A British Medical Association Lecture

ON

AURAL DISCHARGES: THEIR SIGNIFICANCE AND TREATMENT*

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The subject of this lecture embraces a very large section of the common diseases of the ear, so that of necessity, in the time at my disposal, I can only deal with the salient points. This is probably not a matter for regret, as an attempt to crowd into it a great amount of detail would detract from its clarity and usefulness.

All discharges escaping from the external auditory meatus are pathological in origin, with the exception of cerumen, although this may possibly become so when it is excessive or impacted. They may have as their primary source the pinna, external meatus, middle ear, mastoid antrum or cells, or even the intracranial cavity. They generally have certain characteristics, which enable us to make a useful classification of them as set forth below. These characteristics, if carefully elicited in taking the history of the case, possess considerable value, in that they often indicate the nature of the disease and so form the first pointer towards a correct diagnosis.

Classification of Aural Discharge

I. Watery ...	<ul style="list-style-type: none"> Colourless or not Scanty Copious Sticky, mucoid, or viscid Odorous or not 	<ul style="list-style-type: none"> 1. Middle-ear catarrh with perforated drum 2. Cerebro-spinal fluid 3. Meatal eczema
II. Purulent ...	<ul style="list-style-type: none"> Whitish Yellow Scanty Copious Sticky, mucoid, or viscid 	<ul style="list-style-type: none"> 1. Furunculosis 2. Acute middle-ear suppuration 3. Chronic middle-ear suppuration 4. Foreign body
III. Haemorrhagic ...	<ul style="list-style-type: none"> Watery sanious fluid— Scanty Copious Blood 	<ul style="list-style-type: none"> 1. Injury 2. Acute influenzal inflammation of the middle ear 3. Granulation tissue, polypi, etc. 4. Epithelioma of the external meatus
IV. Ceruminous ...	<ul style="list-style-type: none"> Solid Semi-solid 	

Aural discharges are always objective evidence of disease, and in some instances are associated with the most serious affections of the ear, which may lead to complications endangering life and to the temporary or permanent loss of hearing.

WATERY DISCHARGES

There are three possible causes of watery discharges from the ear:

1. The early stage of a middle-ear catarrh accompanying a nasal coryza, in an ear with a large perforation in, or the absence of, a tympanic membrane. This occurs in such cases frequently, but it is usually overlooked unless it passes into the purulent stage.
2. Escape of cerebro-spinal fluid. This is exceedingly rare, and can only occur following a trauma.
3. Associated with acute meatal eczema. This is fairly common.

In the first the fluid is colourless, very scanty, odourless, and sticky. It is similar to the efflux in the early stage of a common cold, but it may later become purulent and yellow.

The second is very rare. In relation to fractures of the base of the skull the discharge is usually blood-stained at first, then becoming quite clear, but this will be mentioned under another heading. I have seen one case of clear, watery discharge (cerebro-spinal fluid) in a soldier in 1918. Its escape was a sequence to an old radical mastoid operation, performed ten years before and followed on three later occasions by the removal of a polypus. It continued to escape for over twelve months, gave the characteristic tests, and the quantity lost was estimated to be $1\frac{1}{2}$ gallons in three months or about 6 gallons for a year. I showed the case at the Section of Otology in August, 1918, and none of the members present had ever seen one of such long duration and severity.

In the third—acute eczema—the quantity varies from scanty to moderately copious. It may stand out in beads on the affected surface. It is clear, sticky, and usually odourless, though it may be offensive if much decomposed epithelium remains *in situ*. It is invariably preceded by itchy sensations, followed by some degree of pain and local tenderness, but with practically no interference with hearing, unless there is much swelling. The stickiness of the discharge is characteristic of acute eczema, and wool or lint will adhere to the surface of the ear if applied to it. It is not, however, stringy like discharges containing mucus.

PURULENT DISCHARGES

There are three common causes of purulent discharges from the ear:

1. Furunculosis of the external meatus.
2. Acute middle-ear suppuration.
3. Chronic middle-ear suppuration.
4. Foreign body (in a child's ear—not common).

In furunculosis the discharge is scanty, yellowish, not sticky, and usually odourless. It is always preceded by local pain and tenderness in the external meatus, which may in some cases be very intense, and in such cases, owing to an associated perichondritic swelling, the hearing is impaired. This is the commonest inflammatory disease of the external meatus.

In acute middle-ear suppuration the discharge is often copious, of a bluish whiteness, very sticky, and mucoid and odourless. Its stickiness is pathognomonic of its origin, as having come from an inflamed mucous membrane surface, and therefore from the middle-ear cavity. This physical characteristic can be easily demonstrated by mopping out a portion of the contents of the external meatus with a rolled pledget of wool and then applying the pus-moistened wool to some other object and withdrawing them slowly apart, when strings of mucus will be seen. This proves the source of the pus, even where a perforation of the drum membrane may not be visible, and differentiates it from pus of furuncular origin, which never contains mucus, unless in the much rarer instances where both meatus and middle ear are involved simultaneously. This discharge has invariably been preceded by an acute febrile affection of the upper airway and pain deep in the ear; no local meatal tenderness, but deafness is marked. The degree of pain preceding it, in infants,

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is often negligible, probably owing to the anatomical characteristics of their Eustachian tubes, the latter being straight and short, with a relatively large lumen, which permits the release of tension in the middle ear during the acute stage. The ear affection in these cases is usually a sequence of pharyngeal sepsis associated with teething troubles. Infants with irritation of the gums show an extraordinary predilection for biting on any available object, a proceeding most likely to cause an oral sepsis, with its possible extension to the nasopharynx.

Variation in the quantity of discharge of a recent middle-ear suppuration may have special significance. As the inflammatory manifestations, such as pyrexia, pain, and intensity of deafness, subside and pass off, the quantity of the discharge gradually lessens and becomes less viscid; but should the flow increase again and become relatively copious an abscess of the mastoid must be suspected, although there may be no localizing swelling or tenderness in the latter region. This is a fairly common sequence of events, and at once its observance raises the question of an operation for mastoiditis.

In chronic middle-ear suppuration the discharge is invariably scanty and yellow, and shows practically no stickiness, unless associated at the moment with a recent inflammatory recrudescence of the middle-ear cavity and Eustachian tube. It is often malodorous, if the case is of long standing, due to the presence of fatty acid degenerative products of dead epithelium and pus. The malodour is especially suspicious of the condition known as cholesteatoma, where masses of suppurating epithelial debris are present in the attic, aditus, or mastoid antrum, and, when large, cause varying degrees of erosion of bone. These erosions may open the path to the invasion of the labyrinth or cranial cavity and lead to the most serious complications which are possible to occur in diseases of the ear.

A discharge from one ear in a child, if of recent onset and not related to any illness, should raise the suspicion of a foreign body.

HAEMORRHAGIC DISCHARGES

There are at least four possible causes of haemorrhagic discharge from the ears:

1. Injury (blood, cerebro-spinal fluid).
2. Acute influenzal inflammation of the middle ear.
3. Granulation tissue, polypi, or ulceration of the middle ear, and caries of bone.
4. Epithelioma of the external meatus.

If the discharge is the result of a blow on the ear or the result of gunfire or shell explosion or high diving, pure blood usually escapes first, becoming serous later. It is rarely profuse. If the injury is considerable, as in a motor accident, causing fracture of the base of the skull, the escape of pure blood is sometimes accompanied by a considerable amount of thin, sanious fluid, which raises the suspicion of its being cerebro-spinal in origin. After bleeding has ceased it may continue to escape as a clear fluid dripping from the lobe of the ear, when it can be collected in a test tube and examined for its chemical properties, etc., to establish its nature. It is significant of a severe lesion, and increases the gravity of the prognosis, but is not necessarily a fatal complication, nor does it appear to increase the risks of meningitis arising in such cases. Areas bathed in cerebro-spinal fluid do, however, appear to become septic with greater facility than in its absence.

In acute influenzal middle-ear inflammation the discharge may appear to be pure blood, but is more often blood-stained serum and small in amount. This fluid invariably escapes from a burst haemorrhagic bulla, which had formed on the outer aspect of the tympanic membrane or adjacent meatal wall, and is almost pathognomonic of

an acute influenzal middle-ear infection of the *Streptococcus haemolyticus* type. It appears early in the acute inflammatory involvement of the middle ear, is indicative of an intense infection, and usually precedes the formation of pus by a couple of days, and is accompanied by pyrexia, pain, and deafness in the affected ear.

In the polypoid type of case, the discharge is either pure blood or pus and blood, usually small in amount, but a drachm or more may escape. There is a history of chronic ear trouble, with a probable recent increase in deafness owing to enlargement of the polypus or granulation tissue, but there is rarely any pain or pyrexia. Its occurrence may follow a slight injury, and its appearance signifies the presence of a polypus or granulations, growing on an ulcerated area of mucous membrane or bone. The tympanic bony ring is intensely hard, and hence badly supplied with blood vessels. It is therefore very prone to caries and shows poor tendency to repair in consequence of its defective nutrition, and this is the chief cause of chronicity. The granulations formed in the attempt at healing are flabby and unhealthy, and therefore apt to bleed easily on touch. The pedunculated polypus usually grows from the middle-ear mucous membrane, is covered with epithelium, is firmer in structure, and unless large enough to extend well outwards in the meatus, is less liable to bleed on slight trauma than the softer granulations.

The fourth type of source, epithelioma, is rare, but sufficiently common to warrant its suspicion when blood escapes from an ear, with no immediate history of an injury or disease, in a person well over 50 years of age. Granulations on an epitheliomatous ulcer are exceedingly friable, and liable to bleed on slight trauma.

CERUMINOUS DISCHARGE

Anxious mothers frequently consult a doctor on finding a little cerumen in an infant's ear. It may have some significance at teething time. Irritation of the gums may cause reflex discomfort, which induces the child to rub the ears. The frequent repetition of this will excite the glands to greater activity in the production of more cerumen.

More commonly the middle-ear discomfort is an infection from the nasopharynx, the result of spread from oral sepsis. The rate of ceruminous secretion in adults seems to vary with the individual, though it is not governed by any physiological law of which I am aware, but its accumulation, however, is largely conditioned by the anatomical formation of the external meatus. If the posterior portion of the outer end of the meatus is overhung by the free border of the concha, the secreted wax tends to be pushed deeper in the meatus, rather than extruded, by the movement of the lower jaw, as should take place normally. It may completely occlude the meatus, causing deafness, and if long retained may set up a dermatitis, accompanied by some pain and discharge.

TREATMENT

It is my intention, owing to considerations of time and space, to limit treatment to one proven method, to the merits of which I can testify, rather than discuss alternative ones which are equally well recommended in the textbooks.

The watery aural discharge from an open middle-ear cavity, resulting from a coryzal extension, usually subsides with the exciting cause in the nose and Eustachian tube, and rarely requires any special treatment. A clean piece of wool, changed when even slightly moist, but at least night and morning, prevents discomfort from the discharge, and lessens the risk of an added infection through the external meatus. If the discharge becomes

purulent and persists when the cold in the head has disappeared, special treatment is indicated, to obviate its passing into a chronic condition.

I favour dry treatment in such a case, and have found the daily insertion of boric powder iodized to the extent of 1 per cent. or even less to give excellent results. If it should still persist after a fortnight's treatment, slight ulceration of the mucous membrane and the formation of some granulation tissue is possibly present. To ascertain this, syringe clean with warm boric lotion, dry, and look for a granulating spot. If found, roll a thin piece of wool on an applicator, dip it in 5 per cent. silver nitrate solution, and apply under direct vision firmly to the area, one day a week, using the powder the other six. I have found the result of this line of treatment in any form of chronic middle-ear discharge most gratifying, and will refer to it again later in more detail.

Apart from fractures of the base of the skull the escape of cerebro-spinal fluid from the ear is, as I have already pointed out, an exceedingly rare occurrence.

I reopened the mastoid in my case and packed it in the usual way with gauze and bipp. In twenty-four hours the dressing was soaked with pus. This occurred on three consecutive days, and still the mastoid cavity and wound continued to pour out pus. I then ceased to pack, but cleaned up with 40 per cent. spirit, using a little gauze soaked in this as a drain, with gratifying results. It cleared up, and later, when granulations had formed, I packed them firmly against the fissured area (junction of attic and aditus), which eventually converted them into a sound scar.

Acute eczema of the ear responds well to treatment. At this stage the affection has usually extended from the meatus to the pinna, and is accompanied by considerable weeping. The application of calamine lotion by dabbing it on with a piece of cotton-wool soothes and helps to dry the affected area in a few days. The following is then used until all weeping has ceased and the condition has passed into a scaly stage: Lassar's paste (zinc oxide, pulv. amyl, lanoline, and vaseline, each 2 drachms) spread on lint (smooth side) and applied night and morning. To treat the scaly stage add 10 grains of salicylic acid to the ounce of Lassar's paste and smear on daily, leaving the part uncovered. If the ointment is warmed to soften it, by standing the pot in hot water, it can be applied with a camel-hair brush. Eczema of the ear in either the wet or dry stage is accompanied by seborrhoea of the scalp, as indicated by the presence of more or less dandruff. Many dermatologists regard the ear condition as a seborrhoea also, and secondary to the scalp. The point of importance, however, is that the scalp and ear must be treated simultaneously to be really effective. The scalp should be shampooed twice a week for two or three weeks, taking care to protect the ear from the shampoo liquid and water. Soap spirit (sapo mollis and spirit. vini rect. each 2 ounces), 1 drachm of which, if rubbed into the scalp, acts well, but it should be thoroughly removed by repeated rinsing with water. In less acute cases with very little discharge, and if confined to the meatus, the following is a useful application:

R.	Ung. hydrarg. nit. dil.	...	...	1 drachm
	Liq. carbonis deterg.	...	...	10 minims
	Paraffin. liquid.	...	...	1 ounce

Apply with a camel-hair brush night and morning.

In the discharging stage of furunculosis of the ear, filling the meatus lightly with a strip of half-inch ribbon gauze, smeared with 10 per cent. ichthyol in glycerin, once a day, is an excellent method of treatment. The meatal epithelium is thus kept clean, dry, and protected from maceration, the latter being the greatest factor favouring recurrence in these cases.

ACUTE MIDDLE-EAR SUPPURATION

The treatment should be general and local, the former being often the more important. The ear condition is always secondary and invariably due to some upper respiratory infection of an exanthematous or influenzal type, so that the first consideration in the treatment is that of the primary affection.

With the onset of an aural discharge, the middle-ear symptoms become less intense, pain should have passed off by the release of inflammatory tension, and any pyrexia specially excited by this complication should have subsided or nearly so. During the acute pyrexial stage the patient should remain in bed, and after this has subsided with the onset of the discharge, confinement to the house or sickroom is indicated so long as the discharge shows much viscosity. This physical character indicates the presence of much mucus, and the latter is evidence of the existence still of marked inflammatory engorgement in the middle ear and Eustachian tube, upon which a relapse with complications may easily supervene.

If the case is "hanging fire" and does not make steady progress to recovery, as when the discharge, though free, is still very viscid and some pyrexia exists, a 10 c.cm. injection of "anti-scarlet-fever serum"—concentrated streptococcus antitoxin (scarlatina) globulins (B.W. and Co.)—will often give a decided turn for the better. It seems to aid or rouse the flagging efforts of the body's immunizing reaction to the infection, and as it is to this reaction we must look as the first line of defence and attack, our usefulness lies chiefly in doing everything which favours its maximum effectiveness, whilst at the same time watching for any threatened complications. Keeping the patient indoors and free from exposure to chills and fresh infection is conducive to this purpose.

Local treatment consists in keeping the ear clean, and if possible free from infection from without by an invasion of the more resistant organisms such as staphylococci and its common sequence, the conversion of an acute into a chronic middle-ear suppuration. For this reason I do not advocate the use of hydrogen peroxide, as it causes too much commotion when mixed with pus, and is liable to carry the contents of the meatus—organisms or otherwise—through the perforation into the middle ear. Syringing may do the same if used with force. Wiping away the pus with wool, dry or soaked in bicarbonate of soda or boric acid solution, will cleanse it, and then filling the meatus with glycerin. acid. carbolic. 2 per cent. will render it practically antiseptic. Covering the area with a sterile dressing to be changed at least night and morning is also helpful. Drainage of the middle ear does not depend on the removal of secretion from the external meatus provided it is not dammed back by plugs of wool. The entrance of air into the middle ear through the Eustachian tube, when we swallow or blow the nose, expels pus through the perforation, and is the most effective factor in drainage. When the discharge has become thinner, filling the meatus daily with boric powder iodized to 1 per cent. is most effective. The boric powder is absorbent, hygroscopic, and antiseptic, and the presence of heat and moisture causes the liberation of some nascent iodine, increasing the degree and efficiency of the antiseptis.

CHRONIC MIDDLE-EAR DISCHARGES

Cases which belong to this category present the most difficult and serious problems of all aural affections—difficult because of their disappointing resistance to any line of treatment which the patient or a nurse can carry out, and serious because of the dangerous possibilities to life which accompany them. For these reasons I propose to deal with the treatment at some length. I must, however, digress at this point to examine certain factors concerned

in the health and infection of air-containing cavities associated with the respiratory tract, because a clearer conception of these should enhance our chance of success in treatment.

I have personally formed certain views on the physiological and pathological problems of air spaces which are either in constant or intermittent continuity with respiratory air currents through the nose and nasopharynx. These are based upon certain researches carried out during the past few years, chiefly upon the nasal accessory sinuses, but also upon the ear. I think it will prove correct to assume that certain principles can be seen to underlie the cause for the maintenance in health of an air space under normal conditions, its spontaneous cure from an inflammatory affection or why it persists in a diseased state. It is briefly summed up in the word "ventilation." This implies the free entrance and exit of air, due to synchronizing air-pressure variations between the air spaces and the respiratory passages, during inspiration and expiration, and so long as this is possible the drainage and removal of certain secretions will be possible also. This state obtains throughout the healthy period of the cavity; it is suspended in diseased conditions, which may prove only temporary, because it is again re-established spontaneously, but the disease remains permanent if it is not, and this is the stage at which the attention of the surgeon is called for. The principles which apply to nasal accessory sinuses are also with slight modification applicable to the middle-ear space. In the former the air movements in the cavity and respiratory passages are practically continuous, whilst in the latter they are intermittent. In the former the walls are rigid and fixed, but in the latter one boundary is membranous and mobile, facilitating the temporary increase or diminution of its contents, whether of air or fluid.

A large number of middle-ear inflammations never suppurate, a second large class suppurate but do not perforate, a third large proportion do all three, and yet all of them heal spontaneously, whilst a fourth residuum goes through the same pathological phases and remains chronically diseased. In the first two the air exchange between the middle-ear cavity and respiratory movements remained possible during the attack, in the third they are not so temporarily, but the membranous walls yielded to infection and pressure of secretion, to be followed by restoration of the air space. In the fourth, not only has this desired aeration result failed to eventuate, but, in addition, the inflammatory process has permanently damaged certain of the structures forming the walls or approaches of the cavity by an infective tissue erosion. If the erosions are purely membranous, opposite the wider portion of the air space, they are usually followed by spontaneous cure and aeration of the cavity, but if in the region of the ossicles or tympanic ring, the attic, aditus, mastoid, or bony Eustachian tube they are prone to chronicity.

The size of the middle-ear cavity varies considerably in different individuals, even in adult life, and one that is abnormally small presents an anatomical factor of great moment in relation to the points just mentioned. Practically all the cases of chronic suppuration one meets with date from, or begin in, childhood, when this anatomical factor of size was most likely to operate. In contrast to this it is exceedingly rare to find such a condition in an adult in whom the first middle-ear inflammatory attack began indubitably when his growth was completed. I cannot recall one such case. From these remarks you will infer that factors unfavourable to the restoration of the middle-ear cavity as a functioning air space make for chronicity of disease.

Occasional discharge, occurring at intervals of months or more, implies an infection spreading along the middle-

ear tract from the nasopharynx and nose, associated with a cold in the head. It is a fresh invasion of an ear which supplicated previously, and is not due to any permanent local lesion. I have discussed this type already under watery discharges. If such a condition occurs in a child, the removal of adenoids gives a gratifying result, and if in an adult, the treatment of a pronounced nasal obstruction may be necessary, and equally successful.

Continuous discharge indicates a local lesion, and this may be situated in any portion of the middle ear, in the mastoid antrum, or Eustachian tube, and our hope of success in treatment will depend largely upon our ability to localize the exact site of the lesion. This is either an erosion of the soft tissue lining or of bone or even a necrosis of bone (invariably an ossicle), and the lesion is often covered more or less by granulation tissue, which is Nature's attempt at repair, and as a result of this process a discharge is produced. After cleaning out the ear, by syringing if necessary, and drying, a systematic examination on a definite plan will materially help.

Imagine the inner end of the meatus to represent the face of a watch. The tympanic membrane, if present, occupies this position, and when absent the inner wall of the middle-ear cavity does so. Divide this into anterior and posterior halves by a vertical imaginary line, from 12 to 6 o'clock, and into an upper and lower half by a horizontal line, from 9 to 3 o'clock. This will give four quadrants in any one of which or in more than one a lesion may be found. Note if the membrane is absent, or only a portion remains at the upper pole, or if it is nearly complete, but perforated, and what is the site of the latter. If adherent to, or well removed from, the inner wall by an air space.

Perforations and granulations in the posterior and upper quadrant are the most grave, as a cholesteatoma is fairly often present, causing some destruction of bone in the region of the external semicircular canal, with possibly severe attacks of vertigo. These cases must be treated by a radical mastoid operation without delay, as otherwise they may cause fatal complications. If the perforation is somewhere nearly central, well away from the periphery, and even if small, with a scanty, glairy, purulent discharge, filling the auditory meatus with 5 per cent. silver nitrate and then inserting an olive-shaped nozzle, to which is attached a piece of tubing and an air ball, to compress gently, but without much force, the fluid through the perforation, will often prove effective. I have seen cases of a year's duration dry up after one treatment. If some of the fluid passes through the Eustachian tube the prognosis is more favourable than if not, for the reasons I have mentioned above about air movements. If the perforation is at the periphery, either anteriorly or posteriorly, it is usually associated with caries of the tympanic ring. These are less promising in their response to treatment, and especially so if the air space is small and the membrane is adherent to the inner wall of the middle ear. If the membrane is absent a lesion of the bony tympanic ring can be easily seen, and treated with a good prospect of success.

Polypi and granulations, if large, may require general anaesthesia for their removal, but much can be done under the local application of Bonain's solution if the patient is fairly tolerant.

To enable silver nitrate to penetrate and be effective the epithelial covering of a polypus or granulation must be broken by pressure of a small curette or friction by a piece of wool. Making them bleed freely answers the purpose. Then apply 20 per cent. silver nitrate on wool repeatedly, by using a number of wood applicators on which the wool is rolled firmly, and after application are thrown away. If persisted in the bleeding will cease, and the area touched will turn white. If bleeding is very troublesome insert a few inches of ribbon gauze, soaked in the silver solution, and leave in for two days. Once a week is sufficiently often to do this, and on all other

days of the interim the patient has some iodized boric powder inserted. Formerly I have used ordinary boric powder, but now find the iodized preparation more effective.

In some cases with complete absence of drum, the middle-ear inner wall is seen to be granulating. These can be treated in the same manner. They may be more sensitive than around the tympanic ring, so 5 per cent. silver solution may be used instead of 20 per cent., and is usually quite strong enough, possibly because there is usually no caries here. If there is a mass of granulations in what appears to be the remains of the membrane in the upper part it usually includes a portion of the ossicles, which are possibly necrosed, and the removal of the entire mass by ossiculectomy or the radical mastoid operation will probably be necessary, but no harm comes from giving the silver treatment a good trial first. By this method we can get the more accessible areas to heal and follow extensions towards the attic or Eustachian tube. If there is still much evidence of disease in the attic, not easily reached by bent metal applicators, the radical operation will be necessary. With large loss of membrane this treatment is easily applied and effective, and when healed the middle-ear cavity is externalized, as it is with the radical operation.

A certain proportion of cases is seen where the middle ear is so small and ill developed, and filled so completely with granulating areas, as to compel the need for a radical mastoid operation to provide a cavity sufficiently large to give access for treatment. Considerable patience and perseverance on the part of the patient and surgeon are required, but the result often justifies it, as it is undoubtedly the only effective treatment I have found, short of the mastoid operation, and may in many cases dispense with the need of the latter. The following are my reasons for having adopted it.

For many years, in cases of extensive middle-ear disease, with granulations and suppuration, which had undergone long periods of treatment by syringing and the various antiseptic and astringent drops, I followed the usual practice of doing a radical mastoid operation. In a very large proportion of these I found only a sclerosed mastoid, with possibly a little septic debris in the antrum, but practically all the active disease present was encompassed by the boundaries of the middle ear, which could be reached through the external meatus. The opening of the mastoid and the removal of all the diseased middle-ear area at the operation did not ensure quick or certain healing of the newly made cavity with any form of dressing or even skin grafting, but, on the contrary, suppuration continued in a large percentage, which vitiated the desired and hoped-for surgical success. I then resorted to the silver treatment of the new cavity with great advantage, and subsequently came to the conclusion that, as so little was found in the mastoid itself in most of these cases, treatment of the middle ear in all that were suitable should be given a good trial first before undertaking any larger surgical procedure, and in consequence I have done fewer radical mastoid operations in recent years.

At least no harm and much good may come of trying this method, and certainly in all the cases which have responded well the hearing was vastly better than one usually finds after the radical operation.

FOREIGN BODY IN THE EAR

This occurs most often in children. Adults sometimes leave pieces of wool in the ears, inserted to ease a slight ache, perhaps in cold weather, and forget about them. Examine first to see if a foreign body is present to ascertain its nature. If metallic or mineral it is usually hard, and if vegetable, soft. Syringing with watery solutions may remove the former if the stream is carefully directed between the meatus and the object; but if against the latter damage to the drum will result.

Watery solutions will cause vegetable matter to swell and probably necessitate the turning forward of the pinna, to expose the meatal tube deep to the foreign body, for its removal. Oil will not cause it to swell, therefore a good general rule is to drop in nightly for a week some warmed olive oil, and then syringe with bicarbonate of soda solution. A thin malleable wire loop can be inserted over the object to extract it, where forceps and probes cannot.

HAEMORRHAGIC DISCHARGES

Number three in the above classification has been considered already. Whenever blood or blood-stained discharge is found in an ear following an injury there is one golden rule to observe in treatment, and it is "never syringe." In the late war it was frequently done in cases of ruptured membranes following gunfire and shell explosion injuries, with the inevitable result of middle-ear suppuration.

The escape of blood and serum flushes the damaged breach, and if the external meatus is then made as aseptic as possible the lesion may heal promptly. Wipe out the meatus with sterile wool and 40 per cent. spirit. The pinna and outer part of the meatus may be painted with iodine or a picric acid solution similar to that applied to the skin prior to operations and covered with a sterile dressing. Haemorrhagic discharge of an influenzal middle-ear inflammation may, in the first instance, be treated in the same manner and then have 2 or 3 per cent. glycerin. acid. carbolic. dropped in twice daily. If there is much pain 5 or even 10 per cent. may be used.

The question of when or not to incise the inflamed drum membrane is a vexed one, on which otologists differ somewhat in practice. I have stated my opinion at some length in a paper read at the B.M.A. Meeting held at Eastbourne in 1931 and in some subsequent correspondence, and still hold to the same views. They are briefly these. I object to incising an inflamed membrane when there is no evidence of tension on it by secretion in the middle ear, as I hold that the infliction of a trauma on any inflamed tissue will most certainly lower its resistance to infection and diminish the maximum effort of its physiological reaction. Many such cases resolve without suppuration or certainly without external suppuration; with perforation, and if incised, both of the latter must obtain.

When, however, the cavity is filling with secretion and there is possibly no escape by the Eustachian tube, the membrane will then bulge outwards, and this is seen to take place invariably opposite the deepest part of the space, posteriorly to the handle of the malleus: release of the tension now is a sound surgical practice for three reasons:

1. Considerable tissue immunity to infection is present already at this stage, when inflammatory exudates are being poured out, and the drum will bear a trauma with greater impunity.
2. Release of tension now favours the subsidence of the inflammatory engorgement, which is a beneficent indication as disclosed by Nature's method of pouring out exudates at this stage.
3. Favours the exit of pus and entrance of air, with the consequent restoration of the air-space character of the middle-ear cavity.

The incision is usually made posteriorly, because the bulging of the membrane is seen here and as it is also the deepest part of the air space, though some factor other than bulging must be concerned with spontaneous rupture, or else all perforation should occur at this situation, which is not the case. The subsequent treatment may follow the lines already mentioned under acute middle-ear suppuration.

EPITHELIOMA OF EXTERNAL MEATUS

A very busy otologist may not see more than five cases of this condition in his own hospital and private practice in twenty years, so this will indicate its rarity when compared with other ear affections. Biopsy is the only sure method of establishing its nature. If seen early, before the lesion has spread widely, I have found radium followed subsequently by intensive *x*-ray treatment very satisfactory. Eight to ten radium needles, of 0.6 mg. strength, are inserted from without inwards around the circumference of the meatus, deep to the lesion, and left *in situ* for ten days. This is followed up by *x* rays for some months. Scarring and occlusion of the meatus is a frequent sequel, and, to prevent this, its patency should be maintained from the outset of treatment by a gauze packing or the insertion of a rubber tube.

CERUMINOUS DISCHARGE

If the mass is hard its removal presents difficulties, and attempts to dislodge it by forceful syringing may damage the drum. As the matter is rarely urgent I advise the use of warm olive oil nightly for a week, and the removal of the mass then is merely a question of syringing with a little technical skill. The nozzle of the syringe should never more than half fill the opened-out meatus, when the ear is pulled upwards and backwards to bring the cartilaginous portion of the passage into straighter line with the deeper bony portion. This enables the operator to direct the stream of fluid from the junction of the posterior and upper meatal walls towards the drum, and provides for its exit along the floor of the passage. A large nozzle will not prevent this; it will fill the outer opening and the stream is directed against the mass, and damage to the drum will result, with considerable pain to the patient. To facilitate the easier entrance of the fluid posteriorly to the mass, a small gutter can be made in the latter with a probe or small forceps, under illumination, through a speculum before syringing. A little refinement to the technique makes all the difference to the comfort of the patient, and, small as this minor operation may seem, it is not uncommon to find those who can recall with much regret some previous unpleasant experience.

If there is a history of middle-ear suppuration many years before, the existence of a perforation may now be assumed, and in such a case I prefer to try and remove the mass instrumentally rather than by syringing, as a fairly common sequence of the latter is reinfection of the middle ear followed by fresh suppuration, a development which will not bring credit to the attendant. Bicarbonate of soda, 2 drachms to the pint of water, at blood heat, is an excellent solution to syringe with. I frequently use soapy water, and think its physical properties aid in the expulsion of the mass.

The fourth International Congress of Radiology will be held at Zürich under the presidency of Professor Hans R. Schinz, from July 24th to 31st, when the following subjects among others will be discussed: radiodiagnosis of bone tumours, radiological appearance of the development of pulmonary tuberculosis, radiotherapy of cancers of the mouth and pharynx, short wave-lengths in treatment, and hard gamma rays and cosmic rays. Particulars may be had from the general secretary, Dr. H. E. Walther, 14, Gloristrasse, Zürich. In connexion with the congress a special exhibition will be held comprising books, journals, etc., connected with radiology and associated sciences. The official opening of the congress will be on July 25th, by the President of the Swiss Confederation, at which meeting Professor Forssell will report on the organization of cancer campaigns.

X-RAY TREATMENT OF EXOPHTHALMIC GOITRE

BY

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The comparative scarcity of papers in our own medical journals on the *x*-ray treatment of exophthalmic goitre might be interpreted as indicating that there is little interest in this subject. In other countries numerous papers continue to appear. In January, 1933, Romanis stated in a paper in the *Journal* that "the results of *x*-ray treatment are not very impressive," and if one can judge by the correspondence which followed there is still interest shown in this line of treatment, and contrary views are held as to its merits. Douglas Webster,¹ Murray,² Cooper,³ Connell,⁴ Rowden,⁵ Riddell,⁶ all wrote upholding *x*-ray therapy, while Joll⁷ gave the case against it. Douglas Webster wrote as follows: "In 1926⁸ I reported marked improvement in 82 per cent. of 107 cases; further experience, with nearly 200 cases in all, has confirmed this conclusion." Rowden⁵ stated that since 1905 he had treated several hundred cases with results at least as good as those claimed by surgery. Murray² gave strong support to *x*-ray therapy when he said that he had found surgical treatment to be advisable in about one-twelfth of the cases. In 1929⁹ I gave details of the cases I had observed, but, rightly or wrongly, I considered as failures all cases which had to have surgical treatment after having had any *x*-ray treatment. Barclay and Fellowes¹⁰ obtained good results in 90 per cent. of 300 private cases, while F. Hernaman-Johnson¹¹ obtained good improvement in 50 per cent. of all cases of Graves's disease.

As a physician one does not approach the treatment of patients with any bias towards either surgery or *x*-ray therapy, but with the aim of obtaining satisfactory results in a high percentage of cases. In assessing the results I have placed most reliance on the variations in the weight and the basal metabolic rate, on the pulse rate, the patients' symptoms and signs, and on their own opinions as to the value of the treatment. An increase in weight and a fall in the basal metabolic and pulse rates usually go hand in hand, but one finds cases where the improvement in general health and in the pulse and metabolic rates has been accompanied by very little increase in weight; on the other hand, an increase in weight does not always mean a big drop in the metabolic rate or pulse rate. By taking all these points into consideration, and by observing alterations in the tremor, the goitre, and the exophthalmos, when present, it is possible to give a very accurate opinion on the value of the treatment. It is quite possible for a patient to improve without iodine, or *x*-ray treatment, or operation, but as most of my cases had some definite form of treatment, I am unable to give a competent opinion on the frequency of such a spontaneous improvement. My experience with sodium fluoride is too small to permit comparison.

SCOPE OF PRESENT INVESTIGATION

The cases discussed are nearly all those which have had *x*-ray therapy at Salford Royal Hospital, and have been under observation for a minimum period of one year. In many cases the period of treatment and observation has been longer, but several are also included which were sent from *x*-ray therapy for an operation.

I am indebted to our radiologists, Dr. Higgins and Dr. Morris, for the following note on the *x*-ray technique.