

Cranial Ultrasound Screening of Low Birth Weight Infants

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ABSTRACT Cranial ultrasound examination was performed on 91 low birth weight infants to determine the occurrence of cerebral hemorrhage with or without ventriculomegaly. In very low birth weight infants cerebral hemorrhage was found in 35%, while the hemorrhage plus ventriculomegaly was found in 18% of the infants. In all low birth weight infants cerebral hemorrhage was found in 17%, while hemorrhage plus ventriculomegaly was found in 8% of the infants. In dysmature infants, cerebral hemorrhage was found in 10%. Severe asphyxia was associated with hemorrhage or hemorrhage plus ventriculomegaly, where the incidence was 45% and 17%, respectively. [*Paediatr Indones* 1996;36:98-101]

Introduction

Cranial ultrasound has been widely accepted as an accurate non-invasive technique for measuring intraventricular size and detecting cerebrovascular hemorrhage. Using cranial ultrasound, cerebrovascular hemorrhage has been demonstrated in 35-55% of very low birth weight infants and in 13% of infants with birth weight between 1501 and 2000

grams.¹⁻⁴ Ultrasound is used to assess the incidence and the cause of cerebral ventricular hemorrhage in low birth weight infants.

Methods

A cranial ultrasound examination was performed on 91 of low birth weight infants born during the period of March 1993 until April 1994 at the Department of Child Health Gunung Wenang Hospital/ Medical Faculty, Sam Ratulangi University, Manado. The examination was

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performed to all low birth weight infants born in the hospital.

All infants were scanned using ALOKA ECHO CAMERA SSD-630 with 5 MHz sector array transducer (Model ASU-32-5-S). Coronal and sagittal sections were taken throughout the lateral ventricles at the level of the interventricular foramen.

The size of lateral ventricle was examined by measuring the ventricle width, i.e., the distance between the medial wall and the floor of the lateral ventricle at the widest points.

Ventricular dilatation was defined as ventricular width of greater than 3 mm, and was graded as mild (>3-5 mm), moderate (>5-10 mm) and severe (>10 mm).

Also were examined the relationship between asphyxia and the occurrence of cerebrovascular hemorrhage.

Results

Ninety one low birth weight infants which consisted of 21 (23%) dysmature and 70 (77%) preterm infants (Table 1) were studied. Seventeen (24%) of the preterm infants had the birth weight between 1001-1499 grams and 53 (76%) with the birth weight between 1501-2499 grams (Table 2). In very low birth weight infants cerebral hemorrhage was found in 6 (35%) while hemorrhage and ventriculomegaly in 3 (18%) of the infants.

In the group of 53 babies with the birth weight between 1500-2499 grams, cerebral hemorrhage was found in 7 (13%), hemorrhage plus ventriculomegaly in 4 (8%), and ventriculomegaly only in 1 (2%) of the infants.

In all low birth weight infants, cerebral

hemorrhage was found in 15 (17%), hemorrhage plus ventriculomegaly in 7 (8%) and ventriculomegaly alone in 1 (1%).

On other hand the incidence of hemorrhage on dysmature infant was 2 (10%) (Table 3). The greatest size of the ventricular dilatation was 32 mm in an infant with meningitis (Table 4).

Cerebral hemorrhage was associated with asphyxia, especially severe asphyxia, where cerebral hemorrhage was found in 8 (45%) and hemorrhage plus ventriculomegaly in 3 (17%) (Table 5).

Table 1. Relationship between maturity and sex

Sex	Premature	Dysmature	Total
Male	29 (73%)	11 (28%)	40
Female	41 (80%)	10 (20%)	51
Total	70 (77%)	21(23%)	91

Table 2. Distribution of preterm infants according to birth weight

Birth weight	No. of babies (%)
1000-1499	17 (24%)
1500-2499	53 (76%)
Total	70 (100%)

Table 3. Relationship between maturity and hemorrhage

Maturity	H	V	H+V	N	Total
1000-1500 g	6	-	3	8	17
1501-2499 g	7	1	4	41	53
Dysmature	2	-	-	19	21
Total	15	1	7	68	91

H = hemorrhage; V = ventriculomegaly; N = Normal

Table 4. Relationship between Apgar Score and maturity

Apgar	Birth weight		Dys-mature	Total
	1000-1500 g	1501-2499 g		
0 - 3	6	9	3	18 (20%)
4 - 6	3	11	9	23 (25%)
7 - 10	8	33	9	50 (55%)
Total	17	53	21	91(100%)

Table 5. Distribution of cerebral hemorrhage according to Apgar Score

Apgar Score	H	V	H + V	N	Total
0 - 3	8	1	3	6	18
4 - 6	4	-	2	17	23
7 - 10	3	-	2	45	50
Total	15	1	7	68	91

H = hemorrhage; v = ventriculomegaly; n = normal

Discussion

It has been established that infants less than 1500 gram birth weight have a high incidence of cerebrovascular hemorrhage. In this study 37% of infants less than 32 weeks gestation showed evidence of cerebrovascular hemorrhage, and the incidence of hemorrhage increased with increasing prematurity.

In premature infants cerebrovascular hemorrhage is thought to arise from rupture of the immature capillaries of the germinal matrix, due to lack of auto-

regulation of cerebral blood flow. The germinal matrix is most prominent in infants of 23-24 weeks gestation, and about half the size at 31-36 weeks gestation. At term, the germinal matrix has almost completely disappeared and the immature capillaries of matrix are remodelled into a definite capillary bed.

Cerebrovascular hemorrhage in infants of more than 32 weeks of gestation may suggest a delay in involution of the germinal matrix which could represent a variation of normal development.

Bleeding from the choroid plexus has also been suggested as a cause of cerebrovascular hemorrhage, especially in infants of 36 weeks or more gestation.

This study showed that cerebrovascular hemorrhage was found in 35%, and hemorrhage plus ventriculomegaly in 18% of very low birth weight infant group. In the group of infants with the birth weight between 1501-2499 grams cerebral hemorrhage was found in 13% while hemorrhage plus ventriculomegaly was found in 8%. On the other hand the incidence of hemorrhage on dysmature infants was 10%. Only 1 infant had ventriculomegaly which was caused by meningitis. There was a relationship between asphyxia, especially severe asphyxia and cerebrovascular hemorrhage. In a group of 18 infants with asphyxia, 8 (45%) showed evidence of cerebral hemorrhage, and 3 (17%) had cerebral hemorrhage plus ventriculomegaly.

The overall results of this study suggest that routine cranial ultrasound screening in infants must be performed in very low birth weight infants and in infants with severe asphyxia for early detection of cerebral hemorrhage.

References

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