Problems of Childhood

Otitis media

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Acute otitis media

Whereas in adults acute otitis media is commonly subdivided into catarrhal and suppurative varieties the catarrhal phase is less commonly seen in children as a clinical entity. The child's relatively wider Eustachian tube is blocked for shorter periods than the adult tube so that the catarrhal phase is often transient and undiagnosed. A catarrhal otitis may persist in the presence of a large pad of adenoids to give rise to deafness which may appear during upper respiratory tract infections often unaccompanied by otalgia. When recurrences are frequent removal of the adenoid mass will generally be effective if nasal decongestion—for instance, by triprolidine hydrochloride—has failed.

Acute suppurative otitis media

Acute suppurative otitis media is extremely prevalent in childhood. If the tympanic membrane is intact infection reaches only the middle ear via the Eustachian tube. Blood-borne infection is rare. The immediate source of infection is the adenoid tissue, especially that around the nasopharyngeal end of the Eustachian tube. Adenoids may be infected from the tonsils, the nasal cavity, and the paranasal sinuses, probably in that order of frequency. Acute otitis media is thus secondary to tonsillitis, coryza, and the infectious fevers, particularly measles and scarlet fever. Its spread along the Eustachian tube may be hastened by a child with an upper respiratory tract infection diving or swimming underwater, while these activities may infect a middle ear if the drumhead is perforated. The common infecting organisms are haemolytic streptococcus, *Staphylococcus pyogenes*, *Haemophilus influenzae*, and pneumococci. Virus infection of the middle ear may occur during influenza epidemics.

Pain is the principal symptom, often arising during the night and so acutely that the child awakens screaming. Unless both middle ears are affected the parents do not normally notice the concomitant deafness, and the child is too concerned with the pain to complain of this. Some children are not seen until the membrane has perforated, when there is a discharge of mucus, often profuse, accompanied by relief from pain.

EXAMINATION

Examination will show congestion of the pharynx, tonsils, and nasal mucosa. Pus may be seen in the tonsillar crypts if there is a tonsillitis, and mucus may be found in the nasal cavities and

nasopharynx, appearing down the posterior pharyngeal wall below the soft palate. If the condition is unilateral the unaffected ear should be inspected first to accustom the child to the electric auriscope and then the painful ear. Gentleness is essential in using the auriscope and the speculum should never be pushed too far into the external meatus because this causes pain. If the pinna is pulled gently outwards the meatal canal is opened and the tympanic membrane is visible with the tip of the speculum in the outer end of the meatus.

Considerable experience is necessary to examine the young infant's drumhead because this appears as a continuation of the upper meatal wall. Once the bony meatus develops early in life the membrane gradually assumes its adult position. In a fully developed acute otitis media the membrane is congested and bulging and its outer surface may show some desquamation of epithelium giving a grey mottling superficial to the congestion. The earlier signs of a catarrhal otitis are not often seen because they are short-lived in children, but as they appear in reverse during healing they should be recognised. The earliest stage is the appearance of dilated surface vessels radiating over the drum and appearing down the handle of the malleus. This is followed by redness of the membrane, initially a flush which gradually increases to a bright congestion. The cone of light disappears at this stage. The membrane then bulges because of the outpouring of mucus in the middle ear cavity and as it escapes too slowly along the congested Eustachian tube the elastic drumhead bulges into the meatus. The swelling appears initially posteriorly, but the anterior part rapidly bulges and the malleolar handle is enveloped in the swelling.

There may often be mastoid tenderness because the inflammatory condition spreads to the mucosa of the mastoid antrum and cells. This should be tested for by the finger tip—never the ball of the thumb—with the examiner standing behind the child. It is most likely to be felt over the mastoid antrum which is placed high up on the mastoid and close to the pinna.

The influenza virus type of otitis media produces small dark blue blood blisters on the outer surface of the drumhead. These may rupture to give a scanty blood-stained discharge or they may gradually shrivel leaving a small black circular spot which may be mistaken for a perforation.

In patients who are not examined until after a discharge it is important to ensure that this is of mucus. Mucus in the discharge shows that it arises from the mucus-secreting glands of the middle ear. There are no mucous glands in the external meatus. No attempt should be made to mop out the discharge to see where the perforation is because, even in expert hands, this is painful, and the perforation site may be seen during resolution. A swab of the discharge must be taken for bacteriological culture and sensitivity tests, and this should be done immediately and routinely before treatment begins. If the discharge is copious there is no problem but if scanty the standard bacteriological swabs may be too large to insert into a child's meatus. Either the swab will gather only meatal commensals, or if it is pushed into the meatus will cause pain. A small wisp of sterile wool may be inserted deeply with forceps and afterwards sent for culture.

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Differential diagnosis is usually easy. If earache is due to a referred pain—as from a carious tooth—the drumhead is normal in appearance. If pain is due to a meatal furuncle the boil is usually obvious at the meatal entrance, movement of the pinna is painful, and the discharge after the boil has burst contains no mucus.

TREATMENT

Treatment varies with the severity of the otitis. In a mild case no treatment may be necessary apart from "junior" aspirin at nights. In the more severe case antibiotics are required. Should the drumhead have perforated a swab of the discharge must be sent immediately for sensitivity tests. Until the result is received penicillin should be given by mouth four times daily in doses appropriate to age and the ear should be dry-mopped as required. It is unwise to leave a plug of wool in the meatus because this adheres to the skin of the meatal entrance and its removal excoriates the skin to produce a dermatitis. When the swab result is received penicillin will be continued if the organisms are penicillin-sensitive but, if not, a change should be made to the appropriate antibiotics. The antibiotics should be continued for ten days however quickly the ear dries up. By this time the ear should be dry, the membrane healed, and hearing normal. Treatment of a patient with an intact drum is less accurate because the infecting organism is unknown. Throat or nose swabs may not define the middle ear organism and swabbing a child's nasopharynx is not possible. Penicillin is most generally useful in doses appropriate to the child's age, and if there is a known allergy to penicillin doxycycline should be used. When either of these drugs is successful the fever should settle and the pain disappear within three days, and after a week's course the tympanic membrane should be normal and hearing fully restored. It is wise to examine the child after three days' treatment. If the expected progress has been made the full course is continued, but if not the antibiotic should be changed—for example, from penicillin to ampicillin or from ampicillin to erythromycin or doxycycline, which should have no untoward effects over a week.

The child should be followed up until the tympanic membrane is normal. If the drum is still flushed after a full antibiotic course the child should be referred to hospital. Similarly, referral should be made if the hearing has not returned, if there is still discharge, or if pain returns. Any swelling over the mastoid process calls for hospital investigation. Acute mastoiditis, although now uncommon, still occurs and should be treated in hospital either by intramuscular antibiotic or, if this fails, by operation.

CHRONIC OTITIS MEDIA

As a result of the great improvement in the treatment of acute infection chronic otitis media is much less common. It may start in an infant when acute otitis media causes a late but extensive perforation of the drum or it may follow an untreated or incorrectly treated acute otitis media which has been allowed to discharge for so long that fibrosis of the central perforation margin prevents natural closure. In either event treatment should be directed to the adenoids and the tonsils if they are unhealthy; x-ray films should be taken of the paranasal sinuses and any infection eradicated. Such children should be investigated, treated, and followed up in hospital. The ear must be kept dry by regular mopping, not by the mother, but by a doctor or trained nurse whenever possible. Drops are not recommended in the presence of profuse discharge or a small perforation because in these cases the drops cannot reach the middle ear mucosa. Closure of the perforation by myringoplasty is less successful in children than in adolescents or adults, and sometimes a graft which appears to have taken is lost after an acute upper respiratory tract infection.

Cholesteatoma occurs in children, even in young children,

and is associated with marginal or attic drum perforations. There may be granulation tissue or polypus obscuring the membrane on examination. Such children are not amenable to conservative treatment and require surgery.

Glue ear

Glue ear is the descriptive name given to the condition in which fluid, often of glue-like consistency, fills the middle-ear cavity. It is also called secretory otitis media or seromucinous otitis media, and the lack of precision in the title reflects the lack of certainty of its aetiology. The condition may occur in children, particularly between the ages of 2 and 6 years, and is usually bilateral. This suggests a central cause and thus adenoids have been blamed. In some patients the adenoids have been removed months or years before the glue ear is discovered. This may or may not mean that adenoids have regrown, and it may or may not mean that the glue was present and undiagnosed at the time of the original operation. Allergy may be a factor in some cases, and virus infections of the upper respiratory tract, usually treated empirically by antibiotics that have no curative value in virus infections, have been widely thought to be causative, although viruses are rarely found in the glue. It is suggested that the middle-ear fluid, which is always sterile, is unable to drain along the Eustachian tube into the nasopharynx, as does the mucopus of an acute otitis media, because of a dysfunction of the Eustachian tube. Much research into the reason for this dysfunction is being carried out.

The main symptom is deafness, and this is shown audiometrically to be a conductive loss of something over 40 dB for all frequencies. The deafness may be noted by observant parents, but it is often discovered only on routine screening of children during the first year at school. Pain may never be experienced but some children have periods of otalgia. There may be no other history. Some children have nasal stuffiness or catarrh, and some have a history of sore throats, but these are not necessary for the diagnosis of glue ear.

Examination of the pharynx and nose may be unrewarding and the results of sinus radiography negative, while lateral views may or may not show a large adenoid mass. Positive or negative findings in the nose or throat do not affect the diagnosis. Otoscopy invariably shows changes from normality, but these may be slight and thus missed if the auriscope's battery is failing. A good light is essential. Unlike acute otitis media, in which wax never obscures the membrane, cerumen may fill the external meatus, and one must never assume that this is the sole cause of the deafness. Sometimes a thin golden brown crust may occlude the meatus or appear to be adherent to the drumhead.

Usually the membrane is readily visible but its appearance varies. There may be dilated vessels along the handle of the malleus and around the drum periphery, and these may radiate over the surface. The drumhead may be near normal in colour, pale and dull, or flushed, but never angrily congested. Sometimes it is amber-coloured, or slate or inky blue, and these colours reflect the nature of the middle-ear fluid. An amber drum suggests a thin serous fluid while a blue drum is due to blood content in the fluid. The handle of the malleus often appears starkly white against the background of the flushed drum. In contour the drumhead may be nearly normal or retracted, often acutely, or full, especially posteroinferiorly, but never bulging as in acute suppurative otitis media. Frequently, especially in longstanding or recurrent cases, there is an area of definite pocketing in the posterosuperior quadrant and this retraction is sharply defined at its lower margin by an obvious ridge which is concave upwards. There may be similar retraction in the attic. Fluid level or air bubbles in the fluid are not often seen in children.

Hearing tests should be performed according to the child's age and this is difficult in the very young. Children respond readily and accurately to Rinne's test, which will confirm a conductive

deafness. In hospital audiometry will measure the loss and impedance audiometry will confirm the cause. Mastoid radiography will show haziness in a cellular process, but not intercellular destruction until later stages.

TREATMENT

The present treatment is myringotomy. This is performed under anaesthesia and with the aid of an operating microscope. The wax is removed, and in some patients a hard semi-transparent crust which adheres to and forms a cast of the tympanic membrane is raised and removed. This may be due to a leak of glue through the membrane which solidifies on its surface and is sufficient to cause considerable hearing loss. The drum is incised and the fluid, which varies in consistency from thin and serous to opaque and viscid, is withdrawn from the middle ear by suction. It may take a considerable time if the fluid is nearly solid, but aspiration continues until no further fluid can be found. Some surgeons routinely insert a grommet through the incision. This is a fine plastic tube whose purpose is to ventilate the middle-ear cavity, and it is usually extruded two months to two years later. After extrusion it may be lifted from the external meatus. While it is in place no water must enter the ear. In some cases the tube must be removed under a short anaesthetic. The incision heals spontaneously. Adenoids and

occasionally tonsils may be removed at the operation, and some surgeons do this routinely while others prefer to make this a separate procedure.

Hearing immediately improves, but recurrences are found in at least 15% of cases. It is not certain whether these are true recurrences or due to incomplete removal of all fluid, and it must be understood that glue may not be confined to the middle-ear cleft, but may be found in the mastoid antrum and cells which makes aspiration extremely difficult. Recurrences require further incision and aspiration, and some surgeons reserve the insertion of grommets for these occasions. Long-term results are satisfactory in about 80% of patients, but whether this is due to surgery or to the fact that glue is seldom found, for whatever reason, in older children is debatable.

Complications occur. Tympanosclerosis, shown by the appearance of chalk-like patches on the drumhead, may ensue, and possibly this is encouraged by grommet insertion. The sclerosis tends to invade the middle ear and cause some degree of permanent hearing loss, and it is very difficult to eradicate. Cholesteatoma may form as a result of breakdown in a retraction pocket, so that these patients must be followed up for a long time. Repeated recurrences of glue may indicate a reservoir of fluid in the mastoid cells, and this may be demonstrated radiologically by intercellular breakdown. It is treated by mastoid surgery when the cells are eradicated. The necrotic cellular material is shown on section to be a cholesterol granuloma.

For Debate . . .

Five-and-a-half-day ophthalmic ward

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In terms of finance and the quantity and quality of skilled staff the rising cost of medical technological advances is in danger of pricing medical care out of the market for some patients. To continue providing an ophthalmic service in this district, with a diminishing number of trained nurses, we decided to try closing the ward at weekends, and we wish to report the success of this experiment. The principle is applicable to ophthalmic units serving small populations and in larger units where many beds could be closed at weekends.

Weekend closure of wards is not new.¹⁻⁴ It may be done where admissions are for cold procedures (investigations or surgery) requiring not more than five days in hospital. Three-quarters of the admissions to this unit came within this category (see table). Gilkes and Handa⁵ surveyed the length of post-operative stay in British ophthalmic wards, and the wide variations reported make nonsense of any logical basis for post-operative care. For example—it is unnecessary for children to

spend more than one night in hospital after squint operations. In the USA this is often a day-case procedure.⁶

Patients with cataract may be discharged after two nights⁷ one night,⁸ or even operated on as outpatients.⁹ In this unit the interval between cataract operations has been gradually, and

Planned and emergency admissions to ophthalmological unit 1972-4

	1972	1973	1974
Planned admissions:			
Cataract extraction	86	60	85
Squint	73	79	60
Retinal surgery	22	19	14
Enucleation	8	9	4
Glaucoma investigation	17	16	9
Filtration	6	4	4
Lacrimal sac surgery	11	4	7
Plastic surgery (cysts, entropion, ectropion, symblepharon, dermoid, rodent ulcer)	13	4	5
Total	236	195	189
Emergency admissions:			
Iritis, corneal ulcers	21	16	10
Penetrating injury and intraocular foreign bodies	7	9	5
Traumatic hyphaema	16	10	14
Vitreous haemorrhage	2	2	—
Herpes zoster	7	5	6
Miscellaneous (orbital cellulitis, lid injuries, chemical injuries)	8	1	7
Temporal arteritis, Stevens-Johnson syndrome, drug allergies	2	1	1
Infections	3	4	3
Acute glaucoma	14	10	9
Total	80	58	55
Percentage of total admissions that were planned	75%	77%	77%

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