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TRAUMATIC POSTERIOR FOSSA EXTRADURAL HAEMATOMA: INSTITUTE EXPERIENCE

Neurosurgery

Dr Souryav Sankar Mondal* M. Ch. Neurosurgery, Post Graduate Trainee, Madras Medical College *Corresponding Author

Dr S. Balamurugan Professor Of Neurosurgery, Madras Medical College.

ABSTRACT

Posterior fossa Extradural haematoma (PFEDH) is a rare variety of traumatic brain injury (TBI), representing 4-12% of EDHs. It is highly fatal due to limited volume in the posterior fossa. If diagnosed early by CT scan, it can be life saving. 50 patients in Rajiv Gandhi government general hospital, Chennai were retrospectively analysed from January 2015 to December 2018. Most patients were male. Occipital bone fracture was an associated finding. The Glasgow coma score (GCS) at admission, the presence of hydrocephalus and associated intracranial injury determined the outcome.

SUMMARY: 50 patients with PFEDH were studied retrospectively. Surgical evacuation was done in 20(40%). Glasgow outcome score (GOS), was favourable in 12 of the 20 cases operated (60%), and 28 out of the 30 conservatively managed group (93%). Overall favourable outcome was found in 40 cases (79%) with overall mortality of the study being 16%.

KEYWORDS

Posterior fossa, Extradural haematoma, Trauma.

INTRODUCTION:

Traumatic posterior fossa EDHs are rare and account for approximately 4-12 % of all extradural haematomas{1,2}. EDH of the posterior fossa can be classified as acute (with brain stem compression within 24 hours) or delayed (with brainstem compression after 24 hours){3,4}.The most frequent symptoms are headache, stiff neck, vomiting and deteriorating level of consciousness. Patient may deteriorate with early development of obstructive hydrocephalus. Timely diagnosis and rapid intervention can lead to good clinical outcome {5}.

MATERIAL AND METHODS:

This is a retrospective study of 50 patients with PFEDH admitted at Rajiv Gandhi government general hospital, Chennai between January 2015 and November 2018. Data calculated using MS Excel 2019.

Clinical examination were performed in all cases. GCS score at admission was calculated. Radiological assessment was performed using CT scan of brain immediately after patients were hemodynamically stable. Patients were managed according to Brain Trauma Foundation guidelines according to which, neurologically intact patients with a posterior fossa lesion and no CT evidence for mass effect (compression of cisterns, distortion of fourth ventricle, hydrocephalus) are managed conservatively. Those with indication for operation were managed using standard suboccipital craniectomy and removal of EDH. The GOS was used at the time of discharge to assess neurologic outcomes. Patients whose score was 1 or 2 were classified as having a poor outcome, and those with a score between 3 and 5 were classified as having a good outcome.

RESULTS:

A total of 50 patients with PFEDH were studies. Seven (14 %) of them were below 18 years. Seven (14 %) of them were females. Most common mode of injury was road traffic accident (n = 33, 66%), rest were either fall (n = 15, 30%) or assault (n = 2, 4%). Post resuscitation admission GCS varied from GCS 15 in 26 (52%) cases, GCS 13–14 in 3 (6%), GCS 9–12 in 12 (24%), and GCS 3–8 in 9 (18%) cases. [Table 1].

Table 1: Clinical - radiological feature

TOTAL NUMBER OF CASES(N) = 50		
FEATURES		n (%)
I. Age (years)		
a)	Pediatric age group (<18 years)	7(14)
b)	Adults	43(86)
II. Gender		
a)	Male	43(86)
b)	Female	7(14)
III. Mode of injury		
a)	RTA	33(66)
b)	Fall	15(30)
c)	Assault	2(4)
IV. GCS at admission		
a)	GCS score 15	26(52)
b)	GCS score 13-14	3(6)
c)	GCS score 9-12	12(24)
d)	GCS score 3-8	9(18)
V. Associated Radiological findings		
a)	Occipital bone Fracture	30(60)
b)	Acute SDH	5(10)
c)	Supratentorial extension	5(10)
d)	Intraparenchymal hemorrhage	11(22)
a)	Frontal contusion	6
b)	Temporal contusion	4
c)	Occipital contusion	2
e)	SAH	4(8)
f)	IVH	2(4)
VI. Hydrocephalus		
a)	Present	3(6)
b)	Absent	47(94)
VII. Management		
a)	Conservative	30(60)
b)	Operated	20(40)
VIII. GOS at time of discharge		
a)	GOS score 5	35(70)
b)	GOS score 4	4(8)
c)	GOS score 3	1(2)
d)	GOS score 2	2(4)
e)	GOS score 1	8(16)

All patients underwent non contrast CT (NCCT) brain with 5 mm axial cuts of the posterior fossa, and PFEDH was present in all cases. Among the associated CT findings, occipital bone fracture was the most frequent, present in 30 (60%) cases followed by acute subdural hematoma (SDH) in5 (10%) cases and frontal contusion in 6 patients. In 5 (10%) cases, the EDH was extending to the supratentorial compartment. Hydrocephalus due to compression or obliteration of the fourth ventricle was seen in 3(6 %) cases. All 3 patient underwent operation, however all three patients expired. There was no requirement of ventriculoperitoneal shunt in any of the patients. Of the total 50 cases, 20(40%) were operated, Incision and craniotomy were made as per the site and size of EDH. All operated patients underwent standard midline suboccipital craniectomy [Fig 1]. All patients were subjected to early NCCT brain in the postoperative period.

Forty-two patients were discharged, of which, to discharge, 40 (80%) had favourable outcome at discharge (Fig 1). Glasgow outcome score (GOS) was used to measure the outcome. Outcome was favourable in 12 of the 20 cases operated (60%), and 28 out of the 30 conservatively managed group (93%) [Fig 2]. However it was noted that GCS score of less than 8 in those who underwent surgery was seen in 35% (n=7) of the cases, while it was noted in only 6.6% (n=2)

of the cases who were managed conservatively.

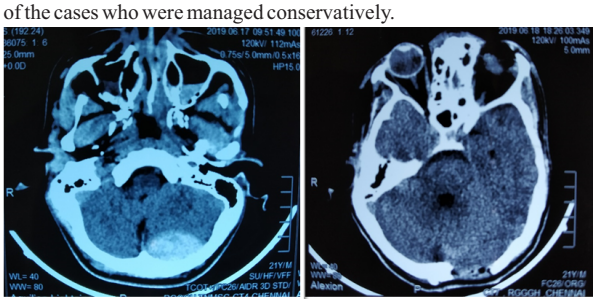
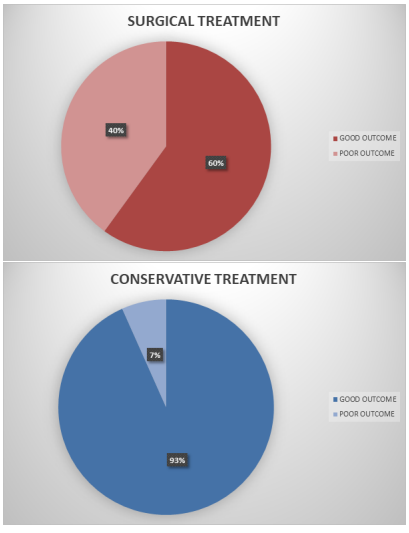


Fig1 (A) Fig1 (B)

Fig1: (A) Preoperative computed tomography scan showing posterior fossa extradural hematoma with compression of the fourth ventricle and (B) Postoperative scan showing complete evacuation of extradural hematoma

Fig 2: Outcome in surgically and conservatively managed patients



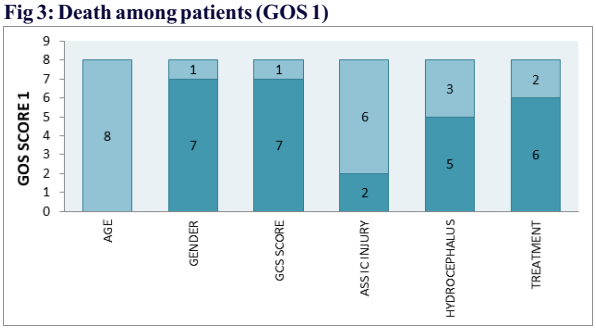
In addition, patients with Pure PFEDH (n = 24) had a much better outcome. Admission GCS varied from GCS 15 in 21 cases, GCS 13–14 in 1, GCS 9–12 in 1, and GCS 3–8 in 1 case, with mortality of 2 among the 24 patients [Table 2]. In sharp contrast, patients with associated intracranial CT findings in addition to PFEDHs (n = 26) had poor outcomes. Admission GCS varied from GCS 15 in 6 cases, GCS 13–14 in 4, GCS 9–12 in 8, and GCS 3–8 in 8 cases with mortality of 6 among the 26 patients.7 out the 21 patients with pure PFEDH were operated, while 15 out of 26 patients with PFEDH associated with other IC injuries underwent operation.

Table 2: Outcome based on CT findings

		Pure PFEDH	PFEDH with associated Intracranial injury
Total no. of patients		24	26
I.	GCS AT ADMISSION		
a)	GCS score 15	21	6
b)	GCS score 13-14	1	4
c)	GCS score 9-12	1	8
d)	GCS score 3-8	1	8
II.	MANAGEMENT		
a)	Conservative	17	11
b)	Operated	7	15
III.	MORTALITY	2	6

Mortality rate was 8 out of the total 50 patients [Fig 3]. 2 out the 30 patients who were managed conservatively died (6.67%), while 6 out the total 20 patient who underwent operation died (30%). GCS score of less than 8 was seen in 7 patients (87.5 % of those who expired). All the 3 patients who had hydrocephalus expired. All the patients who expired were adults and only one patient was a female. 6 out of the 8 (75%) had associated IC injuries.

Fig 3: Death among patients (GOS 1)



Age (n)	Gender (n)	Gcs Score (n)	Associated Intracranial Injury (n)	Hydrocephalus (n)	Treatment (n)
Adults (8)	Female (1)	Score>8 (1)	Present (6)	Present (3)	Conservative (2)
Peadiatric Age (0)	Male (7)	Score<8 (7)	Absent (2)	Absent (5)	Surgical (6)

DISCUSSION:

Extradural hematoma is seen in 1% of patients who present with head trauma. PFEDHs are reported to constitute 0.1–0.3% of all cranial traumatic conditions. Most of these cases are associated with skull fractures. However, an extradural hematoma can develop without a fracture. Owing to the increased plasticity of the bones, the rate of developing extradural hematoma without a fracture is higher in children. Extradural hematoma generally develops by separation of the periosteal duramater from the calvarium and rupture of the interposed vessels after trauma. The rupture of the vessel causes a rapid increase in the size of the hematoma.

However, if the venous structures are involved, late and chronic clinical pictures may develop. Unlike supratentorial EDHs where the source of bleeding is usually the middle meningeal artery in temporoparietal EDHs and the anterior ethmoidal artery in frontal EDHs{6}, PFEDHs have a venous origin in 85% of the cases and develop as a result of injury to the transverse or sigmoid sinuses secondary to occipital bone fracture{7}. The classical history of an extradural hematoma as described in the context of temporal EDHs is a short interval of posttraumatic unconsciousness followed by a “lucid interval” that may last for hours, which in turn, is followed by altered sensorium and development of potentially fatal neurological condition secondary to compression of the brainstem. Diagnosing extradural hematoma in the lucid interval is extremely important for good outcomes. However, in cases of PFEDHs, this classical description does not apply. The treatment of epidural hematoma is surgical except for very small hematomas that are followed-up {8}. Since most of the PFEDHs are of venous origin and expand slowly, it takes longer for the clinical picture to develop in PFEDH and it is of vital importance to use imaging methods for early diagnosis. Currently, NCCT scan is the imaging of choice in brain trauma. An acute extradural hematoma is seen as a biconvex hyperdense mass located between the duramater and the bone on NCCT. In our study, of the 50 patients with a traumatic PFEDHs, (60%) patients had an occipital bone fracture. Early cranial CT examination should be performed routinely in patients who do not have any neurological findings as well.

Table 3: Comparison of case series of posterior fossa extradural hematoma

Authors	Number of cases	Number of cases managed surgically	GOS 5 (good recovery) (%)	Mortality (%)
Verma et al.	69	66	62 (89.9)	2 (2.9)
Prasad et al. {12}	18	16	17 (94.4)	0
Sencer et al. {13}	40	29	40 (100)	0
Balik et al.{14}	24	24	11 (45.8)	1 (4.2)
Malik et al.{10}	61	48	36 (59)	7/48 (15)
Roka et al.{11}	43	33	27/33 (81.8)	3 (7)
Bozbuga et al. {9}	73	59	65 (89)	4 (5.4)
Kabre et al. {15}	20	20	19 (95)	0
Present Study	50	20	35(70)	8 (16)

Furthermore, considering small occipital fractures can be overlooked during physical examination and plain film studies, patients with cranial trauma involving the posterior fossa should definitely be examined with cranial CT. By effectively demonstrating early PFEDHs without clinical findings and the associated pathologies, and allowing early treatment, CT is an indispensable entity. As per the search results on pubmed.org with key words "traumatic posterior fossa extradural hematoma" we found many case series [Table 3]. Bozbuga *et al*.{9} reported 73 cases in 1999, the largest series on PFEDH till now. Out of 73, they operated 53 cases. Eighty-nine percent of operated patients had a good recovery, and 5.4% died. Malik *et al*. {10} published another series of 61 patients in 2007. Of these 48 were managed surgically, 36 (59%) had a good recovery and 15% died. Roka *et al*.{11} reported 43 patients in 2008, of these 33 were operated and were followed up for 79 months with 81.8% good recovery in the operated patients and 3% overall mortality. Two series comprised pediatric cases only. Sencer *et al*.{13} in 2012, Prasad *et al*.{12} in 2012, published pediatric series with 40 and 18 cases, respectively. Sencer reported good recovery in all cases. Prasad's series had 94.4% patients with good recovery. Both these series showed better outcomes in pediatric age group. In this study, we report 50 patients with PFEDHs. Twenty of them were operated. 42 patients were discharged, of which, at discharge, 40(80%) had favourable outcome, and 35(70%) patients had GOS 5. Hence, it can be concluded that PFEDHs are rare events and may be rapidly fatal if neglected, however with timely interventions can result in excellent outcomes, particularly in patients with isolated PFEDHs. Admission GCS is the single most important factor that determined the immediate and long-term outcomes. Patients with additional intracranial findings had relatively poor GCS at admission and categorically much poor outcomes. Nonsurgical management is a viable option in select patients with low EDH volumes, but with intensive monitoring, and low threshold should be kept for surgical evacuation in such patients.

CONCLUSION:

PFEDH are rare. They may be rapidly fatal due to the expansion of hematoma and compromise of the posterior cranial fossa space leading to brainstem compression, tonsillar herniation, and/or obstructive hydrocephalus. Early diagnosis and emergent evacuation lead to good outcome. They are usually associated with occipital bone fractures and may also have associated injuries in form of supratentorial or infratentorial subdural hematoma, intraparenchymal hematoma or intraventricular hemorrhage. Associated intracranial injuries should also be managed emergently as per the clinical situation. However despite best possible management these associated injuries lead to worse outcomes depending upon the severity of associated injury.

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