DISCUSSION

Approximately 1.4 million emergency department (ED) visits for traumatic brain injury (TBI) occur each year in the United States. Although 80% of these patients are categorized as having only mild injuries, approximately 235,000 patients are hospitalized annually and about 50,000 patients with TBI die as a result of their injury. About 5.3 million US residents are living with TBI-related disabilities, including long-term and psychological impairments. The economic cost of TBI in 2010 was estimated at $76.5 billion dollars, including both direct and indirect costs, but excluding combat-related TBI treatments.[1]

Traumatic extradural hematoma (EDH) is a well recognized surgical complication of head trauma. The incidence of EDH among traumatic brain injury (TBI) patients has been reported to be in the range of 2.7 to 4%.[2] Among patients in coma, up to 9% harbored an EDH requiring craniotomy. EDH is rare in extremes of ages[2,3] and carries a mortality rate of 5-15% .[4]

If not diagnosed and operated in time EDH may lead to a high morbidity and mortality.[5] Favorable outcome could be ensured only if the extradural hematoma is evacuated before the onset of brain dysfunction.[6]

The aim of this prospective study is to study the role of emergency medicine department in the resuscitation phase, diagnosis, decision-making and treatment of cases with acute traumatic extradural hematomas.

In the present study which included 77 patients we observed that EDH is more prevalent in male patients, they comprised 65 males (84.4%) and 12 females (15.6 %). These findings are similar to what found by Rehman et al.[108] from Pakistan . In their 38 patients' series, there were 3 females (7.9%) and 35 males (92.1%) with male to female ratio of 11.7:1. This is reflection of our social culture where most of our females are housewives and men are more exposed to traumatic injuries such as road traffic accidents, assaults and falling down.

In this series, patients' age ranged from 9 months to 62 years. Highest numbers of the victims were in the most active period of life i.e. the third decade (n=24, 31.2%) closely followed by second decade (n=22, 28.6%). These patients have a higher exposure to risk situations such as driving at high speed without the use of safety belts or riding motorcycles without a helmet, making them more vulnerable to head injuries and epidural hematomas. In elderly patients EDH is less frequent because of strong adhesion of the dura to the skull, hampering the detachment and accumulation of blood. In children, as the osseous groove that houses the middle meningeal artery is not yet fully formed, injury of this artery is less frequent.[109] Very young infants have a lower incidence presumably due to the pliable nature of the skull that resists fracturing. In our study Only one patient (1.3%) were above the age of 60 years and six patients under the age of 10 years. These results are in agreement with Chowdhury et al.[110] In their 610 patients' series, patients' age ranged from 2.5 years to 83 years. Highest numbers were in the third decade (n=180, 29.51%) followed by second decade (n=168, 27.55%).

In the current study it had been shown that road traffic accidents(n=54,70.1%) was the commonest cause of injury. This is in agreement with Cheung et al.[111]In this study, road traffic crashed were reported as the commonest mechanism of injury. However, in the study of offner et al.[112]and Ersahin et al.[113], fall constitutes the most common mechanism of injury.

On admission, GCS in the present study ranged from 3.0 -15.0 with a mean of 12.58 ± 3.25. According to GCS, severity of traumatic brain injury was classified into severe in 11 cases (14.3%), moderate in 17 cases (22.1%) and mild in 49 cases (63.6%). This is accordance with Rehman et al.[108] who reported mild brain injury as the commonest encountered in their study.

The reported clinical signs in the present study showed that vomiting (n=57,74.0%) was the commonest finding. This is in accordance with the study of Rehman et al[108], in which vomiting was the commonest finding and was present in 76% of the patients.

CT findings in the studied patients revealed a hematoma size ranging from (9.4-121.7 cm^3). Royal Melbourne Hospital series of 200 cases of EDH showed 66 % in temporal region.[114] In our series temporal site was involved in 35% (n=27). Once bleeding begins the extradural space is filled with blood. Experimental evidence indicates that arterial bleeding into the resulting pockets creates a hydraulic "water pressure" effect, progressively stripping away the dura from the skull and widening the perimeter of the hematoma.[115] This is because of the thinness of the temporal squamous and the close approximation of the middle meningeal artery and vein to the inner table in this region, 70% of EDH are located in the temporal region.[116] In our series the rest of cases of EDH occurs in the parietal region 31% (n=24), temporoparietal in 12 patients (15.5%), posterior fossa in 3 patients(4%), occipital in one patient (1.3%) and multiple in one patient (1.3%).

Skull fractures were reported in 48 patients (62.3%) and delayed onset extradural hematoma was reported in 3 patient (4%). In the study of Cheung et al.[111] skull fractures were reported in 74.0% of patients and 1.1 % of patients had delayed onset extradural hematoma. EDHs are nearly always caused by, and located near a skull fracture. Fracture, most often linear is present in 30-40% of patients with EDH.[117] It is thought that initial impact with deformation or fracturing of cranium produces detachment of the dura directly beneath the site of the blow and injures blood vessels.[115]

Post-traumatic seizures were reported in our study in 19 patients , Short acting benzodiazepines(neuril) were used to control seizures and phenytoins (Dilantin) were used for maintenance as an anticonvulsant, prophylactic phenytoin may reduce seizures in the first week but has no long-term benefit.[118] In our study, no recurrence of seizures occurred up to one week post-operatively in patients received phenytoin.

In the current study it had been shown that increase intracranial pressure(ICP) occurred in 21 cases, it was noted that increase intracranial pressure was associated with moderate to severe head trauma, bradycardia and irregular respiration, ICP was managed by elevation of the head of the bed to 30-45 degree, Osmotherapy with mannitol, Controlled mild therapeutic hyperventilation (ETCO2 =30–35 mm Hg) in intubated patients, duiretics and sedation as needed, in our study it was found that most patients received mannitol to lower ICP had favourable outcome.

The use of CT scan in head trauma revealed a new class of EDH patients who may be treated conservatively. Such patients should be monitored with frequent neurological examinations and regular serial CT scans to demonstrate resolution of the hematoma and associated midline shift. With such clinical and radiographic monitoring, a subgroup of patients with acute EDH is detected in whom a return of normal mental status will follow loss of consciousness and in whom spontaneous resolution of their hematoma will occur.[119]

Management interventions in the present study included conservative treatment in 46 cases (59.7%) and surgical interventions in 31 patients (40.3%). Cases treated conservatively in our study included small hematoma with no midline shift on CT Scan and without focal neurological lesion. These cases were closely monitored and serial CT Scans done to assess clot size. In 03 cases only out of the conservative management group, we had to operate as repeated scan showed increase in size of clot. We lost 3 patients, not in the conservative management group, the first was multiple extradural hematomas, the second was presented with post-arrest, GCS=3 and posterior fossa extradural hematoma the later was presented with large parietal hematoma and multiple traumatic injuries .

Considering the study outcome, 7 patients out of 77 (9.1%) had unfavorable outcome with 3 patients reported as non survivors (3.9 %). This rate is comparable to that found by Rehman et al.[108] who reported unfavorable outcome in 13.2 % of cases.

Comparison between patients with favorable and unfavorable outcome had shown that patients with favorable outcome had significantly younger age (26.70 ± 14.52 vs. 43.71 ± 8.38; p= 0.026). However , Comparison between sex distribution in both outcome groups didn't reveal statistically significant differences. This is in agreement with Dubey et al.[120] who noted that younger age was a significant predictor of favorable outcome in their study.

Comparison between patients with favorable and unfavorable outcome had regarding the pupillary reaction had shown that patients with unfavorable outcome had significantly higher frequency of abnormal pupillary reaction . This is agreement with cheung et al.[111] who found that of the nine patients who died in their study, all of these patients presented in coma and only one patient had normal pupils at presentation.

In respect to the relation between outcome and GCS and trauma severity, it was found that patients with favorable outcome had significantly higher GCS when compared with patients with unfavorable outcome. Also, unfavorable outcome was associated with more severe brain injury. This is in agreement with Dubey et al.[120]

Regarding the relation between patients' outcome and CT findings, it was found that unfavorable outcome was associated with more hematoma volume, EDH in the posterior fossa and multiple hematoma sites, bilateral hematoma. This is agreement with Dubey et al.[120] who found that the factor influencing management strategy and outcome were volume of extradural hematoma and its location in the posterior fossa.

In contrast, van den Brink et al.[101] found no correlation between EDH volume and GCS , and outcome at six months. Ramzan et al.[121] reported that when an EDH was operated within six hours then EDH volume didn't correlate with outcome. bilateral hematoma and delayed onset of the hematoma were a predictors of unfavorable outcome in

the present study . This is in accordance with Gelabert-Gonz lez et al.[122] from Spain. In their study, the mortality rate in 6 patients with bilateral extradural hematoma was 50.0 %.

In respect to the relation between outcome and management strategies , it was found that patients treated conservatively had a significantly GOS >3 when compared with those treated surgically. The mean time to intervention in patients with GOS >3 was (3.71 ± 0.69) hours compared to (5.29 ± 0.95) hours in patients with GOS≤3. There significant differences between both groups regarding the reported time to intervention. This in agreement with Dubey et al. However, in surgically treated patients, those with GOS >3 had significantly shorter time to intervention when compared with those with GOS ≤ 3. This is in harmony with 123. Paşaoğlu et al.[123] who concluded that the duration of the time interval between onset of trauma and surgical intervention significantly affect patients outcome.

To achieve the best possible outcome, patients with moderate and severe TBI should be transported directly to a trauma center that can perform a CT scan and ICP monitoring and provide prompt neurosurgical intervention. The receiving facility should be notified as early as possible so that appropriate preparations can be made before the patient's arrival. The patient's pulse rate, blood pressure, SpO2, and GCS should be reassessed and documented every 5 to 10 minutes during transport.