

# When Good Tympanostomy Tubes Go Bad

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Some tympanostomy tubes are going to cause trouble, for reasons that include water precaution issues, otorrhea, blocked tubes, development of granulation tissue, and extrusion problems.

In the first place, the tubes serve as pressure equalizers in children with structural or functional eustachian tube dysfunction, according to Benjamin Cable, M.D., chief of pediatric otolaryngology at Tripler Army Medical Center in Honolulu.

Overall, children with tubes suffer an average of 1.5 episodes of otorrhea per year that the tubes are in place.

Short-acting tubes remain in place for 6-18 months, with an average placement time of 13 months.

Long-acting tubes remain in place for at least 17 months, and may remain indefinitely, so there is plenty of time for complications to develop.

Despite the potential problems, consider tubes for children who experience bilateral effusion for 3 months or have three episodes of acute otitis media in 6 months or 4 episodes in 12 months, Dr. Cable said in an interview.

Stress the importance of being careful in the water, but ear plugs are not particularly helpful, Dr. Cable said. "The real truth is that there is very little evidence supporting the use of ear plugs for water exposure."

He made two important points: First, the opening of an ear tube is so small that a drop of water would not penetrate due to surface tension. If children swim on the surface, and do not dive well below the

water, there is actually little chance of water penetrating the tubes. Second, ear plugs often do not create tight fits within the ear canal.

Otorrhea can occur due to nasopharyngeal pathogens or external auditory canal pathogens. Children who go without treatment of otorrhea tend to have prolonged drainage, Dr. Cable said. "This is not only a problem for the skin of the external canal, but it is often a reason children are sent home from day care, preschool, or school."

First-line therapy should be otological drops in the ear canal, which have demonstrated effectiveness and minimal side effects.

Oral antibiotics are the second-line therapy, and in refractory cases, culture-directed therapy is key, Dr. Cable noted. Drops or oral therapy should be given for 7-10 days, but intravenous therapy may take up to 6 weeks and include home regimens.

Acute posttympanostomy otorrhea is a common complication. However, despite the presence of elevated gastric enzymes in cases of middle ear effusion, gastric reflux has not been shown to play a significant role in acute posttympanostomy otorrhea.

For example, measurable pepsinogen concentrations were below the normal reference ranges in a recent prospective study of 24 children aged 2-16 years (*Otolaryngol. Head Neck Surg.* 2005;132:523-6).

Tube removal is an option for severe cases of otorrhea. "Most often, tubes that require removal are ones that have become blocked with dried otorrhea or blood," Dr. Cable said. If drops are unable



This tube is in the classic position with dried otorrhea in the center.



This tube is totally blocked with fleshy, shiny granulation tissue.

to loosen the debris, the tubes can be removed and replaced in a slightly different location.

Tympanostomy tubes can become blocked by wax, blood, discharge from otorrhea, or even a foreign body. Some blockages can be opened with topical medications or by physically cleaning out the wax, blood, or discharge.

Granulation tissue must be treated with steroid-containing medication. "New otological drops now often contain a combination antibiotic and steroid, Ciprodex, for instance," Dr. Cable said.

"If this is not available, steroid drops made for ophthalmic use can be used in the ear."

Autoextrusion occurs in 95% of cases of short-acting tubes. Standard tubes last from 6-18 months with a mean of 13 months, and tubes that last longer than 2 years are considered "retained."

"We know that the longer the tubes are in place, the less likely it is that the small perforation will heal after extrusion," Dr. Cable explained. "We used to think that happened at 2 years, but the evidence is now pointing more solidly at longer than 3 years, and most surgeons will recommend removal somewhere between 2 and 3 years."

Perforation closure occurs in approximately 97% of short-acting tubes and 80% of long-acting tubes.

Looking ahead to the future of tympanostomy tubes, a large amount of research energy is currently being aimed at materials that resist bacterial colonization, in response to concerns that bacteria set up a biofilm on the synthetic material, Dr. Cable said.



A "perforation" or hole did not heal after the tube extruded.

"My current first choice for ear tube placement is a standard version of the tube called the Armstrong tube," he said. "I make this choice based on the ease of placement and the angle of the tube, which allows it to sit in such a way that the future examiner can look directly into the lumen of the tube."

However, there are many tubes on the market, and many good choices available, he noted.

## Tympanostomy Tubes: No Advantage to Early Insertion

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Early insertion of tympanostomy tubes during the first 3 years of life did not significantly improve the majority of developmental outcomes at age 6, compared with later insertion, in children with persistent otitis media with effusion, said Jack L. Paradise, M.D., of the University of Pittsburgh, and his colleagues.

In a randomized clinical trial of children with persistent effusion who were 61 days to 3 years old, 201 children received tubes promptly (early-treatment group) and 194 received tubes 6 months later in cases of persistent bilateral effusion and 9 months later for unilateral effusion (delayed-treatment group). The children were enrolled in the study as healthy infants aged 2-61 days, and their middle-ear status was monitored regularly from the time of their enrollment.

Abnormal hearing was diagnosed while effusion was present in approximately 75% of those with bilateral effusion and in approximately 50% of the children with

unilateral effusion prior to the insertion of tubes (*N. Engl. J. Med.* 2005;353:576-86).

At 6 years, unilateral effusion was present in 15 children (7%) in the early-treatment group and 20 children (10%) in the delayed-treatment group, and bilateral effusion was present in 7 children (3%) in the early-treatment group and 3 children (2%) in the delayed-treatment group.

There were no significant differences in the mean scores between the early- and delayed-treatment groups on most assessment tests at 6 years, including the Wechsler Intelligence Scale for Children (scores of 98 for both groups) and the Percentage of Consonants Correct-Revised test (scores of 96 for both groups).

The only significant difference in outcome at 6 years was a higher mean score on the Nonword Repetition Task in the early-treatment group, compared with the delayed-treatment group (76 vs. 74).

These data support and extend results from a previous study by Dr. Paradise and his colleagues in which early insertion of tubes did not improve developmental outcomes at ages 3 or 4 years.

