International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 9; Issue 03 (A); March 2020; Page No.21449-21453
DOI: http://dx.doi.org/10.24327/ijcar.2020.21453.4215

Research Article

SMALL EXTRADURAL HEMATOMA- WHAT TO DO?

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A R T I C L E I N F O

Article History:
Received 13th December, 2019
Received in revised form 11th January, 2020
Accepted 8th February, 2020
Published online 28th March, 2020

Key words:

The goal of this study was to define the clinical parameters that may help in the management of the patient with small epidural hematoma where the hematoma was asymptomatic.

A B S T R A C T

Background: Standard neurosurgical management are likely to mandate prompt evacuation of extradural hematomas to obtain a good outcome. A number of authors have suggested that small epidural hematomas may be managed conservatively with normal outcome and without risk to the patient in selected cases. The goal of this study was to define the clinical parameters that may help in the management of the patient with small epidural hematoma where the hematoma was asymptomatic.
Objective: This study was conducted to find out the factors influencing the decision making of asymptomatic extradural hematoma (No clinical evidence of raised intracranial pressure or focal compression) either surgical or conservative.
Methods: Two hundred patients got admitted with head injury with CT scan findings of small extradural hematoma in the department of Neurosurgery, Dhaka Medical College and Hospital from January, 2015 to December, 2018. All these patients were evaluated on the basis of clinical findings, radiological parameters like size of hematoma, location of hematoma, midline shift and overlying skull fractures etc. The choice of management will be either conservative or surgical intervention.
Results: All 200 patients were diagnosed within 72 hours of trauma and were managed expectantly. Analysis of the patients revealed that age, sex, GCS score and initial size of hematoma are not the risk factors for deterioration. However, skull fracture traversing meningeal artery, vein or major sinuses were seen in 136(68%) patients. One hundred and fifty (75%) patients underwent CT scan of head within 24 hours of trauma. 34(17%) deteriorated and 21(10.5%) patients required surgical evacuation of hematoma.
Conclusion: It may be concluded that patients with small epidural hematoma with a fracture overlying major vessels or major sinuses, diagnosed within 24 hours of trauma are at risk of subsequent deterioration and may require surgical evacuation.

INTRODUCTION

Extradural hematomas (EDHs) frequently present with dramatic neurological deterioration that requires urgent surgical evacuation to prevent severe neurological sequelae or death. Munro and Maltby46 stated that a favorable outcome could be ensured only if an EDH was evacuated before the onset of brain dysfunction. Several authors have reported conservative treatment of small sized hematomas with a good outcome.

However, the experimental work of Ford and McLaurin40 indicates that an EDH achieves nearly full size within a very brief period after the injury, which suggests that these lesions do not grow over a period of many hours following the initial injury. The authors emphasized that subsequent neurological decline may be secondary to cerebral edema, hypoxia or impaired cerebrospinal fluid drainage.

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A small EDH is called asymptomatic if there is no clinical evidence of raised intracranial pressure and no evidence of focal neurological signs by the mass effect from that EDH.

MATERIALS AND METHODS

A series of 200 small extradural haematomas being admitted after a minor head injury were observed in the neurosurgical units of Dhaka Medical College and Hospital, Bangladesh from January I, 2015 to December 31, 2018.

Our study included patients presented with a GCS 34 score of 14 or15 showing noneurological deficits. Cases with minor associated cerebral lesions like subdural haematomas, brain contusions were also included, but only if the EDH was small and producing no neurological deficit to the patient. We evaluated the patients clinically with GCS and other symptoms like headache, vomiting, altered conciousness, convulsion and also radiologically with CT scan of head by some parameters like site, thickness and volume of EDH, associated overlying skull fracture, time interval of CT scan from trauma etc.

RESULTS

Table 1 shows the results about the individual characteristics of the study population. There was no exclusion range for age of the patient. Result shows, males were more affected by the condition 135 (67.5%) and road traffic accident

{110 (55%)} was the single most common cause for the head injury. Other causes reported are fall from height {50 (25%)}, physical assault {22 (11%)} etc. All the patients were conscious and well oriented during admission. GCS 15 was found in 120(60%) and GCS 14 in 80(40%) of patients. All patients with GCS 14 had best eye opening 'E3' which may be due to either pain from primary impact or post traumatic psychological unwellbeing. Some of these patients subsequently deteriorated clinically and/or radiologically who had concomitant other intracranial insults like contusion, subdural hematomas etc. Most of the patients presented with headache {130 (65%)}. Other presentations were vomiting {70 (35%)}, cephal- hematoma {(36%)}, irritability or crying particularly in children {12 (6%)}. Most patients had skull fracture {136(68%)} revealed in CT scan of head. The site of primary impact was temporo-parietal in {120 (60%)} of cases with the runner up in frontal in {40 (20%)} cases. Most patients were diagnosed before 24 hours of trauma {150 (75%)}. The rest were diagnosed between 24 to 72 hours from trauma.

Table 1 Characteristics of the Study Population (n=200)

Parameters	Sub group of Parametres	Number of Patients
Age	4.5 – 42 years	
Sex	Male	135 (67.5%)
	Female	65 (32.5%)
Cause of injury	RTA	110 (55%)
	Fall From Height	50 (25%)
	Physical assault	22 (11%)
	Others	08 (04%)
GCS onadmission	15	120 (60%)
	14	80 (40%)
Presentation at admission	Headache	130 (65%)
	Vomiting	70 (35%)
	Cephalhematoma	72 (36%)
	Iritability/Crying(Children)	12 (6%)
Skull fracture	Present	136(68%)
	Absent	64(32%)
Site of impact	Frontal	40 (20%)
	Temporo-parietal	120 (60%)
	Occipital	20 (10%)
	Combined/Others	20 (10%)
Time from injury to diagnosis	<24 hours	150 (75%)
	24-48 hours	36 (18%)
	48-72 hours	14 (7%)

Table 2 shows CT scan findings. Most of the patients had pure epidural hematoma (EDH) {176 (88%)} followed by EDH with contusion {12 (06%)}, EDH with subdural hematoma {08 (04%)} and EDH with subarachnoid hemorrhage {04 (02%)}. On the basis of localization on CT scan EDH was temporal {87 (43.5%)} and then followed by parietal {41(20.5%)}, frontal {35(17.5%}, occipital {23(11.5%)} and in combination {14 (07%)}. On CT scan of brain maximum thickness of blood hematoma was <10 mm in 78 (39%) patients and followed by 11-15 mm {61(30.5%)}, 16-20 mm {30(15%)}, 21-25 mm {16 (08%)} and >25 mm {15 (7.5%)}. No midline shifting was seenin CT scan in {183 (91.5%)} patients, maximum patients did not have ventricular effacement on CT scan of brain {190 (95%)} and normal condition of basal cisterns{193 (96.5%)}.

Table 2 CT scan Characteristics of Study Population (n=200)

Parameters	Sub group of parameters	Number of patients
Associated lesions	Pure Epidural hematoma (EDH)	176 (88%
	EDHwithSubduralhematoma	08 (04%)
	EDH with Contusion	12 (06%)
	EDH withSubarachnoid hemorrhage	04(02%)
Localization	Temporal	87 (43.5%)
	Parietal	41 (20.5%)
	Frontal	35 (17.5%)
	Occipital	23 (11.5%)
	Combination	14 (07%)
Maximum thickness (in mm)	< 10 mm	78 (39%)
	11-15 mm	61 (30.5%)
	16-20 mm	30 (15%)
	21-25 mm	16 (08%)
	>25 mm	15 (7.5%)
Midline shift (in mm)	No	183 (91.5%)
	Yes (<2mm)	17 (8.5%)
Ventricular effacement	Mild	10 (5%)
	No	190 (95%)
Condition of basal cistern	Normal	193 (96.5%)
	Compressed	07 (3.5%)

Among 34 patients who deteriorated later, most of the patients were admitted within 24 hours of trauma {22 (11%)}. Out of these 13 (6.50%)patientsneeded surgical evacuation of hematoma(Table 3).

Table 3 Timing of Deterioration and Intervention ofStudy Population (n=34):

Timing of admission	No. of patients	Conservative	Surgery
< 24 hours	22 (11%)	09 (4.50%)	13 (6.50%)
24-48 hours	07 (3.50%)	03 (1.50%)	04 (2%)
48-72 hours	05 (2.50%)	01 (0.50%)	04 (2%)
Total	34	13	21

Table 4 Outcome: Study Population (n=200):

Parameter	Number of Patients	Surgery Group	Conservative Group
Good recovery without any sequelae	194 (97%)	17 (8.50%)	177 (88.50%)
Good recovery with minor sequelae	03 (1.50%)	02 (1%)	01 (0.50%)
Death	03 (1.50%)	02 (1%)	01 (0.50%)

Among all 200 patients, 194 (97%) got good recovery and most of them were treated conservatively {177(88.5%)} (Table 4). Among 34 deteriorated patients, most patients got good recovery {29(14.50%)},mostly treated by surgery {17 (8.5%)} (Table 5).

Table 5 Outcome: Among deteriorated patients (34 patients):

Parameter	Number of patients	Surgery group	Conservative group
Goodrecovery without any sequelae	29 (14.50%)	17 (8.50%)	12 (6%)
Goodrecovery with minor sequelae	02 (1%)	02 (1%)	00
Death	03 (1.50%)	02 (1%)	01 (0.50%)

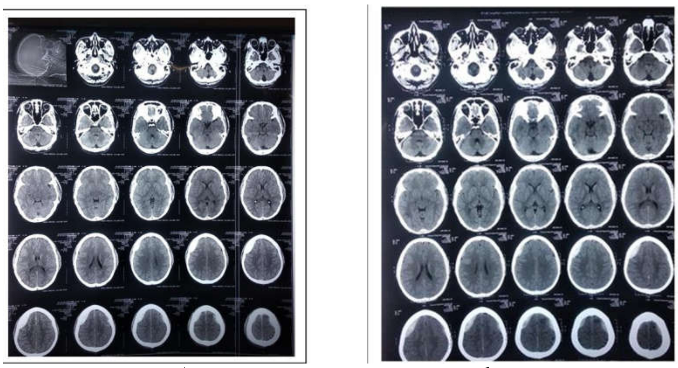

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Figure I (Patient 1): Hematoma size increased but surgery not required. Patient was treated conservatively. (a) CT head on admission (b) CT head on 3rd post admission day .

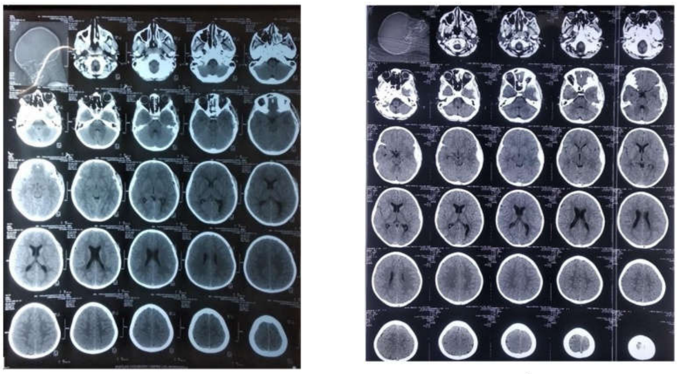

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Figure ii (Patient 2): Hematoma size increased but surgery not required. Patient was treated conservatively. (a) CT head on admission (b) CT head on 3rd post admission day.

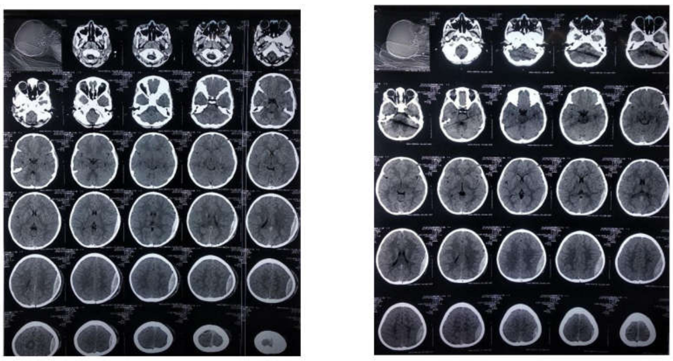

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Figure iii (Patient 3): Hematoma size did not increase. Patient was treated conservatively. (a) CT head on admission (b) CT head on 3rd post admission day.

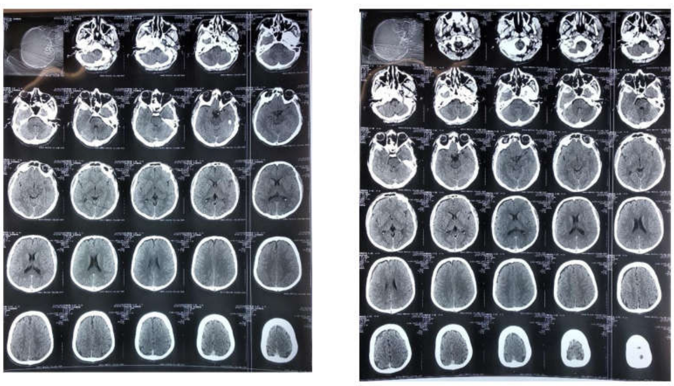

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Figure iv (Patient 4): Hematoma size did not increase. Patient was treated conservatively. (a) CT head on admission (b) CT head on 4th post admission day.

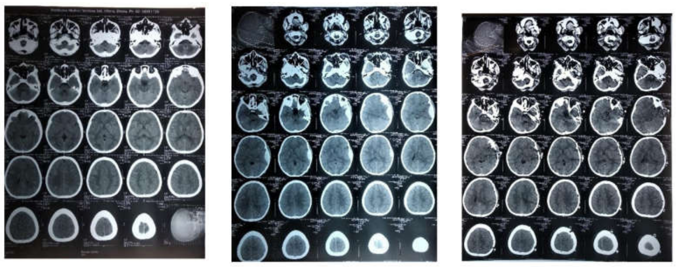

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Figure v (Patient 5): Hematoma size increased. Surgical evacuation was done.
(a) CT head on admission
(b) CT head on 3rd post admission day (c) CT head 2nd Post-operative day.

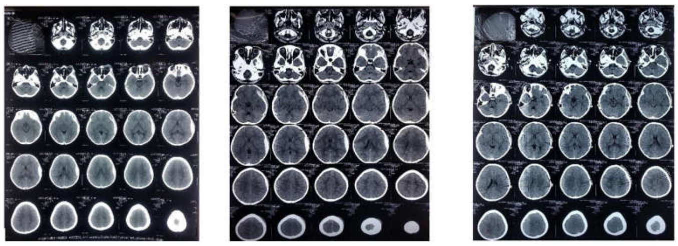

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Figure vi (Patient 6): Hematoma size increase. Surgical evacuation was done.
(a) CT head on admission
(b) CT head on 3rd post admission day (c) CT head 2nd Post-operative day.

DISCUSSION

At first this possibility was attributed to a venous origin of the haematoma that would allow the brain to slowly adapt itself to its presence. Later, McLaurin and Ford40 suggested that the lack of clinical symptoms was not correlated to this venous origin. In fact, they believed that an extradural haematoma has nearly always an arterial origin and it reaches its definitive size within minutes or at the most within hours3. The clinical manifestation20 is the result of the summation of several factors such as the size of the clot, its location and the individual brain tolerance to its presence. Pozzati48 suggested the possible interaction of the two factors (arterial and venous) provided the bleeding sources are of "low tension", while Iwakuma11 thinks bleeding of arterial origin prevails in younger patients.

Temporal and temporo-parietal localizations are present in 60% of our "asymptomatic" cases. This percentage is near to the incidence of temporal localizations in other series of extradural haematoma (in any clinical condition) reported in the CT era.

As early as in 1980 Shields33 speculated that some haematomas may undergo spontaneous re-absorption without surgical evacuation. More recently, several studies 3, 24, 28, 35, 36 confirmed that a selected number of patients may be treated conservatively with success.

The mechanism of haematoma reabsorption was correlated with the formation of a fibrovascular neomembrane functioning as an absorption structure. This process requires many days, with the fastest described as completed in 13 days26, and may undergo periods of expansion between the fifth and the fifteenth day24 but we observed the patients for 72 hours.

The decision not to operate on haematomas having a maximum thickness of less than 10mm with a midline shift of less than 5 mm appears as safe in terms of the results obtained. Temporal location of the haematoma does not allow large lesions to remain asymptomatic rather subsequently may enlarge in size and require surgery.

We think that, facing the challenge of an early diagnosis of asymptomatic extradural haematomas, it is necessary to follow the patients with serial clinical evaluation and CT scan of head to see expansion of hematoma and/or clinical deterioration. In our series, skull fracture was present in the (68%) of patients in CT scan of head. Many of these patients may harbour an EDH underlying the fracture but that may deteriorate the patient as the fracture transmit intracranial pressure towards exterior. To conclude, our study seems to indicate that, extradural haematomas in patients with minor head injury are benign lesions that can be treated conservatively in a well-selected group of cases. Early diagnosis of this recognized asymptomatic EDH and successful conservative management is possible in a large number of cases but will require close follow up to see whether there is expansion of hematoma size and/or clinical deterioration of patients specially in early period of the disease.

CONCLUSION

It may be concluded that patients

1. with small epidural hematoma
2. with a fracture overlying major vessels or major sinuses,
3. Diagnosed within 24 hours of trauma
4. are at risk of subsequent deterioration and may require surgical evacuation.

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How to cite this article:

Dr.Das S *et al* (2020) 'Small Extradural Hematoma- what to do?', *International Journal of Current Advanced Research,* 09(03), pp. 21449-21453. DOI: http://dx.doi.org/10.24327/ijcar.2020. 21453.4215

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