

Epidural Hematomas In Infancy And Childhood: Report Of 54 Cases

MURAT HANCI, MUSTAFA UZAN, CENGİZ KUDAY, ALİ ÇETİN SARIOĞLU,
ZİYA AKAR, BÜLENT CANBAZ, PAMİR ERDİNÇLER, SAIT AKÇURA

Department Of Neurosurgery, Cerrahpaşa Medical School, University Of Istanbul, Aksaray, İstanbul-Turkey

Abstract : We report a series of 54 children with traumatic epidural hematoma. All patients were admitted to the neurosurgery department of Cerrahpaşa Medical Faculty of Istanbul University between years 1982 and 1992. There were 5 infants (0-2 years old) in the series. In children (3-15 years old). Epidural hematoma was

most frequently seen between 11 and 15 years. All the cases were treated surgically. Eighty-seven percent were discharged without any neurological deficit. The overall mortality rate in this series was 5.5%

Key Words : Children, Epidural hematoma, Head injury.

INTRODUCTION

In children, epidural hematoma (EDH) is relatively uncommon and seen only in 0.9-3.4% of head injury cases (3,4,5,6,7,9,13). However despite improved standards of hospital care and scanning methods, management of EDH is still not adequate and potentially avoidable deaths still occur. We retrospectively studied 54 children admitted with EDH. To define the characteristic clinical features of patients and evaluate the relationships between outcome, presenting clinical features and associated radiological findings. We also tried to identify the factors associated with poor prognosis, and compared our results with other series of children and adults with posttraumatic EDH.

PATIENTS AND METHOD

Presenting clinical features, details of examinations carried out, management and outcome of all children admitted with traumatic EDH between 1982 and 1992 were reviewed and recorded for subsequent analysis. In addition to standard epidemiological data including age, sex and cause of injury, the effect of the injury, the level of consciousness was recorded. Also neurological deficits and ophthalmological find-

ings were recorded when available. Outcome was assessed on an outpatient basis. Patients who had made a full recovery were discharged from further follow up and those who had not fully recovered were seen as required. Plain X-rays were reviewed and the presence of the skull fracture or suture separation noted. The diagnosis of EDH was made by computerized tomography in all patients. All the patients had been treated surgically and the hematoma evacuated. In each case, the type of operation, operative findings and the source of the haematoma were recorded.

RESULTS

There were 54 patients, 35 boys and 19 girls; their ages ranged from 0-15 years. 20.4 % of the children were aged between 11 and 5 years and there were 5 infants (aged 0-2 years, 4 boys and 1 girl). The most common cause of injury was fall (72.2%). Only 18.5% of the children with EDH had been involved in traffic accidents (Figure 1). Glasgow Coma Scale (GCS) distribution of the cases is shown in (Figure 2). The initial neurological assessment of the cases was evaluated. 27 of the patients had mild head trauma, 19 moderate head injury and 8 severe head injury.

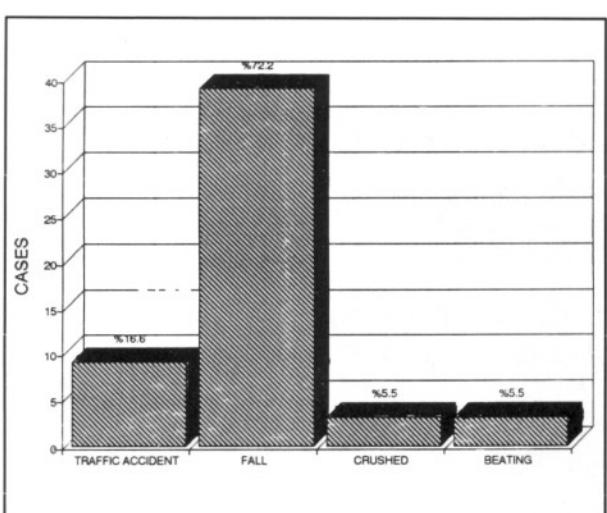


Fig. 1 : Aetiology in 54 cases of epidural hematomas.

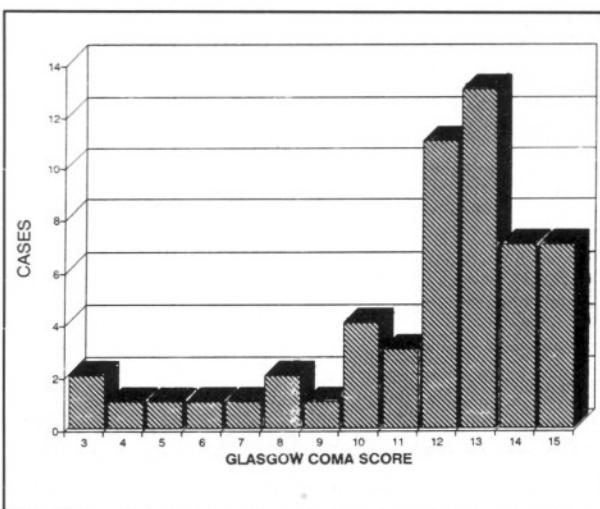


Fig. 2 : Neurologic status on admission.

We found that 6 of 54 cases had lucid intervals. 13 children (24%), excluding those with a third cranial nerve lesion, had cranial nerve palsy. Thirty-seven patients (68.5 %) were neurologically intact. On the skull x rays 34 (62.9 %) had a linear skull fracture, 4 had (7.4 %) a depressed skull fracture and 16 (29.6 %) had normal skull x – rays. According to CT findings, 39 % of the EDH were located in the temporal region, followed by frontal region 22 %, parietal region 18 %, cerebellar region in 17% and occipital region 3 %. In two cases we found an intracranial lesion accompanying the hematoma: diffuse brain edema in one case and an acute subdural hematoma in the other. Of the patients who were operated within 72 hours (n:51) the mean delay between injury and operation was 17.8 hours. Only 3 patients were operated 72 hours after the injury and the time interval between

the injury and the operation ranged from 3 to 20 days in this group. Craniotomy was performed in all cases. Most of the hematomas (54 %) were due to hemorrhage from the middle meningeal artery, the remaining 46 % were caused by the fractured bone edges. When the outcome was evaluated, we found that 47 (87 %) recovered fully without any evidence of post-traumatic sequel; where 4 (7.3 %) did not have full recovery (Figure 3). Eight children (14.8 %) were in coma on admission and just prior to operation. Three patients died, one of them an infant. Their GCS were 3, 3 and 5. The overall mortality rate was 5.5%. All the three patients who died had been in severe respiratory insufficiency on admission.

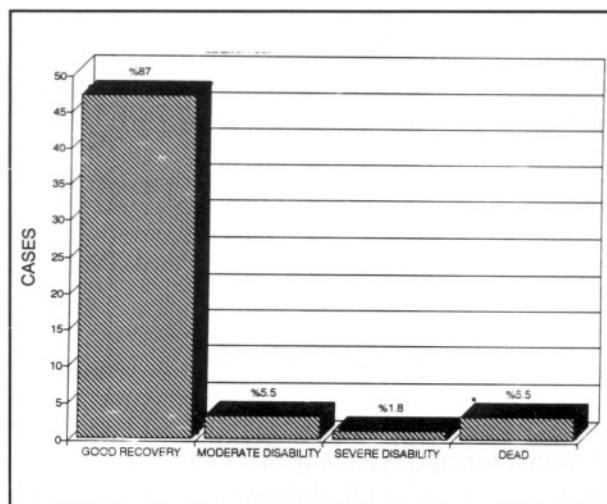


Fig. 3 : Outcome of the cases.

DISCUSSION

EDH is an uncommon intracranial complication of head injury. We found it to be more frequent in children of 11 years of age or over (23 % of our series). In our series there were only 5 infants (9.2 %). This data is in agreement with other reported series of EDH in children (9,16,18,19).

The overall incidence of EDH in older children is parallel to the reported incidence in adults (8,14,20). In our series the majority of patients with EDH were boys (66 %). Similar results have been reported by other authors (9,15,18) and the trend was observed even in infants, (80 % in our series) presumably reflecting the tendency of boys to indulge in boisterous or dangerous play activities. Paşaoğlu, in a series of 75 children with EDH reported that fall was the main cause of injury (63 %) and 32% of his patients

had been involved in road traffic accidents (19). This data is in agreement with our findings. However, Dhellemmes (9), found that 64 % of his series with EDH had been involved in road accidents and other causes had occurred less frequently (36 %). This discrepancy may be the result of different referral and admission patterns. The mechanism and causes of epidural hematoma have been described in detail by Tagaki et al. (21), who reported that coma was uncommon among the infants. In their series only 14.8 % of patients were in coma on admission to the neurosurgical unit and 40 % were fully conscious. In our series most patients (60 %) had impairment of consciousness level and we believe that this is the most significant sign of EDH in children. Our data is in agreement with other reported series (9,16) and as Simpson et al. pointed out (22), tends to suggest that the diagnosis of EDH in a child may not be made until early clinical evidence of raised ICP is present. In our series, we evaluated other clinical signs such as hemiparesis (10 %) and pupil dilatation (24 %). These have been reported as 31 % to 61 % and 30 % to 48 % respectively in other series (9,16,18,1). It may be difficult to observe in children who frequently decompensate rapidly. In our series 31 % of the children had persistent vomiting, a nonspecific but important clinical feature. Unlike other large series (10) we could not evaluate the effect of lucid interval on outcome, because we discovered it in only a few cases. Although CT scanning is the most significant radiological investigation for definitive diagnosis of EDH, 4 out of every 5 patients had an abnormality on plain skull X-rays in our series similar to other series (12,17). Thus the presence of a skull fracture in a child after head injury justifies hospital admission and neurological observation (23). In this series, CT scans demonstrated that 57 % of the hematomas were in the temporoparietal region. It seems that EDH originating in the frontotemporal region does not spread to the frontal region. A possible explanation in infants is the adherence of the dura at the coronal suture line (6). Contrary to other authors (16,19) 16.6 % of our patients had posterior fossa EDH. In the majority of cases (54 %) the bleeding point was the middle meningeal artery. Bleeding following bone fracture was seen in 46 % of our cases. The mean interval between the injury and operation was 17.8 hours. This delay may be explained by inadequate organization of emergency services and the centralization of neurosurgery services. Subacute to

chronic clinical presentation due to slowly expanding hematoma by diploic oozing and lack of guide signs to plan CT scanning may play a role in the delay in diagnosis and treatment of EDH in children. Although the mean interval between injury and operation was not significantly different in patients with a poor outcome 37.5 % of these patients were in coma just before the operation. We did not find any relationship between the location of the hematoma and outcome. Additional lesions diagnosed on CT scans were not associated with a poorer prognosis. Out of patients with additional lesions, one patient was discharged with no deficit and one with hemiparesis. Mazza (16), Paşaoğlu (19) and also Gallanger and Bowder in their neuropathological study (11), reported that additional lesions like contusion and microhemorrhages lead to a poorer prognosis. This discrepancy of our results can be explained by the inadequate number of EDH cases with additional lesions in our series. As a result it may be necessary to distinguish patients with pure EDH from those with an accompanying lesion.

All 3 patients who died were in coma. Although the time interval between injury and operation was not significantly longer in the patients who died, compared with the whole series (21 hours and 17 hours respectively), this may represent an avoidable delay in diagnosis. Therefore adoption of a more aggressive policy of obtaining a CT scan in high risk patients, as advocated by Teasdale et al. (23) may perhaps be necessary. Despite a steady decline in mortality to 2.3 % over the past years, we found the overall mortality rates to be 5.5 %. This is near that of Dhellemer (9 %) (9). While 0 % mortality as proposed by Ammirati (1) and Bricolo (2) is desirable, the difficulties of standardizing emergency services and the frequency of accompanying lesions make this goal difficult to achieve.

CONCLUSION

Our data are in agreement with most of the other series that investigated EDH in children. However certain results (time interval between injury and operation, morbidity and mortality rates) emphasize the contradiction between the operative treatment of this simple pathology and its variable clinical presentations which lead to uncertain outcomes in children.

Correspondence: Murat Hancı
PK 792 Şişli 80220 İstanbul, Turkey

REFERENCES

1. Ammirati M, Tomita T: Epidural hematomas in infancy and childhood. *J Pediatric Neuroscience* 1:123-128, 1985
2. Bricolo AP, Pasut LM: Extradural haematoma: Toward zero mortality. *Neurosurgery* 14:8-12, 1984
3. Campbell JB, Cohen J: Epidural hemorrhage and the skull of children. *Surg gynecol Obstet* 92:257-280, 1951
4. Carcassone M, Choux M, Grisoli F: Extradural hematomas in infants. *J Pediatr Surg* 12:69-73, 1977
5. Choux M, Grisoli F, Baurand C, Vigouroux RP: Les Hematomas Extra-duraux traumatiques de L'Enfant (A propos de 96 observations). *Neurochirurgie* 19:183-197, 1973
6. Choux M, Grisoli F, Peragut JC: Extradural hematomas in children. *Child's Brain* 1:337-347, 1975
7. Choux M: Extracerebral hematomas in children. Mc Laurin. (ed). in *Extracerebral collections*. New York: Springer Verlag, 1986:173-208.
8. Cordobes F, Lobato R, Rivas JJ, Munoz MJ, Chillon D, Portillo JM, Lames E: Observations on 82 patients with extradural haematoma: Comparison of results before and after the advent of computerized tomography. *J Neurosurg* 54:179-186, 1981.
9. Dhellemmes P, Lejeune JP, Christiaens JL, Combelles G: Traumatic extradural hematomas in infancy and childhood. Experience with 144 cases. *J Neurosurg* 62:861-864, 1985
10. Ersahin Y, Mutluer S, Guzelbag E: Extradural haematoma: Analysis of 146 cases. *Childs Nerv Syst* 9:96-99, 1993
11. Gallagher JP, Browder EJ: Extradural haematoma, experience with 167 patients. *J Neurosurg* 9:1-12, 1968
12. Harwood Nash D, Hendrick EB, Hudson AR: The significance of skull fracture in children: A study of 1187 patients. *Radiology* 101:151-156, 1971
13. Hendrick EB, Harwood Nash D, Hudson AR: Head injuries in Children : A survey of 4465 consecutive cases at the hospital for sick children Toronto, Canada. *Clin Neurosurg* 11:45-65, 1964
14. Jamieson KG, Yelland JD: Extradural haematoma. Report of 167 cases. *J Neurosurg* 29:13-23, 1968
15. Leggate JRS, Lopez Ramos N, Genitori L, Lena G, Choux M: Extradural haematoma in infants. *British J Neurosurg* 3: 533-540, 1989
16. Mazza C, Pasqualin A, Feriotti G, Da Pian R: Traumatic extradural hematomas in children: Experience with 62 cases. *Acta Neurochir* 65:67-80, 1982
17. Mealey J: Acute extradural hematomas without demonstrable skull fractures. *J Neurosurg* 17:27-34, 1960
18. Milza PG, Nardi PV, Gigla G, La Motta A: Epidural hematomas in infancy and childhood: Report on 176 cases. *J Pediatric Neuroscience* 5:117-122, 1989
19. Pasaoglu A, Orhon C, Selcuklu A, Ademir H, Uzunoglu H: Traumatic extradural hematomas in pediatric age group. *Acta Neurochir* 106:136-139, 1990
20. Rivas JJ, Lobato RD, Sarabia R, Cordobes F, Cabrera A, Gomez P: Extradural haematoma: Analysis of factors influencing the courses of 161 patients. *Neurosurgery* 23:44-51, 1988
21. Takagi T, Fluoke H, Wakabayah S, Nakagi R, Shibata HT: Posterior fossa subdural hemorrhage in the newborn as a result of birth trauma. *Child's Brain* 8:102-113, 1982
22. Simpson DA, Cockington RA, Hanieh A, Raftos J, Reilly PL: Head injuries in infants and young children: the value of Paediatric coma scale. Review of literature and report on a study. *Childs Nerv Syst* 7:183-190, 1991
23. Teasdale GM, Murray G, Anderson E, Mendelow AD, Mac Millan R, Jennett B, Brookes M: Risks of acute traumatic intracranial haematoma in children and adults: Implications for managing head injuries. *Br Med J* 300:363-367, 1990