able, this can be used instead or in addition to the voiced sounds.

18 months–30 months

At this age, in addition to the information from distraction tests, it is possible to determine how a child responds to speech. Simple instructions can be given at very quiet voice levels without the speaker's face being visible (i.e., from behind, or from in front with the mouth covered). At least three instructions are needed and two responses, to reduce the chances of the child guessing correctly. The instructions, for example, may involve a small object, which the child is asked to give to mother or to father or put into a box. Alternatively, the child may be asked to show a body part (e.g., hair or eyes or nose).

Fig. 2b: A performance test in which the tester is conditioning the child to carry out an action in response to a signal

Photo: Valerie Newton

Over 30 months

Once a child can wait for a signal, a performance test can be carried out (Figures 2a,2b). The sound 'Go' is used to test low pitch sounds and 'ss' to test high pitch sounds. The child is taught to carry out a simple action when 'Go' is heard (e.g., to put a stone in a tin). The sound is made very quietly from behind at about a metre distance, and two responses from the child at this quiet level are required to pass the screen. The sound 'ss' is then taught and the test repeated. If a handheld warble tone generator is available, this can be used instead. If available, an audiometer may be used to screen hearing in children at this age, but more usually in children of three years and older.

Further Assessment

Having detected a hearing loss, the degree of hearing loss can be determined using the same tests, but this time raising the loudness of the sound until the infant/child responds. The amount to which the sounds have to be raised gives an estimate of the degree of hearing loss (e.g., slight, moderate/severe) or, if there is no response, profound. Care has to be taken, however, as children who are slow learners or have sight problems or other defects may not give a response, even when the sound has been heard. This is one reason why assessment of children who have not responded satisfactorily in screening tests, should only be performed by those who have had training for these procedures.

Conclusion

Early detection of a hearing loss is important – and it is possible in infants and young children. Lack of equipment does not prevent a hearing impairment being identified in this age group.

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Review Article

MANAGEMENT OF OTITIS MEDIA IN A DEVELOPING COUNTRY

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Otitis media is an inflammatory process that involves the middle ear cavity and the structures within it. Acute otitis media (AOM) is characterised by the presence of pus in the middle ear and presents with fever, ear pain and hearing loss. Very young children may have such non-specific symptoms as irritability, vomiting, diarrhoea and crying upon ear 'tugging'. The causative agent may be bacterial or viral. The infection usually resolves uneventfully within one to two weeks, although in some cases the eardrum may perforate and the ear may continue to discharge. In other instances, the fluid that forms in the middle ear behind an intact eardrum is clear or mucoid, produces no acute symptoms of infection but, nevertheless, may cause hearing impairment. These conditions are termed otitis media with effusion (OME), serous otitis media or mucoid

otitis media, depending on the appearance of the fluid.

Chronic otitis media presents as recurrent ear discharge through a perforation of the eardrum, presumably as a result of unresolved acute otitis media. This is called chronic suppurative otitis media (CSOM). In more severe cases, chronic suppurative otitis media may present with epithelial debris invading and destroying the structures of the middle ear and mastoid cavities. This epithelial mass is called a cholesteatoma and may lead to the development of intracranial or extracranial extensions of the middle ear and mastoid infection.

Risk Factors for Otitis Media

The risk for AOM increases significantly if any of the following apply:

- Another member of the family has had AOM
- The child attended a day care outside the home or a family day care
- The child has been exposed to parental smoking
- The child has been breastfed for less than three months
- The child had been given a pacifier.[1]

Poor socio-economic conditions and frequent upper respiratory tract infections may be related to the development of CSOM.[2]

Epidemiology

It is estimated that otitis media, in all its forms, accounts for an estimated 4,000 deaths and a disease burden of just over 1.4 million DALYs*.[3] Prevalence surveys, which vary widely in disease definition, sampling methods, and methodologic quality, show that the global burden of illness from CSOM involves 65–330 million individuals with draining ears, 60% of whom (39–200 million) suffer from significant hearing impairment. Over 90% of the burden is borne by countries in South-east Asia and the Western Pacific regions, Africa, and several ethnic minorities in the Pacific rim. CSOM is uncommon in the Americas, Europe, the Middle East and Australia.[4]

Treatment of AOM and OME

An otoscopic examination is necessary to diagnose both AOM and OME. Typical findings include a reddened, bulging eardrum, with fluid level or air bubbles seen through the eardrum. Most cases of AOM and OME resolve spontaneously without complications. Resolution of AOM is slightly more likely with ampicillin or amoxicillin treatment for at least 5 days.[5] Recurrent bouts of AOM and OME may also be slightly shortened by antibiotic therapy.[6] There is no evidence that other antibiotics are any more effective in relieving symptoms although some antibiotics are more likely than others to cause diarrhoea and other side effects.[7] Children with AOM should be followed up to ensure that recurrent episodes are similarly treated. Children with bilateral OME should also be followed up since persistent middle ear fluid may impair hearing and lead to difficulties in school.

Diagnosis and Treatment of CSOM

A history of at least 2 weeks of persistent ear discharge should alert primary health workers to the problem. If the ear can be dry-mopped well enough to see the eardrum, then the diagnosis of CSOM can be confirmed by visualisation of the perforation in the tympanic membrane (Figure 1).

Mastoidectomy with or without tympanoplasty eradicates mastoid infection in about 80% of patients; however, such treatment is costly, does not always lead to satisfactory hearing improvement, and is inaccessible in many developing countries. Daily instillation of topical antiseptics or topical antibiotics after very careful aural toilet, for at least 2 weeks, appears to be the most cost-effective treatment for the short-term resolution of otorrhoea. Topical quinolones (examples:- ciprofloxacin or ofloxacin) are particularly effective in resolving otorrhoea without the risk of ototoxicity. There is no evidence that the addition of oral antibiotics confers increased benefit. Intravenous antibiotics, particularly the anti-pseudomonal drugs, are highly effective, but expensive.[7]

A person with a newly discharging untreated ear, or a persistently discharging initially treated ear, may be managed at the primary health care level. The onset of the ear discharge should

Fig. 1: Dry-mopping an ear during a field survey

Photo: Andrew Smith

be determined by history taking and the eardrum should be examined carefully. Daily ear cleaning, followed by the application by instillation or insufflation of topical antimicrobials may be administered for 2 to 4 weeks. Whenever possible, the patient must be referred to a trained otoscopist for confirmation of the diagnosis of CSOM. This is important since acute otitis externa can also present with a draining ear. A person with a recurrently discharging ear requires careful assessment of the middle ear by an ENT specialist – for middle ear disease that has not resolved. Antimicrobial therapy may still be initiated, but the patient must be given the benefit of otological assessment for possible elective mastoidectomy. Health care managers should consider organising outreach ear clinics and ear camps in areas where patients of this type would not otherwise have access to specialised care. A person with a discharging ear with headache, fever, dizziness and other danger signs of intracranial or extracranial extension of CSOM requires urgent referral to an ENT specialist as such patients may require emergency mastoidectomy. A person with a dry, perforated eardrum, with hearing loss, requires restoration of hearing either by tympanoplasty or by the use of a hearing amplification device.

Summary

Otitis media is highly prevalent in developing countries. The diagnosis involves careful examination of the eardrum and management involves timely and appropriate selection of antimicrobials. Surgical interventions are largely limited to patients with chronic suppurative otitis media who do not respond to medical therapy, particularly those with infectious complications.

**DALY = disability adjusted life year: a combined measure of the years of healthy life lost due to premature mortality and years lived with a disability brought about by a particular disease or condition*

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Review Article

TRAINING FOR PRIMARY AND ADVANCED EAR AND HEARING CARE

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Dr Piet van Hasselt is an ENT surgeon and has worked since 1995 in the Prevention of Hearing Impairment Programme of Christian Blind Mission in Botswana, Malawi, Zambia and Madagascar. In these countries, clinics and programmes have been set up at various levels of ear and hearing care. The main objectives are preven-tion and management of ear infections, aural rehabilitation, as well as training in ear care and surgery.

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Primary Ear and Hearing Care can make a great impact on prevention and management of ear disease and hearing impairment, especially where specialist ENT and audiological capacity is lacking. The reality is that often ear and hearing problems have a low national priority and are neglected, not only because of more pressing health problems, but also because of lack of manpower, skills, medicines and equipment. Training health units/groups in Primary Ear and Hearing Care (PEHC) are, therefore, an essential part of any Prevention of Hearing Impairment Programme. There are two main groups that need training in PEHC: Community Health workers and Primary Health Care (PHC) professionals. Each of these groups has its own set of learning objectives.

Community Health Workers

In urban areas, patients generally find their way to medical care in clinics and hospitals. The situation is different, however, in rural and isolated areas, where access to primary medical care is often limited and sometimes non-existent. Patients may not even expect treatment, because nothing has ever been done about their ear and hearing problems. In these areas, community-based health workers like Family Welfare Educators, Health Surveillance Assistants and Field-workers of Community-Based Rehabilitation Programmes can play a significant role in PEHC.

Learning Objectives of Community Health Workers:

- Causes of deafness and hearing impairment. Risk factors. Preventive measures.
- Identification of patients with ear and hearing problems. In particular, early detection of deafness, recognition of acute otitis media, chronic ear discharge and complications of ear infections, on the basis of core signs and symptoms.
- When to refer to the nurse or doctor and follow-up of patients.
- Instillation of eardrops and dry-mopping/wicking.
- Skills in communication with deaf or hearing impaired. Parental guidance.
- Health promotion, in general, and ear and hearing health in particular.

Primary Health Care Professionals

In developing countries, most general patients are treated by paramedical groups (i.e., nurses, nurse practitioners, medical assistants and clinical officers) due to lack of doctors. These health care professionals need training in Primary Ear and Hearing Care. With adequate knowledge and skills, they will be able to contribute tremendously to Prevention of Hearing Impairment (Figure 1). This training can be done as part of the curriculum of nurses/ nurse practitioners and clinical officers. The course includes diagnosis and management of common ENT problems, with practical training in otoscopy and ear cleaning, hearing screening, as well as in examination of the nose, throat and neck. Much emphasis is on otoscopy, which is indispensable for making a correct diagnosis. Without otoscopy, conditions like otitis media and otitis externa are readily confused and an inappropriate treatment may be given. In Botswana, for instance, antibiotics are too often prescribed without a proper diagnosis. One example of an inappropriate 'diagnosis' to be found on a patient card, is 'inflamed ear'. A syllabus, with equipment like otoscopes, tongue depressors and ear syringes for training in the practical skills, need to be made available to the students.

Learning Objectives of Primary Health Care Professionals:

- Basic knowledge of the structure and function of the ear.