

# 資料

資料 1

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**EARLY INTERVENTION  
FOR AN INFANT WITH A HEARING IMPAIRMENT  
-SUPPORT IN THE FIRST SIXTEEN MONTHS-**

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**ABSTRACT**

This paper reports on an individual case of early intervention for an infant with a hearing impairment. The subject was a baby girl diagnosed as hearing impairment by Universal Newborn Hearing Screening (UNHS). We provided educational guidance and counseling for the subject and her parents through the early intervention program. Three areas of support, i.e. audiological support, developmental support and support for the parents, are discussed in relation to this case.

**1. INTRODUCTION**

The Universal Newborn Hearing Screening (UNHS) provides hearing analysis on newborn babies who may require related surgery, including ENT. UNHS received approval and strong recommendation by the Ministry of Health, Labour and Welfare on 1, Oct. 2000. Hearing impairment up to 3 years old was previously identified through medical (physical) examinations on children 18 months old and 3 years old, enabling diagnosis of newborns through UNHS. Recently, the number of cases visiting to the educational guidance sessions in schools for the deaf or day care centres for the hearing impaired increased. However, many problems are encountered in educational guidance for hearing-impaired infants and their parents, i.e. difficulty in examining the degree of hearing loss due to various auditory behaviors, difficulty in timing the appropriate fitting of hearing aids through audiological development and intervention for parents distressed over infants diagnosed with a hearing impairment.

This study discusses early intervention, or audiological support, including evaluation of the hearing threshold level, appropriate fitting of hearing aids, developmental support, and support for parents in relation to an individual case diagnosed as hearing impaired through UNHS.

## 2. PROFILE OF THE CASE

The subject is a baby girl (age 1 year 8 months) born in Oct. 2000 in a state of suspended animation (weight: 2,968 g). She was evaluated as having a 3-point Apgar score, and her obstetrician transferred her to the general hospital (polyclinic).

The infant did not display any reaction on the UNHS (Automated Auditory Brain Response: AABR) at 7 days, 8 days, and 1 month, nor on ABR (Auditory Brain Response) at 3 months and was subsequently diagnosed as being hearing impaired in both ears. There is no history of hearing impairment in her family. She and her parents visited the educational guidance center in NISE for the first time when she was 5 months old.

## 3. AUDIOLOGICAL SUPPORT

Our support includes the evaluation of various audiological behaviors, the appropriate fitting and usage of hearing aids and guidance for auditory learning in daily life.

### *March 2001 (Age 5 months)*

We evaluated the degree of hearing loss through Conditioned Orientation Reflex (COR) audiometry. The infant showed movement of her eyebrows, and searched for the sound source when she could hear the stimulus sound at 90-95 dB at each frequency. She displayed frustration when the stimulus sound ceased. The first time she wore a hearing aid, appropriately fitted based on the results of audiometry, she appeared pleased to be able to hear sounds through hearing aid.

### *April 2001 (Age 6 months)*

On audiometry, she turned toward the sound source while observing her father's face on being able to hear the stimulus sound at 70 dB (250 Hz), then displayed an inquisitive expression at the sound source heard at 80 dB (1000 Hz). Eventually, she laughed and appeared to enjoy observing moving toys used on COR at 90 dB (1000 Hz). When she wore the hearing aid in her right ear (monaural), she frequently responded to sounds, especially those from the toy drum and rattle.

### *May 2001 (Age 7 months)*

On audiometry, the infant often uttered, "Uh-", "A!" and "Ah-" upon awakening to hear stimulus sounds as follows: hearing levels for 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz were 55 dB, 70 dB, 80 dB, 80 dB and 80 dB, respectively. After one month of wearing the hearing aid, she became active, showing that she wanted a toy by making sounds.

*June 2001 (Age 8 months)*

On audiometry, the hearing levels for 250 Hz, 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz were 60 dB, 65 dB, 80 dB, 85 dB and 80 dB, respectively; she then removed both hearing aids, unable to continue wearing them, because she was suffering the ear mold. When she was absorbed with a toy, she could wear the hearing aids for a few minutes, with our support. We adjusted the maximum output control on the hearing aids because of too loud a bang felt by the infant.

*July 2001 (Age 9 months)*

On audiometry, the hearing levels for 250 Hz, 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz were 55 dB, 70 dB, 85 dB, 90 dB and 90 dB, respectively. She often showed audiological behavior (for example, observing her mother's face, orientation of the sound and so on). Concerning the use of hearing aids, she showed a desire to remove the hearing aids during the absence of sound, while she showed continuity in wearing the hearing aids for more than ten minutes when playing with a toy that made sounds.

*August 2001 (Age 10 months)*

On audiometry, the hearing levels for 250 Hz, 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz were 50 dB, 60 dB, 75 dB, 75 dB and 85 dB, respectively. Her aided hearing level was 40-50 dB in any frequency area.

*September 2001 (Age 11 months)*

At the following session, a change was made from COR to play audiometry. At first, she observed her mother's face when she could hear the stimulus sound and then showed interest in the toys that were used on play audiometry. She switched on the toys when she heard the stimulus sound, while she understood that she could not switch on toys during the absence of stimulus sound. The hearing levels for 250 Hz, 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz were 55 dB, 70 dB, 75 dB, 80 dB and 85 dB, respectively. She often responded to the stimulus sound from toys, especially popping sounds.

*October 2001 (Age 1 year)*

She was eager to begin audiometry because now she understood that she could receive a moving train or animation when she could hear a stimulus sound. Hearing levels for 250 Hz, 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz were 65 dB, 65 dB, 65 dB, 70 dB and 80 dB, respectively.

*November 2001 (Age 1 year, 1 month)*

The use of hearing aids brought to steady interest in the different sounds coming from various toys. When she could hear the stimulus sound, she looked for the source of sound with her voice.

*January 2002 (Age 1 year, 3 months)*

When she could hear the stimulus sound, she showed her ear. In this session, the use of audiometry changed to a procedure using inserted earphones. Hearing levels were 55-70 dB. At first, she played with various musical instruments, and eventually played with the toy that was a favorite with her.

In a series of audiological support, we should evaluate her various auditory behaviors when she could hear the stimulus sound (for example, eye movement, observation of the face, utterances, and so on) as well as turning or pointing to the source of sound.

#### 4. SUPPORT FOR THE PARENTS

At first, the infant's parents had to accept the fact that their daughter had a hearing impairment and even then, it was difficult to grasp the degree of her hearing level. Her parents asked us how many decibels her hearing level might be and so we presented stimulus sounds on the same level as their daughter's to enable them to understand her hearing condition. We also demonstrated sounds that would be difficult or easy to hear.

At each educational guidance session, we requested a report from her parents on her daily life (for example, communication, playing, awakening to sounds and so on). We then advised them according to their report. The progress was as follows.

*Age 5 months - 7 months*

The report showed that she often heard sounds through her hearing aids, and that her parents made approaches to her, but such approaches did not lead to communication. We advised the parents on viewing and understanding her behavior (for example, she may cry out when feeling lonely, indicating that she would like to communicate with them).

*Age 8 months - 10 months*

The reports often indicated what sounds were easy for her to hear. But they also showed that she had not worn her hearing aid. Being of a serious consequence, we advised the parents that their daughter should be provided with the opportunity to experience daily life with or without the hearing aid and that they should be aware not only of the presence of sounds, but also of her daily life.

### *Age 11 months - 1 year, 4 months*

The reports often referred to communication with family, playing with toys and so on, and also mentioned communication with persons other than family members. We advised the parents on understanding her communication behavior.

## **5. DISCUSSION**

### **5.1. The First Educational Guidance Session after Hearing Impairment Diagnosis through UNHS**

At the first educational guidance session, parents with a hearing-impaired infant often ask how many decibels the hearing level is, whether the infant is quite different regarding hearing sounds, and whether it will be difficult for them to communicate with their infant. As Hariya, Tanaka and Morita (2000) indicated, parents are usually distressed about the hearing impairment because they have received an unsatisfactory account of the UNHS results.

Therefore, at the first educational guidance session, it was suggested that we gain an understanding of the UNHS results, obtain more information on hearing impairments, and review comprehensive development with the parents.

### **5.2. Evaluation of the Infant's Hearing**

An infant responds to sound in various ways. In this case study, the infant often searched for the source of sound, and also knitted her eyebrows and displayed a cheerful expression when she heard the sound. Then, it was suggested major factor how we should observe her response to sound on the evaluation of hearing, being difficult for her to respond on her own initiative.

### **5.3. Appropriate Fitting of Hearing Aids**

In this case, the infant began wearing hearing aids at the age of 6 months, but often removed them after a few minutes because they were strange objects to her, which made her parents impatient. As previously discussed, the infant began to hear sounds through the appropriate fitting of hearing aids because her hearing impairment was congenital and she had few experiences in hearing and comprehending sounds. An environment in which she could experience hearing sounds with her parents should be provided.

### **5.4. Support for Communication between Infant and Parents**

As mentioned above, the infant's parents became impatient over the difficulties in communicating with their infant. The parents had disregarded their attachment to their daughter and their dependence on her as a human being, which is the basis of communication and overcoming the impairment.

We advised the parents to accept their daughter's handicap and to participate in

activities and opportunities to play with her, regardless of auditory-oral communication through hearing aids.

### **5.5. Developmental Support**

The possibility that the infant has impairments in areas besides hearing should be considered due to her low Apgar score at birth. She may need developmental support as well as audiological support. In general, infants and parents receive audiological support, but considering infant development, auditory development could be just the beginning. While we evaluate comprehensive development that includes social development, motor development and so on, we should provide support on these matters.

## **6. CONCLUSION**

This paper reports on an individual case of early intervention for an infant with a hearing impairment. The subject is a baby girl who was diagnosed as hearing impaired by Universal Newborn Hearing Screening (UNHS). We provided the early intervention program for the subject and her parents on educational guidance and counseling. Three areas of support were discussed: First, audiological support, which included the observation of various audiological behaviors, the appropriate fitting and usage of hearing aids and guidance for auditory learning in daily life. Second, developmental support, which included the observation of various physical activities and emotional conditions. Finally, on the support for her parents, it was suggested that guidance be provided on understanding hearing impairment, interaction and communication between infant and parents, and the consideration of health care as major factor.

### References

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