Update of Management of Traumatic Extradural Hemorrhage

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Abstract: Objective: is to emphasize the importance of early diagnosis based on head C.T scan and clinical data in choice of conservative vs surgical management. **Aim:** Study factors affecting management (surgical or conservative) of traumatic extradural hemorrhage. **Material and Methods:** 60 patients admitted to the neurosurgery trauma department in Al-Azhar University hospitals between MAY 2016 and July with inclusion criteria: traumatic intracranial extradural hematomas and patients who agree to join study. Exclusion criteria: patients refused to join study, no history of trauma, spinal EDH, predisposing factors for internal hemorrhage, associated another types of intracranial hemorrhage. **Results:** In our study of 60 patients, the conservative management of extradural hematoma continued in 15 patients (25%, group I). Operative management was in 45 patients (75%), 40 patients from start on emergency base (group II) and 5 after trail of conservative management (group III). The commonest site of EDH in group I was temporal area, 16 patients (40%). while commonest site in group II was parietal area, 8 patients (53%), but in group III EDH was present in temporal region and posterior fossa by equal percent 40% (2 patients each group). The source of bleeding was only bone fissure # in 12 patients (20 %) and 9 of them didn't need surgical intervention, the source was only middle meningeal artery or on of its branches in 27 patients (45%) and all these patients were managed surgically, the source of bleeding was combined fissure # with middle meningeal artery or one of its branches injury or dural venous sinus injury in 13 patients (21.6%) and all these cases were managed surgically, the source of bleeding was not detected by C.T in 6(10%) patients and all were managed conservatively. The volume of EDH was less than 30 cm^3 and the thickness was less than 1 cm in all conservatively treated 15 patients and it was enlarged in 5 patients (25% of patients went to be managed conservatively), while the volume was more than 30 cm^3 in and the thickness was more than 1cm all surgically treated 40 patients from the start. **Conclusion:** Conservative management has no role in temporal and posterior fossa EDH. EDH with size>1cm and volume >30cm3 must be treated surgically. EDH due to MMA injury or its branches must be treated surgically.
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Key Words: extradural hematoma, conservative treatment, enlarged EDH, bleeding source, bleeding site.

Abbreviations: C.T: Computerized Tomographic Scanning. EDH: Epidural Hematomas.

1. Introduction

Epidural hematoma (EDH) is a traumatic accumulation of blood between the inner table of the skull and the stripped-off dural membrane. EDH results from traumatic head injury, usually with an associated skull fracture and arterial laceration. (2)

Hemorrhage causing the dura to separate from the bone can occur at any site, But it is most commonly related to bleeding the anterior or posterior branches of middle meningeal vessels. Approximately 70% of extradural hematomas occur in the temproparietal region; while 30% occur in other regions. (9)

The primary diagnostic investigation for extradural hematoma is a CT without contrast; in the majority of cases this will show a hyperdense lentiform (biconvex) extra-axial collection adjacent to calvarium. (3)

Some extradural hematomas with none of associated features mentioned above may be treated conservatively in alert and cooperative patient. Close neurological observation can be maintained and facilities for urgent craniotomy should be available. (8)

2. Material and Methods

In period between MAY 2016 and July 2017 there were 60 patients with traumatic intracranial EDH admitted to the neurosurgery trauma department in Al-Azhar University hospitals.

The inclusion criteria:

•All patients with traumatic intracranial extradural hematomas.

•patients who will agree to join the study according to the ethical considerations and consent will be taken from them.

The exclusion criteria:

•Patients who refuse to join the study.

•Patients without history of head trauma.

•Patient with spinal extradural hematoma.

•Patients with predisposing factors for internal hemorrhage.

•Patients presented with associated another types of intracranial hemorrhage (subdural, intracerebral).

Good history is taken and clinical assessment was done for all patients, initial CT scan was done on admission for all patients, follow up CT was done after 6 hours then after 24 hours from initial CT for patients with EDH treated conservatively.

Patients were classified into 3 groups:

•Group I: patients managed surgically.

•Group II: patients managed conservatively.

•Group III: patients managed conservatively at the start then need surgical evacuation.

3. Results:

Table (1): Comparison between groups according to mode of trauma.

Mode of Trauma	Group I		Group II		Group III		Chi-square test	
	No.	%	No.	%	No.	%	x2	p-value
FFH	12	30.0%	6	40.0%	1	20.0%	2.307	0.679
IHT	12	30.0%	2	13.3%	1	20.0%		
MCA	16	40.0%	7	46.7%	3	60.0%		
Total	40	100.0%	15	100.0%	5	100.0%		

(FFH: *fall from height,* **IHT:** *isolated head trauma,* **MCA:** *motor car accident)*

This table shows no statistically significant difference between groups according to mode of trauma.

Table (2): Comparison between groups according to extradural site on admission.

Extradural Site	Group I		Group II		Group III		Chi-square test	
	No.	%	No.	%	No.	%	x2	p-value
Frontal	5	12.5%	4	26.7%	0	0.0%	45.611	<0.001
Occipital	0	0.0%	1	6.7%	0	0.0%		
Parietal	3	7.5%	8	53.3%	0	0.0%		
Posterior fossa	1	2.5%	0	0.0%	2	40.0%		
Temporal	16	40.0%	0	0.0%	2	40.0%		
Combined	15	37.50%	2	13.40%	1	20.00%		
Occipito-Prietal	0	0.0%	1	6.7%	0	0.0%		
Fronto-Parietal	10	25.0%	1	6.7%	1	20.0%		
Parieto-Temporal	5	12.5%	0	0.0%	0	0.0%		
Total	40	100.0%	15	100.0%	5	100.0%		

P I vs. II = <0.001; P I vs. III = 0.049; P II vs. III = 0.008

This table shows statistically significant difference between groups according to extradural site.

Table (3): Comparison between groups according to extradural thickness (cm) on admission.

Extradural size (cm)	Group I		Group II		Group III		Chi-square test	
	No.	%	No.	%	No.	%	x2	p-value
<0.5cm	0	0.0%	7	46.7%	2	40.0%	60.202	<0.001
>1cm	40	100.0%	0	0.0%	0	0.0%		
0.5-1cm	0	0.0%	8	53.3%	3	60.0%		
Total	40	100.0%	15	100.0%	5	100.0%		

P I vs. II = <0.001; P I vs. III = <0.001; P II vs. III = 0.795

This table shows highly statistically significant difference between groups according to extradural size.

4. Discussion:

Our study shows that the commonest site of EDH in group I was temporal area, 16 patients (40%). while commonest site in group II was parietal area, 8 patients (53%), but in group III EDH was present in temporal region and posterior fossa by equal percent 40% (2 patients each group), this is statistically significant in all groups.

This study show that the commonest site of an EDH is the temporal area alone or extending to parietal region 38.3% of cases, this not agree with:

Miller and Satham, (2007) who reported that approximately 70% of extradural hematomas occur in the temproparietal region; while only 10% are frontal and 10% are in occipital region.

Shepherd, (2004) who reported that 20 to 30% of epidural hematomas occur outside the region of the temporal bone.

In our study the incidence of posterior fossa epidural hematomas among intracranial epidural hematomas was 5% and they were managed surgically 1 from the start and 2 after period of conservative treatment.

This agree with **Roka et al., (2008)** who reported that posterior fossa EDH with low GCS or the hematoma of more than 10 ml volume were subjected to evacuation. Since the volume of the posterior fossa is limited, patients deteriorate early with the development of obstructive hydrocephalus, which is visible in the CT scan in only thirty percent of cases, so posterior fossa EDH is unlikely to be managed.

In our study there were 18 patients with pure temporal region EDH and 16 was managed surgically from the start, and 2 were managed surgically after follow up (no role for conservative management).

This agree with **Dubey et al., (2004)** who found that temporal EDH is unlikely to be managed conservatively as compared to frontal or parietal as it compress on temporal lobe of the brain which compress the brainstem.

In our study patients with GCS 14/15 on admission were 8 cases (13.3 %); and patients with GCS 15/15 on admission were 52 cases (86.6 %) and this shows no statistically difference between groups, we did not report a GCS less than 14.

This not agree with **Dubey et al., (2004)** who reported that (86%) Patients were GCS 13-15, (7%) GCS 9-12 and (7%) GCS 3-8 in his study.

In our study the age of the patients was less than 2 years in 2 patients (3.3%), 2-60 years in 57 patients (95 %) and more than 60 years in 1 patient (1.7%). This gave a clue that the age below 2 years and above 6o years were less susceptible to EDH and the mean age is young age. This shows significat statistically difference between groups.

This agree with a study of **Kvarnes and Trumpy, (2005)** which was done on 107 cases of extradural hematoma and the age varied from 1-75 years with highest incidence in the age group 11-20 years.

IN our study there were 11 female (18.3%) and 49 males (81.6%) by about 4:1 males outnumber females. This shows no statistically significant difference in all groups according to age.

This agrees with:

Duthie et al., (2009) who reported that 70% of their patients were males and 30 % were females. The results are with this study results. Males outnumber females by 4:1.

Malik et al., 2007 *and* **Dubey et al., (2004)** reported that young males are more than female patients, and the majority of the patients were young male with a male to Female ratio of 3.5:1.

IN our study the source of bleeding was only bone fissure # in 12 patients (20 %) and 9 of them didn't need surgical intervention, the source was only middle meningeal artery or on of its branches in 27 patients (45%) and all these patients were managed surgically. The source of bleeding was combined fissure fracture with middle meningeal artery or one of its branches injury or dural venous sinus injury in 13 patients (21.6%) and all these cases were managed surgically. The source of bleeding was not detected by C.T in 6(10%) patients and all were managed conservatively.

This is highly statistically significance in all groups, this agree with **Duthie et al., (2009)**, **Malik et al., (2007)**, and **Dubey et al., (2004)** considered that the presence of fissure fracture has an important role in EDH especially in conservatively treated EDH. It may be a cause of EDH in a number of patients by many means, as fissure fracture causes blood to accumulate in the extradural space; or injury to the MMA or vein.

Duthie et al., (2009) reported that source of EDH is mostly from skull fracture and arterial origin more common venous origin. The middle meningeal artery is the main source of bleeding in extradural hematoma.

In our study of 60 patients, the conservative management of extradural hematoma continued in 15 patients (25%). This means that conservative management is now increased and our protocol of management gives successful results in the treatment of EDH but still operative management is more 45 patients (75%). This agree with:

Bejjani et al., (2004) who reported that Out of 300 cases, 245(80%) cases were operated on emergency basis while rest was treated conservatively (20%), similar to this study. Cases treated conservatively included small hematoma with no midline shift on CT scan and general condition of the patients.

Malik et al., (2007) who reported that the evolution of nonoperatively managed EDH by reviewing 160 conservatively managed patients who were selected from 221 patients with EDH. These selected patients were studied over a period of 5 years at a level 1 trauma center. This represents one of the largest series of patients with EDH who were managed without surgery. The investigators found that approximately one quarter of the EDHs enlarged which is similar to our study 5 cases enlarged of 20 conservatively managed patients.

In our study the volume of EDH was less than 30 cm^3 and the thickness was less than 1 cm in all conservatively treated 15 patients and it was enlarged in 5 patients (25% of patients went to be managed conservatively), while the volume was more than 30 cm^3 in and the thickness was more than 1 cm all surgically treated 40 patients from the start.

This shows highly statistically significance in all groups, this agree with:

Malik et al., (2007) who reported that the thickness did not exceed 15 mm and midline shift did not exceed 5 mm in all patients managed conservatively.

Dubey et al., (2004) also reported that supratentorial EDH with volume more than 30 ml, a thickness more than 15 mm and a midline shift more than 5 mm tended to require surgery.

Duthie et al., (2009) reported that Others factors like a thickness > 15mm and a midline shift > 5mm have also been found to unfavorably influence the outcome.

Summary:

The study was applied in Al Hussein University hospitals on 60 patients, the conservative management of extradural hematoma was 15 patients (25%) and surgical management of extradural hematoma was 45 patients (75%), 40 from the start and 5 after follow up.

There were 11 female (18.3%) and 49 males (81.6%).

The age of the patients was less than 2 years in 2 patients (3.3%), 2-60 years in 57 patients (95 %) and more than 60 years in 1 patient (1.7%).

The number of patients with motor car accident was 26 (43.3%) patients, number of patients with fall from height was 19 (31.6%) patients and number of patients with isolated head trauma was 15 (25%) patients.

Patients with GCS less than 15/15 were 8 cases (13.3 %), and patients with GCS 15/15 were 52 cases (86.6 %), with no focal deficits in our patients.

The site of EDH was parietal in 11 cases (18.3 %); frontal in 9 cases (15 %); temproparietal in 5 case (8.3 %); frontoparietal in 12 cases (20%) and occipital in 1 cases (1.6 %) and temporal in 18 cases (30%) and posterior fossa in 3 case (5%).

Patients who have fracture of their skull 25 (12 only fracture & 13 combined fracture with vessel injury) patients (41.6%) versus 35 patients (58.3%) had no fracture, patients with MCA 26 patients (43.3 %); and with fall from height 19 patient (31.6%); and patients with isolated head trauma 15 cases (25%).

The volume of EDH is less than 30 ml in all conservatively treated 15 patients and it was enlarged in 5 patients that needed surgical intervention.

According to the statistical analysis was done we recommend that conservative management has role in patients with hematoma <1cm size, <30cm3 volume, not due to bleeding from MMA or its branches and not present in temporal or posterior fossa regions.

Conclusion:

Extradural hematoma is a serious complication of head injury requiring immediate diagnosis and surgical intervention. It is mostly surgically managed but nowadays conservative management has role that cannot be underestimated.

Gender, age, mode of trauma, Glasgow coma scale on admission, All these factors have no role in management of extradural volume.

Conservative management has no role in temporal and posterior fossa EDH.

EDH with size>1cm and volume >30cm3 must be treated surgically.

EDH due to MMA injury or its branches must be treated surgically.

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