

# A Life Threatening Problem in Children; Extra Dural Hematomas. Analysis of 65 Cases

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## ABSTRACT

**Aim:** We present this study about the management of Extra Dural Hematomas in children using aggressive diagnostic approach, Prompt surgical intervention was the goal to get excellent results.

**Material and Methods:** Sixty five children underwent surgery in our department from Jan. 2010 to Dec. 2014. Data was gathered in terms of age, sex, mode of injury, clinical presentation, CT scan finding, and localization of hematoma, operative treatment and outcome.

**Results:** Out of 65 cases 44 (68%) were boys and 21 (32%) were girls with a ratio of 2:1. Age ranged from 1–18 years with majority 48 (64%) were from 6 – 18. Most common mode of injury was fall 35 (54%) followed by RTA 25 (38%). The commonest clinical presentation was altered sensorium 42 (63%) followed by headache and vomiting 36 (54%). Mortality rate was 4 (6%).

**Conclusion:** As early symptoms in children with EDH are quite non-specific, EDH must be considered in any child whose condition does not improve rapidly following a relatively mild head injury. Early diagnosis and emergency surgical treatment of EDH result in excellent outcome.

## INTRODUCTION

Extra Dural Hematoma (EDH) is a unique form of neurotrauma, being potentially lethal, yet easily remediable if diagnosed early and promptly treated.<sup>5</sup> It has been estimated that EDH represents 2 – 3% of all the head injury in paediatric population and the incidence of EDH is even less encountered among infants under the age of 12 months.<sup>7</sup> The mean age of paediatric patients developing EDH is between 6 and 10 years.<sup>2,5,7,20</sup>

It has been observed that the presentation of EDH in children is quite different from EDH in adults in that hematoma may follow a trivial injury, symptoms are different, the course is more insidious, associated skull fracture is infrequent<sup>11</sup> and these make it difficult to diagnose and often challenging to manage. The lack of any well defined criteria regarding surgical evacuation vs. conservative management of EDH in paediatric patients and particularly in infants make the management of this specific group of patients all the more complicated.<sup>7</sup>

Different studies showed a varying degree of

mortality ranging from 0 – 17%.<sup>11</sup> Such a considerable variation in the outcome and lack of data that provide a clear cut picture of EDH in children pushed us to carry out this study; we present our experience with 65 cases of acute EDH in children less than 18 years age.

## MATERIAL AND METHODS

Between Jan. 2010 and Dec. 2014 sixty five patients were surgically managed at the Department of Neurosurgery DHQ Teaching Hospital/Sahiwal Medical College, Sahiwal. A detailed physical examination, with an emphasis on the neurological functions, was performed on admission. Initial management was done following ATLS criteria. The diagnosis was confirmed by C T Scan of the brain. In addition, standard epidemiological data including age, sex, mode of injury, and localization of hematoma and final outcome were recorded. Decision for surgical evacuation was made following the clinical and radiological parameters.

1. Unconscious/deteriorating neurological status in

- patients with EDH larger than 20 ml.
- 2. Persistent headache and vomiting in patients with EDH > 30 ml.
- 3. EDH more than 30 ml even if the patient is conscious and free from neurodeficits.
- 4. Midline shift > 0.5 cm with deteriorating conscious level.
- 5. Volume of hematoma 20 ml when located in critical site such as temporal base and posterior cranial fossa.
- 6. EDH almost 20 ml with underlying brain injury.

All the cases were operated on emergency basis. Surgical management consisted of craniotomy under general anaesthesia and evacuation of underlying hematoma. Outcome was assessed at the time of discharge and on follow up in OPD.

**RESULTS**

The results illustrated the epidemiology and clinical feature of the 65 paediatric patients and were shown in tabulated form as well. The age of these patients was between 1 – 18 years. Forty eight (74%) children were from 6-18 years and the rest of 17 (26%) were from 1 – 5 years. This showed that the elder children were the common victims of such injuries Among the 65 patients 44 (68%) were boys and 21 (32%) were girls. The boys and girls ratio was 2:1.

The commonest mode of trauma was fall from height i.e. 35 (54%) followed by Road Traffic Accidents (RTA) 25 (38%).

**Table 1:** Demographic Profile of EDH in Children.

Features	Number (n)	Percentage
1. No of patients	65	
2. <b>Age</b>		
1 – 5 years	17	26%
6 – 18 years	48	76%
3. <b>Sex</b>		
Boys	44	68%
Girls	21	32%
Boys: Girls ratio	2:1	
<b>Mode of Injury</b>		
Fall from height	35	54%
RTAs	25	38%
Assault	3	5%
Fall of TV trolley on Head	2	3%

The most common clinical presentation was altered sensorium i.e. irritability and lethargy 42 (63%) followed by headaches & vomiting 36 (54%). Neurological deficits in the form of hemi paresis was found in 25 (23%) children and 18 (27%) children were comatose. These eighteen children had GCS 3–8 indicating severe head injury. Seizures were noted in 6 (9%) children. The last but not the least, pallor and scalp swelling were noted in 50 (77%) and 23 (35%) of the children indicating how important is to get Haemoglobin level be checked earliest possible to avoid hypoxic insult to the brain.

Radiological findings, X- rays skull and C T scan brain, showed fracture in 36 (54%) children. The most common location of EDH was Temporo-Parietal 22 (34%) followed by frontal 16 (25%) and parietal 13 (20%) regions.

**Table 2:** Clinical Presentation of EDH in Children.

Features	Number of Patients	Percentage
Altered Sensorium Irritability & Lethargy	42	63%
Headache & Vomiting	36	54%
Coma , GCS 3-8	18	27%
Seizures	6	9%
Pallor	50	77%
Scalp Swelling	23	35%

**Table 3:** Radiological Profile of EDH in Children.

Features	Number of Patients	Percentage
<b>Common Sites of Haematoma</b>		
Temporoparietal	22	34%
Frontal	16	25%
Parietal	13	20%
Temporal	2	3%
Posterior fossa		
<b>Associated Brain Injury</b>		
Skull Fractures	36	54%
Brain Contusions	10	15%
ICH	4	6%

Among the associated intracranial injuries, 10 (15%) children had brain contusions and 4 (6%) had intracerebral hematoma.

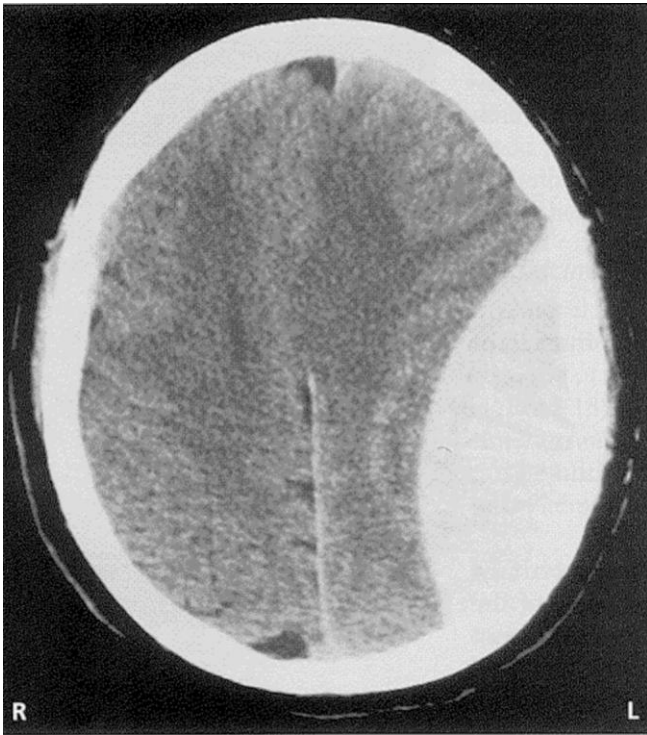


Fig. 1: EDH in Fifteen Year Old Child.

All the children were operated on emergency basis. Four (6%) children died after the surgery, these patients had associated brain injury and were deeply comatose and poor GCS at the time of admission. Six (9%) children with seizures were given anti-epileptics and continued for at least six months.

With regard to neuro-deficits 9 (14%) showed good outcome at the of discharge and rest showed good improvement on follow-up in OPD.

## DISCUSSION

The presence of only few numbers of articles in the literature relating to EDH in children pushed us to collect data and write these few words about EDH in children based on surgical experience and analysis of the existing literature. Traumatic EDH in children has some unique features when compared with those in adult population. Reported incidence of EDH among the Traumatic Brain Injury (TBI) patients is in the range of 2.7% – 4%<sup>14,23,24</sup> and among the comatose patients it may reach up to 9%.<sup>21</sup> Among the paediatric

population the incidence of EDH ranges from 2% – 3%.<sup>7</sup> The lower incidence of EDH in paediatric age group is attributed to the tight adherence of the dura matter to the inner table of the skull.<sup>8,11,18,19</sup>

In this study age ranged from 1 – 18 years and children above 6 years are more affected i.e. 48 (74%), showing that elderly children are more affected from such injuries. These figures are quite comparable with a study by Khalid et al.<sup>12</sup> This is due to high velocity trauma mechanism in this age group.<sup>19</sup>

In this study majority of the patients were boys 44 (68%) which is almost similar to figure in a study by Khalid et al<sup>12</sup> and other reported series.<sup>8,10,13,16</sup> It reflected the natural tendency of boys to indulge in risky activities.

Falls were the predominant mode of injury i.e. 35 (54%) followed by RTA 25 (38%). Similar results had been reported by Khalid et al<sup>12</sup> 41% & 32% and 59% & 33%.<sup>25</sup> On the other hand RTA is the most common injury in adults.<sup>6,11</sup> Our study and other reported series showed a significant difference in the mechanism of injury between children and adults.

The classical presentation of traumatic EDH mentioned in literature/books may not be there in majority of paediatric age patients with EDH. In our study 42 (63%) children presented with altered sensorium, irritability & lethargy which seems to be significant sign of EDH in children. It was supported by Khalid et al 61%<sup>12</sup> and other series, 68%.<sup>25</sup>

Another important but non-specific sign was hemiparesis 15 (23%) in this study which was comparable 19% to study Khalid et al.<sup>12</sup> Associated headache & vomiting were present in 36 (54%) children in this study, it was very close to figure 56% in another study.<sup>12</sup>

Another important difference of clinical presentation between children and adults was that the diagnosis of EDH in children may not be possible until early clinical features of raised intracranial pressure (ICP) is present. As compared to adults, children can tolerate the sudden rise in ICP because they have unfused cranial sutures and open fontanale in early years of life and moreover the source of EDH in children is often venous whereas in adults it is often arterial bleed which lead to EDH.<sup>1</sup> It seems difficult to establish early diagnosis on clinical grounds as the signs & symptoms of EDH in children are often non-specific in majority of such cases. So we believe that C T Brain should be done routinely in suspected cases to diagnose EDH in earlier stages as radiological changes do appear earlier than clinical changes.<sup>3,4,22</sup>

In our study skull fracture was present in 36 (54%) children which coincide with another study.<sup>12</sup> Temporo-parietal region was the commonest area 22 (34%) followed by frontal region. It is similar to study by Hanci et al<sup>14</sup> and Khalid et al.<sup>12</sup> The presence of associated intracranial injuries is recognized as a poor prognostic factor.<sup>11</sup> In this study associated brain injuries were noted in 14 (21%) children which is quite close to figures in studies by Mazza et al<sup>15</sup> and Khalid et al.<sup>12</sup> Associated intracranial injuries in patients with EDH lower the chance of good outcome.<sup>5</sup>

In our study 18 (27%) children had GCS 8 or below 8 and these were labelled as deeply comatose patients and majority had underlying brain injuries. Poor GCS and associated brain injuries had strong correlation with outcome in children. It is in strong agreement with Mohanty et al<sup>17</sup> and Khalid et al experience.<sup>12</sup> In this study 4 (6%) children died in spite of all the efforts and emergency surgery. Mortality rate is quite close to Ersahin et al 10%<sup>9</sup> and Khalid et al 8%.<sup>12</sup>

## CONCLUSION

As early symptoms in children with EDH are quite non-specific, EDH must be considered in any child whose condition does not improve rapidly following a relatively mild head injury. Early diagnosis and emergency surgical treatment of EDH result in excellent outcome. Many factors affect outcome of EDH surgery e.g. pre-operative neurological status (GCS), associated brain injuries and time interval between onset of coma and surgical intervention. EDH in children is one of the most rewarding neurosurgical emergencies which must be recognized and managed as early as possible. The results of this study indicate that zero mortality from EDH is a realistic goal for a modern, well run care system for head-injured patients that includes prompt referral by doctors working in periphery and suitable hospital facilities for constant access to emergency neurosurgery.

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## REFERENCES

1. Balmer B, Boltshauser E, Altermatt S, Gobet R:

- Conservative management of significant epidural haematomas in children. *Childs Nerv Syst* 22:363–367, 2006.
2. Ben Abraham R, Lahat E, Sheinman G, Feldman Z, Barzilai A, Harel R, Barzilay Z, Paret, G: Metabolic and clinical markers of prognosis in the era of CT imaging in children with epidural haematoma. *Pediatr Neurosurg*. 2000; 33: 70-75.
3. Bor-Sen-Shu E, Aguiar PH, Almedida Leme RJ, Mandel M, Andrade AF, Marino R Jr: Epidural hematomas in the posterior cranial fossa. *Neurosurg*. 2004; 16 (2):
4. Bozbuga M, Izgi N, Polat G, Gurel I: Posterior fossa epidural hematomas: Observation on a series of 73 cases. *Neurosurg Rev*. 1999; 22: 34-40.
5. Bullock MR, Chesnut R, Ghajar J, Gordon D, Hartl R, Newell DW, Servadei F, Walters BC, Wilberger JE: Surgical management of acute epidural haematomas. *Neurosurgery*, 2008; 58 (3): S2-7-S2-15.
6. Chowdhury Noman Khaled SM, Raihan MZ, Chowdhury FH, Ashadullah ATM, Sarkar MH, Hossain SS: Surgical management of traumatic extradural haematoma: Experiences with 610 patients and prospective analysis. *Indian Journal of Neurotrauma (IJNT)*, 2008; 5 (2): 75-79.
7. Ciurea AV, Kapsalaki EZ, Coman TC, Roberts JL, Robinson III JS, Tascu A, Brehar F, Fountas KN: Supratentorial epidural hematoma of traumatic etiology in infants. *Childs Nerv Syst*. 2007; 23: 335–341.
8. Dhellemmes P, Lejeune JP, Christianes JL, Combelles G: Traumatic extradural haematoma in infancy and childhood: Experience with 144 cases. *J Neurosurg*. 1985; 62: 861-864.
9. Ersahin Y, Mutluer S, Guzelbag E: Extradural Haematoma analysis of 146 cases. *Child's Nerv Syst*. 1993; 9: 96-99.
10. Hanci M, Uzan M, Kuday C, Sarioglu A C, Akar Z, Canbaz B, Erdinclear P, Akcura S: Epidural Haematomas in infancy and childhood: Report of 54 cases. *Turkic Neurosurgery*, 1994; 4: 73-76.
11. Jamjoom A, Cummins B, Jamjoom ZA: Clinical characteristics of traumatic Extradural haematoma: A comparison between children and adults. *Neurosurg Rev*. 1994; 17: 277-281.
12. Khalid Chowdhary SMN, KM Tarikul Islam, Ehsan Mahmood, Sk Sader THossain. Extra Dural Haematoma in Children: Surgical Experiences and Prospective Analysis of 170 Cases. *Turkish Neurosurgery*. 2012; Vol. 22, No. 1: 39-43.
13. Leggate JRS, Lopes Ramos N, Genetori I, Lena G, Choux M. Extradural haematoma in infancy, *B J Neurosurg*. 1989; 3: 533-540.
14. Maggi G, Aliberti F, Petrone G, Roggiero C. Extradural haematoma in children. *J Neurosurg Sci*. 1998; 42: 95-99.
15. Mazza C, Pasqualin A, Feriotti G, Da Pian R: Traumatic Extradural Haematoma In children: Experience with

- 62 cases. *Acta Neurochir.* 1982; 65: 67-80.
16. Milza PG, Nardi PV, Gigla G, La Motta A: Extradural haematoma in infancy and childhood. Report on 176 cases. *J Pediatric Neuroscience*, 1985; 5: 117-122.
  17. Mohanty A, Kolluri VR, Subbakrishna DK, Satish S, Mouli BA, Das BS. Prognosis of extradural haematomas in children. *Pediatr Neurosurg.* 1995; 23: 57-63.
  18. Pasaoglu A, Orhan C, Koc K, Selcuklu A, Akdemir A, Uzunoglu H. Traumatic extra dural haematoma in paediatric age group. *Acta Neurochir (wien)*, 1990; 106: 136-139.
  19. Rocchi G, Caroli EM, Raco A, Salvati M, Delfini R: Traumatic epidural hematoma in children. *J Child Neurol.* 2005; 20: 569–572.
  20. Schutzman SA, Barnes PD, Mantello M, Scoot RM. Epidural haematoma in children. *Ann Emerg Med.* 1993; 22: 535-541.
  21. Seelig j, Marshall L, Totant S, Toole B et al. Traumatic acute epidural haematoma ; Unrecognized high lethality in comatose patients. *Neurosurgery*, 1984; 15: 617-620.
  22. Simpson DA, Cockington RA, Hanieh A, Raftos J, Reilly PL. Head injuries in infant and young children: The value of paediatric coma scale. Review of literature and report on study. *Child Nerv Syst.* 1991; 7: 183-190.
  23. Wu J, Hsu C, Liao S, Wong Y. Surgical outcome of traumatic intracranial haematoma at a regional hospital in Taiwan. *J Trauma.* 1999; 47: 39-43.
  24. Gupta S, Tandon S, Mohanty S, Asthna S, Sharma S. Bilateral traumatic extradural haematoma. Report of 12 cases with a literature review. *Clin Neurol Neurosurg.* 1992; 94: 127-131.
  25. University of Sao Paulo Medical school, Dept. of Neurology, Div. of Neurosurgery. Sao Paulo SP Brazil. Management of supratentorial epidural hematoma in children: report of 49 patients.

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