

# Early Diagnosis and Intervention in Epidural Hematoma of the Posterior Cranial Fossa

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## ABSTRACT

**Objective** is to emphasize the importance of early diagnosis based on head CT scan and aggressive surgical treatment. The authors present their experience in the management of patients with posterior cranial fossa epidural hematoma (PFEDH) which involved an aggressive diagnostic approach based on symptoms and signs and early use of head computerized tomography (CT) scanning.

**Material and Methods:** The authors treated 25 patients in DHQ Teaching Hospital/Sahiwal Medical College, Sahiwal from January 2007 to June 2014. Diagnosis was established in all the patients with the aid of CT Scanning because the clinical manifestations were frequently non-specific. Cases were stratified by clinical course, Glasgow coma score (GCS) and their radiological status. Based on clinical and radiological parameters, patients underwent surgical or conservative management.

**Results:** Male to female ratio was 1.6:1. Patients ranged in age from 5 – 45 years. All hematomas were of traumatic origin. The most frequent cause was motor vehicle accidents (17 cases) and fall from height (8 cases). Out of cases of PFEH, male to female ratio was 1.6:1. The most important findings were occipital, sub-occipital or retro-mastoid swelling (18 patients – 72%) headache (16 patients-64%) vomiting (16 patients – 64%). Clinical signs and symptoms are summarized in the table. Ten out of 23 patients (40%) had disturbed conscious level, three patients had ear bleed and then developed CSF leakage and two patients were asymptomatic. On admission a GCS score of 5 – 6 was noted in two patients, a score of 7 – 8 was seen in three cases, a score of 9 – 12 in five and score of 13 – 15 in fifteen cases. In two patients in whom there were small hematomas not exerting mass effect as well as absence of other associated traumatic lesions, conservative therapy was elected. Admission score was 15 which remained unchanged and patients were free of deficits after hospitalization for one week or until the clinical and radiological deterioration was excluded. Twenty three patients in whom the hematoma caused mass effect, even if the lesion was small and associated with either traumatic lesions, were treated surgically. The mortality rate in this group was 4% as one patient died despite prompt evacuation of the clot and supportive intensive care treatment. Nine patients in which GCS score was less than 13 on admission improved after surgery, making an excellent recovery without neurological deficit except one patient who remained disabled after surgery. Thirteen patients in whom the GCS score was 13-15 on admission and in whom large hematomas exerted mass effect underwent surgery and all improved of consciousness remained unchanged and discharged without neurological deficit.

**Conclusion:** Compared with outcomes reported in the available literature, good outcome was found in our series. This is primarily due to the early use of CT scanning for diagnostic and observational purposes, which in the authors' opinion, led to early diagnosis, prompt treatment and ultimately good outcome.

**Key Words:** Epidural hematoma, Posterior Fossa, Computerized Tomographic (CT) Scanning.

**Abbreviations:** CT: Computerized Tomographic Scanning. PFEDH: Posterior Fossa Epidural Hematoma. EDH: Epidural Hematomas. GCS: Glaucoma Scale.

**INTRODUCTION**

Posterior fossa epidural hematoma (PFEDH) is not so common. It accounts for approximately 0.3% of all cranio-cerebral injuries<sup>1</sup> and constitutes of 2.7 – 11% of all intracranial epidural hematomas (EDH).<sup>2</sup> Clinical diagnosis is difficult because of its relative rarity combined with the scarcity of early specific symptoms. Clinical progress may be silent and slow but the deterioration may be sudden because of compression of vital structures in the posterior fossa i.e. brain stem, usually without significant warning signs. This may cause devastating consequences if not promptly treated. The recommended treatment for PFEDH is urgent surgical evacuation as posterior fossa contains vital structures. However since the introduction and availability of Computed tomography (CT) scanning, there has been an increasing number of cases of PFEDH treated conservatively with good results, both in children<sup>5</sup> and adults.<sup>3</sup> Despite the rarity of these lesions, the importance of timely recognition and surgical evacuation, when indicated, cannot be overstated. Many patients can undergo rapid deterioration because of the limited size of the posterior fossa and the propensity for these lesions to produce brain stem compression.<sup>6</sup> The decision between surgery and observation is a difficult and a controversial issue.

**MATERIAL AND METHODS**

Between January 2007 to June 2014, 25 patients with an established diagnosis of PFEDH were admitted in the neurosurgical department of the DHQ Teaching Hospital, Sahiwal. The clinical signs and symptoms on admission are summarized in table 1. The GCS was used to assess the level of consciousness in all patients (table 2) and also to measure the status of surviving patients to compare the surgical and conservative management.

All the patients underwent cranial CT scanning to confirm the diagnosis and to see the size and mass effect of EDH. Associated traumatic lesions were also identified (table 3).

Twenty three patients underwent surgery and two patients were managed conservatively. In patients who underwent surgical treatment, CT scan had revealed a mass effect due to hematoma, partial or total obliteration of the perimesencephalic cisterns, compression and/or displacement of the fourth ventricle. Minimal or small hematomas were surgically treated when associated with other intracranial traumatic lesions. The standard approach in 23 cases was the wide sub-occipital craniectomy. In four patients sub-occipital craniectomy was extended above the transverse sinus to evacuate the EDH from occipital region. In two patients receiving non surgical treatment, the decision to undertake conservative therapy was based on absence of clinical and radiological signs of brainstem compression. These patients underwent careful observation of neurological status and follow up CT scan brain.

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**RESULTS**

**Sex Incidence**

Male to female ratio was 1.6:1. Patients ranged in age from 5 – 45 years. All hematomas were of traumatic origin. The most frequent cause was motor vehicle accidents (17 cases) and fall from height (8 cases). Out of cases of PFEH, male to female ratio was 1.6:1.

**Clinical Presentation**

The most important findings were occipital, sub-occipital or retro-mastoid swelling (18 patients – 72%) headache (16 patients-64%) vomiting (16 patients –

**Table 1:** *Clinical Findings in 25 Patients with PF-EDH.*

Symptoms and Signs	No. of cases (%)
Occipital, Suboccipital or retromastoid swelling	18 (72%)
Headache	16 (64%)
Vomiting	16 (64%)
Transient loss of consciousness	10 (40%)
Disturbance of consciousness	10 (40%)
Otorrhoea	3 (12%)
Asymptomatic	2 (8%)

64%). Clinical signs and symptoms are summarized in the table. Ten out of 23 patients (40%) had disturbed conscious level, three patients had ear bleed and then developed CSF leakage and two patients were asymptomatic.

On admission a GCS score of 5 – 6 was noted in two patients, a score of 7 – 8 was seen in three cases, a score of 9 – 12 in five and score of 13 – 15 in fifteen cases.

**Table 2:** Neurological status characterized by admission GCS score.

CCS Score	No of cases	Percentage
5 – 6	2	8
7 – 8	3	12
9 – 12	5	20
13 – 15	15	60

**Radiological Findings**

Skull radiographs were obtained in 20 patients (80%) in whom occipital fracture was detected in 15 patients (60%). In the remaining 5 patients and in the 5 patients in which radiographs were not obtained, an occipital fracture was observed in four patients on CT scan or intra-operatively. In six patients (24%) we were unable to find evidence of fracture. In four cases, the EDH extended into supra-tentorial compartment.

**Associated Lesions**

In relation to associated intracranial lesions coexisting with PFEDH, we found cerebellar contusions in 2 patients (8%) subarachnoid hemorrhage in two cases (8%) and posttraumatic ventriculomegaly in five patients (20%). Generalized brain swelling and contusions were found in five patients (20%).

**Table 3:** Summary of trauma-induced lesions associated with PFEDH.

Traumatic Lesions	No. of Cases	Percentage
Brain swelling and contusions	05	20
Cerebellar contusions	02	8
Subarachnoid hemorrhage	02	8
Posttraumatic hydrocephalus	05	20

**Conservative Management**

In two patients in whom there were small hematomas not exerting mass effect as well as absence of other associated traumatic lesions, conservative therapy was elected. Admission score was 15 which remained unchanged and patients were free of deficits after hospitalization for one week or until the clinical and radiological deterioration was excluded.

**Surgical Management**

Twenty three patients in whom the hematoma caused mass effect, even if the lesion was small and associated with either traumatic lesions, were treated surgically. The mortality rate in this group was 4% as one patient died despite prompt evacuation of the clot and supportive intensive care treatment. Nine patients in which GCS score was less than 13 on admission improved after surgery, making an excellent recovery without neurological deficit except one patient who remained disabled after surgery.

Thirteen patients in whom the GCS score was 13-15 on admission and in whom large hematomas exerted mass effect underwent surgery and all improved of consciousness remained unchanged and discharged without neurological deficit.

The bleeding source responsible for the PFEDH in 12 patients originated from transverse sinus and in 3 patients it was sigmoid sinus. No bleeding source was found at surgery in 8 cases.

**DISCUSSION**

As expected in groups in which a lesion PFEDH is caused by trauma, our population was composed primarily of young male individuals. Accordingly early detection of the lesion is critical. The signs and symptoms were, in the majority of cases, non specific for PFEDH. In only a small percentage of cases could the diagnosis be established based on clinical findings. We believe that CT scan should be done routinely in cases of head injury because in some patients with PFEDH, the GCS score was 15 and patients were asymptomatic.<sup>3</sup> In addition the only reason to visit the hospital might be the presence of an occipital, sub-occipital or retro-mastoid swelling as seen in two patients in our series.

An early diagnosis is mandatory for good recovery, and some authors have suggested that CT scanning be conducted in all patients with occipital soft tissue ecchymotic swelling<sup>3</sup> and fracture of underlying bone.<sup>10</sup>

A high level of clinical suspicion, a prolonged period of clinical and radiological<sup>4</sup> observation, and application of broadest criteria for indication of head CT scanning<sup>3</sup> are the points in managing this situation. Control CT scanning performed within the first 24 hours plays a central role in this observational period because a slower course of the PFEDH or a delayed hematoma may be possible in the presence of occipital fractures.<sup>4,8,13,14</sup>

The bleeding sources could be identified in the majority of cases with PFEDH and despite the limited number of patients, the transverse sinus was consistently the bleeding source, 12 patients – 52%, a finding comparable with those in the literature.<sup>4</sup> In a series by E. Bor-Seng-Shu et al,<sup>9</sup> the transverse sinus was found to be the source of bleeding in 60% of cases. The most common associated traumatic lesion in our series were brain contusions/oedema (20%) and posttraumatic hydrocephalus (20%) which is quite comparable with a series by E.Bor-Seng-Shu et al,<sup>9</sup> 30 and 21% respectively.

Deciding between conservative or surgical management is controversial.<sup>1,2,4,8,12,13</sup> A GCS score of 15 and the exclusion of both mass effect and associated lesions were the criteria in our series to indicate conservative therapy. In 8% patients in our series with PFEDH, a poor outcome was observed, one patient died and another patient remained neurologically disabled. In a series by E.Bor Seng-Shu et al. overall mortality rate was 4.7% which is quite comparable with mortality rate (4%) in our patients and also in recently reported series.<sup>2,4,7,10,11,13</sup> We believe this is likely to be explained by the “aggressive” use of head CT scanning and consequent early diagnosis. Unfortunately it was not possible to evaluate the long term outcome in our patients because of poor follow-up in our society and settings.

## CONCLUSION

Patients with trauma to occipital and sub occipital regions and presenting with related symptoms and signs or patients with occipital/sub-occipital fractures should undergo CT scanning and close observation. Once the diagnosis of PFEDH is established, the hematoma must be evacuated immediately, except in special cases. The CT scan has made a real revolution in the diagnosis and consequently, in the early treatment of posterior fossa extradural hematomas.

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