Case Report Kitasato Med J 2016; 46: 81-85

Remarkably improved intractable otitis media by treatment in accordance with clinical practice guidelines for the diagnosis and management of acute otitis media in children: a case report

Atsushi Ochiai, Tatsutoshi Suzuki

Department of Otolaryngology, Head and Neck Surgery, Kitasato University School of Medicine

Acute otitis media (AOM) is the most frequently encountered disease in childhood and usually has good prognosis. However, cases presenting that exhibit the limit of antibacterial chemotherapy are increasing. This is a report of a refractory case of AOM. The patient was a 1-year-old boy. He was admitted and underwent a right myringotomy under general anesthesia. We intraoperatively found a relatively large amount of viscous, yellow reservoir fluid. After washing the wound with physiological saline, we surgically placed a tube. After the left myringotomy, and washing the wound with physiological saline, we found no reservoir fluid. Therefore, we did not place a tube. The otitis media did not recur. Tube placement surgery is effective for intractable cases that are refractory to conservative treatment.

Key words: acute otitis media, guidelines, tube placement surgery

Introduction

Acute otitis media (AOM) is the most frequently encountered infectious disease in childhood. Because AOM usually improves and is cured quickly with oral antibiotics, AOM has good clinical prognosis. However, rapid change has been seen in the pathology since the middle of the 1990's, and cases showing the limit of antibacterial chemotherapy have been increasing.[1] We report a case of refractory AOM we were having difficulty treating until it remarkably improved with the treatment we provided in accordance with the clinical practice guidelines for the diagnosis and management of AOM in children.

Case report

A 1-year-old boy presented with right otalgia. He had started going to nursery school in July and contracted AOM frequently, so he began to visit a neighborhood otolaryngologist from August and underwent a myringotomy. We detected *Haemophilus influenzae* in a bacterial culture of the reservoir fluid from his ear, so we administered cefditoren pivoxil (CDTR-PI) and he improved.

His first visit to our hospital in September was because of the onset of right otalgia a few days after having contracted a cold. There was nothing remarkable in his past medical history or family history. Otolaryngological findings at the first visit revealed that his auricle and external auditory meatus were normal. Although there was slight hyperemia of the bilateral tympanic membranes, there was no protrusion. The nasal cavity and pharynx showed slight redness. The cervical lymph nodes were normal.

We had administered CDTR-PI, and his bilateral tympanic membranes were only slightly hyperemic, so we did not perform a myringotomy but gave him an analgesic instead. He was ultimately treated with six right myringotomies. The bacterial culture of the reservoir fluid was positive for *H. Influenzae*, though it could have been present when we detected the *H. influenzae*, AOM recurred in his left ear in February. So he was admitted, and we administered ceftazidime at 1.5 g per day, for 3 days. After which he was discharged, but he visited the outpatient clinic again in March with the chief complaint of right otalgia. Upon examination, the left tympanic membrane was found to be normal; however, the right tympanic membrane showed hyperemia and protrusion (Figure 1). Therefore, he was admitted and underwent a

Received 28 September 2015, accepted 4 November 2015
Correspondence to: Atsushi Ochiai, Department of Otolaryngology, Head and Neck Surgery, Kitasato University School of Medicine
1-15-1 Kitasato, Minami-ku, Sagamihara, Kanagawa 252-0374, Japan
E-mail: atsuochi-tky@umin.ac.jp

right myringotomy.

Although *H. influenzae* was detected in the bacterial culture of the reservoir fluid, there was only indigenous bacteria in the bacterial culture of the pharynx. The *H. influenzae* detected in both February and March were ampicillin resistant (Table 1). He underwent computed tomography (CT) of the temporal bone 2 days later. His left ear was found to be normal. And although growth and pneumatization of the mastoid cells in the right ear were poor, and there was an apparent soft tissue shadow detected, we identified the auditory ossicles and found normal formations (Figure 2).

The boy was admitted in April and had surgery the next day under general anesthesia. During the right myringotomy, we found a relatively large amount of viscous, yellow reservoir fluid. Therefore, after washing the ear with physiological saline, we surgically placed a tube. The result of the bacterial culture of this reservoir fluid was negative. After the left myringotomy, we washed the ear with physiological saline but did not find any reservoir fluid. Therefore, we did not surgically place a tube. He was discharged the next day and the otitis media has not recurred to date. Findings of the bilateral tympanic membranes at a follow-up examination in May revealed no inflammation (Figure 3).

Discussion

AOM is one of the most frequently encountered infectious diseases in infants. Teele et al.[2] reported that by 1 year of age, 47% of children have had at least one episode of otitis media (OM), 64% by 2 years of age, and 71% by 3 years of age. Otalgia of AOM is among the most painful of otolaryngological diseases. Because otalgia tends to

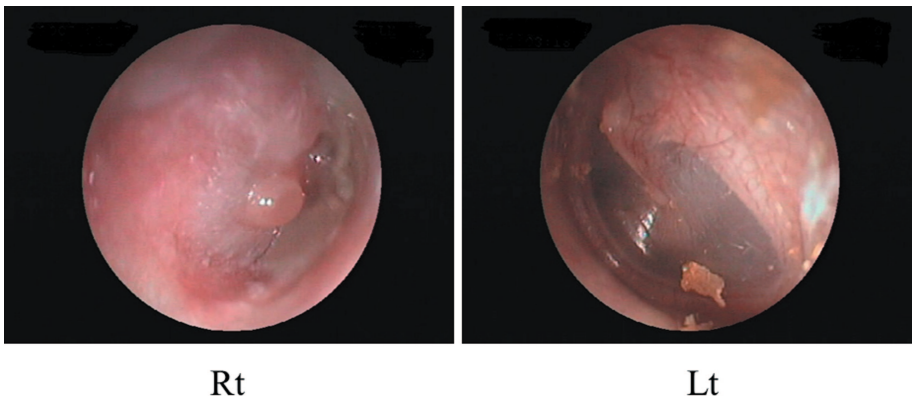

Figure 1. Findings of bilateral tympanic membranes

The left tympanic membrane was normal, but the right tympanic membrane showed hyperemia and protrusion.

Table 1. Bacteriological examination

	February		March	
Antibiotics	MIC	Judgment	MIC	Judgment
ABPC	8	R	8	R
CEZ	>16	-	>16	-
CTM	>16	-	>16	-
CMZ	8	-	16	-
CAZ	<1	S	<1	S
FMOX	8	-	8	-
AZT	4	-	4	-
IPM	1	-	2	-
EM	1	-	1	-
CLDM	4	-	2	-
MINO	<0.5	S	<0.5	S
LVFX	<0.25	S	<0.25	S

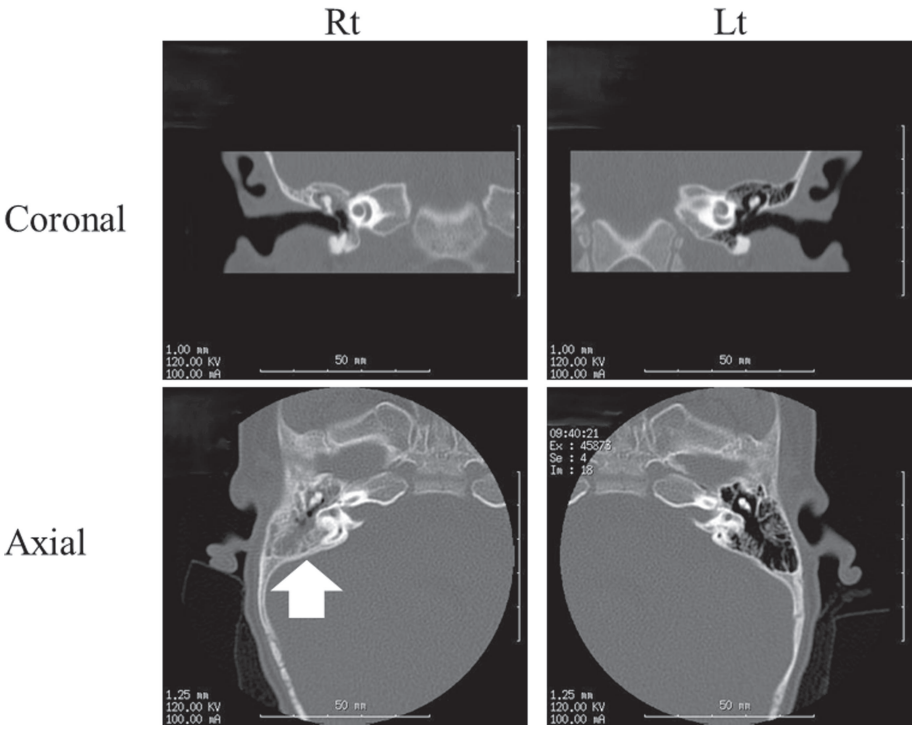

Figure 2. Temporal bone CT

Growth and pneumatization of the right mastoid cells (arrow) were poor, and there was a soft tissue shadow inside.

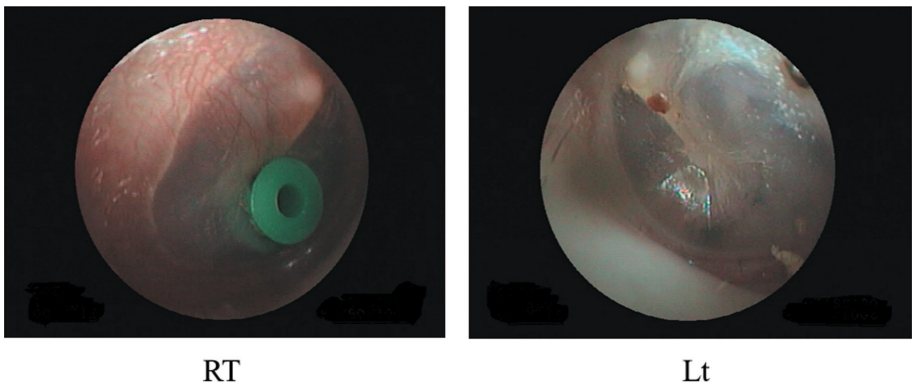

Figure 3. Bilateral tympanic membranes at re-examination

There was no inflammation in the bilateral tympanic membranes.

Table 2. Risk factors of intractable and recurrent OM

Exogenous risk factors	Endogenous risk factors
・Group nursing ・Lactation in a short period ・Parents smoke ・Appearance and spread of resistant bacteria	・Early age (<24 months) ・Past history of recurrent AOM ・Immune disorder ・Eustachian tube dysfunction ・Adenoid vegetation

continue and recur, and because there are so many infants who suffer from otalgia, AOM should urgently be addressed by the medical community. Moreover, infancy is an important time in the growth of the mastoid cells. Therefore, continuation and repetition of AOM affects their healthy growth. Because suppression of the growth of mastoid cells is one of the pathogeneses of various chronic OM requiring radical surgery, treatment of recurrent OM in infancy is, therefore, important.

The increase in drug resistant strains of pathogenic bacteria, such as Streptococcus pneumoniae, H. influenzae, and Moraxella catarrhalis, can be cited as the first cause of intractable and repetitive AOM. Drug-resistant *S. pneumoniae*, such as penicillin-resistant *S. pneumoniae*, penicillin-intermediate *S. pneumoniae*, and beta-lactamase-negative ampicillin-resistant *H. influenzae*, have spread in urban areas. Although these bacteria are also part of an infant's normal nasopharyngeal bacterial flora, exposure to a large amount of these bacteria in immature infancy causes intractable AOM and upper respiratory inflammation. However, not all infants who have pathogenic bacteria suffer from a refractory infectious disease. Exogenous risk factors, such as younger infants in group nursing, and increasing bacterial resistance and endogenous risk factors, such as the immunity of affected infants, are important in both intractable and recurrent OM. However, the onset of intractable infectious disease is induced by a balance of these bacteria and immunity-related risks (Table 2).[1]

In addition, because the middle ear cavity is surrounded by bone tissue, it is to be expected that antibiotics would have difficulty migrating to the middle ear and, thereby, contributing to recovery. In this case, because the CT revealed that growth and pneumatization of the right mastoid cells were poor, it was likely that the right side would be intractable. And in this case, only the right side did require tube-placement surgery.

AOM treatment is prescribed in accordance with the severity of otoscopic findings, and young age correlates with severity. Even though the general symptoms improve, otoscopic findings often do not improve. Therefore, accurately judging otoscopic findings and knowing their severity leads to the selection of the appropriate treatment. Severity of AOM is classified as mild, moderate, or severe according to otoscopic findings and clinical manifestations (Table 3).[3]

In the present case, because 3 points are given automatically below the age of 24 months, otalgia was scored as 2 points, fever as 1, crying and/or bad temper as 1, hyperemia of the tympanic membrane as 4, protrusion of the tympanic membrane as 8, otorrhea 4 points, and the light reflex of the tympanic membrane was 4; therefore, with a total of 27 points, severity at admission was classified as severe. According to the guidelines,treatment of severe AOM is any of high dose of AMPC (Amoxicillin), CVA (Clavulanate)/AMPC, or CDTR-PI for 5 days and undergoing a myringotomy. If there is little or no improvement, repeat. If there is still no improvement, intravenous administration for 3 days.

The patient in the present case improved at first by this treatment. Until standard guidelines are available, the treatment of OM will continue to depend on the physician's experience, and is not consistent with evidence-based medicine (EBM). Therefore, as cases refractory to treatment increased, it lead to an increase in the unnecessary administration of antibiotics, and got caught up in a vicious cycle causing resistant bacteria to evolve. Then this treatment was supported, and cases that were refractory to treatment decreased by following these guidelines and because consistent with EBM.[4] However, in accordance with the classification of severity, the treatment algorithms provide the recommended treatments for common cases. In clinical practice, it is also necessary to provide treatment based upon the specifics of the situation and the case. However, should any of these treatment algorithms be unable to cure OM

Table 3. Severity of AOM

Age	0: ≥24 months; 3: <24 months
Otalgia	0: absent; 1: present; 2: present-continuous severe pain
Fever	0: <37.5℃; 1: ≥37.5℃－≤38.5℃; 2: >38.5℃
Crying and/or bad temper	0: absent; 1: present
Hyperemia of the tympanic membrane	0: absent; 2: present at the manubrium of malleus, or in a part of the eardrum; 4: present in the whole tympanic membrane
Protrusion of the tympanic membrane	0: absent; 4: present in a part of the ympanic membrane; 8: present in the whole tympanic membrane
Otorrhea	0: absent; 4: present but the tympanic membrane is visible; 8: present and obstructing visibility of the tympanic membrane
Classifications	Mild: ≤9 points Moderate: 10－15 points Severe: ≥16 points

or even suppress it by repetition, tube therapy is an effective alternative.

Tube placement surgery is effective for intractable cases that are resistant to conservative treatment.[5,6] It is adequate because it allows adequate drainage from the middle ear cavity, and the effect is increased by washing the ear with physiological saline. In addition, it achieves normalization of the middle ear mucosa by adequately ventilating the tube after drainage, whereby it is possible to release the negative pressure and prevent the aspiration of pathogenic bacteria present in the nasopharynx to the middle ear cavity. Furthermore, it causes the attenuation of pathogenic pneumococcus that has recently been reported to be caused by oxygenation of the middle ear cavity.[7,8]

The guidelines for tube placement surgery are: I. Despite multiple myringotomies, OM resists intravenous antibiotic administration or sufficient amounts of oral antibiotic administration, and has repeated episodes of OM for more than 3 months; II. Otorrhea or intratympanic reservoir fluid continues for more than 3 months; III. Group nursing children; IV. The pathogen is a resistant bacteria; V. The family understands the necessity of surgery; and VI. General anesthesia is possible.[6,9] The present case included all of these.

The effect of tube placement surgery is high, however, there are four limitations. 1. Although the surgery is brief and relatively simple to perform, in Japan, it is performed under general anesthesia. 2. The economic burden increases because hospital admission is required under Japanese law. 3. Although the frequency is low, there are sometimes perforations in or tearing of the tympanic membrane, the formation of cholesteatoma, and/or tympanosclerosis, and sometimes other complications related to the tube removal. 4. The tube may need to be replaced if OM recurs after tube removal. Moreover, there is scant evidence regarding the timing of the tube removal.

Even though there were some complications in the present case, OM did not recur, and the tympanic membrane remains normal to date. Therefore, the tube placement surgery was effective allowing good auditory function for the child.

Our future plans will be to initially comply with these guidelines. If OM recurs, we will perform a tympanostomy (tube placement surgery) which is common in young children and a simple operation for otolaryngologists.

References

1. Ito M. Acute otitis media －resistant bacteria and recurrent otitis media－. *J Otolaryngol Jpn* 2004; 107: 500-3 (in Japanese).
2. Teele DW, Klein JO, Rosener BA. Epidemiology of otitis media in children. *Ann Otol Rhinol LaryngolSuppl* 1980; 89 (3 Pt 2): 5-6.
3. Subcommittee of Clinical Practice Guideline for Diagnosis and Management of Acute Otitis Media in Children (Japan Otological Society, Japan Society for Pediatric Otorhinolaryngology, Japan Society for Infectious Disease in Otolaryngology). Clinical practice guidelines for the diagnosis and management of acute otitis media (AOM) in children in Japan. *Auris Nasus Larynx* 2012; 39: 1-8.
4. Tomiyama M. A case of severe acute otitis media complicated by infectious mononucleosis. *Pediatr Otorhinolaryngol Jpn* 2014; 35: 252-6 (in Japanese).
5. Franklin JH, Marck PA. Outcome analysis of children receiving tympanostomy tubes. *J Otolaryngol* 1998; 27: 293-7.
6. Maruyama Y, Ito M, Furukawa M. Insertion of ventilation tube for treatment of recurrent acute otitis media. *Pract Otol (Kyoto)* 2002; 95: 327-36 (in Japanese).
7. Hotomi M, Yamanaka N. *Management of otitis media in children.* Osaka: Iyaku (Medicine and Drug) Journal Co., Ltd.; 2006; 204-6 (in Japanese).
8. Weiser JN, Bae D, Epino H, et al. Changes in availability of oxygen accentuate differences in capsular polysaccharide expression by phenotypic variants and clinical isolates of Streptococcus Pneumonia. *Infect Immun* 2001; 69: 5430-9.
9. Sawatsubashi M, Washizaki M, Kakizoe A, et al. Recurrent otitis media in pediatric patients -The effect of tympanostomy tube placement-. *Otologia Fukuoka* 2005; 52: 38-45 (in Japanese).