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RESEARCH ARTICLE

CLINICAL INDICATORS OF SURVIVAL IN PATIENTS WITH BILATERAL TRAUMATIC INTRACRANIAL HEMATOMAS

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Glossary of Abbreviations:

CT - Computed Tomography,
EDH – Extra Dural Hemorrhage,
GCS – Glassgow Coma Scale,
SDH – Sub Dural Hemorrhage,
TBI – Traumatic Brain Injury.

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ABSTRACT

Aim: To assess the impact of clinical features like pre-operative GCS and status of pupils on the survival of patients presenting with combination of EDH+EDH, EDH+SDH and SDH+SDH on the opposite sides. **Materials and Methods:** 79 patients admitted in the Institute of Neurology, Rajiv Gandhi Government General Hospital & Madras Medical College, Chennai, with bilateral traumatic intracranial extra parenchymal haematomas were included in this study. Acute, bilateral, traumatic, intracranial-extraparenchymal haematomas that is composed of EDH+EDH, EDH+SDH and SDH+SDH patterns were included in the study group. CT-Brain was done in all patients. In patients having bilateral intracranial haematomas, the GCS and the condition of pupils on admission were ascertained and documented. The impact of these factors on the survival of the patients was analysed. The data was subjected to statistical analysis and a "p" value of less than 0.05 was supposed to indicate a positive association of the results and survival. **Results:** The patients who had a low GCS score had higher mortality rate when compared to patients with GCS score of more than 9 and the patients with a normalpupils had better survival rate than patients with pupillary asymmetry in the pre-operative phase **Conclusion:** The statistically significant positive correlation of the included clinical factors makes the early clinical assessmenta useful tool in the assessment of the survival in patients with combination of intracranial haematomas on the opposite sides.

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INTRODUCTION

Traumatic brain injury (TBI) affects up to2% of the population per year and constitutes the major cause of death and severe disability among young people. Road traffic injuries account for 2.1% of global mortality. The developing countries bear a large share of burden and account for about 85% of the deaths as a result of road traffic crashes. India accounts for about 10% of road accident fatalities worldwide. Head injury is the leading cause of death in our country. Intracranial haematoma plays an important role in the death and disability that are associated with head injury. There are many studies on intracranial extraparenchymal lesions viz. extradural haematoma (EDH) and subdural haematoma (SDH). Studies on bilateral EDH and bilateral SDH have been presented. But very limited literature is available in patients presenting with combination of EDH+EDH, EDH+SDH and SDH+SDH on the opposite sides.

The pathophysiology of both these lesions is different. This poses a challenge to the treating neurosurgeon. Guidelines for the Management of Traumatic Brain Injury are available in cases of EDH and SDH. But there are no clear cut guidelines when a patient presents with EDH+EDH, EDH+SDH and SDH+SDH on the opposite sides.Here an attempt has been made to study patients presenting with "Acute bilateral traumatic intracranial – extra parenchymal haematomas". The high association of SDH with focal brain lesions is atleast partially responsible for higher mortality rate (Setti, ?). Annual incidence of acute subdural haematoma is 2–5 per 100,000. Incidence correlated to frequency of traumatic brain injury. The common causes leading to SDH are road traffic accidents, falls, assault, objects falling on head or sometimes unknown. Incidence of bilateral EDH has been variably reported ranging from 2-25% (Huda *et al.,* 2004; Gupta *et al.,* 1992; Ramzan, 2002; Rasmussen, 1992; Agrawal, 2011). Highest numbers of the victims were in the most active period of life i.e. the third decade, closely followed by second decade (Chowdhury

Noman Khaled, 2008). Moreover, there is a need for modalities easily available even in rural areas to predict the outcome in patients with combination of EDH+EDH, EDH+SDH and SDH+SDH on the opposite sides. One such easily available tool is the assessment of the clinical status of the patient using the GCS and pupillary asymmetry.

MATERIALS AND METHODS

79 patients admitted in the Institute of Neurology, Rajiv Gandhi Government General Hospital & Madras Medical College, Chennai, with bilateral traumatic intracranial extra parenchymal haematomas were included in this study.

Inclusion criteria: Acute, bilateral, traumatic, intracranial-extra parenchymal haematomas that is composed of EDH+EDH, EDH+SDH and SDH+SDH were included in the study group.

Exclusion criteria

- Intra parenchymal haematomas
- Chronic intracranial haematomas
- Nontraumatic intracranial haematomas
- Posterior fossa haematomas

On admission patients clinical profile such as age, sex, admission GCS, status of pupils, presenting symptoms and signs were recorded. All patients were subjected to CT scan brain plain study. In patients having bilateral intracranial haematomas the following features were noted – type of haematoma, site of haematoma, volume of haematoma, midline shift, condition of cisterns and associated lesions. Patients were either managed conservatively or by surgical evacuation of intracranial haematomas. Outcome analysis was done at the time of discharge. Patients with GCS score of less than 9, pupillary abnormality, compression of the cisterns, combined haematoma volume of more than 30ml, patients whose GCS score decreased by 2 from the initial GCS score and CT features suggesting expansion of the haematoma were treated by surgical evacuation of haematoma within 4 hours of admission. In this study the patients were grouped as follows based on their GCS

GROUP 1 – GCS 3 – GCS 8
GROUP 2 – GCS 9 – GCS 13
GROUP3 – GCS14 & 15

The various factors mentioned were documented at the time of admission. The clinical parameters like GCS and status of pupils were considered. The obtained data were subjected to statistical analysis and were correlated to the survival of the patients. A "p" value of less than 0.05 was considered to denote a statistically significant positive correlation between the factors and survival.

RESULTS

In Group 1 (39 patients) 6(15.4%) survived and 33(84.6%) expired.

In Group 2 (21 patients) 18(85.7%) survived and 3(14.3%) expired.

In Group 3 (19 patients) 18(94.7%) survived and 1(5.3%) expired. Patients with low GCS score had higher mortality rate when compared to patients with GCS score of more than 9. There is a statistically significant positive correlation between GCS and patient survival.

Table 1. GCS VS Outcome

GCS Group	Outcome				Total
	Survived	%	Expired	%	
1	6	15.4	33	84.6	39
2	18	85.7	3	14.3	21
3	18	94.7	1	5.3	19
Total	42		37		79

Table 2. Pupil vs Outcome

Pupil	Outcome				Total
	Survived	%	Expired	%	
Normal	34	82.9	7	17.1	41
Abnormal (Asymmetry)	8	21.1	30	78.9	38
Total	37		42		79

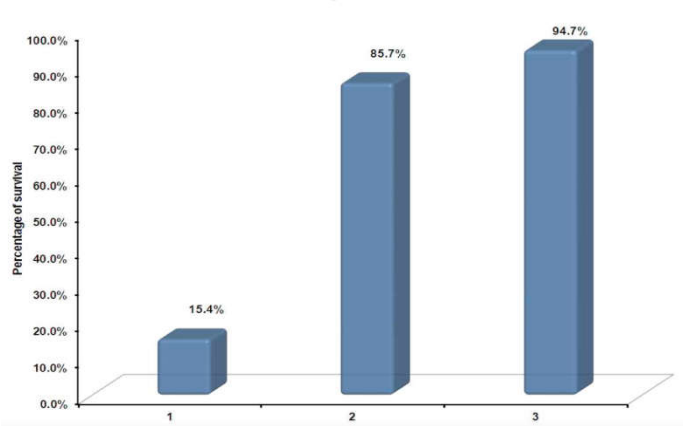

Fig. 1(gcs vs outcome)

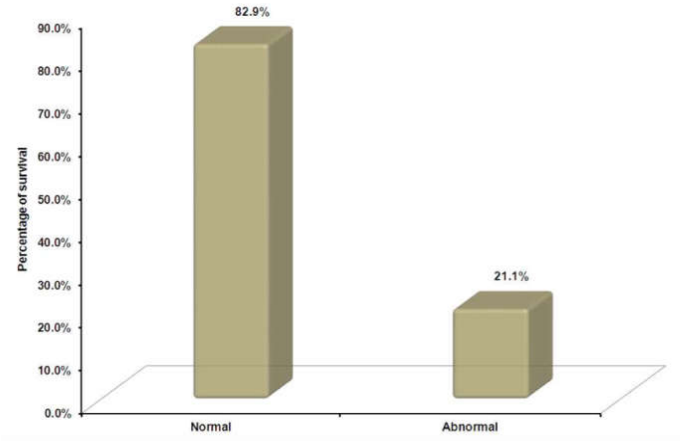

Fig. 2. (Pupil vs Outcome)

There is correlation between GCS vs. Outcome (P-value – 0.000<0.05). In patients with nomal pupil (41 patients) 34 (82.9%) survived and 7 (17.1%) expired. In patients with pupillary asymmetry (38 patients) 8(21.1%) survived and 30(78.9%) expired. Patients with normal pupils had better survival rate than in patients with a pupillary asymmetry. There is a statistically significant positive correlation between pupil status and patient survival. There is correlation between Pupil vs. Outcome (P-value – 0.000<0.05).

DISCUSSION

Management

Subdural haematoma: Patients with small acute SDH thinner than 5 mm on axial CT images without sufficient mass effect can cause midline shift or neurological signs and this can be observed clinically with frequent neurological examination. The use of sequential CT scanning is important. Serial imaging is done to document haematoma resolution because an acute SDH that is treated conservatively can evolve into a chronic haematoma. Another indication for surgery is an Expanding haematoma noted on serial diagnostic imaging, even if the neurological status of the patient is near normal. Bullock et al recently reported that "an acute SDH with a thickness greater than 10 mm, or a midline shift greater than 5 mm on CT scan should be surgically evacuated, regardless of the patient's GCS score (Bullock, 2000)."

Extradural haematoma: The recently published "Guidelines for the Surgical Management of Traumatic Brain Injury" recommended that patients who exhibit an EDH that is less than 30 ml, less than 15-mm thick and less than 5-mm midline shift, without a focal neurological deficit and GCS greater than 8 can be treated nonoperatively. Early follow-up scanning should be used to assess a further increase in haematoma size prior to deterioration. Delayed epidural formation has been reported. If a rapid size increase is noted and/or the patient develops anisocoria or a neurological deficit, then surgery is indicated. Any symptomatic EDH, an acute asymptomatic EDH with more than 1cm maximal thickness, midline shift of more than 5mm, volume more than 30ml, posterior fossa EDH and paediatric patients with EDH are the indications for surgery. When operation is performed early, the prognosis is good (Rasmussen, 1992). Patients comatose at operation usually evidenced a more rapid clinical deterioration and tended to have a large haematoma volume, a higher incidence of mixed CT density clot (hyperacute bleeding), more marked shift of midline structures, more severe associated lesions, and higher postoperative ICP levels (Rivas *et al.,* 1988). Occasionally, the bone flap (decompressivecraniectomy) may not be reattached. This occurs when significant intracerebral swelling or injury is noted on the initial CT scan or encountered during the operation

Outcome and prognosis: EDH or SDH <1 cm thick can be safely managed nonoperatively unless there is concomitant cerebral oedema (De Souza *et al.,* 2007).

Acute subdural haematoma: The outcome from acute SDH has been generally unsatisfactory. Most series in the literature report a mortality of over 50 percent and none records a mortality of less than 35 percent (Setti, ?). Other factors associated with markedly increased morbidity and mortality were increasing age, GCS, associated intraparenchymal contusion, compression of basal cisterns and presence of subarachnoid haemorrhage on CT (Damianos *et al.,* 1995). Croce, et al. (2004). reported a functionally independent outcome in 93% of the patients conservatively managed presenting acute SDHs that measure 10 mm or less at the thickest diameter and a GCS>11. Patients who are alcohol abusers have a higher incidence of morbidity and mortality after acute SDH than nonalcoholics (Sonne, 1992). Multivariate logistic regression analysis indicated that age, preoperative GCS score, brain herniation and the time from trauma to decompression were independently associated with mortality (TIAN Heng-li, 2008).

Acute Extradural Haematoma: According to Chowdhury et al[7] the highest mortality was found in patients of EDH with subdural haemorrhage and a GCS between 3 and 5. Factors that affect the outcome in EDH are midline shift, traumatic subarachnoid haemorrhage, obliteration of the basal cisterns, thickness of blood clot and haematoma volume, cerebral contusion and fracture of skull bone[7]. Another important consideration is the timing of repeat CT scan. Sullivan et al have shown that EDH enlargement occurs within 36 hours and a repeat CT is useful at this time .EDH enlargement occurred in 23% of patient and mean time to enlargement was 8 hours of injury (Dubey, 2004; Bezircioglu, 1996; Bullock, 1985; Giordano, 1985; Sullivan *et al.,* 1999). Management of patients with bilateral traumatic intracranial haematomas is a challenge because of the multiple factors involved in causation of injury, progression of clinical course, associated intracranial lesions and co-existing morbid medical conditions. Various factors like age, presenting GCS, neurological status, associated intracranial lesions, major medical conditions etc. affecting the outcome of management of bilateral EDH and bilateral SDH have been studied. In this study of heterogeneous group of patients presenting with combinations of EDH/EDH, EDH/SDH and SDH/SDH, an attempt has been made to analyze clinical factors such as pre-operative GCS and status of pupils through basic bed side clinical examination and their impact on survival of patients. A series of 79 cases were evaluated.

GCS: Patients with low GCS score had higher mortality rate when compared to patients with GCS score of more than 9.GCS score is an extremely important predictor of mortality. [P23] Patients initial GCS and postresuscitative GCS score has been shown to correlate reliably with outcome[1].GCS before surgery is the single most important predictor of outcome in patient with EDH undergoing surgery[21, 22, 23].A lower GCS has been associated with a worse outcome in most studies[13, 24, 25].

Status of pupils: Patients with normal pupils had better survival rate than in patients with abnormal pupils.

Conclusion

To assess the survival in patients with Bilateral Traumatic Intracranial Hematomas in The Opposite Sides, an easily available, access able to all and low cost tool is essential. The survival of patients in the post-traumatic period has a binding on the productivity of the patients. Clinical status of the patient is one such tool. The statistically significant positive correlation of the clinical factors included in this study like GCS and status of pupils on admission makes clinical assessment a useful tool in the assessment of the survival in patients with combination of intracranial haematomas on the opposite sides

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