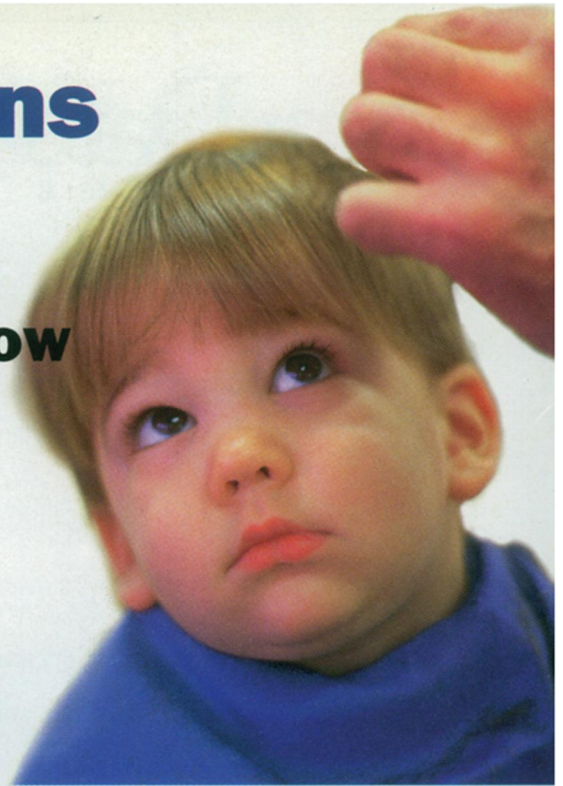


Middle Ear Infections in Children

Brouhaha over treatment leads to consensus — for now

By ADRIENNE C. BROOKS



Pediatrician John C. Bolton recalls tales of home remedies for earache. "When I lived in the South, people said the best thing to do was to press a hot water bottle against the offending ear and hope it would get better," he says. "My wife, who comes from New England, says a warm bag of salt against the ear was the preferred treatment around there."

With the advent of antibiotics and precision surgical instruments, treatments for painful infection of the middle ear, or otitis media, have become more sophisticated than hot water bottles and salt. Yet over the last few years, opinions on how best to cure such infections have generated high-decibel controversy.

Otitis media ranks second only to the common cold as the most frequent illness among children in the United States. Because it can cause hearing loss if not treated properly, middle ear infection has attracted considerable attention from medical and other health care professionals.

The numbers tell the story. Nearly 70 percent of children born in the United States will develop otitis media by age 2. Most of them will outgrow their susceptibility to the infection by age 5, as the immune system and body develop. For other children — over half of those who experience an initial infection — it remains a continuing battle, recurring three or more times. Implanting tubes to drain the middle ear, a surgical procedure known as tympanostomy, is the most common surgery requiring a general anesthetic performed on children under age 2. In addition, otitis media accounts for at least 30 percent of visits to pediatricians each year and represents more than \$3.5 billion in U.S. health care costs annually.

"The sheer number of children affected and the incredible amount of money spent for treatment demand that we take a serious look at what's going on," says Bolton, president of the Northern California chapter of the American Academy of Pediatrics. He treats hundreds of chil-

dren for otitis media each year in his San Francisco practice.

Otitis media develops when bacteria or viruses, usually associated with colds or sore throats, make their way up the Eustachian tube, from the upper part of the throat behind the nose to the middle ear. As a result of the infection, the eardrum can become swollen and inflamed, a condition called acute otitis media, which can lead to hearing loss and thus affect a child's learning and language skills.

When fluid accumulates against the eardrum, either as a result of an acute infection or on its own, a second, more insidious type of otitis media may develop. Known as otitis media with effusion, this condition often shows no symptoms such as pain or fever. Parents of infants may not even know their child has fluid blocking the eardrum unless a doctor discovers it as part of a routine examination. Each type of otitis media is distinct from the other, although a number of physicians theorize that repeated bouts of acute otitis media may lead to effusion.

The controversy over how best to treat these infections erupted in the pages of two U.S. medical journals about 5 years ago, following publication of a study on the effectiveness of amoxicillin, an antibiotic often used to treat both forms of otitis media.

Researchers at Children's Hospital in Pittsburgh conducted a 4-year study which found that children who took amoxicillin for a middle ear infection were twice as likely to be cured as those who took a placebo, or inactive substance. The team's work was published in the Feb. 19, 1987 *NEW ENGLAND JOURNAL OF MEDICINE*.

However, one of the Pittsburgh researchers disagreed with that conclusion. He submitted a separate paper to the *NEW ENGLAND JOURNAL OF MEDICINE* citing no appreciable difference between the antibiotic and the placebo. Charges

flew back and forth, and it took until Dec. 18, 1991, for the second paper to be published, in the *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION (JAMA)*.

In an attempt to quiet the brouhaha, a team of researchers led by Robert L. Williams, a family practitioner at the MetroHealth Clement Center in Cleveland, analyzed 27 studies on the effectiveness of several antibiotics used in the treatment of otitis media. But this team's findings, published in the Sept. 15, 1993 *JAMA*, showed mixed results, at best. The researchers concluded that of every nine children taking antibiotics for acute otitis media, only one showed improvement. Of every six patients receiving antibiotic treatment for otitis media with effusion, one improved.

Surgeons also find themselves in the fray, arguing over when, or whether, to implant tubes in the ear to drain excess fluid. A study by Lawrence C. Kleinman, a pediatrician currently with Children's Hospital in Boston, and his colleagues in the April 27 *JAMA* examined the records of 6,611 children under the age of 16 whom physicians had recommended for tympanostomy.

About 25 percent of the proposed tube insertions were inappropriate, the authors concluded, and for another 30 percent, the risks equaled the benefits. Since the study involved the records of a health services utilization review group, Value Health Services (VHS), which develops criteria to assess the appropriateness of medical procedures, a number of surgeons and other practitioners have challenged those results, citing a potential conflict of interest.

In an as yet unpublished letter to *JAMA*, Jerome C. Goldstein, executive vice presi-

dent of the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) raises that group's objections to the analysis. Goldstein calls the study "scientifically invalid or at least badly flawed," particularly since "the authors all admittedly have a financial relationship to VHS." Furthermore, he says, because the study analyzed data on the number of proposed tympanostomies — not on the actual number of tubes inserted — the conclusion that 25 percent were inappropriate is misleading.

"Although it is difficult to come up with a flat statement about when surgery is needed, most physicians and experts agree that tubes are the best option if a child has fluid in the ear for more than 4 months and is having difficulty hearing," says Maureen T. Hannley, associate vice president of research and development at AAO-HNS. Despite the risk involved in giving young children a general anesthetic, "there comes a point where it's clear the more conservative options aren't working. The clear advantages of tube insertion — the immediate recovery of normal hearing and the removal of fluid that may lead to future infections — may make surgery the best option," she notes.

While these debates were going on, the Department of Health and Human Service's Agency for Health Care Policy and Research in Rockville, Md., pulled together representatives of AAO-HNS, the American Academy of Family Physicians, the American Academy of Pediatrics, and other professional groups. They reviewed published studies, evaluated clinical trials, and developed guidelines for treatment of otitis media with effusion in children age 1 to 3. They released their report this summer.

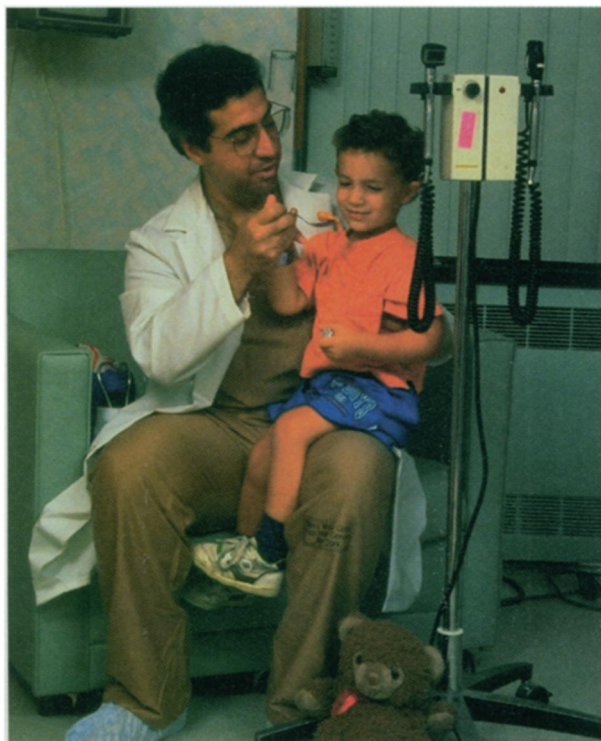
The guidelines suggest a go-slow approach for physicians and parents: Monitor the condition for the first 3 months; use antibiotics if the infection persists or if the child suffers pain or shows loss of hearing during this time; perform surgery as the last resort — specifically, if the condition doesn't improve in 4 to 6 months and the physician finds a hearing loss of 20 decibels or more.

Many physicians advocate the same approach for acute otitis media. "When a child is screaming in pain and the eardrum is red and bulging, I usually use antibiotics. If the infection is very mild or very early, I frequently... see if it will clear up on its own," says Bolton. He cites a number of studies showing that nearly 50 percent of cases clear up without any medication. "We have to be very careful not to overprescribe antibiotics, since evidence now shows a growing resistance by bacteria," he cautions.

For now, the debate about otitis media treatment appears to have quieted down considerably, but researchers continue their investigations into the many remaining mysteries of middle ear infection.

Development of a vaccine against otitis media caused by bacteria remains an area of great interest.

Researchers at the State University of New York (SUNY) at Buffalo, working with scientists from Japan, may have taken an important step closer to that goal. In a recent study, they uncovered a link between frequent acute otitis media and a bacterium known as nontypeable *Haemophilus influenzae* in the nasal passages of children. They also found antibodies (proteins that can trigger an



immune response) to the bacterium's outer membrane protein, or P6. Their finding suggests that immunity against the infection could be enhanced by building up antibodies against P6.

"Our study indicates that many middle ear infections originate in the nasal passage and that if we can target the P6 bacteria and increase the local antibodies there, we may be able to thwart subsequent infections," says infectious disease specialist Howard Faden of SUNY Buffalo. He, Yasuaki Harabuchi of Sapporo Medical College in Japan, and their colleagues reported their findings in the October JOURNAL OF INFECTIOUS DISEASES.

The P6 antibodies had also proved beneficial in an earlier study by Faden and his colleagues. That study, published in the February JOURNAL OF PEDIATRICS, showed that infants who consumed breast milk containing high concentrations of the P6 antibody had fewer

H. influenzae in their nasal passages than babies whose mother's milk had lower concentrations of the antibody.

Faden has also collaborated on research that may contribute to the debate about antibiotic use. While most pediatricians agree that antibiotics are the first line of defense when otitis media causes pain or threatens a child with hearing loss, questions of which antibiotics to administer and for how long remain open.

Working with researchers at the University of Massachusetts Medical School in Worcester, Faden and his colleagues have shown that three types of bacteria cause 50 to 90 percent of middle ear infections — *Streptococcus pneumoniae*, nontypeable *H. influenzae*, and *Moraxella catarrhalis*. More important, the researchers discovered, all three have developed resistance to commonly prescribed antibiotics.

The group collected nasal mucus at regular intervals between age 1 month and 24 months from 216 infants in Buffalo who had never taken antibiotics before. They found that 96 percent of *M. catarrhalis* bacteria did not respond to penicillin, 90 percent were unaffected by ampicillin, and 19 percent did not respond to trimethoprim-sulfamethoxazole, all antibiotics commonly used to fight otitis media. Approximately 32 percent of nontypeable *H. influenzae* were resistant to ampicillin, and 17 percent did not respond to cefaclor, another antibiotic in the study.

"We learned that some commonly used drugs are no longer valuable in certain areas of the country," says Faden. "Surveys of antibiotics should be done on a regular basis to keep up with changes in resistance in any given area."

Despite this caution, antibiotics remain the treatment of choice for pediatricians and family practitioners facing a child in pain and anxious parents.

"It's a gray area sometimes, but the common antibiotics still seem to be working," says James M. Perrin, a pediatrician at Massachusetts General Hospital in Boston. The newer antibiotics are much more expensive and show only marginally improved efficacy over the traditional ones, he maintains.

In the meantime, while the research continues and the debate goes on, those suffering from earache pain can always go back to the home remedies. If the salt or hot water bottle doesn't do it, some doctors suggest a drop of warm oil in the ear. □