Traumatic Hematomas of the Posterior Cranial Fossa†

BOONLERT SRIPAIROJKUL, M.D.*,
SANGUANSIN RATANALERT, M.D.*,
SAKCHAI SAEHENG, M.D.*,
NAKORNCHAI PHEUNPATHOM, M.D.*,
HUTCHA SRIPLUNG, M.D.**

Abstract

The objective of this study was to find out the result of treatment and the factors which can predict the outcome of traumatic hematomas of the posterior cranial fossa. Twenty two patients with traumatic hematomas of the posterior cranial fossa from 1,500 patients with traumatic intracranial hematomas were analyzed. There were fourteen male and eight female patients. The most common etiology was a motor vehicle accident. About 90 per cent of the patients had a direct injury to the occipital region. Ninety per cent of the patients had an occipital skull fracture or diastatic fracture of the lambdoid suture. The overall mortality rate was about 38 per cent. Patients having pure epidural hematoma had zero mortality. By contrast, patients suffering epidural hematoma with associated intracranial hematoma had 20 per cent mortality. Intracerebellar hematoma led to 60 per cent mortality. Glasgow Coma Scale (GCS) before operation was used to predict the patients' outcome. Ninety per cent of the patients who had a GCS between 13 and 15 had a good recovery. By contrast, only 30 per cent of the patients who had a GCS below 9 had a good recovery. Statistical analysis showed that the GCS value of below 9 predicted the poor outcome for the patients.

Traumatic intracranial hematomas are a major cause of death in severe head injury patients. Most are supratentorial hematomas, but only 3-5 per cent are infratentorial hematomas[1-3]. Traumatic posterior fossa hematomas cause a considerably higher mortality compared to the mortality of traumatic supratentorial hematomas because they directly compress the brainstem. There are many reports of traumatic posterior fossa hemotoma and some concluded that the mortality rate depended

* Division of Neurosurgery, Department of Surgery,
** Department of Pathology, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90112, Thailand.
† Presented at the 22nd Annual Scientific Meeting of the Royal College of Surgeons of Thailand, 18-21 July 1997, Royal Cliff Hotel, Chonburi, Thailand.

Table 1. Posterior fossa hematomas.

No.	Age	Sex	Cause	Scalp Cont.	Fracture	Site of hematomas	GCS	Interval	Bleeding Site	Result
1	10	F	Walk	Occipital	Linear # Occipital	EDH Post. Fossa	15 ↓ 15	12 days	Transverse Sinus	GR
2	17	M	MC	Occipital	-	EDH Post. Fossa	13 ↓ 7T	1 hr.	Dural vessel	GR
3	29	F	MC	Lacerated Occipital	Diastatic # Lambdoid	EDH Post. Fossa	10 ↓ 10	4 hrs.	Transverse Sinus	GR
4	29	M	MC	Frontal	Linear # Frontal	EDH Post. Fossa	15 ↓ 15	1 day	-	GR
5	25	M	MC	Occipital	Linear # Occipital	EDH Post. Fossa	13 ↓ 15	3 hrs.	-	GR
6	16	M	MC	Occipital	Linear # Occipital	EDH Post. Fossa	11 ↓ 7	3 hrs.	Trocular Herophili	GR
7	28	F	Walk	-	Linear # Occipital	Chronic EDH Post. Fossa	15 ↓ 15	14 days	-	GR
8	26	M	MC	Occipital	Diastatic # Lambdoid	EDH Post. Fossa Rt. Frontotemporal Contusion	15 ↓ 14	4 days	Dura V.	GR
9	51	F	MC	-	Linear # Occipital	EDH Post. Fossa Lt. Frontal Contusion	15 ↓ 9	12 hrs.	Transverse Sinus	GR
10	19	M	MC	Lt.Frontal Occipital	Diastatic # Lambdoid	EDH Post. Fossa Lt. Frontal Contusion	15 ↓ 6T	1 day	-	MD
11	12	M	MC	Frontal Occipital	Linear # Temporal + Frontal Diastatic # Lambdoid	EDH Post. Fossa Rt. ASDH Occipital Rt. Frontal EDH	7T ↓ 13	9 hrs.	-	GR
12	46	M	MC	Occipital	Diastatic # Lambdoid	EDH Post. Fossa Rt. ASDH with Brain Swelling	4 ↓ 3T	1 hr.	-	Death
13	38	F	MC	Frontal	#Base of Skull Linear # Occipital	EDH Post. Fossa ICH	11 ↓ 15	2 days	-	GR
14	22	M	MC	-	Linear # Occipital	EDH Post. Fossa ICH	15 ↓ 12	20 hrs.	-	Death
15	63	F	MC	Occipital	Linear # Occipital	EDH, ASDH, ICH — Post Fossa	14 ↓ 14	8 hrs.	Transverse Sinus	MD
16	21	M	assault	Occipital	Linear # Occipital	EDH, ASDH, ICH — Post Fossa	10 ↓ 10	1 hr.	-	GR
17	12	M	Fall	Occipital	Linear # Occipital	ASDH Post. Fossa	15 ↓ 8	3 days	Cerebellum	GR
18	61	M	MC	Frontal Occipital	Linear # Occipital	ICH	9 ↓ 6	12 hrs.	-	SD
19	8	M	Walk	Frontal Occipital	-	ICH with Cerebellar Swelling	8T ↓ 7T	3 hrs.	-	Death
20	59	F	MC	Occipital	Linear # Occipital	ICH Rt. ASDH Lt. Frontal Contusion	15 ↓ 6	8 hrs.	-	Death
21	60	F	MC	Occipital	-	ICH with Cerebellar Swelling Rt. ASDH	4T ↓ 3T	2 hrs.	-	Death
22	19	M	MC	Temporal Occipital	Linear # Occipital	ASDH ICH with Cerebellar Swelling	8 ↓ 8	3 hrs.	-	SD

EDH = Epidural hematoma
ASDH = Acute Subdural hematoma
ICH = Intracerebellar hematoma
# = Fracture
T = *Endotracheal tube*

on the site of the hematomas and associated intracranial hematomas[4-8]. The introduction of computerized tomography into clinical practice has brought about a marked reduction in the mortality of traumatic posterior cranial fossa hematomas[1,9-12].

The aim of our paper is to report the result of treatment and the predictable factors related to the mortality and morbidity rate based upon 22 cases of traumatic hematomas of the posterior cranial fossa.

MATERIAL AND METHOD

From 1985 to 1996 there were 1,500 cases of traumatic intracranial hematomas admitted to Songklanagarind Hospital, Songkhla, Thailand. They were sent to our hospital by a direct transfer and referral system. There were 22 patients who had traumatic posterior cranial fossa hematomas (Table 1). The patients consisted of 14 males and 8 females aged 8 to 63 (mean : 30.5 years). The time between injury and operation ranged from 1 hour to 14 days. Some came late because they showed a good clinical condition at first and thus received a delayed diagnosis. The causes of head injury included motor vehicle accidents (17 patients), walking accidents (3 patients), falling accidents (1 patient) and the remaining patient had been assaulted.

All patients underwent investigation by computerized tomography scan. There were 19 patients who had skull fractures and 3 patients had no skull fracture (Table 2). Of the 19 patients with skull fractures, 13 patients had an occipital skull fracture, 5 had diastatic fractures of the lambdoid suture, 1 patient had a frontal skull fracture. Seven patients had pure posterior fossa epidural hematoma and 9 patients had posterior fossa epidural hematoma with associated lesion. One patient had a pure acute subdural hematoma and 1 patient had a subdural hematoma with intracerebellar hematoma. Two patients had pure intracerebellar hematoma and 2 had intracerebellar hematoma with supratentorial hematoma.

The Glasgow Coma Scale (GCS) was used to assess each patient's level of consciousness at the emergency room and before the operation[13]. Before the operation, 8 patients had a GCS value of between 13 and 15, 4 patients had a GCS between 9 and 12 and the remaining 10 cases had a GCS value of below 9.

The outcome was evaluated by means of the Glasgow Outcome Scale (GOS) at least 6 months after injury[14]. None of the cases were in a vegetative state.

Stata 5.0 was used to analyze the relationships of variables. Pearson Chi Square was used to perform univariate analysis and logistic model was used to predict the final outcome.

RESULTS

The patients' ages compared by GOS are presented in Table 3.

Of the 7 patients with a GCS between 13 and 15 before surgery, 6 patients showed good results and 1 patient showed a moderate disability. Of the 6 patients having GCS between 9 and 12, 4 patients had a good recovery, 1 patient had a severe disability and the other patient died. The patients with a GCS under 9 had less favourable results, 3 patients recovered completely, 1 patient had a moderate disability, 1 patient had a severe disability and the 4 remaining patients died (Table 4).

We found that mortality was related to the interval between the injury and surgery. Intervals less than 6 hours resulted in less favourable outcome than intervals greater than one day (Table 5).

Table 2. Type of hematomas associated with skull fracture.

Skull fracture	Yes	No
EDH (+ associated lesion)	15	1
ASDH	1	
ICH (+ associated lesion)	3	2

Table 3. The patients' age and result of treatment (GOS)

Age	GR	MD	SD	Dead
1-9				1
10-19	5	1	1	
20-29	6			1
30-39	1			
40-49				1
50-59	1			1
>60		1	1	1

Table 4. GCS before surgery and result of treatment (GOS).

GCS	GR	MD	SD	Dead
13-15	6	1		
9-12	4		1	1
3-8	3	1	1	4

Table 5. Intervals between injury and operation and result of treatment (GOS).

Interval	GR	MD	SD	Dead
< 6 h	5		1	3
6 h - 1 days	3	1	1	2
> 1 days	5	1		

Table 6. Type of hematomas and result of treatment (GOS).

Lesion	GR	MD	SD	Dead
EDH	7			
EDH + Supratentorial or Infratentorial lesion	5	2		2
ASDH	1			
ASDH + ICH			1	
ICH			1	1
ICH + supratentorial lesion				2

In comparing results of each lesion type, we found that 7 pure epidural hematoma patients had a complete recovery. In the patients who had an epidural hematoma and an associated lesion, 5 cases achieved a good recovery, 2 cases had a moderate disability and 2 cases died. One patient with pure subdural hematoma showed a good result. Among the remaining patients, who had an intracerebellar hematoma and an intracerebellar hematoma with an associated lesion, 2 patients showed a severe disability and 3 patients died (Table 6).

Statistical analysis showed that a GCS below 9 had a statistically significant correlation with the results of treatment with an odds ratio of 0.057, 95 per cent CI < 0.004,0.894>.

DISCUSSION

According to the literature, traumatic posterior fossa hematomas are less common than supratentorial hematomas. Wright reported 17 cases of traumatic infratentorial hematomas compared with 344 cases of traumatic supratentorial hematomas during the same period of time[1]. Young reported 11 cases of posterior fossa hematomas in 134 patients with occipital fracture[6]. Fisher analyzed 296 patients of occipital trauma and found 21 patients had posterior cranial fossa hematomas. He noted that only 7 per cent of the patients with occipital trauma without fracture had serious neurological complications, while one third of the patients with occipital fractures had serious neurological complications[15].

Epidural hematoma is the most common lesion in the posterior cranial fossa[1,2,15-17]. It accounts for about 1.7 to 3 per cent of all head injuries[1,2,15,16]. Among the epidural hematomas the frequency of posterior fossa hematomas ranges from 3 per cent to 12.9 per cent[2,4,7,10]. Mortality rate is about 26 to 35 per cent and depends on associated intracranial hematomas[4-7]. Some studies reported a low mortality and some showed no mortality at all[11,16,18]. Epidural hematomas of the posterior fossa are associated with occipital fractures in approximately 80-100 per cent of cases[1,4-6,12,16]. Bleeding sites were found at the lateral sinus, trocular Herophili, meningeal artery of occipital artery and emissary vein[19]. Some literature reported non surgical treatment in the case of epidural hematoms because of the limited size of the clot and the satisfactory clinical conditions[20,21].

Subdural hematomas are less common than extradural hematomas[1-3]. The incidence is about 2.5 per cent of all subdural hematomas (22,23). The source of bleeding was found in appoximately 25 per cent of patients[24]. Subdural hematomas of the posterior fossa are associated with occipital skull fractures, accounting for about 30 to 50 per cent of the cases[1,6,22]. Bleeding was found from a lacerated cerebellum, lateral sinus, bridging vein or ruptured intracerebellar hematoma in the subdural space[22,24]. Mortality in this group was 40 per cent of all cases[1].

The diagnosis of traumatic intracerebellar hematoma has been improved with the introduction of computerized tomography. The incidence rate is approximately 1.7 per cent of all traumatic intracranial hematomas, but the exact incidence is not

known[1]. Traumatic intracerebellar hematomas may coexist with brain stem damage, so their mortality is higher than the mortality of other hematomas; 50 per cent of the patients with this lesion are moribund at admission[3]. Mortality rate is about 50 per cent of the cases. The size of the hematoma and location of the lesion predict the patients' outcome[8].

In short, our study included 22 patients with traumatic posterior fossa hematomas. More than 90 per cent had a direct injury to the occipital region. Almost all of the epidural (98%) hematomas had an occipital skull fracture while intracerebellar hematomas were associated with skull fractures in 60 per cent of the cases. The overall mortality rate was about 38 per cent.

Older patients had higher mortality than younger patients. The patients younger than 40 years had a mortality rate of about 10 per cent. By contrast, patients older than 40 years had 50 per cent mortality. By statistical analysis, age was not significantly related to the result of treatment. A larger sample size might show a statistically significant relationship between age and prognosis.

An interval greater than one day between injury and surgery showed a good outcome. This might be because the patients who received delayed surgical treatment had a good clinical condition or could tolerate a space occupying lesion. Therefore, they received delayed diagnosis. However, surgical treatment must be done as soon as possible because the mortality rate in conscious patients was lower than that in unconscious ones.

No patients with a pure epidural hematoma died. Concomitant infra and supratentorial lesions increased the mortality and morbidity rate in cases of epidural hematoma. Twenty per cent died and 20 per cent had a moderate disability. Our patients who had intracerebellar hematoma or intracerebellar hematoma with associated lesion had poor outcome. Sixty per cent died and 40 per cent had a severe disability.

Application of GCS before operation could predict the patients' outcome. More than 90 per cent of the cases with a GCS between 13 and 15 had a good recovery. By contrast, only 30 per cent of cases with a GCS between 3 and 8 had a good recovery. By statistical analysis, we concluded that a GCS under 9 before surgery could predict the patient's outcome. The patients with GCS under 9 before surgery showed a poor prognosis.

SUMMARY

Twenty-two cases of traumatic hematomas in the posterior cranial fossa were presented. The most common cause of injury was a blow to the occiput. Posterior fossa hematomas were usually accompanied by occipital skull fractures. Younger patients had more favourable outcome than older patients. Concomitant intracranial hematoma had an increased mortality rate in cases with epidural hematomas. Intracerebellar hematomas had the highest mortality rates compared with other lesions. GCS could predict the patients' outcome. A GCS < 9 predicted a poor prognosis for the patients.

ACKNOWLEDGMENT

The authors wish to thank Nanta Chiranee (Ph.D.) for correcting the English grammar of this manuscript.

(Received for publication on June 4, 1997)

REFERENCES

1. Wright RL. Traumatic hematoma of the posterior cranial fossa. J Neurosurg 1966; 25: 402-9.
2. Zuccarello M, Pardatscher K, Andrioli GC, et al. Epidural hematomas of the posterior cranial fossa. Neurosurgery 1981; 8: 434-7.
3. Tsi FY, Teal JS, Itabashi HH, et al. Computerized tomography of posterior fossa trauma. J Com Assist Tomogr 1980; 4: 291-305.
4. Roda JM, Gimenez D, Perez Higueras A, et al. Posterior fossa epidural hematomas : a review and synthesis. Surg Neurol 1983; 19: 419-24.
5. Pozzati E, Tognetti F. Spontaneous healing of acute extradural hematomas: study of twenty-two cases, Neurosurgery 1986; 18: 696-700.
6. Young HA, Schmidek HH. Complications accompanying occipital skull fracture. J Trauma 1982; 22: 914-20.
7. Holzschuh M, Schuknecht B. Traumatic epidural hematomas of the posterior fossa: 20 new cases and a review of the literature since 1961. Br J Neurosurg 1989; 3: 171-80.
8. Pozzati E, Grossi C, Padovani R. Traumatic intracerebellar hematomas. J Neurosurg 1982; 56: 691-4.
9. Cervantes LA. Concurrent delayed temporal and posterior fossa epidural hematomas. J Neurosurg 1983; 59: 351-3.
10. Cordobes F, Lobato RD, Ribas JJ, et al. Observation on 82 patients with extradural hematoma. comparision of results before and after the advent of computerized tomography. J Neurosueg 1981; 54: 179-86.
11. Bricoro AP, Pasut L. Extradural hematoma : toward zero mortality. J Neurosurg 1984; 14: 8-12.
12. Ammirati M, Tomita T. Posterior fossa epidural hematoma during childhood. Neurosurg 1984; 14: 541-4.
13. Teasdale GM, Jennett B. Assessment of coma and impaired consciousness : a practical scale. Lancet 1974; 2: 81-4.
14. Jennett B, Bond MR. Assessment of outcome after severe brain damage. Lancet 1975; 1: 480-1.
15. Fisher RG, Kim JK, Sasha E. Complication of posterior fossa due to occipital trauma - their operability. JAMA 1958; 167: 176-82.
16. Garza - Mercado R. Extradural hematoma of the posterior cranial fossa. J Neurosurg 1983; 59: 664-72.
17. Cordobes F, Lobato RD, Amor T, et al. Epidural haematoma of the posterior fossa with delayed operation. report of a chronic case. Acta Nerochir (Wien) 1980; 53: 275-81.
18. Zuccarello M, Pardatscher K, Andrioli GC, et al. Epidural hematomas of the posterior cranial fossa. Neurosurgery 1981; 8: 434-7.
19. Kosary IZ, Goldhammer Y, Lerner MA. Acute extradural hematoma of the posterior fossa. J Neurosurg 1966; 24: 1007-12.
20. Pozzati E, Tognetti F, Cavallo M, et al. Extradural hematomas of the posterior cranial fossa: observations on a series of 32 consecutive cases treated after the introduction of computed tomography scanning. Surg Neurol 1989; 32: 300-3.
21. Pang D, Horton JA, Herron JM, et al. Nonsurgical management of extradural hematomas in children. J Neurosurg 1983; 59: 958-71.
22. Jamieson K, Yelland JDN. Surgically treated traumatic subdural hematomas. J Neurosurg 1972; 37: 137-49.
23. Mile I, Medlery AV. Posterior fossa subdural hematoma. J Neurol Neurosurg Psychiatry 1974; 37: 1373-7.
24. Ciembroniewicz JE. Subdural hematoma of the posterior fossa: review of the literature with addition of three cases. J Neurosurg 1965; 22: 465-73.
25. Estridge MN, Smith RA. Acute subdural hemorrhage of posterior fossa. report of a case with review of the literature. J Neurosurg 1961; 18: 248-9.

เลือดออกบริเวณสมองน้อยจากอุบัติเหตุ†

บุญเลิศ ศรีไพโรจน์กุล, พ.บ., ศักดิ์ชัย แซ่เฮ้ง, พ.บ.**
สงวนสิน รัตนเลิศ, พ.บ., นครชัย เผื่อนปฐม, พ.บ.*, หัชชา ศรีปลั่ง, พ.บ.***

เพื่อศึกษาถึงผลการรักษา รวมทั้งความสัมพันธ์ของ GCS ก่อนทำการผ่าตัดต่อผลของการรักษาผู้ป่วยที่มีเลือดออกบริเวณ posterior cranial fossa จากอุบัติเหตุในโรงพยาบาลสงขลานครินทร์ จึงได้ทำการศึกษาย้อนหลังในผู้ป่วย 22 ราย ที่มีเลือดออกบริเวณ posterior cranial fossa จากจำนวนผู้ป่วยทั้งหมด 1,500 ราย ที่มีเลือดออกในสมองจากอุบัติเหตุ พบว่าเป็นผู้ป่วยชาย 14 ราย และหญิง 8 ราย สาเหตุส่วนใหญ่ของการบาดเจ็บคือ อุบัติเหตุจากจักรยานยนต์ ประมาณ 90 เปอร์เซนต์ของผู้ป่วย ได้รับแรงกระแทกที่บริเวณท้ายทอย ผู้ป่วย 90 เปอร์เซนต์ มีกะโหลกศีรษะร้าวที่กระดูก Occipital และมีรอยแยกของรอยต่อ lambdoid อัตราตายในผู้ป่วยกลุ่มนี้ประมาณ 38 เปอร์เซนต์ ไม่พบอัตราตายในผู้ป่วยที่มีเลือดออกนอกเยื่อหุ้มสมองเพียงอย่างเดียว แต่ผู้ป่วยที่มีเลือดออกนอกเยื่อหุ้มสมองร่วมกับเลือดออกในตำแหน่งอื่นในกะโหลกศีรษะมีอัตราตาย 20 เปอร์เซนต์ ในขณะที่เลือดออกในเนื้อสมองของสมองน้อย มีอัตราตายสูงถึง 60 เปอร์เซนต์ GCS ก่อนทำการผ่าตัดบอกผลการรักษาได้ ประมาณ 90 เปอร์เซนต์ ของผู้ป่วยที่มี GCS ระหว่าง 13 ถึง 15 ก่อนทำการผ่าตัดรักษา มีผลการรักษาที่ดีมาก ในขณะที่มีผู้ป่วย 30 เปอร์เซนต์ ในกลุ่มที่มี GCS น้อยกว่า 9 ให้ผลการรักษาดีมาก การวิเคราะห์ทางสถิติ พบว่า GCS น้อยกว่า 9 พยากรณ์ผลการรักษาที่เลว

* หน่วยประสาทศัลยศาสตร์, ภาควิชาศัลยศาสตร์,
** ภาควิชาพยาธิวิทยา, คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์, หาดใหญ่, สงขลา 90112
† เสนอในการประชุมประจำปีครั้งที่ 22 ราชวิทยาลัยศัลยแพทย์แห่งประเทศไทย วันที่ 18-22 กรกฎาคม 2540 ณ โรงแรมรอยัลคลิฟ พัทยา ชลบุรี