

# Posterior Fossa Extradural Haematoma: A 12 Year Retrospective Study

N Khursheed MCh, B Indira Devi MCh, S Satish MCh and VRS Kolluri MCh

Department of Neurosurgery, National Institute of Mental Health and Neurosciences, Bangalore (Karnataka)

**Abstract :** Posterior fossa extradural haematoma is a rare entity as compared to supratentorial EDH, but are the most common traumatic space occupying lesion in the posterior fossa. A retrospective study of 61 patients from 1991 – 2001 was carried out to study the clinical spectrum and demographic characteristics of posterior fossa extradural hematomas and assess factors influencing outcome. Clinical features and radiological parameters were analyzed and correlation with outcome was evaluated. GCS score was the most important factor dictating outcome, and children fared better than adults.

**Keywords :** Posterior fossa extradural haematoma, Glasgow Coma Scale [GCS].

## Introduction

Posterior fossa extradural hematoma (PFEDH) is not as common as supratentorial hematoma, but the former is the most common traumatic space occupying lesions in the posterior fossa, representing 25-30% of all traumatic posterior fossa lesions<sup>1</sup>. It can evolve without any warning and then a precipitous deterioration leads to death or poor outcome<sup>2</sup>. PFEDH accounts for about 0.3% of all craniocerebral injuries<sup>3</sup>.

Despite the fact that EDH is the most common traumatic space occupying lesion of the posterior fossa, it seems to have been rarely diagnosed before the advent of CT scan<sup>3</sup>. Meredith<sup>4</sup> encountered two cases among several thousand of head injuries. While supratentorial EDH is suggested when head trauma is followed by depression of consciousness and lateralizing signs, no such stereotype in clinical presentation has emerged from posterior fossa lesions. All too often the diagnosis is entertained only when coma and signs of brain stem compression are present. The 40-60% mortality for PFEDH seems due not only to the intrinsic severity of the untreated lesion, but to difficulty in making a prompt diagnosis as well. Formerly skull radiographs and arteriography were the diagnostic procedures of choice. CT scan has aided in the prompt localization and recognition of this entity<sup>5</sup>. With the advent of CT scanning an increasing number of patients with only minimal neurological symptoms and no signs of brain stem herniation are diagnosed and a better treatment

protocol based on conservative or operative management is being framed<sup>6</sup>.

While the traditional treatment of PFEDH is to have it evacuated surgically, a number of patients with a PFEDH have been successfully treated without operation in a way similar to those with a supratentorial epidural haematoma<sup>7</sup>. Surgical management is a patient is undertaken if the patient shows deteriorating clinical signs and a large hematoma<sup>6</sup>.

## MATERIALS AND METHODS

The study was a retrospective analysis of patients admitted with diagnosis of posterior fossa extradural hematoma (PFEDH) from 1991-2002, a period of 12 years. A total of 68 patients with PFEDH were seen out of which 7 patients were excluded because their CT scans were not available for review. The clinical features evaluated were age, sex, mode of injury, associated injuries, GCS score and other signs and symptoms.

The radiological parameters on CT scan which were included were:

Volume of clot =  $(a \times b \times c)/2$ , (a, b, c, being the length, width and thickness of the clot), status of 4<sup>th</sup> ventricle and status of basal cisterns and associated brain injury.

Various management strategies adopted for the treatment, prognostic indicators and outcome were also evaluated. Outcome was evaluated at the time of discharge by using Glasgow Coma Scale. We used chi-square test for our statistical analysis.

Address for correspondence : Dr. B Indira Devi M Ch,  
Department of Neurosurgery, NIMHANS, Bangalore (Karnataka)  
e-mail: binidira@nimhans.kar.nic.in

RESULTS

Signs and Symptoms

Altered sensorium was seen in 56 (92%) patients. Vomiting and ENT bleed were seen in 35 (57%) and 25(41%) patients respectively. Pupillary asymmetry and hemiparesis were seen in 6 patients each (10%) (Table 1).

Table 1. Clinical Symptoms and Signs

Clinical symptoms and signs	Number of patients (%)
Altered sensorium	56 (92)
Vomiting	35 (57)
ENT bleeding	25 (41)
Pupillary asymmetry	6 (10)
Hemiparesis	6 (10)
Headache	4 (7)
Seizures	4 (7)
Gait ataxia	2 (3)

GCS Scores

Eleven of our patients were in GCS score 3-8 whereas 24 and 26 patients were in GCS 9-12 and 13-15 respectively. There was statistically significant difference in the mortality between the groups based on GCS. (Table 2)

Table 2. GCS score at admission and mortality (n=61)

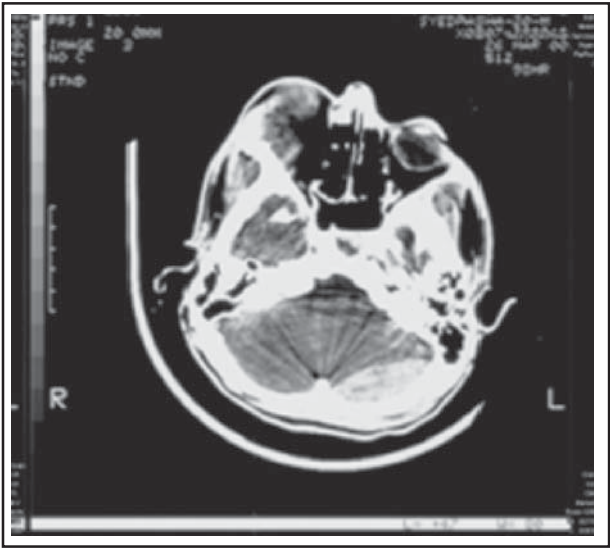
GCS at admission	Number of patients (%)	Mortality (%)
3-8	11 (18)	4 (36)
9-12	24 (39)	3 (12)
13-15	26 (43)	0 (0)

CT Scan Findings

Forty nine patients (80%) had clot volume of > 10ml and 12 (20%) had clot volume < 10ml. Fourth ventricle was normal in 14 (23%) and effaced partially in 34 (56%) and completely in 13 (21%) . Quadrigeminal cistern was normal in 6 (10%) patients and obliterated partially in 21 (34%) and completely in 34 (56%) patients (Tables 3,4,5).

Clinical Parametres, Management and Outcome

There was no mortality in children < 15 years and all mortalities were reported in patients > 15 years. The difference was statistically significant. (Table 6).



CT Scan Showing L Posterior Fossa EDH

Table 3. Clot Volume and Mortality (n = 61)

		Mortality (%)
< 10 ml	12	1 (8)
> 10 ml	49	6 (12)

p=1.000 (not significant)

Table 4. 4<sup>th</sup> Ventricular Status and Mortality (n=61)

CT findings	No. of patients	Mortality (%)
Normal	14	0
Partial obliteration	34	4 (12)
Complete obliteration	13	3 (23)

p = 0.170 (Not Significant)

Table 5. Quadrigeminal Cistern and Mortality (n=61)

CT findings	No. of patients	Mortality (%)
Normal	6	0
Partial effacement	21	1 (5)
Complete effacement	34	6 (18)

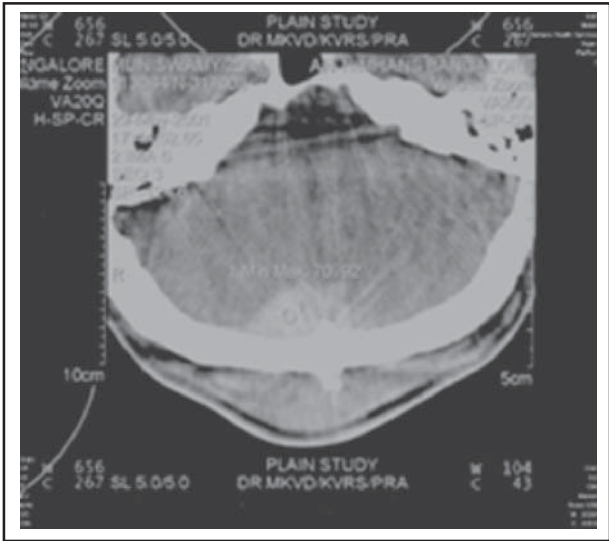
P = 0.2248 (Not Significant)

Table 6. Age and Mortality

Age	N	Mortality	Percentage (%)
< 15 years	22	0	0
> 15 years	39	7	18

P=0.0423 (significant)

Forty eight (79%) patients were operated by sub occipital craniectomy and evacuation of hematoma and 13 (21%) patients were managed conservatively. While there was no death in the conservatively managed group,



CT Scan Showing Midline Posterior Fossa EDH

mortality in the surgically treated group was 15%. The mortality rates were directly proportional to the low GCS score at presentation. Four patients (40%) with GCS 3-8 died whereas 3 patients (14%) with GCS of 9-12 died. There was no mortality in patients with GCS 13-15. The differences were statistically significant. Patients who were managed conservatively improved to GCS-15 at the time of discharge. 7 patients who expired, all were > 15 years of age and 6 (86%) had RTA, only 1 (14%) had history of fall. The GCS at admission was poor. Four patients (57%) had GCS of 3-8 and 3 patients (43%) had GCS of 9. The clot volume was > 10ml in 6 patients (86%) and 10ml in one (14%) patient. Six of these patients (86%) had completely effaced quadrigeminal cistern and clot volume varied from 10-39 ml. However statistical analysis revealed only GCS at the time of surgery to be important and clot volume and status of quadrigeminal cistern are not statistically significant. (Tables 7,8,9)

Table 7. Management Outcome and Mortality

	n = 61	Mortality (%)
Conservative	13	0
Surgery	48	7 (15)

Overall mortality was 15/61 = 11%.

Table 8. GCS, Surgery and Mortality (n=48)

GCS Before Surgery	No. of Patients	Mortality (%)
3-8 10	4 (40)	
9-12 21	3 (14)	
13-15 17	0	

P = 0.0175 (Significant)

Table 6. Age and Mortality

Age	Sex	Mode of Injury	GCS at Admission	Clot volume (ml)	Fourth ventricular status	Quadrigeminal Cistern	Associated CT Findings
30	M	RTA	6	14	Partially effaced	Partially effaced	Supratentorial EDH+fracture occiput
40	F	RTA	7	10	Completely effaced	Completely effaced	Nil
35	M	Fall	7	38	Completely effaced	Completely effaced	Nil
30	M	RTA	9	19	Partially effaced	Completely effaced	Contusion + diffuse brain edema
18	F	RTA	9	18	Partially effaced	Completely effaced	Contusion
18	F	RTA	4	22	Partially effaced	Completely effaced	Contusion + edema + fracture occiput
35	M	RTA	9	39	Completely effaced	Completely effaced	Nil

DISCUSSION

The retrospective analysis included study of all the PFEDH's from 1991-2002 diagnosed at NIMHANS, Bangalore whose records were available. In our study out of a total of 2259 cases of extradural hematomas there were only 68 cases of PFEDH's (3%). Kosary et al<sup>8</sup> in his study reported that PFEDH's comprise 7% of all extradural hematomas. Other authors<sup>9,10</sup> have reported PFEDH comprising 4% to 12.9% of all the extradural hematomas.

In an earlier study from our institute reported by Mohanty et al<sup>12</sup> there were 11 cases (46%) of PFEDH in patients < 15 years and 13 cases (54%) in patients > 16 years. We found 22 cases (36%) of PFEDH in patients less than 15 years and 39 cases (64%) in patients more than 15 years. In our study pediatric cases are relatively less than the adult cases as compared to Mohanty et al<sup>12</sup> but 36% is still a high percentage. The increase in the percentage of patients with posterior fossa EDH in our study who are above 15 years may reflect an increase in the percentage of adult population who are exposed to accident.

In our study 26 patients (43%) had GCS of 13-15, 24 patients (39%) had GCS of 9-12 and 11 patients (18%) had poor GCS of 3-8. Gupta et al<sup>2</sup> (2002) in their study on 18 patients found 78% of patients in GCS of 13-15, 17% in GCS of 9-12 and 5% of his patients in poor GCS of 3-8.

Altered sensorium was the commonest symptom seen in our study, seen in 56 (92%) patients. Other symptoms were vomiting in 35 (57%) patients, ENT bleeding in 25 (41%) patients, seizures in 4 (7%) and headache in 4 (7%) patients. Commonest signs noticed were pupillary asymmetry and hemiparesis, each in 10% of patients. Gait ataxia was seen in 2 (3%) patients. Gupta et al<sup>2</sup> reported vomiting as the commonest symptom seen in 67% of patients. Headache was recorded in 50% of his patients, the frequency of which was very less in our study. ENT bleeding was seen in 28% of his patients which is less than what was noticed by us. Amongst the clinical signs pupillary asymmetry was seen in 11% of his patients which was comparable to that noticed by us. Hemiparesis was recorded by him in 5% of patients, which was seen in 10% of patients in our study. Other unusual features like gait ataxia was seen by us in 2 (3%) of patients which was not observed by him. None of our patients had any others comorbid condition or any associated systemic injury.

We studied clot volume on CT scan and found 12 (20%) patients had clot volume < 10ml and 49 (80%) patients had clot volume of > 10ml. We did not notice any statistically significant difference between mortalities based on clot volume. Wong<sup>7</sup> in his series of 25 patients with PFEDH found clot volume < 10ml in 12 (48%) and clot volume of > 10ml in 13 (52%) of his cases. He found statistically significant correlation between clot volume and poor outcome.

Other CT parameters like partial obliteration of fourth ventricle was found in 34 (56%) and complete obliteration in 13 (21%); fourth ventricle was normal in 14 (23%) of patients. Similarly, quadrigeminal cistern was found completely obliterated in 34 (56%), partially obliterated in 21 (34%) and normal in 6 (10%). The mortalities were higher in patients with effaced fourth ventricle or quadrigeminal system but it was not statistically significant. Gupta et al<sup>2</sup> found compression of fourth ventricle in 33% of his patients with posterior fossa EDH and quadrigeminal cistern was obliterated in 6% of his patients. He also did not find statistical correlation between these CT parameters and outcome.

In our study, 48 (79%) patients were operated. The mortality in surgically treated patients was 15%. The mortality was 4 (40%) in patients with GCS score of 3-8 and 3 (14%) in patients with GCS of 9-12. The GCS score before surgery correlated well with the mortality because all patients with a GCS in the range of 13-15 survived and patients with a poor GCS score fared poorly at surgery. This difference was statistically significant.

Thus GCS score was an important factor which affected the outcome in surgically treated patients. Mohanty et al<sup>12</sup> also found in their study that GCS score had a statistically significant bearing on the outcome.

In our series 13 (21%) patients were managed conservatively. Conservative treatment included a vigilant observation of patient's vitals, pupillary status, respiration with constant monitoring of the GCS score. Of the 13 patients who were conservatively managed, 9 patients had a GCS score of 13-15 at admission. These patients responded well to conservative treatment with a GCS score of 15 at discharge. Four patients with GCS score of 9-12 also managed conservatively improved to a GCS of 15 at discharge. There was no patient in the conservative group whose GCS was poor (3-8).

In our study there was no mortality in patients < 15 years and it was 18% in patients > 15 years. The difference was statistically significant. Our study correlated well with Mohanty et al<sup>11</sup> in whose series on posterior fossa EDH, there were 91% children and 85% adults with a good outcome. Pasaoglu et al<sup>12</sup> reported in their series the overall mortality of only 17% amongst children. Santos et al<sup>13</sup> in their study reported a mortality rate for pediatric patients as 3.4%. In their series the mortality for conservative management was nil, similar to that in our study. Thus it can be concluded that if recognized and treated in time mortality in posterior fossa EDH is very less especially in children.

Seven patients who expired, were > 15 years of age and 6 (86%) had RTA, only 1 (14%) had history of fall. The GCS at admission was poor. 4 patients (57%) had GCS of 3-8 and 3 patients (43%) had GCS of 9. The clot volume was > 10ml in 6 patients (86%) and 10ml in one (14%) patient. We did not find any statistically correlation between clot volume and mortality though in a study by Wang<sup>7</sup>, bad prognosis was associated with increased volume which was statistically significant. We also did not find higher mortality in patients with associated CT abnormalities as was reported earlier by Gupta et al<sup>2</sup>.

## CONCLUSIONS

A high degree of suspicion is required to diagnose posterior fossa EDH. Children have a good outcome. GCS at presentation has significant bearing on outcome.

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