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Surgical management of traumatic extradural haematoma: Experiences with 610 patients and prospective analysis

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Abstract : This study was carried out to find out the age, sex, mode of injury, localization, clinical presentation, CT findings, operative measures and outcome of extradural haematoma in the patient population at Dhaka Medical College. 610 consecutive patients with cranial extradural haematoma who underwent surgery in department of Neurosurgery from 1st January 2006 to 6th October 2008 were included in this prospective study. Each of the patients were evaluated in term of age, sex, mode of injury, localization of haematoma, clinical presentation, CT findings , operative measures and outcome. Out of 610 cases 86.32 % were male and 13.78 % were female. The male and female ratio was 6.27: 1. Age ranged from 2.5 to 83 years. Commonest age group was 21 to 30 years. Commonest mode of injury was Road traffic Accident 53.45%, followed by Assaults. Most common clinical presentation was headache / Vomiting 63.61 %, followed by altered sensorium 60.66 %. In this present prospective study of 610 cases of EDH, temporo parietal site was involved in 33.45 % followed by frontal region in 23.28 %. Sixty five patients (10.66 %) died; 19 of these had associated brain injuries and 28 cases were deeply unconscious. Extradural haematoma is a neurosurgical emergency where early surgical intervention is associated with the best prognosis. Many factors affects the outcome of extradural haematoma surgery and the most important one is the duration of time between incident/accident and operation in neurosurgical operation theater; mortality can be close to 0% if this time interval can be minimized.

Keywords: extradural haematoma, head injury

INTRODUCTION

Head injury is the leading cause of death in the age group of 16 to 40 years[1]. Extradural haematoma, (EDH) a collection of blood between the skull and dura mater due to bleeding from extra cerebral vessel is a common complication of head injury, often fatal if not treated in time[2]. The incidence of EDH among traumatic brain injury (TBI) patients has been reported to be in the range of 2.7 to 4%[3]. The availability of computed tomography (CT) has increased the diagnosis of extradural haematomas. Among patients in coma, up to 9% harbored an EDH requiring craniotomy[3,4]. The peak incidence of extradural haematoma (EDH) is in the second decade of life and mean age of patient with EDH in different series is between 20 and 30 years of age[3,5-17]. Extradural haematoma is very rare in extremes of ages. Mortality rate vary from 10 – 40% and is an index of alertness and efficiency of health care and hospital setup in a country[18]. Actually extradural haematoma, is considered among the most rewardingly responsive traumatic lesions treated by neurosurgeon. The early mortality rate was 86% [19], which has reduced now by introduction of CT and proper resuscitative measures and timely surgical intervention to 5 to 12%[9]. We analyzed 610 consecutive cases with EDH who underwent surgery over a period of 2 years and 7 months from January 2006 to July 2008, in order know the demographic picture of EDH, to determine the independent influencing factors and surgical outcome and also to evaluate our current management strategy in dealing with EDH.

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MATERIALS AND METHODS

This study includes 610 consecutive patients underwent surgery for EDH in the Department of Neurosurgery of Dhaka Medical College Hospital between 1 January 2006 and 31 July 2008. Each of the patients were evaluated in term of age, sex, mode of injury, localization of haematoma, clinical presentation, CT findings , operative measures and outcome.

OBSERVATIONS AND RESULTS

Six hundred ten EDH patients were surgically managed in the Neurosurgery Department of Dhaka Medical College Hospital from 1st January 2006 to 31st July 2008. Of these, 86.32 % were male (n= 528) and 13.78 % were female (n = 84). Male and female ratio was 6.27: 1. Age of the patients were ranged from two and half years to 83 years. Commonest age group involved was 21 to 30 years (n=180, 29.51%), followed by 11 to 20 years age group (n=168, 27.55%). We found the commonest mode of injury was road traffic accident (RTA) (n=326, 53.45%) followed by assaults(n=172, 28.20%). Most common clinical presentation was headache/vomiting (n=388, 63.61%) followed by altered sensorium (n=370, 60.66%). Fifty two patients (8.53%) were deeply unconscious at the time of admission, while 111 patients (18.20%) had pupillary abnormalities. Unilateral mydriasis was present in 93 patients (15.25%) and 18 patients (2.96%) had bilateral mydriasis.

In this present prospective study of 610 cases of EDH, temporo-parietal site was involved in 33.45 % (n = 204) followed by frontal region in 23.28 % (n = 142). Six patients (0.98%) had EDH in posterior fossa. Associated injuries were present in 198 patients (32.46%). All the cases were operated on emergency basis. The patients treated conservatively were not included in this study. Those who treated conservatively had small haematoma, haematoma thickness was < 1 cm with no midline shift on CT scan with GCS score were 14 and above. These patients were very closely monitored clinically and follow up CT scan was done to asses clot size. We had to operate on 11 such cases when patient's level of consciousness and GCS score were deteriorated and repeat CT scan showed increase in size of haematoma. Sixty five patients (10.66 %) died. None in conservative management group. Among these 65 patients, 19 had associated brain injuries, 28 cases were deeply unconscious and 18 of these had fixed pupil / pupils at the time of admission.

Table 1: Age Distribution of population (n =610)

Age in years	Number of population	Percentages
0 - 10	78	12.79
11 – 20	168	27.55
21 – 30	180	29.51
31 – 40	106	17.38
41 – 50	48	7.87
51 – above	30	4.92

Table 2: Mode of Injury

Cause of injury	Number of population	Percentage
RTA	326	53.45
Assaults	172	28.20
Fall from height	94	15.41
Fall of heavy weight on head	18	2.96

Table 3: Clinical Presentations

Signs / Symptoms	Number of population	Percentages
Lucid interval	196	23.94
Headache / Vomiting	388	63.61
Altered sensorium	370	60.66
Neurodeficit	282	29.84
Bradycardia	158	25.91
Pupillary changes (Unilateral)	93	15.25
Pupillary changes (Bilateral)	18	2.96

Table 4: Population distributions as per site of Haematomas

Site of Haematoma	Number of population	Percentages
Temporoparietal	204	33.45
Frontal	142	23.28
Parietal	130	21.32
Temporal	74	12.14
Frontoparietal	22	3.61
Parieto-occipital	24	3.94
Occipital	8	1.32
Posterior fossa	6	.98

Table 5: Associated injuries

Associated injuries	Number of population	Percentages
Fracture	452	74.09
Acute Subdural Haematoma	36	5.91
Contusion / ICH	162	26.56

DISCUSSION

This prospective study include only surgically managed cases of EDH. Since the introduction of CT scan as the imaging study of choice to detect intracranial lesion after trauma[3], it is now possible to detect not only EDH but also identification of additional features that effect the outcome such as midline shift (MLS), traumatic subarachnoid haemorrhage, obliteration of the basal cisterns, thickness of blood clot and haematoma volume, cerebral contusion and fracture of skull bone. EDHs are nearly always caused by, and located near a skull fracture. The collection takes several forms in terms of size, location, speed of development and the effect they exert on patients. EDH usually forms within a matter of hours from the time of injury but sometimes run a more chronic course, being detected only days after injury[5]. There were no cases of chronic EDH which is a well recognized entity[9,20].

EDH can results from injury to the middle meningeal vessels, the diploic veins or the venous sinuses. Historically, bleeding middle meningeal artery considered as the main source for EDH. In a recent report on EDH in 102 paediatrics patients and 387 adults, arterial bleeding identified as the source of EDH in 36% of adults and in 18% children with EDH[3,21]. All cases of this series had their surgery within 48 hours following admission. This study provided us the opportunity to observe the various aspects of EDH and evaluate our ongoing management procedure. In this series, patients' age ranged from two and half years to 83 years. Highest numbers of the victims were in the most active period of life i.e. the third decade (n=180, 29.51%) closely followed by second decade (n=168, 27.55%). Only 30 patients (4.92%) were above the age of 50 years. But in reported series, 2 – 14 % of patients are above the age of 60[11, 22-24], peak incidence of EDH being in the second decade and the mean age of patients with EDH is between 20 and 30 years of age[6-8,10,11,13-17,25,26] . In the present study, male-female ratio of 6.27: 1 is reflection of our social culture where most of our females are housewives and are not exposed to external works. The male dominance among the victims of EDH is recognized with only 7 - 26 % of cases in different series being female[10,11,23,24]. In this series, road traffic accidents (RTA) was the commonest cause of injury comparable with many other published series[2,3,6,12,13,14,21, 25,27-29] but is contrast to Baykenar et al[22], Ersahin et al[30]. In pediatric age group, fall was the leading cause of EDH. In various reported series, EDH is more frequently located in the temporoparietal and temporal region as compared with other locations[2,3,6,15,21,22,24,31-35]. Royal Melbourne Hospital series of 200 cases of EDH showed 66 % in temporal, 11 % in frontal, 7 % in parietal, 8 % in occipital and 9 % in posterior fossa[36]. According to our finding, location of EDH is highest in the temproparietal region followed by frontal, parietal, temporal region respectively. There were no correlation statistically between the site of EDH and mortality although high mortality has been reported in association with EDH in the temporal region[6,30,37].

The classically described "lucid interval" was observed in 20 – 50% cases[38]. We observed it was only in 23.94% cases (n =146). It is similar to Babu et al who observed it in only in 20% cases[18]. Literatures shows 12 to 42 % of patients remained conscious throughout the time between trauma and surgery[3,6,10,13,25], and pupillary abnormalities are observed in between 18 and 44% of patients[3]. Bradycardia is a reliable sign of increasing ICP but is seen only in small number of cases and can present in absence of EDH. If there is mild neck stiffness with respiratory irregularities and bradycardia, posterior fossa haematoma should be suspected. Associated intracranial lesions are found in between 30 and 50.5% of adults with surgically evacuated EDH[3,4,6,9,13,15,21,25,39,40], and these are predominantly contusion; intracerebral hemorrhages followed by subdural haematoma and diffuse brain swelling[3,4,6,9,15], and It is recognized that patients with lower GCS score at presentation had higher incidence of an intradural damage with EDH[9,41,42] . Lee et al[13] identified associated brain lesions as one of four independent predictors of unfavorable outcome after surgery for EDH and this has been confirmed by several others[3,8,9,39], other three being low GCS,pupillary abnormalities and raised ICP[3]. GCS before surgery is the single most important predictor of outcome in patient with Extradural Haematoma undergoing surgery[3,12,13,17,25,41]. The highest mortality (74%) was found in patients of EDH with subdural haemorrhage and a GCS between 3 and 5. Patient with an EDH and a GCS of 3 to 5 had a mortality of 36% and patients with an EDH and a GCS of 6 to 8 had a mortality of only 9% [3].

CONCLUSION

Extradural haematoma is a well recognized and most rewarding neurosurgical emergency. It must be recognized and evacuated early to prevent potential mortality and morbidity. From our experience of 610 surgically managed cases we can conclude that when

surgical treatment is indicated, early surgical intervention is associated with the best prognosis. Many factors affects the outcome of extradural haematoma surgery and the most important one is the duration of time between incident/accident and operation in neurosurgical operation theater; mortality can become near to nil if this time interval can be made as short as possible

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