Acta Paediatrica Academiae Scientiarum Hungaricae, Vol. 22 (4), pp. 347–352 (1981)

Neonatal intracranial haemorrhage: aspiration through anterior fontanel in 23 cases

by

Ilona GYÖRGY

Department of Paediatrics, University Medical School, Debrecen, Hungary

Received April 5, 1981

In 23 cases of perinatal intracranial haemorrhage with elevated intracranial pressure, the haematoma was aspirated through the anterior fontanel. Five patients died during the neonatal period, 18 infants are alive. The site of haemorrhage in the survivors was intraventricular in six cases, intraventricular and convexity subdural in six cases and only convexity subdural in six cases. At present the age of children ranges between 7 and 40 months. Subsequent follow-up revealed a normal development of 13 survivors. Four children have slight cerebral palsy (one of these has epilepsy). One preterm newborn with intraventricular haemorrhage has progressive hydrocephalus.

Hypoxic periventricular-intraventricular haemorrhage has been shown to be a common occurrence in the premature infant [6, 7, 11, 12, 14, 15, 17, 18], while improvement in obstetric technique have resulted in a reduction in traumatic haemorrhages of the newborn [25]. Nevertheless, intracranial bleeding is not infrequent in term infants, too [1, 2, 3, 16].

Acute subdural, extradural or intraventricular haemorrhage can cause elevated intracranial pressure endangering the life of the newborn. Prompt diagnosis and treatment are of critical importance and evacuation of the haematoma can be life-saving. In the following we shall report on our pertaining experience.

Material and Method

The subjects of the present study were 23 newborn infants treated in our perinatal intensive unit between November, 1977, and May, 1980. Table I shows their history as well as their main symptoms. The first 13 cases were fullterm, the next 5 preterm survivors. The last 5 babies died during the neonatal period. The diagnosis of intracranial bleeding is based on computer tomography or ultrasound scan [10, 13, 22, 23]; we have used the latter method.

The haematoma was aspirated when indicated by symptoms like coma, status epilepticus with transtentorial herniation, or brainstem failure. A bulging fontanel and separated sutures were also indicative of an elevated intracranial pressure.

Intraventricular punctures were applied when in addition to the above signs, the CSF contained blood. The presence of blood in the CSF did not by itself indicate an intraventricular puncture.

First, a subdural tap was done on the right side. In the case of a massive intraventricular haemorrhage, an intraventricular puncture was also performed. Finally, a subdural tap was performed on the left side. The intraventricular puncture was repeated whenever indicated by a dangerous elevation of intracranial pressure. The subdural taps were repeated until blood was not obtained from the subdural space.

TABLE I

Clinical data of patients
Signs and symptoms

Name	Gestational age, week (birth-weight) kg	Fetal distress	Placental bleeding	Abnormal presentation	Obstetric complication	Apgar 5/1 7/5	Middle-aged primigravida	Twin pregnancy	Hyperviscosity	Manifestation of symptoms (days)	Altered consciousness	Seizures	Irritability	Muscle hypertension	Muscle hypotension	Fever	Haemorrhagic diathesis	Bulging fontanel	Transtentorial herniation	Brainstem failure	Hemiparesis
1. M. Zs.	40/3.2	+	−	−	−	+	+	−	−	22	+	+	+	+	−	+	+	+	−	+	−
2. V. K.	38/2.9	−	−	+	+	+	−	−	−	1	+	+	+	+	−	+	+	+	−	−	−
3. B. Cs.	39/2.4	+	−	+	+	−	−	+	−	1	+	+	+	+	−	−	−	+	−	+	−
4. D. T.	40/3.5	+	−	+	+	+	−	−	−	2	+	+	+	+	−	+	+	+	−	+	−
5. K. E.	40/3.2	+	−	−	−	−	−	−	−	1	+	−	−	−	+	−	+	+	+	+	−
6. Cs. L.	41/3.5	+	−	−	−	−	−	−	−	5	+	+	+	+	−	+	−	+	−	+	+
7. B. K.	40/2.8	+	−	−	+	+	−	−	−	1	+	+	−	+	−	−	−	+	+	+	−
8. D. K.	40/3.1	−	−	+	+	−	−	−	−	1	+	−	+	+	−	+	−	+	+	−	−
9. B. T.	40/3.8	+	−	−	+	+	−	−	−	2	+	+	−	+	−	−	+	+	−	+	−
10. B. K.	37/3.2	+	+	−	−	+	−	−	+	1	+	+	−	−	+	−	−	+	−	−	−
11. S. J.	39/3.2	+	−	−	−	+	−	−	−	2	+	+	−	+	−	−	−	+	−	−	−
12. Z. L.	40/2.6	+	−	−	−	+	−	−	−	1	−	−	−	−	+	−	−	+	−	−	−
13. P. S.	40/2.6	+	−	−	−	+	−	−	−	1	+	−	−	+	+	−	−	+	−	−	−
14. G. R.	33/1.5	−	+	−	−	−	−	−	−	14	−	−	−	−	+	−	−	+	−	−	−
15. M. J.	30/1.5	−	−	−	−	+	−	−	−	12	−	−	−	−	+	−	−	+	+	−	−
16. P. R.	35/1.4	+	−	−	−	+	−	−	−	3	+	−	+	+	−	−	−	+	−	−	−
17. B. B.	33/1.4	+	−	+	+	−	+	−	−	3	+	+	+	+	−	+	+	+	−	−	−
18. U. Á.	34/1.4	−	−	−	−	+	−	−	+	3	+	+	+	−	−	−	−	+	−	+	−
19. V. M.	40/3.4	−	−	−	−	−	−	−	−	5	−	+	−	−	+	−	−	+	−	+	−
20. H. B.	38/2.4	−	−	+	+	+	−	−	−	2	+	+	−	−	+	+	+	+	−	+	−
21. T. A.	37/2.0	−	−	+	−	−	−	−	−	2	+	+	−	−	+	+	−	+	−	+	−
22. M. A.	36/1.9	+	−	−	+	+	+	−	−	6	+	+	−	−	+	−	−	+	−	+	−
23. K. Z.	38/1.9	−	−	−	+	+	−	−	−	1	+	−	−	−	+	−	−	+	−	+	−

The babies were kept under close observation and treated whenever habilitation was needed; this was done by the method of Katona [9]. For psychological examination the Bühler—Hetzer test [3] was used.

Statistical evaluation was done by the chi-square test.

Results

Five newborns died during the neonatal period. Necropsy revealed besides the intraventricular haemorrhage:

— posterior fossa haemorrhage (Cases Nos 20 and 23);

— cervicothoracal epidural bleeding (Cases Nos 19 and 21);

— purulent ventriculitis (Case No. 22), corroborating the diagnosis made from the CSF smear.

Eighteen children are alive. Table II shows the neonatal localization of haemorrhage in the survivors.

Intraventricular puncture was applied once in each of four of the dead newborns, and in five survivors with isolated intraventricular haemorrhage. At each intervention 5 to 20 ml of blood was obtained and subsequently the intracranial pressure decreased promptly. It was not necessary to repeat the intraventricular puncture in four newborns with intraventricular and subdural haemorrhage.

Repeated subdural taps showed that the haematoma was successfully aspirated by the first tap.

Follow-up of the survivors revealed that 13 out of 18 have developed well. Four children suffer from slight cerebral palsy, one of them from epilepsy. One child (Case No. 15) has progressive hydrocephalus. At the time of reporting the age of survivors is between 7 and 40 months.

Table III shows the outcome according to the localization of the haemorrhage. In this respect the patients showed no significant difference.

Table IV demonstrates the outcome according to gestational age. Preterm babies had a poor prognosis.

In the following, some cases are described in detail. The case numbers are those marked in Table I.

Case 3. — Twin birth. In utero, the head of the second fetus was pushed behind the head of the first one who was already in the birth

Table II

Localization of haemorrhage in the survivors

Haemorrhage	Groups	
	fullterm (n = 13)	preterm (n = 5)
Intraventricular (n=6)	3	3
Intraventricular + convexity subdural (n=6)	5	1
Convexity subdural (n=6)	5	1

Table III

Outcome and the site of haemorrhage

Site	Outcome		
	Normal	Slight brain injury	Hydrocephalus
Intraventricular	4	1	1
Intraventricular + convexity subdural	5	1	—
Convexity subdural	4	2	—

TABLE IV

Outcome and gestational age

Age	Outcome		
	Normal n = 13	Slight brain injury n = 4	Hydro-cephalus n = 1
Fullterm (n=13)	11	2	—
Preterm (n=5)	2	2	1

A significant difference was found between the two groups with the chi-square test ($p < 0.05$).

canal with breech delivery. At one day of age the second twin had coma, seizures and apnoeic spells. The fontanel was tense, the sutures separated and the neck was stiff. Immediate subdural taps yielded 8 ml of blood on the right, and 10 ml on the left side. Intraventricular puncture yielded 15 ml of blood with elevated pressure. During the next days the punctures were repeated three times. The baby was discharged at the age of one month without neurologic abnormality. Subsequent follow-up revealed a normal development of both twins. Developmental quotient: 100.

Case 4. — This fullterm male was born by breach delivery. At the age of three days he was discharged with his mother. At 5 days of age he was readmitted with seizures, hyperpyrexia, anaemia, and coma. There was no response to painful stimuli. The right pupil was dilated and fixed. The anterior fontanel was bulging and the sutures were separated. Respiration was irregular and bradycardia could be observed intermittently. The CSF contained blood. Subdural taps yielded 4 ml of blood on each side. From the right ventricle 20 ml of blood was gained with increased pressure. A silicone catheter was introduced into the frontal horn of the right lateral ventricle by the method of Paraicz [19]. In six hours 70 ml of blood containing fluid dripped down through the extracranial drain, then the catheter became clotted. On the following day ventricular punctures yielded 4 ml of blood and on the fourth day 20 ml of blood-tinged fluid. Repeated subdural taps were nonproductive.

On the first day the coagulation parameters were abnormal. Fresh whole blood was infused twice. On the second and third days repeated coagulation studies were normal. On the sixth day the baby was conscious but lethargic. From the 17th day on he was breastfed and on the 22nd day he was discharged. — At the age of 18 months, the child is developing normally. Developmental quotient, 94.

Case 15. — A preterm male. On the first days of life he developed respiratory distress. Positive pressure ventilation was applied, and since the bilirubin level was high, an exchange transfusion was given. At 14 days of age a rapidly growing head circumference was verified. The spinal and ventricular fluid contained blood. Continuous ventricular drainage was applied. The ventricular fluid contained blood permanently for a month. The catheter was left in place in view of the hypertensive hydrocephalus and the infant was transferred

to the surgical unit for a shunt operation. Surgery could not, however, be performed because of a hepatitis. Now, at the age of 30 months, the hydrocephalic child is alive and awaits placement of a ventil.

Discussion

Changes in obstetric practice in the last 40 years have reduced the incidence of traumatic intracranial haemorrhage of newborns. It is, however, mandatory to consider intracranial bleeding as a potential occurrence in term newborns displaying acute neurologic symptoms. With the improved chance of an accurate diagnosis by computer tomography or ultrasound scan, it is now increasingly possible to verify the suspected cases [5, 15, 20, 21, 24].

Massive intracranial haemorrhage can cause severe intracranial hypertension during the neonatal period, too. The signs of transtentorial herniation or brainstem failure with increased intracranial pressure indicate the evaluation of massive hematoma. In our experience this intervention has proved life-saving in several cases.

The outcome of the survivors is not so uniformly poor as stated earlier [4]; the majority develop well.

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I. György, M. D.
Pf. 32
H-4012 Debrecen, Hungary