Tympnastomy Tubes in Pediatric Cochlear Implant Recipients: Analysis of Complications
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Abstract

Infectious complications after CI are rarely dy...

Introduction

Cochlear implantation (CI) in children is being performed at an increasingly young age. In 2000, the FDA lowered the age of eligibility from 24 to 12 months, and many centers are performing implantation even earlier. As a result, the majority of children are now implanted before age 2 when they are also most prone to ear infections.1,2 Hence, the pediatric CI surgeon is increasingly faced with the decision of whether to perform TT insertion in young CI recipients or candidates. Insertion of TT in the setting of CI is controversial. Proponents reason that ventilation reduces frequency of acute OM, which should reduce infectious complications.3,4 Critics argue that intubation of the tympanic membrane provides a route for external contamination of the middle ear and hardware. As a result, many pediatric CI surgeons avoid placing TT in CI patients, and even remove any existing tubes before implantation.5,6 The existing literature provides little guidance to the clinician faced with this dilemma. To help better understand the relative safety of TT in CI recipients, we reviewed our center’s experience with infectious complications, specifically in the context of the whether TT were present or absent. At our center, TT are placed routinely in pediatric CI candidates and recipients who have chronic otitis media with effusion or recurrent acute otitis media, and are not routinely removed prior to implantation.

Methods

Study Design and Setting: Retrospective cohort study performed at a tertiary care children’s hospital. IRB approval with a waiver of informed consent was obtained.

Participants: Children who received implants between 1999 and 2012, and met the following criteria: 1.) underwent the surgery at our institution; and 2.) had post-operative follow-up data for at least 6 months.

Data Collection. All inpatient and outpatient encounters were reviewed for each subject. Demographic information, etiology of hearing loss, medical comorbidities, surgical details for TT and CI, implant model, and physical exam findings were collected. For each patient who had undergone TT insertion, a timeline was constructed to reflect their period of tympanic membrane intubation.

Complications were defined as any infections processes requiring treatment and included wound complications, mastoiditis, labyrinthitis, refractory AOM requiring IV antibiotics, device infection or exposure. Additionally, device-related complications were examined, including explantation, device repositioning or other revision, and device failures.

Discussion

Otitis media (OM) is the most common diagnosis in pediatrics, with 90% of children suffering at least one episode before 2 years of age.1,7,8 And many in this age group require tympanostomy tube (TT) placement for recurrent infections.12 As the target age for cochlear implantation continues to fall to 12 months or younger, and more and more practitioners will be faced with otitis-prone children prior to cochlear implantation, or during the first few years thereafter. The question is whether to treat such children differently from those without CI. In particular, should TT be employed at all, and if so, should the indications for their use be different, or more stringent? Should they be removed earlier? Many pediatric implant surgeons routinely employ TT in implant recipients in the same manner as for non-implanted children, but this practice is the subject of debate. Many otologists steadfastly oppose the use of TT in an implanted ear, citing a risk for contamination of the cochlear implant by organisms from the ear canal. A survey of the American Neurotology Society regarding use of TT in cochlear implant recipients found that 43% of respondents would remove a dry ventilation tube at the time of cochlear implantation, and an additional 18% would graft the tympanic membrane. Only 38% would proceed with the CI with the TT intact.

Arguments have been made both for and against CI in CI patients. Proponents argue that TT reduce the frequency of acute otitis media and the prevalence of serious otitis media, therefore decreasing the chance of hardware contamination by middle ear pathogens, and subsequently the risk of supplicative labyrinthitis and bacterial meningitis. Several smaller studies support this view where otitis-prone implant recipients had no complications attributable to the TT.13,14 Reduced surgical difficulty, due to decreased middle ear inflammation and bleeding, is also often reported after TT.15 Opponents argue that there is little strong evidence either way and that TT may permit contamination of the hardware by pathogens from the ear canal which acts as both a reservoir for infection and a pathway to the inner ear and CSF.

In the present study, case #17 was the only patient to sustain an infectious complication, and a TT was in place. He presented with a draining TT and an associated device on the day after having been lost to follow-up for almost 2 years. The infection did not respond to debridement and IV antibiotics, ultimately requiring explantation, followed by successful reimplantation several weeks later. The causative organism was Pseudomonas aeruginosa with external contamination of the middle ear via the TT as a likely etiology. A noteworthy circumstance in this patient was the prolonged retention of his TT (42 months), which is far longer than our usual practice. Prolonged intubation of the TM may have created a surface for biofilm formation as well as a prolonged conduit for pathogens. It is possible that earlier removal of TT may have prevented this complication. Certainly, if TT are used in patients with cochlear implants, they require close monitoring and expedient removal when they are no longer needed.

Conclusions

• Infectious complications after CI are rarely associated with the presence of TT, supporting the concept that overall, TT are safe in CI recipients.

• Close monitoring is essential, including prompt removal of tubes when they are no longer needed.

References