Management of Acute Otitis Media in Cochlear Implant Recipients: To Tube or Not to Tube?

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BACKGROUND

The optimal age range for cochlear implantation (CI) in prelingually deafened children coincides with the peak incidence of otitis media (OM). It is expected that by age 3 years, half of all children in the general population will have experienced multiple episodes of acute OM (AOM). AOM following CI theoretically portends a high risk of infectious complications. Despite this, the overall risk of infectious sequelae in pediatric CI remains relatively low. Myringotomy tube (MT) placement is the mainstay of surgical treatment for recurrent AOM or for prolonged middle ear effusion in the pediatric population. However, much like in stapedectomy surgery, a perception exists among some CI surgeons that the middle ear space and ear drum should be intact (and free of any foreign body) at the time of CI, and that an MT should be avoided in the setting of CI so as to prevent any theoretical complication related to the MT specifically. Therefore, debate remains as to the exact role of MT placement in children undergoing CI. Should best practice dictate a more aggressive approach, placing an MT sooner so as to avoid infectious sequelae of OM, or should an MT be avoided to maintain an intact middle ear space?

LITERATURE REVIEW

Overall, there is a paucity of literature exploring this issue specifically. Most published studies have reported on the use of an MT in AOM-prone children undergoing CI, but little data exist about the use of an MT for noninfectious chronic middle ear fluid in CI patients. In a prospective study of acute OM in CI children, Luntz et al.1 compared a group of otitis-prone children undergoing CI with a group of non–otitis-prone children being implanted. The otitis-prone children were treated with a protocol intended to control the otitis symptoms, which included MT insertion prior to CI. Otitis prone was defined as current or recent history of AOM at referral. After MT placement, all children had to be drainage and infection free for at least 2 weeks prior to implantation. In the Luntz et al.1 study, only one child suffered from MT otorrhea >1 week following implantation, and there were no infectious complications related to AOM in any of the recipients in either group. They concluded that a structured protocol for otitis control, including MT placement in children undergoing CI, should not delay the procedure and should help prevent infectious complications. The study, however, was arguably underpowered as it included only 18 total subjects.

In a retrospective study, Fayad et al.2 studied the records of 126 pediatric cochlear implant recipients, of which 72% had a history of at least one episode of AOM, and 31% had at least three episodes of AOM. Overall in their cohort, 23% underwent MT placement either before, at the time of, or after CI. Patients who had undergone previous MT placement for middle ear fluid, but had no evidence of persistent fluid or infection for 6 months prior to implantation, had their MT removed at the time of CI. All patients treated with an MT were found to have a decrease in their episodes of AOM after CI, compared to 79% of those treated without an MT. Much like in the Luntz et al. study, no infectious complications related to the MT specifically were seen. Based on their findings, they concluded that placement of an MT either before or at the time of cochlear implantation seemed to adequately prevent infectious disease-related complications in otitis-prone children.

Baranano et al.3 reported on outcomes in 78 ears receiving an MT prior to CI, of which 32 were kept in place after the CI, and 46 were removed at the time of CI. All eardrums where the tubes were removed at the time of CI healed without sequelae. In 11 of these patients (33%), the MT had to be replaced for recurrent AOM after CI; however, this was not different from ears where the MTs were left in place after CI, where six (19%) needed to be replaced at some point after CI. Overall, 26 ears (33%) presented with an episode of MT otorrhea at some point after CI, but they were all...
adequately managed without the need for further surgery or intravenous antibiotics. Four ears in their study developed a chronic perforation at some point after CI, and all were successfully managed with surgical repair without incident to the cochlear implant device. They concluded that the presence of an MT before, during, and after CI could be managed with limited therapeutic burden and without placing the success of the CI or the patient at undue risk.

In a survey of 220 American Neurotology Society members, Kennedy and Shelton reported that although a wide variation in practice exists as to the management of OM in children receiving a cochlear implant, a majority of surgeons proceed with CI in a child with an MT as long as it is clean and dry. Only 5% of surgeons reported ever seeing complications in CI patients that they attributed to the MT. Based on these responses, the authors concluded that it is acceptable to place the MT in otitis-prone children with CI, and that despite theoretic concerns related to MT complications, the reported incidence of these complications was low.

In part, based on the findings from these and other studies, Rubin and Papsin published an American Academy of Pediatrics policy statement on the management of OM in CI patients, and stated that surgeons should manage OM with MT placement either before or at the time of CI to prevent further recurrent OM episodes.

BEST PRACTICE

Although there is a lack of prospective controlled studies analyzing the role and potential complications related to the use of an MT for AOM in pediatric CI, the preponderance of published evidence and policy statements argue in favor of using an MT in acute otitis-prone children undergoing CI. There appears to be little evidence demonstrating an increased rate of infectious complications after CI in children with an MT, and there appears to be a demonstrable level of AOM control with MT use in these children. Further, there are no reported cases of intracranial or device complications related specifically to MT use in CI. The question as to whether MTs should be used in CI candidates with persistent middle ear fluid but without infection remains understudied and unanswered. Based on the published literature, one can reasonably conclude that a history of recent OM in a child younger than 4 years of age should not delay CI. Subsequent episodes of AOM can be managed by conventional therapy, including MT placement if necessary.

**LEVEL OF EVIDENCE**

The literature reporting on the role of MT use in pediatric CI is characterized by a relatively poor level of evidence, impairing efforts to make solid evidence-based practice decisions. In this article, one underpowered level 2 study (prospective study with internal control), one level 3 study (retrospective review with internal control group), and one level 4 study (retrospective study without review without internal control group) were reviewed (Table I).

**BIBLIOGRAPHY**