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Non-Operative Management Of Extradural Haematomas

SÜLEYMAN R. ÇAYLI, ETEM BEŞKONAKLI, UFUK SOYLU, HÜSEYİN ANASIZ, YILDIZ YALÇINLAR

Department of Neurosurgery Numune Hospital Ankara - Türkiye

Abstract : A series of 57 patients with acute extradural haematoma (EDH) treated conservatively is reported. The main parameters for conservative management were close clinical supervision, repeated computerized tomography (CT) follow-up and asymptomatic or minimal neurological deficit. The criteria for the decision whether an EDH requires surgical evacuation or non-operative management are discussed.

Key Words : Extradural haematoma, Conservative management, Head injury.

INTRODUCTION

EDH becomes life-threatening only by causing irreversible damage from brain herniation and intracranial hypertension. It is well known that some patients can tolerate the presence of an intracranial haematoma and will recover even if it is not surgically removed. However an increasing number of EDHs treated non-surgically have been reported and the main clinical and CT parameters are discussed(1,6,7,11,13,14,19,21). Between 1990 and 1994, 57 patients with traumatic EDH were treated by conservative methods. The thickness of the EDH, the degree of midline shift on the CT scan and the Glasgow Coma Score (GCS) are the main criteria in our department.

MATERIALS AND METHODS

One hundred and two cases of EDH admitted to our department over a 5- year period are presented. Forty-five cases (44.1%) were treated surgically and 57 (55.9%) were managed conservatively. Cases who did not receive surgical treatment consisted of 17 females and 40 males aged between 3 and 62 years (Mean age 23.3).

RESULTS

Causes of the head injury were classified as follows; 22 road accidents, 32 falls, and 3 assaults. On admission to hospital the GCS was 15 in 28; between 13 and 14 in 16; and 12 in 13 cases. The most frequently observed symptoms were headache and vomiting. All of the cases had CT scans on admission to the emergency department. The intervals between head injury and the first CT scan were: in the first 6 hours for 33 cases, between 6-24 hours 12 cases, between 24 and 72 hours 8 cases and more than 72 hours for 4 cases. The relation of time after injury to diagnosis and haematoma thickness, and midline shift are shown in Tables I and II.

EDHs were bilateral in 5 cases and sited in the following regions; frontoparietal and parietooccipital; bilateral temporooccipital; frontoparietal and temporooccipital; biparietal; frontal and temporooccipital. Therefore we observed 62 locations in 57 cases. Locations were frontal in 10 cases, parietal in 17, temporal in 6, parietooccipital in 9, temporooccipital in 9, frontoparietal in 3 and temporoparietal in 8 cases.

The EDHs had widths between 4-30 mm and extension lengths of at least 3 consecutive 10 mm CT slices. The maximum length was 7 consecutive CT

Table I: Haematoma thickness (in mm) related to time from injury to diagnosis.

Time (hours)	Thickness (mm) 4-15	15-30	N
0-6	27	6	33
6-72	17	6	23
72	4	2	6
	48	14	62

Table II: Shift of the midline related to time from injury to diagnosis

Time (hours)	Shift (mm) 0-5	6-10	N
0-6	21	2	23
6-72	16	1	17
72	1	1	2
	38	4	42

in 3 cases, all with temporoparietal location. The site of the haematoma compared with the haematoma thickness in mm is shown in Table III. The typical biconvex-lens-type conformation was observed in all cases. Forty-one EDHs had a homogeneously high density (Zimmerman and Bilaniuk type II) (23) and there were mixed density of hyper-hypodensity in line with type I in 16, and homogeneously high density with presence of small air bubbles in 5. Forty-two cases had midline shift between 2 to 10 mm measured at the level of the septum pellucidum on CT. There was no demonstrable fracture on plain x-ray or CT scans in 7 cases.

Table III: Site of the haematoma compared with the thickness

Site	Thickness (mm) 4-15	15-30	N
F	7	3	10
P	16	1	17
T	6	–	6
PO	9	–	9
TO	6	3	9
FP	3	–	3
TP	5	3	8
	52	10	62

F = Frontal
P = Parietal
T = Temporal
PO = Parietooccipital
TO = Temporooccipital
PF = Frontoparietal
TP = Temporoparietal

Localized contusion associated with EDH was found in 9 cases. A mass effect on the supratentorial ventricular system such as ventricular asymmetry or ventricular horn compression was observed in 16 cases.

All cases were admitted to the intensive care unit. Level of consciousness and heart rate were monitored during clinical observation. The interval between CT scans was decided according to the clinical status. In the majority of cases, the second CT scan was performed on the second day after admission.

DISCUSSION

The incidence of EDH is 1-4.6% of all head injuries (15,19,22), higher in patients younger than 20-years, but uncommon in infants (1,4,15). CT is the safest and the most reliable method of demonstrating intracranial haematoma. Before the introduction of CT, it was difficult to diagnose such lesions in patients with minimum symptoms and without neurological signs (7,12,23). With the advent of CT, an increasing number of patients with head injury with minor neurological deficits or sings are scanned. The majority of patients with head injuries and 1/3 of patients with EDH seen in hospital emergency departments are fully conscious (2,7,9). Skull fracture on plain x-ray is regarded as an indication for a CT scan (7,16). CT scanning of every minor head injury with a skull fracture has allowed the detection of a large number of asymptomatic haematomas, and EDH is the most frequent lesion of asymtomatic patients with skull fracture (17). It is agreed that except for patients with trivial head injuries, all head injuries require CT scan (18). Approximately 90% of all EDHs are due to injury of middle meningeal artery and branches; vein and dural venous sinus tear is found in about 10% of cases (15) and EDH formation depends on the type and degree of local deformation of skull (5). A typical CT picture of an acute EDH is a homogeneously hyperdense, biconvex collection (20,23).

Many authors agree that neurologically intact or mildly symptomatic patients with small EDHs may not require surgical evacuation and that clinical evaluation for mental criteria, such as the patients must be conscious, awake without or with minimal focal deficits must remain constant over time (7,12, 14,17). CT parameters for evaluation of patients for conservative management are still controversial. It is well known that various factors play a prognostic role in determining the capacity of the brain to tolerate an extradural blood clot. These include rapidity of the formation of the clot, site, size and configuration, and presence of intradural mass lesions (7).

Servadei (16) reported that the size of haematoma, rather than its location, and the degree of midline shift were the factors most influential in deciding in favour of surgical treatment, and a haematoma with a maximum thickness less than 10 mm with a midline shift of less than 5 mm appeared to be safe. According to Pozzatti and Tognetti (14) the maximum width could be less than 15 mm, extending over no more than 4 consecutive 10 mm CT cuts. A significant midline shift over 15 mm constituted a contraindication to conservative management (2,7,8). In our series the EDH thickness in 14 cases was over 15 mm and the maximum thickness was 30 mm. In 3 cases EDHs extended over 7 consecutive 10 mm CT cuts.

The location of the haematoma is important for the clinical course and prognosis. EDH in the temporal fossa has a propensity for rapid deterioration due to uncal herniation, mesencephalic distortion and aqueduct occlusion (3,7,12,14,21). Servadei (16) confirms that the temporal location may also be compatible with successful conservative management, and Pozatti's series (14) included 5 cases of temporal EDH. The posterior fossa is also seen as a contraindication to non surgical management by some authors (12,17). Our series included 6 temporal EDHs with maximum thickness 13 mm, but there was no posterior fossa location.

Patients with the presence of associated intradural lesions such as subdural haematoma, contusion or diffuse oedema have a much less favourable outcome because of reduced intracranial compliance (7,12), but according to some series concomitant cerebral lesions did not influence the decision to operate and the final results of therapy (3,21). In our series there were associated intradural lesions in 9 cases and no effect on the outcome was observed.

According to Knuckey (10), patients with small epidural haematomas diagnosed during the first 6 hours after trauma are at risk of subsequent deterioration and might require evacuation. Some authors claim that the EDH reaches nearly full size within a very brief period after the injury (3,11). Thirty-three cases were diagnosed within 6 hours after injury in our series. In two cases EDH enlarged 2 and 3 mm in diameter but neither required surgical evacuation.

Resorption of EDH begins within the first few days and continues for 4 to 12 weeks after injury (7,12). The longest resorption period was 14 weeks in our series.

CONCLUSION

We believe that; a) GCS must be 12 or over 12, b) shift of the midline structure must be less than 10 mm measured at the level of the septum pellucidum, c) the maximum thickness must be less than 30 mm according to location of the haematoma for conservative management of EDH safely.

And also important are; time between injury and diagnosis, concomitant intradural lesions, temporal fossa location of EDH, extension of haematoma more than 4 consecutive 10 mm CT cuts, bilateral locations of EDHs do not affect their favourable management non—surgically. In our opinion, close clinical observation and repeated CT follow—up are very important conditions for conservative management of EDHs.

Correspondence : Dr. Süleyman R. Çaylı
Salkımsöğüt Sok. No: 18/32
Dikmen, Ankara - Türkiye

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