | 10 | 10 | 0 | 4 |

*Table 2: Comparative study of the data with other centers in Asia and Europe.*

evacuation even in severe head injury leads to improved survival with the exception in cases with fixed dilated pupils as this suggest primary brain injury which is irreversible.[1] The factors with poor outcome in EDH are GCS score of less than 10, focal neurological deficits, younger age, hyperglycemia and bradycardia.[7,8,9,10]

## Conclusion

EDH can be managed with excellent outcome in any centre where diagnosis is prompt and the criteria for surgery are well defined. In developing countries the majority of head injuries are due to RTA, fall, lack of helmets and drunk driving and hence the government needs to ensure stricterprovide better roads and awareness to the public regarding the complications of head injury. The results of this study show that the overall results of EDH management are the same in both the developing and developed countries.

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