The Influence of Birth Injuries in First-Born and Second-Born Twins

A. Asaka[1], S. Ooki[2], K. Yamada[3]

[1]Department of Health Sciences, Yamanshi Medical College; [2]Department of Mental Health, Tokyo University; [3]Department of Nursing, Sapporo Medical College, Japan

Abstract. This study showed that biological handicap with many complications at birth was much more recognized in the second-born than in the first-born twins. One of the most prominent intrapair differences was, for example, the weight at birth. However, intrapair differences, which were observed also in other physical measurements, diminished gradually with age. Moreover, as for intellectual ability, which was represented by the scores of the entrance examination test or standard achievement test, no remarkable influences due to handicap of the second-born were identified. Thus, it was concluded that the biological handicap seen in the second-born twin at birth did not give any significant effect on later development.

Key words: Birth injury, Birth order, Development, Twins

INTRODUCTION

This study aims at clarifying the influence of perinatal handicap over later development as is more often seen in the second-born twin. There have been several reports, which selected only pairs showing conspicuous differences between the twins [1,3]. However, as far as we know, no general comparison between first-born and second-born twins was attempted. Therefore, we have tried to compare the influence of birth injuries on the later development of the first- and second-born twins.

SUBJECTS AND METHODS

Subjects were 461 pairs of twins, applicants of the Junior High School affiliated to Tokyo University during 1981-1988. They were a part of Tokyo 12-year-old Twin Regis-

try. Available data included complications at birth, height and weight at birth, at one year and at 12 years of age, the results of entrance examination I (Japanese) and II (mathematics) and standard achievement test, consisting of Japanese, history and geography, mathematics and science. The complications at birth included asphyxia, cyanosis, severe icterus, breech presentation, and so on. After standardization of each value of items by sex, several analyses were carried out.

RESULTS AND DISCUSSION

Various complications were more frequent in the second-born than in the first-born twins (257 vs 197), as is shown in Table 1, indicating that the second-born had biological handicap from the time at birth. These numbers exclude cesarean section.

Table 1 - Complications at birth seen in twins

		Second-born		
		Absent	Present	Total
First-born	Absent	126	101	227
	Present	41	156	197
	Total	167	257	424

The difference (the value of the first-born minus that of the second-born) of each item is shown in Table 2. The largest value is birthweight, which appears both in mean (0.16) and in total sum (65.94). However, the difference in weight gradually becomes small. The values at 1 year of age are 0.05 (mean) and 12.05 (total sum), respectively, and at 12 years 0.01 (mean) and 5.28 (total sum), respectively.

As for height, a similar tendency is observed. The difference becomes smaller and smaller as the twins grow up. Entrance exmination I (Japanese) shows negative values in mean and in total sum, indicating much higher scores in the second-born than the first-born twins. In entrance examination II (mathematics), it was clear that first-born and second-born twins had almost the same scores. In the standard achievement test, the result for Japanese was similar to that of entrance examination I and the remaining results resembled those of entrance examination II. If compared to birthweight, remarkable changes were observed in each item. Thus, it was suggested that the biological handicap seen in the second-born twins at birth did not affect later development.

The following analysis was performed on those twins whose intrapair differences concerning intellectual ability were greater than 2 SD. And the comparison was made in order to find out which one of the cotwins had higher values. As shown in Table 3, second-born twins were higher in almost all items, suggesting that the handicap often seen in the second-born twin at birth did not affect intellectual ability.

Table 2 - Standardized intrapair difference (first-born twin minus second-born twin) concerning each item

Items	No. of pairs	Mean	Sum
Height at birth	393	0.07	28.84
Weight at birth	421	0.16	65.94
Height at 1 year	218	0.01	2.30
Weight at 1 year	226	0.05	12.05
Height at 12 years	359	0.01	4.19
Weight at 12 years	359	0.01	5.28
Entrance examination I	395	−0.03	−10.15
Entrance examination II	395	0.00	1.63
Standard achievement test:			
Japanese	110	−0.09	−10.29
History & geography	93	0.04	3.88
Mathematics	110	0.12	13.58
Science	109	0.86	0.51

Table 3 - Case study showing extreme intrapair difference (over 2 SD) concerning intellectual ability

Item	First-born > second-born	First-born < second-born	No. of pairs
Entrance examination I	2	6	8
Entrance examination II	3	5	8
Standard achievement test:			
Japanese	2	6	8
History & geography	1	4	5
Mathematics	4	5	9
Science	1	1	2

Lastly, as an application of zygosity diagnosis by questionnaire [2], intraclass correlation coefficients were compared between two groups. One group consisted of all applicants, and probably MZ or probably DZ pairs were diagnosed by questionnaire. The other group included only those who passed the entrance examination and their zygosity was confirmed by many genetic markers. So, twins in this group were diagnosed as definite MZ or DZ pairs. As shown in Table 4, only slight differences were noticed between the sets of figures in definite and probale MZ as well as in definite and probable DZ pairs. Therefore, the effectiveness of zygosity diagnosis by questionnaire was partly supported.

Table 4 - Intraclass correlation coefficients of each item between definite MZ and DZ, and probable MZ and DZ twin pairs

Item	Definite				Probable			
	MZ pairs		DZ pairs		MZ pairs		DZ pairs	
	r	N	r	N	r	N	r	N
Height at birth	.740	96	.729	26	.768	326	.640	113
Weight at birth	.685	100	.622	26	.697	339	.482	119
Height at 1 year	.928	49	.621	9	.928	175	.581	59
Weight at 1 year	.895	55	.187	9	.899	180	.509	61
Height at 12 years	.944	83	.639	18	.944	278	.579	109
Weight at 12 years	.900	84	.580	18	.903	709	.485	109
Entrance examination I	.589	101	.308	27	.709	309	.608	120
Entrance examination II	.498	101	.198	27	.743	309	.601	120
Standard achievement test:								
Japanese	.562	98	.194	27	.565	92	.250	33
History & geography	.627	85	.351	20	.608	81	.458	24
Mathematics	.524	98	.282	27	.512	92	.349	33
Science	.660	97	.303	27	.665	91	.380	33

REFERENCES

1. Blickstein I, Lancet M (1988): The growth discordant twins. Obstet Gynecol Surv 43:509-515.
2. Ooki S, Yamada K, Asaka A, Hayakawa K (1989): Zygosity diagnosis of twins by questionnaire. Acta Genet Med Gemellol 39:109-115.
3. Ylitalo V, Kero P, Erkkola R (1988): Neurological outcome of twins dissimilar in size at brith. Early Hum Dev 17:245-255.

Correspondence: Dr. Akio Asaka, Department of Health Sciences, Yamanashi Medical College, Tamaho, Nakakoma, Japan 409-38.