Cochlear Implantation In Congenital Cytomegalovirus-infected Children With Profound Sensorineural Hearing Loss

Hiroshi Ogawa, MD, PhD; Yoko Baba, MD, PhD; Naoko Yamada, PhD; Tatuso Suzutani, MD, PhD; Koichi Omori, MD, PhD
Fukushima Medical University, Fukushima, Japan

ABSTRACT

Cytomegalovirus (CMV) infection is the most common intrauterine viral infection in developed world, present in one in every 250 to 300 births. Among the congenitally infected newborns, about 10% are born with obvious symptoms, and more than 10% of asymptomatic infants may experience sequelae, such as late-onset sensorineural hearing loss (SNHL). The standard viologic diagnosis is restricted to the collection of clinical manifestations at birth makes the problem more complex, as determination of the causal relationship with CMV becomes impossible after 3 weeks from birth due to the possibility of postnatal infection. Using dried umbilical cord, we recently developed a PCR-based assay for the retrospective detection of congenital CMV infection. In the cases for which CMV was detected we performed cochlea implantation and evaluated speech perception and acquisition, and language development.

INTRODUCTION

Sensorineural hearing loss (SNHL) is one of the most frequent manifestations in patients with congenital Cytomegalovirus (CMV) infection at birth. The late onset of SNHL and mental retardation in many patients with congenital CMV infection showing few clinical manifestations at birth makes the problem more complex, as determination of the causal relationship with CMV becomes impossible after 3 weeks from birth due to the possibility of postnatal infection. Using dried umbilical cord, we recently developed a PCR-based assay for the retrospective detection of congenital CMV infection. In the cases for which CMV was detected we performed cochlea implantation and evaluated speech perception and acquisition, and language development.

METHODS

Four cases have been found to be CMV-positive using this method. Clinical review demonstrated that three of the cases were late-onset SNHL cases, with one of the three cases having passed the newborn hearing screening examination. None of these subjects presented any extra auditory manifestations of CMV infection.

RESULTS

The age at implantation ranged from 2 years 1 month to 3 years 1 month, with the mean age of 2.6 years. All children were implanted with a Nucleus 24 device, and all underwent full insertion of the electrode array without surgical complications. Follow-up study of audiometric examination ranged from 13 to 25 months postoperatively. Speech perception and acquisition, and language development were improved postoperatively in all children.

CONCLUSIONS

Cochlear implantation affords improved speech comprehension in children with CMV-related profound SNHL. The aim of the current study was to assess the utility of cochlear implantation for the treatment of children with CMV-related profound SNHL.

OBJECTIVE

The age at implantation ranged from 2 years 2 month to 3 years 2 month, with a mean age of 2.6 years. All children were implanted with a Nucleus 24 device, and all underwent full insertion of the electrode array without surgical complications. After implantation, all children had average thresholds ranging from 33.75 to 38.75 dB. Follow-up period of audiometric examination ranged from 13 to 25 months postoperatively. Speech perception and acquisition as well as language development were improved postoperatively in all children. The average IT-MAIS score increased from 7.5 /40 preoperatively to 23.25 /40 and the average MUSS score increased from 3.25 /40 preoperatively to 19/40.

SUBJECTS

Four cases have been found to be CMV-positive using the retrospective PCR-based assay. Clinical review demonstrated late-onset SNHL in three cases, with one of the three cases having passed the newborn hearing screening examination. None of the subjects presented any extra auditory manifestations of CMV infection. We performed cochlea implantation for each of the 4 subjects and evaluated speech perception and acquisition as well as language development using the Infant-Toddler Meaningful Auditory Integration Scale (IT-MAIS) and Meaningful Use of Speech Scale (MUSS). SNHL was confirmed by auditory brainstem response (ABR) testing, behavioral audiometry, and auditory steady state response (ASSR) testing. We show the patient data in Table 1.

RESULTS

The age at implantation ranged from 2 years 2 month to 3 years 2 month, with a mean age of 2.6 years. All children were implanted with a Nucleus 24 device, and all underwent full insertion of the electrode array without surgical complications. After implantation, all children had average thresholds ranging from 33.75 to 38.75 dB. Follow-up period of audiometric examination ranged from 13 to 25 months postoperatively. Speech perception and acquisition as well as language development were improved postoperatively in all children. The average IT-MAIS score increased from 7.5 /40 preoperatively to 23.25 /40 and the average MUSS score increased from 3.25 /40 preoperatively to 19/40.

CONCLUSIONS

Cochlear implantation affords improved speech comprehension in children with CMV-related profound SNHL. The aim of the current study was to assess the utility of cochlear implantation for the treatment of children with CMV-related profound SNHL. The age at implantation ranged from 2 years 2 month to 3 years 2 month, with a mean age of 2.6 years. All children were implanted with a Nucleus 24 device, and all underwent full insertion of the electrode array without surgical complications. After implantation, all children had average thresholds ranging from 33.75 to 38.75 dB. Follow-up period of audiometric examination ranged from 13 to 25 months postoperatively. Speech perception and acquisition as well as language development were improved postoperatively in all children. The average IT-MAIS score increased from 7.5 /40 preoperatively to 23.25 /40 and the average MUSS score increased from 3.25 /40 preoperatively to 19/40.

REFERENCES


CONTACT

Hiroshi Ogawa MD, PhD.
Fukushima Medical University
Email: hmmjs@fmu.ac.jp