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## THE NATURAL HISTORY OF SPEECH RETARDED CHILDREN

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We studied the natural history of children who were suspected to be delayed in speech by mail questionnaire. We received answers for 155 cases out of which the boys outnumbered the girls by 3 to 1. Out of the 155 cases, 69% visited our clinic only once, 78% of the cases who visited were under three years old. At the time of study, seven children had hearing loss, and in 45 cases speech delay disappeared at a mean age of four years and nine months of age. Perinatal complications were more apparent in the speech retarded children than in the normal children who participated in the study.

Key words : speech delay, prognosis.

Although many children who appear to have delayed speech have visited our pediatric clinic in Hokkaido University Hospital, most of them have in time stopped coming to the clinic for observation. Naturally, a complete evaluation of speech delay involves screening such children for neurological, otological, emotional and social problems on a more long term basis. Another drawback to our making a more comprehensive study of these children are the fact that at present there is no speech pathologist employed in the clinic. Thus to obtain more data on these children we studied the natural history of speech retarded children using the method of the mail questionnaire.

### MATERIALS AND METHODS

The study group was comprised of 648 children who visited our clinic from 1968 to 1979 for diagnostic evaluation and treatment of delayed speech. Mailed to the children's parents, the questionnaire probed such questions as the existence of speech delay, the normalized age of improved children, the complications and the present diagnosis.

Out of the 648 questionnaires mailed, 155 were returned, 120 males (77%) and 35 females (25%).

### RESULTS

The mean age of the 155 cases was three years and two months of age at the first visit and eight years and two months of age at the time of study. Out of these, 107 cases had dropped out after the first visit to our clinic.

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i) The distribution of age and the diagnosis. There were 121 cases (78%) who first visited our clinic at under three years of age (Figure 1).

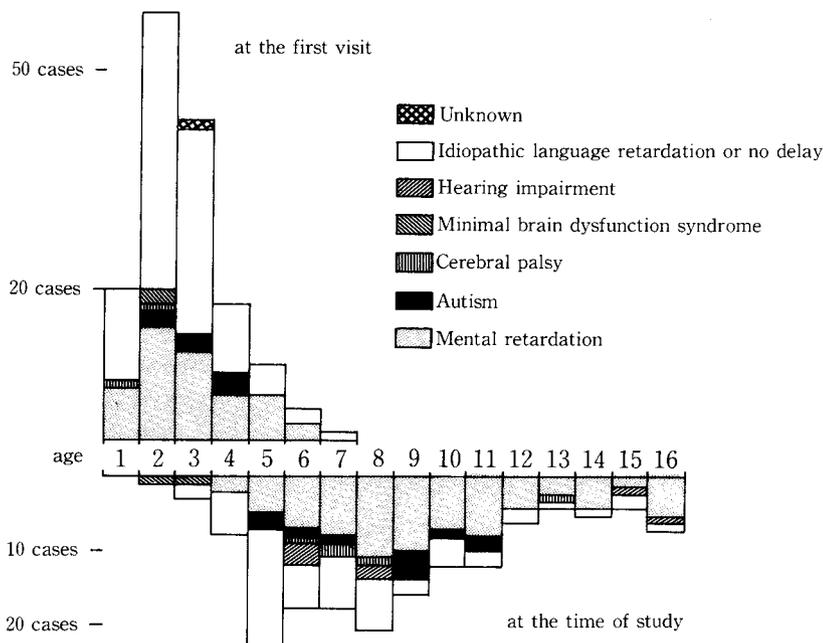


FIGURE 1 The age distribution and the diagnoses

ii) Changes of diagnosis.

At the first visit the diagnosis were 50 cases of mental retardation, seven of autism, two of cerebral palsy, two of minimum brain dysfunction syndrome, 93 of not delayed or idiopathic language retardation, and one of unknown origin. At the time of study, the diagnoses ranged from 78 cases of mental retardation, 11 of autism, five of cerebral palsy, seven of hearing impairment, 14 of idiopathic language retardation and dysarthria, and 41 of normally developed children. The seven cases of hearing impairment were not noticed at the first visit, and their mean age at the first was three years and five months of age (Table 1). At the study, disappearance of the delayed speech was recognizable in 45 cases (29%), 38 males (84%) and 7 females (16%). The number of speech retarded children was 110 (71%), 82 males (75%) and 28 females (25%). The mean age of children who caught up to normal speech ability was four years and nine months of age (Table 2). Of the 93 cases who had showed the probability of becoming normal in the future, 56 cases (60%) continued to show delayed speech at the time of study.

iii) The perinatal history (Table 3).

At the time of study, only 17% of the normal children showed such a past history whereas 33% cases of the delayed speech children showed perinatal complications. The difference was statistically significant.

TABLE 1  
The diagnoses

	At the first visit	At the time of study
Mental retardation	50	78
Autism	7	11
Cerebral palsy	2	5
Minimal brain dysfunction syndrome	2	0
Hearing impairment	0	7
Idiopathic language retardation	}93	}14
Dysarthria		
No delay		41
Unknown	1	0
	155cases	156cases*

\* a case complicated by cerebral palsy and hearing impairment

TABLE 2  
The presence of speech delay at the time of study

	Speech delay	
	(-) 45 cases	(+) 110 cases
The mean age at the first visit	2y11m	3y3m
The mean age at the time of study	7y10m	8y3m
The mean age for catching up	4y9m	

TABLE 3  
The history of the perinatal complications

	Speech delay	
	(-)	(+)
Asphyxia	5	12
Vacuum delivery	1	5
Cesarean section	1	5
Severe jaundice	1	2
Toxemia		1
Premature rupture		1
Forceps delivery		3
Breech delivery		1
Low birth weight		4
Exchange transfusion		2
	8cases	36cases
	8/45=17%	36/110=32%

## DISCUSSION

The main results of the present study were that the percentage of cases who visited

the clinic on only one occasion was 69%; seven cases were diagnosed as having hearing impairment, which was not detected at the first visit; 45 children with normal speech at the time of study caught up at the mean age of four years and nine months of age; and the perinatal complications of the speech delayed children exceeded those of the normal speech children.

It was surprising that as many as approximately 70% of all the cases stopped coming to the clinic after only the first visit. This figure may indicate that our treatment efforts did not meet with the parents' expectations. Ideally, the treatment of delayed speech should be done in co-operation with a pediatrician, psychiatrist, otologist, psychologist, speech therapist, nurse and teacher.

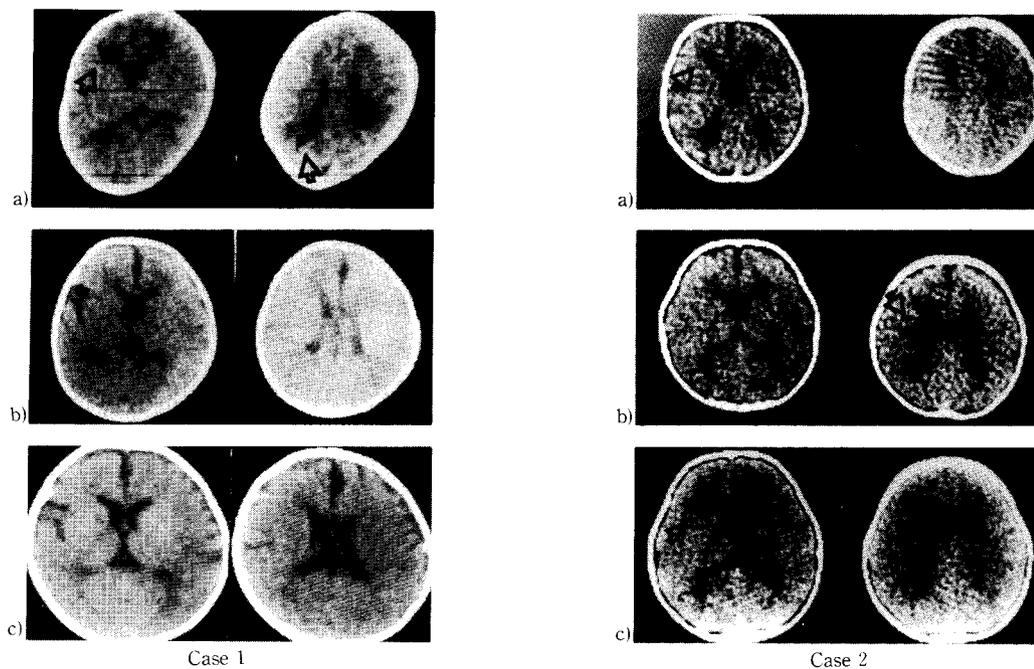
Recently, otologists have reported that hearing loss in children can be diagnosed up to two years of age and that the diagnostic procedure should be the determination of the existence of the picking up one's ears even on usual conversation, the testing of the ability to distinguish high or low tones, the observation of the child's ability to watch a speaker's lips and the testing of the child's ability to pronounce consonants (Koga 1979 ; Kaga, Ishii & Tanaka 1979).

The diagnosis of 45 children whose retardation of speech disappeared at the time of study was so-called idiopathic language retardation. Due to some deficiencies in our questionnaire, we were unable to clarify what factors influenced their improvement, for example, the special education or drug therapy etc used. There is a view that speech delay only and its improvement at ages ranging from three to five years is due to the retardation of brain maturation (Karlin 1965). Another opinion is that, in normal speech development, the rapid increase in the number of vocabulary after two years of age correlates with the increase of the myelin lipids associated with myelination (Lenneberg 1967).

Hitherto, we were unable to observe the brain maturation of a living child; however, recently, we have been able to observe the lesions of cerebral white matter by computed tomography (CT). We have reported that the CT images of congenital rubella syndrome, which are low density of cerebral white matter, suggest the retardation of myelination (Ishikawa, Murayama & Sakuma).

In the present study, the perinatal complications of the speech retarded cases exceeded these of the normalized cases. Despite this finding, it is difficult to correlate these perinatal disturbances with speech delay during a certain period in young children. We are able to observe occasionally the effect of a perinatal disturbance on the neonatal brain by CT scans. One of the CT findings is the existence of a periventricular low density area which changed in degree and persistence according to the gestational age, birth weights and asphyxia (Figure 2).

The vicissitudes of these CT findings and their correlation to child development are not yet known. Although CT scans are not normally performed in only speech delayed children, it is possible that their correlation with speech delay will provide an answer to the hypothesis of Karlin and Lenneberg.



**FIGURE 2** Case 1: 38 weeks gestation, 2630 g birthweight (appropriate for date), severe asphyxia. a) CT images at 10 days of age show a periventricular low density area (arrow); b) at one month of age; c) at five months of age CT shows the disappearance of the periventricular low density areas. Case 2: 37 weeks gestation, 2240 g birthweight (small for date), slight asphyxia. a) at two months of age, CT shows a periventricular low density area (arrow); b) at five months of age; c) at one year and five months old; the periventricular low density areas are still recognized. The development of these two cases was almost normal.

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