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– Abstract –

Determination of Follow-up Timing of Brainstem Auditory Evoked Potential in Infants with Risk Factors

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Objective : To research the risk factors affecting brainstem auditory evoked potential (BAEP) and to determine optimal follow-up timing for high-risk infants with abnormal BAEP at the initial test.

Method : The total number of subjects were 126 infants, who were consist of 85 infants with normal BAEP at the first examination and 41 infants who revealed abnormal BAEP at the first examination but being normalized by regular follow-up exams. We recorded factors that could affect initial BAEP: intrauterine age (correctional age), intrauterine period, method of delivery, perinatal asphyxia, Apgar score after 1 minute, birth weight, the highest serum bilirubin level, and the results of cranial ultrasonography. All subjects were regrouped by each factor, and then they are resorted by the result of BAEP. The above factors, and peak and interpeak latencies of BAEP were compared between subgroups. We checked up the time when abnormal BAEP were normalized.

Results : 1) Prematurity (<37 weeks), low birth weight (<2.5 kg), and high bilirubin level (>10 mg/dl) were correlated to abnormal BAEP in infants ($p<0.05$). 2) 91% high-risk infants who had revealed abnormal BAEP at the first exam were normalized within 48 weeks, 96% within 52 weeks by correctional age.

Conclusion : This study suggests that BAEP should be done as an initial screening test for early detection of neurological deficit of high-risk infants, especially, with prematurity, low birth weight, or hyperbilirubinemia, and also suggests that abnormal BAEP should be rechecked after 51 weeks by correctional age.

Key Words : Brainstem auditory evoked potential (BAEP), Prematurity, Hyperbilirubinemia, High-risk infants

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5 k

1 kg 0.5 ml 10% chloral hydrate

THD-39 70 dB
masking 40 dB
white noise
11.29 clicks/sec 200~3,000 Hz,
1 msec 2,000 2

I, III, V

I-III, III-V, I-V

4 2

4

126

(Table 1),

(Fig. 1)

SPSS PC+

7.0 for windows

student t-test

1.

1.

126 (71 , 55)

85

40.2 ± 2.8 (: 34~50) ,

41 37.7 ± 2.4

(: 33~43)

(p<0.01).

2.

2.

I 1.93 ± 0.18 msec, III 4.64 ±

0.20 msec, V 6.85 ± 0.22 msec ,

I-III 2.17 ± 0.13 msec, III-V 2.09 ± 0.09 msec, I-V 4.93 ±
0.21 msec ,

I 2.12 ± 0.38

msec, III 5.07 ± 0.33 msec, V 7.45 ± 0.37 msec ,

I-III 2.95 ± 0.31 msec, III-V 2.83 ± 0.19

msec, I-V 5.36 ± 0.34 msec

I-III, III-V, I-V 가

Nihon Kohden Neuropack

10-20

Fz

Table 1. Correctional Age when BAEP¹ was Normalized

		Correctional Age(Weeks)				Total
		44	45~48	49~52	53	
Intrauterine	<37	21	12	1	1	35
Periods(Weeks)	37		4	1	1	6
Birth Weight	<2.5	18	8	2	1	29
(kg)	2.5	3	8			11
Bilirubin Level	10	18	8		2	28
(mg/dl)	<10	3	8	2		13
Apgar Score	<7	6	2			8
	7	15	13	1	2	31
Perinatal	(-) ²	18	8		2	28
Asphyxia	(+) ³	3	8	2		13
ICH ⁴	(-) ²	13	9	1	1	24
	(+) ³	8	7	1	1	17
Delivery	Vaginal	11	10	1		22
Method	C-section ⁵		6	1	2	19

1. BAEP: brainstem evoked potentials, 2. (-): absence, 3. (+): presence, 4. ICH: intracranial hemorrhage

5. C-section: cesarean section

Table 2. Peak and Interpeak Latencies of BAEP1 by the First

Exam	Reference Value ²	Normal BAEP	Abnormal BAEP
Peak I	2.03±0.38	1.93±0.18	2.12±0.38*
Peak III	4.65±0.47	4.64±0.20	5.07±0.33*
Peak V	6.88±0.44	6.85±0.22	7.45±0.37*
I-III	2.63±0.33	2.71±0.13	2.95±0.31*
III-V	2.24±0.27	2.09±0.09	2.83±0.19*
I-V	4.86±0.39	4.93±0.21	5.36±0.34*

Values are mean±S.D.

1. BAEP: brainstem auditory evoked potential

2. Reference value from electrodiagnostic laboratory of Konkuk university hospital

*p<0.01

가 (p<0.01)(Table 2).

3.

37, 37, 71, 35, 37, 55, 6 (11%)

(p<0.01)(Fig. 1A).

37, 35 (60%), 45~48, 12 (34%), 49~52, 1 (3%), 53, 48, 94%가, 52, 97%가, 37, 55, 45~48, 4, 6, 1 (17%), 53, 1 (17%), 48, 66%가, 52, 83%가

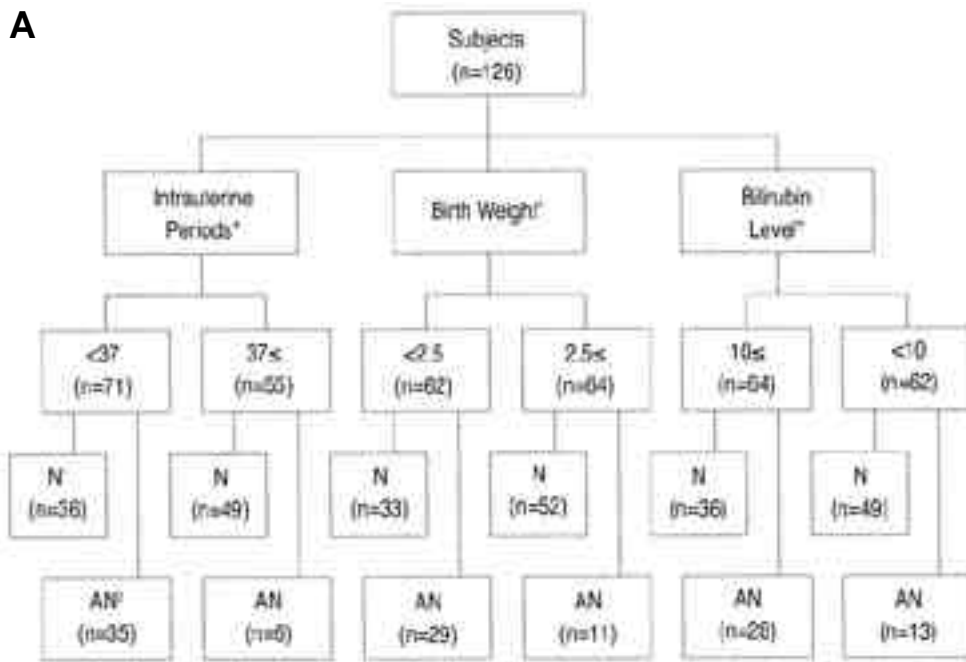
4.

1.5 kg, 5, 3, 1.5~2.5 kg, 57, 26, 2.5 kg, 62, 29 (47%), 2.5 kg, 64, 11, (17%)

(p<0.05)(Fig. 1A).

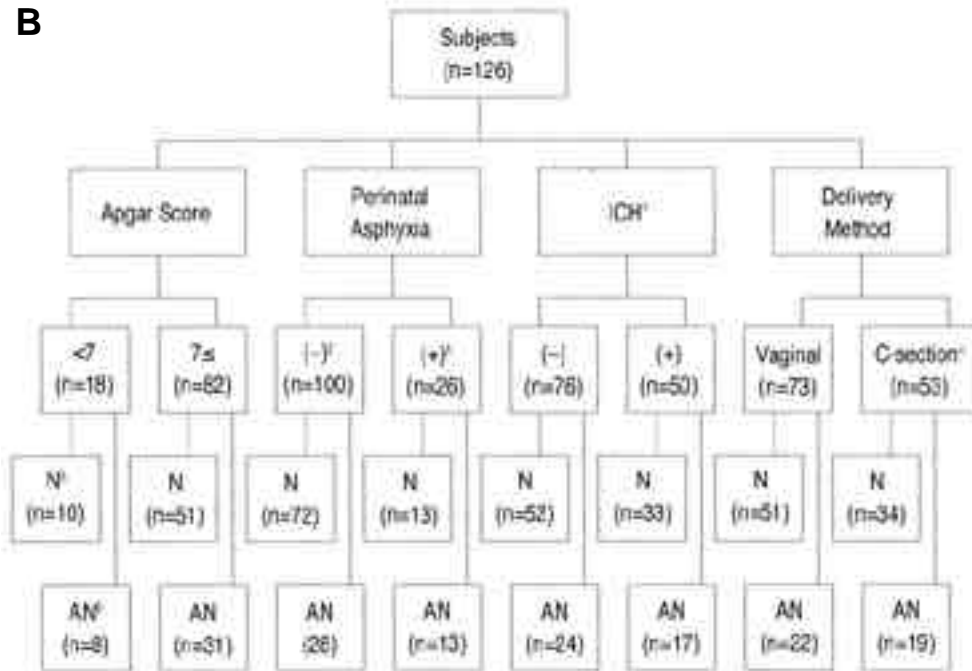
2.5 kg, 37, 71, 35, 29, 44, 18 (62%), 45~48, 8 (28%), 49~52, 2, 37, 55, 6 (11%), (7%), 53, 1 (3%), 48, 90%가, 52, 97%가

A



* Weeks, *kg, *mg/dl. 1. N: normal, 2. AN: abnormal

B



1. ICH: intracranial hemorrhage, 2. (-): absence, 3. (+): presence
 4. C-section: cesarean section, 5. N: normal, 6. AN: abnormal

Fig. 1. Flow chart for regrouping subjects by the factors affecting BAEP

According to the results, **A**) The factors that were considered to affect BAEP: There were significant differences between normal and abnormal conditions of these conditions of these factors, and **B**) The factors that did not affect BAEP.

2.5 kg
 11 44 5. 1 가
 3 (27%), 45~48 8 (73%)
 48 100%가 100 1 가

, 1 가 7 (64%), 45~48 8 (29%), 53 2 (7%)
 6 18 8 (44%) 48 93%가 .

31 (38%)

8.

(p<0.05)(Fig.

1B). 1 가 가 6 18

50

44 6 (75%), 45~48 2 (25%) 17 (34%)
 48 100%가 , 1 가

76 24 (32%)

(p>0.05)(Fig. 1B).

가 7 82 31 44 15
 (48%), 45~48 13 (42%), 49~52 1 (4%), 53

2 (6%) 48
 90%가 52 94%가 .

17
 44 8 (47%), 45~48 7
 (41%), 49~52 1 (6%), 53 1 (6%)
 48 88%, 52

94%가 ,

6.

10 mg/dl 64 28 (44%)
 , 가

24
 44 13 (54%), 45~48 9 (38%),
 49~52 1 (4%), 53 1 (4%)
 48 92%가, 52

62 13 (21%)

96%가 .

9.

(p<0.05)(Fig. 1A).

가 10 mg/dl

28

44 18 (64%), 45~48 73 22 (30%) ,
 8 (29%), 53 2 (7%) , 53 19 (36%)
 48 93%가 ,

(p>0.05)(Fig. 1B).

가 10 mg/dl

13

3 (23%), 45~48 8 (62%), 49~52 2 (15%)
 , 48 85%가
 52 100%가 .

22
 44 11 (50%), 45~48 10 (45%),
 49~52 1 (5%) 48
 95%가, 52 100%가 .

7. 가

가 가 26 13
 (50%) ,

19 44
 10 (52%), 45~48 6 (32%), 49~52 1 (5%), 53
 2 (11%) 48
 84%가, 52 89%가 .

가 가 100 28 (28%)
 가 가

(p>0.05)(Fig. 1B).

가 가 26
 13 44 3
 (23%), 45~48 8 (62%), 49~52 2 (15%)

48 85%가, 52 가 .¹⁰
 100%가 . 가 가 100

28
 44 18 .

11- Goldenberg 3

2.5 kg

(p<0.01).

가 , 15 가 , 1996

가 , 가 I , I-III, I-V 가 , Deliac 12

, 16 가 가 가 가

1,6,9,13,17

가 , 가 , 가

29-32 가 10

mg/dl

18

가

(p<0.05).

19

28~30

I, 1956 Ranck Windle¹⁴ ,

III, V 36

, 1983 Sohmer 33

22

가 I

2~3 , V 12~24

가 , 1999

9 3 7

29 가 가

9 3

가

7,13,14,18,23

가 1992 6

. Eggermont²⁴ I-V

가

가

가

37

, 1982 Robert 31 가

가

(p<0.01).

1 가 가 가 가 가

가

가

가

가

,

가

,

37

가

가

48

94%가, 52

97%가

,

33

가

25

26

1,500

Salamy

g

27

Eldredge³⁴

가

, 6

가

29,31,35

가

85

41

, 126

3

4,5,23,36

1988 Majne-

mer 19

1

1)

가

85

40.2 ± 2.8

41

37.7 ± 2.4

Stockard¹⁵

Picton¹⁶

(p<0.01).

1

2)

37

37

2.5 kg

2.5 kg

가 10 mg/dl

, Ikuko³⁷

V 가

, 1990 Kitamoto³⁰

1

가

7

가

(p<0.05).

3)

가

(p>0.05).

4)

가

91%가 48

96%가 52

1

가

가

가

가

48

가

가

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