Current Practice

RESPIRATORY TRACT DISEASE

Diagnosis and Treatment of Discharging Ears

COLIN M. JOHNSTON,* M.S.

Discharge in the ear can come from the external meatus, the middle-ear cleft, or both. A survey of factory workers¹ made before antibiotics were generally available in general practice showed that otitis externa was not uncommon: 2.6% of a sample of the workers were found to have otitis externa and 3.3% to have middle-ear discharge. Because permanent deafness or other serious complications may follow otitis media, simple otitis externa should not be diagnosed until it can be shown that the middle ear is healthy. The Medical Research Council's Working Party for research in general practice for the year 1955 reported² a yearly incidence of 8% of acute otitis media in children. The medical inspections of the school health service show that on entering school nine children out of every 1,000 have chronic discharge from the ear. Chronic ear infection in the adult population is not a notifiable disease and the incidence is unknown. Medical examination of recruits for National Service,³ however, showed an incidence of bilateral dry perforations of the tympanic membrane or active disease in one or both middle ears ranging from 2.2% to 5.9% in different counties of England.

Acute Otitis Media

An accurate history of the time of onset, symptoms, and previous treatment is essential for diagnosis, and will often permit a tentative differentiation between acute or chronic suppurative otitis media. The first symptom is pain in the ear, and this is usually followed by rapid relief or diminution in intensity when the drum perforates and discharge appears at the ear. This is accompanied by subsidence of pyrexia and toxæmia. It is essential to inquire if there has been a previous ear infection in the recent past. If antibiotics were given for the initial attack—and particularly if they were given by the oral route—treatment may have been inadequate and could have masked a latent infection for several weeks. During this time extensive bone disease may have occurred in the mastoid process, with an intracranial extension or the development of venous sinus thrombosis. These conditions demand immediate surgery. In other cases vertigo, profound deafness, or facial nerve paralysis may occur; but it will then be a problem requiring some experience to decide whether medical or surgical treatment is advisable.

If the case is seen within the first 24 hours of the appearance of the discharge, deafness, tinnitus, and occasionally slight vertigo will be present. Pain will have usually subsided. Tenderness of the mastoid process should be sought by firm pressure on the mastoid tip and near Macewen's triangle. Particularly with children, apprehension may give a false impression that tenderness is present. This can be discounted if no movement of the head away from the diseased side results

when simultaneous and equal pressure is made on both mastoid processes.

The discharge is mucopurulent and may be blood-stained at first, becoming less profuse or more mucoid in appearance with resolution of the infection. There is often an active or subsiding infection in the nose and throat, and in these cases the perforation in the tympanic membrane will probably be in the membrana tensa. If it is in the anterior part of the membrane it may be hidden by a hump on the floor of the external meatus, but self-inflation of the ear by the patient may produce air bubbles or frothing of the discharge in this area. The perforation may be small and not seen with an auriscope, unless suction is applied with a pneumatic attachment after any discharge has been wiped away from the drum. Occasionally a pinhole perforation may be on the summit of a nipple-like projection of the drum, which has been weakened by the infection.

Mastoid Infection

When the infection is in the upper or posterior part of the drum the discharge is likely to be less profuse; but if it can be seen to flow through the perforation after the meatus has been cleaned a reservoir of infection in the mastoid must be suspected. Mastoid infection may also cause redness and oedema of the postero-superior part of the meatal skin near to the drum margin, and in these cases discomfort from pressure by the speculum is greater than in the uncomplicated case. Debility caused by an acute infectious disease such as measles, scarlet fever, or influenza may be followed by infection of the middle ear with a β -haemolytic streptococcus. Rapid necrosis of the drum and the lining mucous membrane of the middle-ear cleft, often with localized necrosis of the bone of the cleft or of the ossicles, may result, but has become rare since the general use of antibiotics for prophylaxis in these fevers. A dangerous form of the disease may result from infection with a type III pneumococcus. The onset and progress of the disease are insidious. Early complications such as intracranial spread of infection are more likely and may well be missed because of the slight symptoms from the ear.

Treatment

The organisms most commonly responsible for acute infections are haemolytic streptococci, staphylococci, and pneumococci, and penicillin should be given until the results of the culture and sensitivities from the swabs taken from the meatal discharge are known, though at least 10% of such swabs will produce no growth. While some patients will respond to oral penicillin, low concentrations in the blood due to poor alimentary absorption or omission of regular dosage will make the result less certain. In most cases a daily intramuscular injec-

* Otologist, Swindon and Cirencester Hospitals.

tion of 1 million units of benzylpenicillin and 300,000 units of procaine benzylpenicillin followed every six hours by a maintenance dose of 250 mg. of oral penicillin V will produce a response in 18 to 24 hours. Resolution may follow provided this treatment is maintained for a minimum of five days—even though the ear may have ceased discharging after two or three days. If there is no response to this treatment after 24 to 36 hours 500,000 units of benzylpenicillin should be injected every 12 hours and a sulphonamide, such as sulphadimidine, should be given in a dose of 0.5–1 g. initially, followed by 0.25–0.5 g., according to age, every six hours. If bacterial sensitivity tests show a resistant organism a change must be made to the appropriate antibiotic. Whenever necessary the discharge should be removed by mopping with dry gauze or cotton-wool from the pinna and the entrance of the meatus only. A loosely compressed pledget of wool should be wedged behind the tragus of the pinna to absorb the discharge but in such a way that it will not obstruct the flow of the discharge. During the first few days of an acute infection it is considered that ear drops need not be used, as they may promote the entrance of secondary infection.

The success of the treatment of the acute infection must be judged by the healing of the perforation and the return of the hearing to normal. In favourable cases the perforation will heal within a few weeks or less but it may be delayed for several months. Until this occurs care must be taken to prevent re-infection of the ear from water entering the meatus. Swimming should be forbidden. Cessation of the discharge and healing of the perforation is not always an indication that the hearing has recovered. That it will recover in most cases was shown by Neil and his colleagues,⁴ who found that of 49 children with otorrhoea from acute otitis media treated mainly with oral penicillin only 3 (6%) suffered from a permanent damage to hearing. The fact that this number of cases should have occurred is to be regarded as justification for treating a discharge from the acutely infected ear without delay and with the most potent drugs which are indicated.

Recurrent Otitis Media in Children

There are many causes of recurrent ear infection in children. Mention has already been made of latent mastoiditis due to inadequate dosage of antibiotics and to the risk of reinfection through a persistent perforation. Other causes are enlarged or infected adenoids and tonsils, maxillary sinusitis, congenital cleft palate, and infection in the chest. Poor general health from any chronic disease may lower the resistance to infection. Poverty in the home resulting in overcrowding and malnutrition may still be a cause in large cities and justify treatment in a convalescent hospital. Repeated nasal infections may be due to an underlying allergy, which may be slight and apparent only in a tendency to sneezing attacks and upper respiratory infections which are slow to clear.

Chronic Otitis Media

Discharge from the middle ear persisting for more than three weeks may be regarded as a chronic infection. After acute infection the middle ear may be invaded by a second wave of bacteria and a *Staphylococcus aureus* (often penicillin resistant) is the organism most commonly found. *Proteus*, *Pseudomonas*, and coliform organisms occur in other cases, sometimes as a mixed infection. Persistent infection may be due to inadequate drainage of pus from polyposis of the middle-ear mucosa or granulation tissue, infection of the mastoid air cells, necrosis of bone in the middle ear and mastoid, or simply to poor tissue resistance from scarring resulting from previous infections. Any of the conditions causing recurrent acute otitis in children may result in persistent ear discharge in adults as well. A

major and important cause of chronic otitis media, however, is cholesteatoma. The onset is insidious and the progress is silent except for a persistent discharge and gradual loss of hearing. Its importance lies in the risk of serious or possibly fatal complications from erosion of bone.

Examination of the ear after the meatus has been cleaned will sometimes indicate whether the infection is likely to result in serious complications. If the infection is in the attic or antrum the ear is "unsafe" and the perforation will usually be in the membrana flaccida or the postero-superior part of the membrana tensa. Where there is a large perforation involving much of the membrana tensa, a pneumatic speculum may show that the pus is coming from the attic. If odourless mucoid discharge can be sucked from the antero-inferior region it probably denotes a "safe" infection. When the discharge has an offensive odour or the sweet musty smell of cholesteatoma the ear must also be regarded as "unsafe." Granulation tissue may be present, and if it recurs after removal may indicate bone necrosis or cholesteatoma. Granulation tissue in a child's ear very often covers underlying cholesteatoma. An x-ray examination of the temporal bone may show erosion of bone, but the absence of abnormality will not of necessity rule out serious disease. A change in the character of the discharge—for example, an increase, malodour, or blood-staining—may be due to superimposed acute infection. Examination may show bright red granulations bathe in thick pus, the so-called strawberries-and-cream appearance. If the patient also complains of ear-ache, headache, vertigo, or malaise, a serious extension of the infection should be suspected. Occasionally these symptoms are associated with lessening or cessation of the discharge. This may be due to obstruction of drainage deep in the ear and can also herald impending complications.

Treatment

Unless expert opinion has pronounced the ear to be "safe," persistence of discharge in the middle ear, however scanty, must be regarded as a potential source of danger. The absence of pain or a complaint of deafness is of no significance in this respect and the patient must be impressed with the essential need for treatment.

The object of treatment, therefore, is to obtain a dry ear and to ensure that the perforation closes, or, failing this, that the middle ear remains dry. If cholesteatoma can be seen, clearance with suction, using an ear microscope, may succeed for a time if the collection is small and adjacent to the eardrum, but it is probable that all these cases will eventually require surgical clearance. The fact that little impairment of the hearing has occurred and that surgery may increase the deafness need not deter the surgeon from operating. The hearing eventually retained will be better than if the disease had been allowed to progress unchecked. In a high proportion of cases, however, the cholesteatoma is situated deeply in the recesses of the middle-ear cleft and cannot be seen. Its presence can be suspected only because a scanty malodorous discharge persists despite treatment with local cleansing and ear drops. If therefore energetic medical treatment fails to obtain a dry ear within a few weeks surgical exploration is advisable.

Medical treatment aims at facilitating the drainage of collections of pus and at reaching the diseased area with antibacterial agents. Fibrosis occurs around pockets of infection and may result in a poor blood supply. Parental antibiotic therapy has thus been found disappointing, though it may occasionally succeed if the intramuscular route is used at a high dosage and for a sufficient length of time. Topical applications of antibacterial agents is more often successful and may be combined with hydrocortisone to reduce inflammatory oedema and thereby improve drainage. If the preparation is to reach the infected areas it is essential first of all to remove pus and epithelial debris from the meatus.

Ear Drops

Where there is a steady flow of pus, ear drops are more likely than a powder to convey a sufficient concentration of the antibacterial agent to the site of the disease unless toilet and application under direct vision can be carried out several times a day. Antibiotics chosen for topical therapy have a wide spectrum of antibacterial activity and tend to cause less sensitization reactions of the meatal skin than chemical antiseptics. However, they must be carried in a suitable vehicle—usually propylene glycol—and this may itself cause sensitization in addition to a hygroscopic action resulting in mucosal swelling interfering with drainage. There is therefore some advantage in sterilizing the meatus and accessible parts of the middle ear with a combination of broad-spectrum antibiotics, and after a few weeks changing to spirit or boric acid drops with the object of reducing the hygroscopic action of propylene glycol. There are several combinations of hydrocortisone with neomycin or framycetin and polymixin B or gramicidin. Although sensitization reactions of the meatal skin are common with chloramphenicol or penicillin (the latter indeed should never be used topically in the ear), they may also occur after longer periods of exposure to neomycin or framycetin. Furthermore, the reaction is damped down by the hydrocortisone, so that the only observed effect is one of a persisting discharge resembling pus and composed of serous exudate loaded with epithelial squamous debris. Thus there is an additional need to change the antibacterial agent in the drops or powder every few weeks or whenever an improvement in the condition is not maintained. A further risk in treatment with these broad-spectrum antibiotics is colonization by fungal growth, particularly *aspergillus* and *candida* (monilia).⁶

Otitis Externa

This disease may cause a discharge from the ear, though the amount is usually slight, and it tends to dry in crusts at the entrance. If an ear discharge is associated with tenderness in front of or below the pinna, or pain is increased when the pinna is pulled backwards, there is a strong possibility that otitis externa is present. However, otitis media may also exist and be the cause for the otitis externa. Conversely, a mucoid discharge indicates an origin in the middle ear, as there are no mucin-secreting glands in the meatus. Oedema may be present over the mastoid process and raise the suspicion of mastoid bone infection. Although the meatus may be occluded by oedema at the time of examination, pain and tenderness in the ear will usually have preceded the onset of deafness, sometimes by several days. If the case is one of mastoiditis it will have followed infection of the middle ear and this will have caused early deafness. Furthermore, tenderness over the mastoid bone from otitis externa is maximal in the post-auricular fold near the anterior border of the process and fades towards the central part and the posterior border. The tenderness with mastoiditis is more general and tends to be maximal at the tip and over the mastoid antrum. If swelling of the meatal walls does not prevent inspection of the drum, removal of discharge will often show that it has a normal appearance or merely shows superficial desquamation and reddening without much loss of hearing. A small perforation discharging pus in the membrana flaccida can easily be overlooked or may be hidden by meatal oedema. Granulation tissue may be growing on the meatal walls or the surface of the drum. It should be removed with cup forceps or by mopping to ensure that it is not covering bone disease or a perforation of the drum. If free bleeding occurs on touching or removing granulation tissue a piece should be submitted for microscopical examination to ensure

that a neoplasm is not present. Granulation tissue or swelling may be covering a foreign body or a plug of keratosis obturans.

Viral infections are uncommon and result in haemorrhagic blebs forming in the meatal skin or drum (otitis externa haemorrhagica). These cause severe pain followed by a blood-stained discharge that may later become infected.

Treatment

Meatal furunculosis and acute diffuse otitis externa cause extreme tenderness and meatal oedema. Care is needed to avoid abrading the surface and exacerbating the infection. A wick of "selvedge" gauze $\frac{1}{2}$ in. (1.3 cm.) wide, soaked in 10% ichthamol and glycerine, should be inserted deeply into the meatus and changed daily. When the swelling subsides the meatal walls can be painted with 2% crystal (gentian) violet in alcohol/water solution. Alternatively ear drops or an ointment in a water-miscible base containing hydrocortisone and wide-spectrum antibiotics can be inserted twice a day.

Chronic otitis externa is associated in at least a third of the cases with seborrhoea of the scalp, and this requires continued treatment to prevent relapse. Removal of pus and epithelial debris from the meatus is essential and must be performed thoroughly and gently to avoid abrading the surface. It is useless to expect an ear preparation to exert any effect if it has to penetrate a layer of pus and debris. Infection and inflammation can then usually be controlled by application of 1% hydrocortisone and a combination of broad-spectrum antibiotics and is the treatment of first choice. An ointment with a water-miscible base is preferable to one with a greasy base and is less likely to cause the outer layer of the epithelium to become sodden. However, when applied by the patient it will not reach the deeper part of the ear as well as ear drops, and the latter appear to give equally satisfactory results. If the infection requires more than three weeks' treatment with these preparations sensitivity reactions or colonization with fungal growth may result, as already mentioned in the treatment of otitis media. A change must therefore be made to another agent such as aurist, alumin, acetat. B.N.F., 3% silver nitrate, or 2% crystal violet. The latter preparation will allow the skin surface to become dry and also has an antifungal action. Irritation may be a prominent feature and the patient must be warned not to scratch the ear. In a few individuals emotional strain may precipitate or prolong an attack and appropriate sedation should be prescribed.

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