Current Practice

Myringotomy

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The first operation of myringotomy (perforation or incision of the tympanic membrane) is believed to have been performed in 1760 for the relief of deafness by Eli, a strolling quack, although there is no record of the result. Forty years later Sir Astley Cooper,¹ of Guy's Hospital, a President of the Royal College of Surgeons, suggested that the deafness due to eustachian tube obstruction might be relieved by tympanic puncture. He described four cases, in three of which relief was obtained. The instrument used was a trocar and cannula inserted through the antero-inferior quadrant of the membrane. A subsequent memoir to the Royal Society on the treatment of deafness by perforating the membrane in 20 cases was awarded the Copley Medal, "a tribute, perhaps, to the personality of the surgeon rather than to the scientific value of his communication."²

The first to advise incision of the drum for drainage of pus in acute suppurative otitis media was John Cunningham Saunders (1773-1810), demonstrator of anatomy at St. Thomas' Hospital. Since then myringotomy has always been regarded as a useful and, at times, essential measure for the relief of pus under tension in the middle ear.

With the introduction of antibiotics, myringotomy, which before the last war was everywhere performed almost routinely in a child with acute otitis media having a temperature of 100° F. (37.8° C.) or pain for 24 hours, became very much less often required. Indeed, in an early postwar series of 115 cases treated with penicillin³ only eight had a myringotomy, and in a series of 366 cases reported from Sweden the following year⁴ the operation received no mention at all. Subsequently the further development of antibiotic therapy confirmed acute otitis media as one of the most favourable diseases for this form of medical treatment.

The six arteries of supply to the middle ear ensure a rich blood supply to the muco-periosteal lining. Acute inflammation of this lining declares itself early and unmistakably by the symptom of earache and the sign of a red tympanic membrane. The organisms responsible are nearly always Gram-positive and sensitive to a wide variety of antibiotics, especially the penicillins. Successful treatment has now become so much taken for granted that the operation of myringotomy in connexion with middle ear infection has tended to fall not into obloquy (for it always was a sound procedure) but into oblivion.

The purpose of this paper is to draw fresh attention to certain indications which still exist for surgical drainage of the tympanic cavity in middle ear infections, to re-emphasize the now established importance of drainage and re-aeration in certain other middle ear conditions causing deafness, and to rehabilitate the operation of myringotomy as a precise technique in the modern microsurgery of the ear.

Indications

The indications for myringotomy, or rather the conditions in which myringotomy may be required, are as follows: (1) acute

suppurative otitis media—pus under tension, delayed resolution, relapsing; (2) acute non-suppurative otitis media (secretory otitis); (3) chronic non-suppurative otitis media (chronic serous effusion, exudative otitis media, "glue" ear); (4) otitic barotrauma; and (5) diagnosis.

Acute Suppurative Otitis Media

Pus under Tension.—Despite antibiotics, an inflamed and bulging eardrum may occasionally persist, accompanied by considerable pain, indicating pus under tension in the middle ear. If this is unrelieved, pressure necrosis of the drum-head will occur, with ultimate bursting out of the pus. Once a perforation has occurred, inevitably accompanied by loss of tissue, a problem of healing will be entailed. While traumatic uninfected perforations nearly always heal spontaneously, probably not more than 85% of those caused by spontaneous escape of inflammatory products from the middle ear do so. On the other hand, a myringotomy incision, to enable the escape of contents under pressure, is not associated with loss of tissue, and when the discharge dries up the edges of the incision fall together, healing is rapid, and full restoration of function is therefore more certain.

Again, pus under tension in the middle ear is the principal cause of extension of the infection to the mastoid cells. This tension also accelerates the process of retrograde venule thrombophlebitis by which spread outside the middle ear often occurs. There are thus three reasons for relieving pus under tension persisting despite antibiotics: (a) to safeguard hearing by ensuring more certain healing of the membrane, (b) to relieve pain, and (c) to prevent further complications.

Delayed Resolution.—Many cases of acute otitis media appear to hang fire. The tympanic membrane fails to regain its normal appearance and hearing fails to return entirely to normal. Often this is found to be due to the retention of inflammatory products in the middle ear which have been rendered sterile by the antibiotics. Drainage of these products by myringotomy offers a means of hastening the process of resolution. Every case of otitis media, where practicable, should have the hearing tested at the end of antibiotic treatment. The emphasis today is on restoration of function, and if conductive deafness persists the reason for it should be investigated.

Relapsing Otitis Media.—Many practitioners must be familiar with the patient who, after an initial attack of otitis media, treated by antibiotics, has a recurrence of symptoms two to three weeks later. This is generally taken as an indication for a further course of antibiotics and the process may be repeated *ad lib*. These patients often find their way into the ear, nose, and throat clinics, where, if the ear is examined under an operating microscope, it is usually possible to see residual inflammation, often in the attic, and an appearance of fullness of the membrane suggesting retained products of inflammation in the middle ear. As the membrane has never ruptured and the ear has not discharged, the otitis media will have been

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treated with antibiotics without laboratory control of the organisms responsible and their sensitivities. Myringotomy in such cases may be a means not only of curing the relapsing otitis media by draining residual products and allowing re-aeration of the middle ear but also of obtaining a sample of middle ear flora for laboratory investigation. Nine times out of 10 the result will be sterile, but occasionally an organism is grown showing very restricted sensitivity to the commoner antibiotics and a more active response to one of the less well known.

Acute Non-suppurative Otitis Media

This condition, otherwise known as secretory otitis, is essentially the sudden appearance of a thin sterile effusion in the middle ear. The cause of the condition may be allergy or virus (without secondary infection by pyogenic organisms) or eustachian tube obstruction. In many cases the exact cause cannot be established. The symptom is deafness, which typically varies with changes in position of the head, and the sign is a fluid level or bubbles visible behind the drum-head.

Myringotomy can be performed in these cases without an anaesthetic provided the myringotome is sharp and the tympanic membrane is not in the least inflamed. An effusion may also be aspirated with a needle and barrel syringe. Unfortunately, the fluid has a tendency to recur, but repeated myringotomy does not seem harmful. At one time it was not uncommon to hear of cases where myringotomy without anaesthetic had been performed a dozen or more times on the same patient at weekly intervals. Now, however, it is more usual in recurrent cases to insert a small plastic tube (grommet) through the drum until the tendency of the fluid to recur has died away.

Chronic Non-suppurative Otitis Media

In this condition, otherwise known as chronic serous effusion, exudative otitis media, or "glue" ear, the leading symptom is deafness. It occurs typically in children and is due to the slow accumulation of a thick exudate which effectively impairs the sound pressure transformer action of the middle ear. In appearance the tympanic membrane is, typically, opaque and full, with visible vessels coursing in from the periphery; the colour varies between grey to yellowish to blue and may appear quite dark on otoscopy. It is generally found in children of early school age but has been discovered in infants, and must always be borne in mind in any unexplained cases of conductive deafness. Aetiology has not yet been definitely established, but the consensus of opinion at present is that it derives from malfunction of the eustachian tube.

Treatment requires drainage and re-aeration of the middle ear. This is generally achieved in the first instance by myringotomy and aspiration of the exudate by means of a fine electrical sucker. Occasionally two incisions are required to release the fluid. Unfortunately in about 30% of cases the fluid recurs, and when this happens it is now usual to reaspirate and insert a grommet. This is a small plastic tube, "hour-glass" in shape, which is inserted through the membrane, usually in the anterior portion, and remains with half the hour-glass in the middle ear and the other half in the meatus. The chief effect of this is to secure permanent re-aeration. It acts as an accessory eustachian tube. The recurrence rate after the use of this device is only 10%, and some otologists use it as a first treatment. However, it does raise some problems—for example, if and when to remove it and whether to allow the patient to swim. A practical answer to these problems is to leave the grommet in position as long as it is functioning as intended but to remove it if it fails or before school-leaving age, after

which it is more difficult to keep in contact with the patient for supervision purposes. It is probably wise not to swim in baths, but bathing in the sea (which does not so often involve diving or jumping into the water) may be permitted.

The insertion of grommets is a relatively new procedure and really useful long-term results of its use (over five years) are not yet available.

Otitic Barotrauma

A patient whose eustachian tube does not function may suffer from failure of re-aeration of the middle ear on descent in an aeroplane. During ascent air leaks out passively through the eustachian tube as the atmospheric pressure falls, but repressurization on descent requires active opening of the tube by swallowing or yawning. In severe cases a relative vacuum will develop in the middle ear, causing pain and deafness. Failure of methods such as eustachian catheterization or Politzerization to pressurize the middle ear may necessitate puncture of the eardrum to allow air entry. In some cases the loss of pressure may lead to *hydrops ex vacuo* and myringotomy and suction aspiration may be required as in secretory otitis.

Diagnosis

In some cases of middle ear deafness it may be impossible to determine clinically whether or not the middle ear contains fluid or other material (it should normally contain air). If the deafness is of sufficient severity to interfere with educational or social needs it may certainly be justified to perform a myringotomy to settle the issue. But if the differential diagnosis is thought to lie between ossicle fixation due to otosclerosis, adhesive otitis, or congenital defect myringotomy alone will not be sufficient and exploratory tympanotomy may be required.

Technique

As already stated, myringotomy can be performed in phlegmatic adults without a general anaesthetic provided the membrane is not in the least inflamed. In children, and wherever the membrane is injected or hyperaemic, a general anaesthetic is necessary. Ideally myringotomy should be performed with an efficient binocular operating microscope. So much more definition and precision is obtainable with such an instrument than with the naked eye or an electric otoscope that it is only in unavoidable conditions of emergency or difficulty that the latter should be used.

Under the operating microscope and with an apparatus such as the Shea speculum holder it is possible to fix a speculum in the ear, leaving both hands free. This enables the operator to use the myringotome in one hand and a sucker end in the other, and it is still better if the operator can develop ambidexterity with these instruments. Incisions are divided into two groups, anterior and posterior.

Posterior incisions are generally used in the first instance, as the posterior part of the membrane is easier to see, being anatomically nearer the operator. The myringotome, which should be sharp, is inserted well below the calculated anatomical level of the incudostapedial joint and midway between the tip of the handle of malleus and inferior meatal wall. The incision should be made upwards and parallel to the curve of the posterior meatal wall until midway between the umbo and posterior rim of the membrane. Where the drum is bulging, without landmarks, it will be standing well away from the incudostapedial joint and an approximate incision made in the

convexity will be unlikely to cause injury. The most common error, when the drum is inflamed and bulging, is to incise the posterior meatal wall, as the definition between it and the membrane tends to become lost. Incisions should not be carried down to the inferior margin of the drum, as incision of the annulus may impede healing. There is also a risk of injury to the jugular bulb if this is at all prominent in the floor of the middle ear.

Anterior incisions are usually used for the insertion of plastic tubes or for facilitating aspiration of effusions by providing a second opening on the "beer-can" principle. These incisions are placed in the pars tensa anterior to the handle of the malleus.

Incisions for uninfected effusions heal very quickly once the effusion has stopped draining. The ear should be protected postoperatively with wool to prevent entry of water, but it is not necessary to give a systemic course of antibiotics provided strict aseptic conditions have been preserved during operation.

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ANY QUESTIONS?

We publish below a selection of questions and answers of general interest.

Urethral Moniliasis in Males

Q.—What can be done to eradicate urethral moniliasis in the male?

A.—Infestation of the urethra in men with the fungus *Candida albicans* is not very common. The usual type of genital infestation in men with this fungus is balanoposthitis.¹ Urethral infestation may follow the use of broad-spectrum antibiotics or metronidazole, it may sometimes occur in patients with diabetes mellitus, it occasionally follows urethral irrigation or instrumentation, and it is sometimes sexually transmitted.

Symptoms are usually mild and consist of urethral discharge, frequency, and dysuria. There may be itching at the external urinary meatus and along the urethra. Diagnosis can be made with certainty only if Gram-stained smears of the urethral discharge, obtained by gently scraping the urethral mucous membrane with a platinum loop, contain typical mycelia and Gram-positive yeast-like forms. Sabouraud's medium should also be inoculated with material from the urethra to confirm that the fungus is *Candida albicans*.

Spontaneous recovery usually occurs in a number of patients. Treatment consists in urethral instillations or urethral irrigations with antifungal agents, as no satisfactory systemic treatment is available. Penotrane urethral jelly may be instilled into the urethra daily or on alternate days for 7 to 14 days, or a suspension of the antibiotic nystatin, 100,000 units per ml., may be used daily for seven days or longer. Equally satisfactory results have been obtained with urethral irrigations, using 1 in 10,000 solution of oxycyanide of mercury daily for 7 to 14 days.

In cases where these methods fail urethral instillations of a 3% solution of amphotericin B might be tried. If there is evidence of balanoposthitis nystatin ointment should be applied to the glans penis and prepuce.

A careful search should be made for evidence of fungus infestation elsewhere on the body, and any sexual contacts should be examined and treated if necessary.

REFERENCE

- ¹ Symposium, *Urethritis and Balanitis due to Candida*, edited by H. L. Winner and R. Hurley, 1966, Edinburgh.

Early Mixed Feeding

Q.—Are the results and possible hazards known of the present tendency among mothers to introduce mixed feeding with strained foods at an ever-earlier age, sometimes to infants of two weeks old?

A.—The present fashion of early additions to the customary milk and vitamin diet represents the end of a swing of the pendulum rather than a scientific experiment in nutrition. As would be expected, babies vary; some enjoy and some refuse the strained food. There is no evidence that healthy normal babies cannot digest strained foods nor that they benefit from them, though it is said that weaning on to solids later is less difficult.

Oral Catarrh Vaccines

Q.—Is there any evidence that oral cold and catarrh vaccines containing mixed bacteria, or antigenic extracts of them, are effective in preventing respiratory infections?

A.—Oral vaccines were proposed many years ago by Besredka for the prevention of enteric fever. The hypothesis is that a local immunity can be produced by applying an antigenic stimulus to the tissue attacked by the disease. There is some evidence in favour of this idea, but none whatever for supposing that stimulating the mucosa of the alimentary tract can increase the resistance of that of the respiratory tract.

The results of properly controlled trials of orally administered vaccines containing such organisms as pneumococci, streptococci, *H. influenzae*, and *N. catarrhalis* on susceptibility to colds have all been negative. M. Siegel *et al.*¹ found that such a vaccine "appeared to have no influence either on the incidence or severity of the common cold." H. S. Diehl *et al.*,² in a more extensive study, report that "the group which received the polyvalent vaccine administered orally experienced just as many colds as the control group during both years of the study." L. C. McGee *et al.*³ obtained similarly negative results with three proprietary oral vaccines. These preparations are discredited.

This answer should not be construed as implying that benefit is to be expected from administering such vaccines by the more orthodox route of parenteral injection. The great multiplicity of immunologically distinct serological types of the organisms concerned is a complete bar to producing useful immunity to these species as a whole.

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Notes and Comments

Skin-staining by Metal.—Dr. A. GREEN (London W.1) writes: With regard to this question ("Any Questions?" 3 August, p. 301) my wife tells me a simple remedy is to apply colourless nail varnish, covering all metal parts of the article (rings, bracelets, etc.). This forms a transparent covering which prevents contact between skin and metal but does not show in any way.

OUR EXPERT replies: The technique of protecting the skin from contact with the metal by the application of nail varnish is ingenious, but it involves a significant risk of inducing allergic sensitization to the varnish itself. When answering the question I inadvertently wrote that the black staining was said to be due to "metabolic sulphides." I should have written "metallic sulphides."