Original Article

Indian Journal of Neurotrauma (IJNT)
2007, Vol. 4, No. 1, pp. 41-44

Contralateral motor deficit in extradural hematoma: Analysis of 35 patients

Mazhar Husain M Ch, **BK Ojha** M Ch, **Anil Chandra** M Ch, **Anoop Singh** MS, **Gurpreet Singh** MS, **Ashish Chugh** MS, **Manu Rastogi** M Ch, **Kamlesh Singh***

Department Of Neurosurgery, King George Medical University, Lucknow, &*Statistician, Institute of Clinical Epidemiology, King George Medical University, Lucknow, India.

Abstract: We work at one of the busiest trauma centers of the country and deal with more than 200 cases of extradural hematomas per year. The striking frequency of the association of motor deficits with extradural hematomas prompted us to take up this study and delineate the factors that could lessen the morbidity by decreasing the convalescence of the affected patients. We primarily found that the association between EDH and motor deficits was common, and early intervention resulted in faster recovery of motor power, (70% in patients operated within 24 hours of trauma, and 53.3% in patients operated after 24 hours of trauma. recovered complete power within 4 weeks.) We concluded a clinically significant association of extradural hematomas and concurrent motor deficits, and found that timely intervention in patients presenting with mild head injury enabled us to achieve complete recovery of motor power. Contributing factors included the concurrence of signs of herniation and associated parenchymal injuries.

Keywords: extradural hematoma, head injury

INTRODUCTION

Extradural hematoma (EDH) occurs in less then 2% of patients admitted with cranial trauma. Approximately 70-80% of the EDH is located in the temporo-parietal region, although extension to adjacent frontal and occipital areas is common. EDH is usually arterial in origin but may result from venous bleeding or as a result of oozing from the fractured skull bones in one third of patients[1]. Expanding high-volume EDH can produce compression of cerebral tissue which in turn can impinge on the third cranial nerve, resulting in ipsilateral pupillary dilatation, compress the ipsilateral cerebral peduncles resulting in contra lateral hemi paresis, extensor motor response and deteriorating level of consciousness. Reported mortality rate ranges from 5-43%. Risk factors are advanced age, intradural lesions, temporal location, increased hematoma volume, rapid clinical progression, pupillary abnormalities, increased intracranial pressure (ICP) and low Glasgow coma scale (GCS). When a patient of EDH has contra lateral motor deficit at presentation, it is likely that the deficit will improve with a timely surgical intervention. There is no report in the literature about either the prevalence or the outcome of the motor deficit in patients with EDH. This retrospective study was planned to find the answer to these questions as well as to analyze the factors influencing the outcome

Address for correspondence:

Dr. Gurpreet Singh
Room 4, New Residents Hostel, Behind Queen Mary Hospital, K.G.M.U. Lucknow, 226003
E-Mail: medicine2music@hotmail.com Mobile: 9336829735)

MATERIAL AND METHODS

The hospital records of all cranial trauma_patients who were admitted in department of neurosurgery KGMU, Lucknow from 1st January 2005 to 31st December 2006 were screened. Only those who were found to have extradural hematomas on the radiology with clinical evidence of contralateral motor deficit and remained in our follow up for 12 weeks were included in this study. Their clinical record was taken out and data regarding the epidemiology, pre-operative, operative and post-operative findings were tabulated. Recovery of motor deficit was recorded at 1 week, 4 weeks, and 12 weeks after surgery.

For the measurement of the EDH volume "ABC" method was used as described by Kothari et al. for the measurement of intracranial hematomas, where volume of EDH (Ve) = ABC/2

Where A, B, and C are the three diameters of the hematoma [2].

Depending on the time frame required by the patients

to attain full motor power (5/5) in the hemiparetic limbs, outcome was categorized as:

Excellent - motor power recovery within a week;

Good - motor power recovery within 4 weeks

Satisfactory - motor power recovery within 12 weeks

Unsatisfactory - incomplete recovery at the end of 12 weeks

RESULTS

During the study period 6976 head injured patients were admitted at our institute. Out of these 410 patients (5.88%) were operated for EDH. Only 43 (10.48%) of these patients had a contralateral motor deficit. After excluding 8 patients who, expired from their injuries within a week from the surgery only 35 patients fulfilled the criteria for inclusion into this study.

There were 31 males and 4 female patients with age ranging from 4 years to 65 years, with a mean of 36.05+. 13.9 years.

Twenty one patients had sustained the injury due to road traffic accident, 7 due to fall from height, six due to assault and one patient sustained the injury due to a heavy object falling over his head.

Out of 35 EDH patients, 31 were temporo-parietal in location with frontal (9) and occipital (1) extensions. Of the remaining four, three were frontal and one was hemispheric.

The mean GCS score at presentation was 9.03, with range 5 to 15. Due to delayed referral, most of the patients arrived late at our hospital, tThe mean time between injury and arrival was 34.14 hrs with a range from 6 hrs to 144 hrs. On radiology the mean volume of EDH was 79.34 ml with a range from 20 ml to 274.5 ml. After an initial preoperative assessment all patients underwent Craniotomy with EDH evacuation.

As the age distribution of the population under study was strongly biased for the age group of < 50 years (n=31) over the group of > 50 year old (n=4) the association of a better recovery in the younger population could not be statistically proven

Another observation during this study was the coherence to a previously stated observation that females over 51 years of age fared better in terms of the clinical outcome[3].

Proportion for complete recovery, within a month, in mild head injury (GCS 14-15; n= 7) patients was 85.7% (95% CL 42, 99) while only 66.67% (95% CL 41, 87) patients operated with GCS below 8, showed complete recovery at 4 weeks. Though the two differences are not statistically significant, these are clinically important and should be considered for predicting recovery within the month.

Table 1.:The results achieved with respect to the variables of age, sex, GCS, associated injury, time of intervention, and signs of herniation.

RESULT	EXCELLENT	GOOD	SATISFACTORY	UNSATISFACTORY
FACTORS				
AGE	8	11	10	2
<50YEARS	2	1	0	1
>50YEARS				
SEX	8	11	10	2
M	2	1	0	1
F				
GCS	4	8	4	2
<8	2	2	5	1
9-13	4	2	1	0
14-15				
ASSO.		1	2	2
CONTUSIONI			1	1
NJURY				
SAH				
TIME OF	5	9	5	1
<24	5	3	5	2
HOURSINTER				
VEN.				
>24 HOURS				
SIGNS	3	8	6	1
PRESENTOF	7	4	4	2
HERNIATION				
ABSENT				

In our study we found that 61% patients presenting with signs of herniation (n=18) showed complete recovery in 4 weeks and 64.7% patients without signs of herniation (n=17) showed complete recovery in the same duration. This difference was not statistically significant (p=0.826).

We also reinforce the importance of timely intervention for faster neurological recovery and prevent morbidity of the young population most often affected with this injury. (Range 4-65 years, mean age 36.05±13.9 years). We found that timely intervention (less than 24 hours; n=20) resulted in complete motor power recovery within 4 weeks in 70% (95% CL 46, 88) of the patients vis-à-vis those operated after 24 hours (n=15) where the complete recovery at 4 weeks was 53.3% (95% CL 27, 79).

Associated injuries, namely contusions and SAH contributed to the delay of the final recovery of the patient's focal deficit and none of our 7 patients with these associated injuries, Contusion (n=5) and SAH (n=2), had an excellent recovery and 3 patients had an

unsatisfactory recovery.

DISCUSSION

Motor deficits in patients with EDH results either due to direct compression of the motor cortex by overlying EDH or due to the compression of the ipsilateral cerebral peduncle by impinging cerebral tissue. Rarely the contra lateral cerebral peduncle may get compressed against the tentorium cerebelli and may produce weakness on the same side as the EDH. This never happens in isolation in patients with EDH and is always preceded by compression of the ipsilateral cerebral peduncle. This phenomenon of the Kernohan's notch is usually seen only in slowly developing hemispheric compression as in the case of a chronic subdural hematoma. After reviewing the available literature available on the concurrence of EDH with hemiparesis we could not find any comprehensive study discussing the incidence, outcome or the factors affecting the outcome of hemiparesis in patients of EDH. The present study demonstrated that

1. The association between the two entities is common. (10%)
2. The effect of age, sex, interval between trauma and surgery, GCS at presentation, presence / absence of signs of herniation at presentation, associated intracranial injuries and volume of the EDH on the final outcome of the patient.
3. The excellent recovery in motor deficit resulting from timely intervention Studies done on the volume of the EDH at which surgical intervention is mandatory have approximated the intervening volumes at 30 cc[4].

In this study we operated upon EDH with volumes < 35 cc, with contralateral hemiparesis and found that timely intervention (< 24 hours) resulted in complete return of normal power (5/5) in a time range of 7 days to 3 months. Clinical studies of cerebral blood flow and metabolism following severe head injury suggest that the most vulnerable period for cerebral ischemia is the first 24 hours. Both bedside xenon radioisotope study and stable xenon CT have revealed that the lowest blood flow values occur in the first 24 hours. Monitoring of the jugular venous oxygen saturation confirms these findings[5,6,7,8,9].

An epidural hematoma (EDH) greater than 30 cc should be surgically evacuated regardless of the patient's Glasgow Coma Scale (GCS) score[4]. An EDH less than 30 cc and with less than a 15-mm thickness in patients with a GCS score greater than 8 with focal deficit should be operated on an emergency basis to ensure complete return of motor power.

CONCLUSION

This study brought to light the clinically significant association of extradural hematomas and concurrent motor deficits. We found that timely intervention in patients presenting with mild head injury enabled us to achieve complete recovery of motor power in the young bread winning population, most affected by this injury. Contributing factors included the concurrence of signs of herniation and associated parenchymal injuries. However, the small sample size did not let us attain statistical significance and optimal power. Therefore we do not have sufficient evidence that the results of our study be generalized to the population of interest. This is the limitation of our study. We suggest a multi-centric study with a larger sample size to answer these questions.

REFERENCES

1. Borozone M, Gantiles, Perriac,et al: Epidural Hematoma. *Surg Neurol 1979; 11: 277-84.*
2. Kothari RU, Brott T, Broderick JP, Barsan WG, Sauerbeck LR, Zuccarello M, Khoury J. The ABC of measuring intracerebral hemorrhage volumes. *Stroke 1996; 27:1304–5.*
3. Azadeh Farin, Reena Deutch, Anat Biegon, Lawrence F Marshall. Sex related differences in patients with severe head injury: Greater susceptibility to brain swelling in female patients 50 years of age and younger. *J Neurosurg 2003; 98:32-6.*
4. Ross Bullock M, Randall Chestnut, J Ghajar, D Gordon, R Hartel, DW Newell. Surgical management of acute epidural hematoma. *Neurosurgery 2006; 58:S2-S15.*
5. Gerrit J Bouma, J Paul Muizelaar, Sung C Choi, Pauline G Newlon, Harold F Young. Cerebral circulation and metabolism after severe traumatic brain injury: The elusive role of ischemia. *J Neurosurg 1991; 75: 685-93.*
6. Kwan – Hon Chan, J Douglas Miller, N Mark Dearden, Peter JD Andrews, Susan Midgley. The effects of changes in cerebral perfusion pressure upon middle cerebral artery blood flow velocity and jugular bulb venous oxygen saturation after severe brain injury. *J Neurosurg* 1992; 77: 55-61.
7. Michael Sheinberg, Malcolm J Kanter, Claudia S Robertson, Charles F Contant, Raj K Narayan, Robert G Grossman. Continuous monitoring of jugular venous oxygen saturation in head injured patients.

J Neurosurg 1992; 76: 212-7.

8. Gerrit J Bouma, J Paul Muizelaar, Warren A Stringer, Sung C Choi, Panos Fatouros, Harold F Young. Ultra- early evaluation of regional cerebral blood flow in severely head injured patients using xenon-enhanced computerized tomography. *J Neurosurg 1992; 77: 360-8.*
9. CS Robertson, CF Contant, ZL Gokaslan, RK Narayan, RGGrossman. Cerebral blood flow, arterio venous oxygen difference, and outcome in head injured patients. *J Neurol Neurosurg Psychiat 1992; 55: 594-605.*