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Conclusions Based on Twenty-Five Years' Practice in Mastoid Surgery

PRESIDENT'S ADDRESS

By L. GRAHAM BROWN, F.R.C.S.

To attempt a review of mastoid surgery during the past quarter of a century would be beyond the scope of this Address. It may prove useful if I express some thoughts upon the subject of mastoid surgery which are the outcome of my own experience.

I believe the opportunities for mastoid surgery are gradually decreasing in proportion as the prophylactic measures against the incidence and spread of aural disease increase. Indeed the time may not be far distant when intracranial complications of otitic origin will be considered rare phenomena.

During my apprenticeship I can well remember having been greatly shocked by the gross infection occurring in post-operative mastoid wounds. It was a time when the method of packing the open wound was still in vogue. There resulted too many failures in the form of chronic middle-ear suppuration, post-auricular fistulae or unsightly scars and depressions. Even keloids of the scar tissue were not uncommon. Mollison (1937) has recorded the advance in theory and practice which has helped in bringing about the better results to-day. This improvement has been obtained mainly by three important factors, viz. the position of the skin incision, the technique of operation upon the soft tissues and diseased bone, and the post-operative care of the wound.

The essential points are: The skin incision, instead of being in or near the post-auricular sulcus, should curve widely outwards, even to the hair-line, and thus provide a large anterior skin-flap which on replacement will entirely cover the bony cavity. There should be as little interference as possible with the soft tissues. That is to say, the temporal muscle should not be incised, whilst the periosteum should be dealt with by a T-shaped incision and carefully preserved by elevating it from the small area of bony cortex which later has to be removed. There should be little if any interference with the attachment of the sterno-cleido-mastoid muscle to the mastoid process, and the latter, likewise, should be preserved as far as possible. There should be a thorough removal of all diseased bony and cellular structures by means of gouge and curette, whilst the cavity remaining should be smooth and shelving. The

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wound should be completely closed except to provide drainage at the lower end by means of a small rubber tube. Finally, meticulous post-operative attention should be given to the wound. The latter, if it cannot be undertaken by the surgeon himself, should be left only to a carefully trained assistant, preferably, in hospital, the ward-Sister.

Syringing the wound cavity and the external auditory meatus is an infinitely better method of cleansing the ear than swabbing with pieces of cotton-wool. The latter can be not only a painful procedure but can cause delay in healing owing to irritation of the repair granulation tissue. To help to get rid of the initial infection, and to prevent reinfection of the wound and middle-ear cavity, I strongly advocate the use of 50 to 60 per cent. of S.V.R. applied on a strip of $\frac{1}{4}$ in. ribbon gauze. Following these essentials, the average time of complete closure of the wound and healing of the tympanic membrane should be no more than twelve days. From time to time there have been advocates for the complete closure of the mastoid wound at the time of operation; recently the advent of the sulphonamides and their use in powdered form may bring about this desired gain.

For the radical mastoidectomy the same essentials should apply, except that the posterior wound can be completely closed, drainage being provided for through a flap in the external auditory canal. Here arises a debatable point. To what extent should a plastic flap be cut in the meatal wall? I have long been an advocate of using the smallest one possible. Unlike Körner, Panse, Ballance and others, I never invade the cartilaginous portion. Such a procedure should be reserved only for cases of cicatricial stenosis of the canal, very often the results of previous bad surgery. I content myself with a small tongue-shaped flap which is really the extremity of the posterior membranous portion. Such a small flap tends to decrease the eventual size of the healed cavity and later on makes its periodical cleansing comparatively easy.

In the performance of the radical operation I believe that it always pays to attempt to close the Eustachian tube by careful curetting of its lining mucosa as far down as the isthmus. When successful, this must prove an important factor in attaining complete epithelialization of the cavity. Further, one should not forget that suppuration persisting from a radical mastoid cavity may be due to the presence of a fistulous tract from the petrous bone. Hence, during the operation careful inspection should be made to exclude such a possibility.

Where the amount of hearing present is useful to the patient, the radical mastoid operation is to be avoided whenever possible, particularly in children and young adults. The incomplete, or modified, or conservative radical mastoid operation was first described in this country by Heath in 1904. It aimed at conserving the function of hearing as much as possible, whilst eradicating the potential danger of a chronic suppurative disease. It consisted in opening up the attic and mastoid bony regions, removing diseased tissue but retaining healthy ossicles and as much of the tympanic membrane as remained.

Various modifications of this operation have been described by Cottle (1933), Lempert, Jenkins and others. However, the one that has found most favour with me is that described by Sourdille for another purpose, viz. the first step in his multiple operation on the mastoid prior to fenestration of the

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external semicircular canal in cases of chronic progressive deafness and otosclerosis. I have performed many operations of this kind, closely following his technique. It should be done only in very carefully selected cases, in which the hearing is good and the perforation is in the attic region or is small and marginal in the posterior segment of the tympanic membrane. The presence of cholesteatoma need not always prove a contra-indication to the operation. Regarding the ossicles I have come to the conclusion that unless covered by healthy mucous membrane, the incus and head of the malleus may as well be removed. If left, even though not necrosed, they later on become involved in the healing process. The fibrous tissue eventually binds them down and renders them immobile, thus from pressure effects making the final degree of hearing less than if they had been removed at operation. One admits that removal of the incus and head of the malleus (the latter to facilitate drainage only) invariably reduces the acuity of hearing. Nevertheless useful hearing is maintained. To my mind, the question of the conservation or not of the ossicles is of far less importance than the problem of how to maintain the mobility of the oval and round windows. If, as I believe, good hearing depends on the proper functioning of these windows, the one being in opposite phase and synchronous with the other, this, maybe, can only be achieved by an operation which leaves an air-space in the tympanic cavity, with the walls of the latter covered over by mucous membrane. Hence my contention that it is better to remove the incus at operation rather than, by retaining it, find it later on bound down by fibrous tissue and exerting a pressure effect upon the oval window *viâ* the stapes. This theory, too, can explain why, after the radical mastoid operation when the cavity remains moist, hearing is very often much better than in the completely epithelialized one. The continuity of the external auditory canal membrane with that of the tympanic membrane should be preserved, and drainage should be carried out *viâ* the post-auricular incision as in simple mastoidectomy. W. McKenzie (1940) published his results of 70 cases operated upon by the conservative radical method. My own results are about the same as his, viz. about 50 per cent. of dry ears with retention of good hearing. My technique, however, differs in that I have never yet made use of a meatal flap.

Since the field is so small and the technique both difficult and delicate, the surgeon is greatly facilitated in his work by the aid of binocular magnifying spectacles, good lighting and an efficient blood-suction apparatus. The same applies, of course, to other regions of mastoid surgery, but especially to that to the inner wall of the middle-ear cavity where magnification helps one to recognize important small relations and to carry out the necessary delicate instrumentation.

Otologists have often discussed the significance that lies in accidentally or purposely uncovering the dura mater and the lateral sinus in cases of otherwise uncomplicated mastoiditis. I believe the answer is this: Never purposely lay bare these structures unless the bony disease leads down to them, but, when thus removed or accidentally so, bear in mind the fact that infection has been brought a stage nearer to the vital intracranial contents, and govern your subsequent proceedings accordingly. It is advisable to leave such a wound well exposed and very lightly covered with sterile gauze, rather than

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to close it up with possibly infected blood-clot. Penetrating wounds of the dura and sinus wall should be dealt with in a similar manner, though it may be necessary sometimes to occlude a grossly injured sinus above and below the site of injury and open up the intervening portion. Through neglect of these precautions one has seen not only rapid infection of the meninges but also fatal hæmorrhage from the subsequently infected lateral sinus.

Following the modern technique, skin and muscle grafts on the mastoid cavity should seldom be necessary after an uncomplicated simple or radical mastoidectomy. In plastic operations to close large post-auricular fistulae, or to open up a stenosed external auditory meatus which is inadequately draining a suppuration from the middle ear, they may occasionally be used with advantage.

The respective merits of the post-auricular approach as compared with that of the endaural route, as advocated by Lempert (1928), has been well discussed by many aurists and the superiority of the latter method has not been substantiated. The fact that the majority of otologists still practise the old and original method is sufficient answer to the question. Indeed, a tolerant attitude becomes sceptical criticism when Lempert further advocates this approach for such operations as fenestration of the external semicircular canal for otosclerosis and those concerned with the various intracranial complications spreading from the middle ear and mastoid.

Injury to the facial nerve during the course of a radical mastoid operation is a distressing event both to the patient and to the surgeon. Although the utmost care may be exercised in clearing out the middle-ear cavity, a paralysis of the nerve may occur even though it be discovered only post-operatively. Especially one should be on the look-out for this in cases of cholesteatoma when dehiscences in the bony wall of the fallopian canal from erosion are so likely to occur. Fortunately, a fair proportion of these paralyses eventually recover, especially the post-operative ones. However, those that do not must remain an everlasting stigma or undergo attempts for their repair by one of the several methods of graft implantation or anastomosis with other cranial nerves. Even plastic surgery on the facial structures themselves, as practised by Gillies, may have to be tried. A full review of the methods employed for the surgical treatment of traumatic facial paralysis by direct nerve suture and graft inlay has been given by Miss D. J. Collier *et al.* (1941). Following the pioneer work of such men as Ballance, Duel and Young, future workers can and will obtain much better results.

The treatment of petrositis, associated or not with Gradenigo's syndrome, still presents a problem to the otologist. The diagnosis is undoubtedly helped by radiography, especially when the cranial nerves in relation to the apex of the petrous and to the posterior fossa show no clear evidence of irritation. The surgical treatment has been thoroughly reviewed by Ramadier, Watkyn-Thomas (1936), Kopetzsky (1933) and others, and each has advocated his own preferred method of approach to the cellular apex. It seems to me that one should adopt as conservative a method as possible. Very often a simple cortical mastoidectomy suffices to clear up the symptoms of an acute petrositis, just as the radical operation following an acute exacerbation of a chronic middle-ear suppuration will do likewise. When, however, often after a latent

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period, the clinical signs and symptoms suggest an empyema of the petrous apex—usually readily confirmed by radiograph—further steps should be taken. The fistulous tract should be carefully sought for, and when found to be present in the region of the antrum or semicircular canals, its opening should be enlarged and the tract curetted right along its path until the pus is reached and can be evacuated. When the opening of the fistulous tract cannot be found, or it is in the region of the Eustachian tube opening, the route chosen should be behind the arch of the superior vertical canal in relation to the postero-superior surface of the pyramid. The approach *via* the tubal cellular tracts and carotid canal, as recommended and practised by Ramadier, is condemned by Kopetzsky as being far too difficult and hazardous.

Again, conservatism should be our attitude in surgical treatment of inflammatory disease affecting or invading the labyrinth. Our first duty should be to clear away the primary focus, whether this means simply incising a drumhead or performing a simple or radical mastoidectomy. Only if and when symptoms of meningeal irritation occur should we proceed further to the opening up of the labyrinth, preferably by the method of Neumann.

Perisinus abscess and extradural abscess are complications of mastoid disease which are admittedly difficult to diagnose before operation. As a rule they need not exercise our minds very much provided that at operation we do not disturb any granulations present, for these are Nature's barrier of defence against bacterial invasion. The wound should be kept well open and the patient carefully watched for further spread of infection to intracranial contents.

Before passing on to a consideration of the most serious of the endocranial complications of otitic origin, viz. meningitis, brain abscess and lateral sinus thrombosis, it may be useful here to mention the use of sulphonamide therapy and that of penicillin. Before the introduction of these powerful, selective, bacteriostatic drugs the prognosis in such cases was always considered grave. This led in turn to elaborate surgical methods of treatment which, in already enfeebled patients, and particularly in cases of acute diffuse suppurative meningitis, very often did nothing more than quicken or delay the fatal issue.

The sulphonamides, since their introduction about the year 1937, have already proved their worth and have decidedly altered our conceptions of how to deal surgically with these conditions. Likewise it seems probable that pencillin, after further trial, will do the same. Briefly stated, their value is as follows: These drugs will not by themselves, and unaided, cure infective disease produced by certain organisms, except perhaps in the earliest stage of invasion. When pus has begun to form in bone or soft tissues the inflammatory process may be retarded, with the so-called masking of symptoms, but not to the point where resolution can effect a healing of such abscesses. Cirillo (1942) has cited several cases which ended fatally owing to the too early use of this form of chemotherapy and the consequent masking of symptoms. Most of us have had similar experiences, and we have been taught that these drugs cannot replace surgical treatment if an undrained necrotic focus is present. The great increase (almost double) in the recovery rate since the introduction of chemotherapy has been clearly shown by Williams and others (1942) in their review of the literature on otitic meningitis and report of results five years before and since the introduction of chemotherapy. However,

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apart from this added use of the sulphonamides, their conclusions as to the best method of treatment do not materially differ from those arrived at in a discussion on the subject by Layton, N. Jory and Symonds (1934).

I lay great stress on the diagnostic value of lumbar puncture and examination of the cerebrospinal fluid in all cases of suspected endocranial infection. Increase in pressure above normal levels and an abnormal cytology of the fluid, in conjunction with ordinary clinical signs, nearly always give a positive indication that the vital structures of the endocranium are being attacked. If the focal area of infection has not already been removed by operation, this procedure should no longer be delayed. If, on the other hand, only after the initial operation has this evidence been gained, further operative measures, and certainly chemotherapy, must be introduced without delay. It must be remembered, too, that the proper concentration of these drugs is most important and can only be determined by a blood examination. Again, the prognostic value of lumbar punctures will keep us informed of the efficacy or not of our therapeutic measures.

Brain abscess, whether it be in the temporosphenoidal lobe or the cerebellum, is a matter of great concern both to the otologist as well as the neurosurgeon. I think that, as far as brain surgery is concerned, we otologists should recognize our limitations. Personally, from a review of my own cases of otitic brain abscess, I have found that I have been successful only when I have discovered the fistulous or necrotic tract leading to the brain tissue and through this, with a minimal disturbance of adherent meninges, have been able to locate the pus and establish drainage into the abscess cavity. The neurosurgeon on the other hand has established for himself rules of procedure for dealing with the abscess, whether by decompression, aspiration or enucleation, or by a combination of some or all of these. Northfield (1942), in some recent publications, gives a full account of these procedures and shows how, influenced by the closed method of treatment of brain abscess by Clovis Vincent, neurosurgeons to-day are obtaining increasingly better results.

There is still considerable difference of opinion among otologists regarding the best method of treatment for lateral sinus infection. Controversial problems arise concerning the eradication of the septic clot in the sinus itself or its extension to the jugular bulb, or even beyond this to the internal jugular vein. There are conflicting opinions, too, about whether to resect the whole or a portion of the vein in the neck, to ligate it (i.e. sever it between ligatures), or whether to leave it severely alone. I will state briefly my views in the light of my own practical experience. The simple, modified or complete radical mastoidectomy should first be completed. The lateral sinus is then laid bare, particular attention being paid to the upper end by nibbling away the bony groove until healthy sinus wall has been reached. The vein at this upper end is then temporarily plugged. The lower end is dealt with similarly, but if healthy vein has not been reached one stops short of the jugular bulb. A gauze plug is introduced here and the sinus is then opened and whatever blood clot it contains is turned out. As much of the outer wall is removed as possible. Tentatively, the upper plug is now released until one feels assured free bleeding has occurred, after which the plug is firmly replaced. The lower end is dealt with in a similar manner, but if no bleeding occurs the plug is

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dispensed with altogether. Bleeding sometimes occurs from the inferior petrosal sinus or the mastoid emissary vein, in which case light packing with gauze will suffice to control it. The wound is left well open and only lightly dressed with sterile gauze. I make a point of removing the plugs from the sinus at the earliest possible time, sometimes on the second or third day.

We come now to the question of the internal jugular vein. I confess I have never tied one in the past fifteen years, nor have I ever opened up the jugular bulb area. I was influenced towards this conduct by the fact that some twenty years ago I saw my chief, Mr. Norman Patterson, searching for the internal jugular vein in order to ligate it. Finding it thrombosed beyond the clavicle, he left it alone and the patient made a complete recovery. This led me to several conclusions which, rightly or wrongly, have guided my actions ever since. First, I believe that in a thrombosed sinus an aseptic clot always precedes the infected portion. Secondly, if one opens the sinus where the initial infection has occurred drainage is thereby established, the *vis a tergo* is removed and little if any further aseptic thrombosis takes place downwards towards the heart. Thirdly, the induration about the upper part of the internal jugular vein is mainly caused by the lymphatics draining the sinus and jugular bulb area, including that of the mastoid bony tip. This infection may often lead to abscess-formation deep in the muscular layers of the neck which will need to be opened by incisions in front of or behind the sterno-mastoid. Chemotherapy by the sulphonamides will play an important rôle nowadays in dealing with the toxæmia or blood infection. My record of cases in the past fifteen years of practice at one hospital shows 19 recoveries out of a total of 23. I may have been merely lucky, or else, perhaps, there is something in what I say about it being unnecessary to tie the jugular. It is interesting to note that Singleton (1942) has recently recorded the recovery of six consecutive cases of this disease in which the vein was not ligated, and he too now questions the necessity of doing so. I believe that when rigors occur early in cases of lateral sinus thrombosis before operation is undertaken, they do so whilst the thrombus is forming, when toxins, infective emboli or even isolated organisms may be entering the blood-stream. After thrombosis is complete toxæmia may still produce rigors, but emboli and organisms are excluded from the blood-stream. Metastatic abscesses in the lungs, joints and other regions of the body may occur after operation, but I think they are the expression of the earlier septic emboli which have got through the vein before complete thrombosis has occurred. Hence to prevent these, it would be too late to tie the jugular if at operation we have cleared out the infected clot completely or have left behind a thrombosed vein in the lower portion.

Suitable operations on the mastoid for the relief of tinnitus, vertigo and deafness have exercised the minds of otologists ever since mastoid surgery began. However, in the last twenty years or so, along with our advance in the theories of equilibrium and hearing, these have been mainly directed towards operations on some part of the labyrinthine capsule. In Ménière's syndrome complex when the membranous labyrinth itself is considered to be at fault and other factors have been excluded, a variety of operations have been advocated and practised. Since we do not yet fully understand the ætiology or pathology of the condition, although Hallpike and Cairns (1938)

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have so far given the best explanation, we cannot hope to be completely successful in our operative procedures. Portmann's operation on the saccus endolymphaticus, Dandy (1941) and other neurosurgeons' section of the VIIIth nerve, Wright's injection of alcohol into the vestibule *viâ* the tympanic membrane and the oval window, Mollison's injection of alcohol into the exposed external semicircular canal and Cawthorne's modification of this without alcohol injection, have all given fairly good results. My own feeling in the matter is that medical treatment on the lines recommended by Tobey (1941), Dederding, Mygind, Furstenberg and others will continue to suffice for the majority of sufferers, but if and when an operation must be performed, Wright's method should first be tried, but if unsuccessful, fistulization of the external semicircular canal *viâ* the mastoid approach should be recommended.

For the alleviation of deafness of the chronic progressive conduction type much experimental work on the labyrinthine capsule has been done by Holmgren, Sourdille, Lempert and others. This has been well reviewed by Kopetzsky (1941), who presents the difficulties, apart from the delicate surgery involved, in obtaining lasting beneficial results. The external semicircular canal seems to be the site of election for the fenestration. No method, however, has yet been devised for ensuring the patency of this artificial window, or rather its mobility. Sooner or later it becomes fixed, either by fibrous tissue or by the osteogenesis that takes place there. This, in my opinion, is the same problem that confronts us in the case of the modified radical mastoid operation, viz. how to ensure the mobility and hence the reciprocal action of two membranous windows, whether they are those provided by Nature or artifically provided by us. Until this problem can be solved it seems to me that we will not progress much further in helping to alleviate this type of deafness. In the meantime increasing help can doubtless be expected from the rapidly improving electrical aids for hearing by bone conduction.

In conclusion I shall merely mention some rare diseases that demand mastoid surgery. A gumma of the mastoid I have never seen, and tuberculosis only on a few occasions, in one of which, however, the whole of the petrous bone showed itself at operation to be a complete sequestrum. A dead labyrinth and a facial nerve paralysis were attendant factors. Again, I have seen during the past six years two cases, confirmed by operation, of a rare pathological condition, viz. hæmangioma of the petrous bone invading the middle-ear cavity and the posterior fossa of the skull. In the one case I was associated with Mr. Mollison and with him performed a modified radical operation. The case was then taken over by Mr. Northfield, who attempted the removal of the growth from the posterior fossa and petrous bone. A course of deep X-ray therapy followed operation with apparently satisfactory results. The other similar case was dealt with in conjunction with my surgical colleague, Mr. Broster, but has since been lost sight of. With regard to cases of cavernous sinus thrombosis I have only seen one in the whole of my career, and that ended fatally.

The occasional malignant disease of the ear and mastoid can still only be dealt with palliatively by a combination of surgery, diathermy and X-rays.

In conclusion may I add that I hope I have raised in this Address some useful points for discussion, from which, too, there will arise a consensus of

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opinion that will serve to help us when dealing with future problems of mastoid surgery.

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Mr. W. M. MOLLISON: *Choice of operation* in chronic suppurative otitis. In young people I feel that the radical should not be done on account of the loss of hearing after it and in view of the powers of recovery of function in the young. Unless the malleus and incus are found necrosed some form of conservative operation should be followed, only proceeding to the radical if conditions finally necessitate it. One of the essentials for success is a generous meatus and the President has stressed this by his treatment of the deep free end of the soft tissues; in many cases a temporal muscle flap is helpful. Incidentally this temporal flap is the only method of closing post-aural fistulae with 100 per cent. success.

These two tables show the hearing after various operations; they are the result of the examination of recruits referred from medical boards and show the results of the operations. Hearing is *good* if the man heard 10 ft. and upwards, *bad* if he heard 0 to 6 in. and *fair* in between.

TABLE I.—186 MEN, AGED 17-25

Radical operation		10 (dry 4)
Hearing bad		9
Hearing fair		1 (facial paralysis 1)
Conservative operation		17 (dry 6)
Hearing good		4
Hearing fair		7
Hearing bad		6
Heath's operation	1	
Hearing poor		1
Simple operation	14	
Hearing good		9
Hearing fair		1
Hearing bad		4
		42 = 22·5%

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TABLE II.—205 MEN, AGED 25-42

Radical operation	9 (dry 5)
Hearing bad	8 (1 not known)
Conservative operation	7 (dry 0)
Hearing bad	7
Simple operation	8 (dry 4)
	∴ 24 operations (dry 9)
Hearing good	9
Hearing bad	4
Hearing fair	1
Permeatal operation	1
Hearing bad	1
	25 = 12·2%

A recital of possible mishaps during operation on the mastoid may be encouraging as showing what Nature can do in the way of recovery.

(*a*) Opening the mastoid under the impression that there is a posterior marginal perforation with granulations and pus, only to find the mastoid normal and the granulations due to local necrosis of the tympanic ring—always annoying.

(*b*) Letting the gouge slip in the wrong place; on one occasion my gouge slipped and punctured the dura above the tegmen antri, while operating on an acute mastoiditis. The operation was completed. The temperature and pulse charts were watched: in three or four days the temperature became subnormal and the pulse slowed and the patient vomited. The wound was then opened and a subdural abscess evacuated and uninterrupted recovery followed.

(*c*) Puncture of the lateral sinus during operation for acute mastoiditis; a child developed signs and symptoms of thrombosis in a few days; the internal jugular was ligatured and the patient recovered.

(*d*) Damage to the facial nerve; an elementary knowledge of the anatomy of the position of the nerve should save it from damage and indeed it is rare to see a paralysis in these days. However, I have damaged it on three occasions (this is as far as my memory takes me) and in all three it was in cases of very brittle and hard bone: (1) In operating for acute mastoiditis, opening the cells running down immediately posterior to the nerve in its canal, the bone cracked across the canal and facial paralysis resulted and I fear was permanent. (2) During a radical operation—the same accident, but in this case recovery occurred in a few weeks. (3) In an operation to open the external canal, the bone was seen to crack—it was pressed back into position—the operation of opening the canal was completed. The resulting paralysis had completely disappeared in three weeks.

Mr. F. W. WATKYN-THOMAS said that Mr. Mollison's rubber-dam technique was most valuable; it made dressings as nearly painless as mastoid dressing could be.

The epitympano-mastoid operation without plastic flap was introduced by Bárány about twenty years ago, and was widely used for some time in the Northern European clinics. He had done a number himself, but he had found that, in spite of some excellent results, too often a secondary plastic was needed to provide drainage. This was a general experience: Jessen of

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Copenhagen found that in 71 cases of this operation there was complete healing in only 58 per cent. of cases, and in eight years S. H. Mygind found that of 31 cases of mastoids requiring further operation 22 had been treated by this method. He felt that the President's excellent results were due to the skill of the operator, not to the propriety of the operation. He agreed that preservation of the ossicular chain was not the most important factor in the preservation of hearing. The important thing was to leave enough of the drum to protect the inner wall. So far as hearing was concerned it did not matter materially whether the incus was removed or not. If an incus was so loose that it would come out at a touch of the hook it was clear that the continuity of the ossicular chain was broken already, and the incus should be removed as a useless foreign body.

In the last 12 cases of lateral sinus thrombosis which he had seen 8 bled freely from both ends when the sinus was opened, and no interference with the jugular was needed. In one, the only fatal case, there was no bleeding from the upper end; the patient died of a cerebral thrombophlebitis. In 3 there was no bleeding from the lower end. One patient recovered without further trouble. In 2 swinging temperatures continued and the vein was tied. Both patients recovered. Perhaps they would have recovered anyhow, but they did not look as if they would.

When he ligated the jugular he always preferred to divide it, bring the upper end to the surface, and tie all branches above the point of section.

Mr. T. B. LAYTON said that during the last twenty-five years otologists had learnt to be conservative when treating mastoid cases.

He did not believe to-day that the simple incision for the post-aural swelling should ever be done until pus had formed which could be felt by fluctuation. It was surprising when this plan was adhered to how many recovered without any operation at all. The only exceptions to this rule should be when rigidity of the neck, indicating meningeal irritation, was present, or where a rigor had occurred, suggesting sinus invasion: and both these were very rare in cases with a retro-aural swelling. A snick should be made and a tube put in for forty-eight hours. He now believed that no mastoid operation should be performed on a patient with a retro-aural swelling until pus had formed and that snick had been made.

They had also learnt that chronic ear disease was an incurable condition. Ear disease had to be tackled from an earlier stage than at present. In the population it was to-day dealt with from the schools. That was too late. It had to be dealt with before the child got back to the school after the acute ear disease had occurred.

Mr. E. COWPER TAMPLIN said that for three years now, with the aid of sulphathiazole insufflated at operation, he was discharging about 80 per cent. of cases of acute mastoid in eight days, soundly healed with a dry middle ear. It was doubtful if this could be further reduced with penicillin.

Mr. I. SIMSON HALL said that in chemotherapy a weapon had been found so effective against the serious complications of otitis media that the possibility of a fatal termination was slender, and all our skill could now be directed towards the preservation of function in the ear affected.

Those whose duty it had been to examine recruits for the Forces had been

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impressed by the wastage of otherwise high-grade man-power owing to the results of otitis media.

The large number of low-category men and women was convincing proof that it was time the treatment of otitis media was replanned with restoration of function as the criterion of success.

Mr. TERENCE CAWTHORNE made a plea for abandoning the term " conservative-radical " operation in favour of " modified ", adding if necessary a descriptive but *not* contradictory adjective.

For the past six years he had used the endaural approach for the uncomplicated radical operation where the mastoid was acellular. He had found that with practice this approach offered certain advantages over the formal operation.

To avoid exposure of the dura of the middle fossa, he recalled Arthur Cheatle's advice on the subject of what to do when in doubt as to the whereabouts of the mastoid antrum : " Remove the tegmen and follow the dura inwards. You will always find the antrum without jeopardizing the labyrinth or facial nerve." His experience of facial nerve surgery had been that often the nerve had been damaged in the course of a mastoid operation because the operator had tried to search for the antrum too far down. Whilst it was clearly not necessary to expose the dura in every case, its value as a landmark and guide should be remembered and taught.

Bleeding from a lateral sinus accidentally injured could usually be checked by the application of a small square of temporal muscle. The advantage of this over plugging was that the lumen of the sinus was not encroached upon.

The work of Hallpike and Cairns, Wright, Crowe, Rollin and Fowler had established a pathological basis of sufficient stability to warrant the use of the term " Ménière's disease " in many cases of vertigo and deafness, and he hoped that the terms " symptom complex " and " syndrome " as applied to Ménière might be abandoned.

Brigadier MYLES L. FORMBY said that it was the skill with which the attiço-tympanotomy was performed and the subsequent meticulous care with which the President always personally treated his cases that were the important factors. It was useless to do the operation and leave the after-care to somebody else ; suppuration invariably continued and although the ear might no longer be dangerous the result would certainly not be satisfactory.

Concerning the drainage of brain abscesses he agreed that where the track was obvious, the dura necrotic and the abscess at or near the brain surface in relation to the mastoid wound, it should be opened and drained. For all other cases the correct procedure was repeated aspiration through healthy dura. If the dura exposed in the wound were thoroughly cleansed then exploring the temporosphenoidal lobe was not a dangerous procedure. Success in the treatment of brain abscess depended on resistance to the spread of infection by the surrounding brain tissue and removal of the pus. The latter could not be achieved by drainage, at any rate not for any length of time, except in a few abscesses that were very near the surface.

Mr. R. D. OWEN said he would like to know whether the President still regarded mastoid drainage, in childhood, as the right or the wrong thing to

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do where the case presented normal temperature and no mastoid tenderness but a pulsating discharge persisting for five or six weeks after the initial onset.

Although one might rely on sulphonamides for resolution and an intact drum, one must not forget that these cases of subacute mastoiditis if left without drainage could lead to permanent deafness. It was quite likely that a good number present themselves in middle age with progressive deafness associated with Ménière's disease. He felt that a timely paracentesis or mastoid drainage would avoid this disability in adult life.

The PRESIDENT (in reply) said that he dispensed with the meatal flap as far as possible, for he looked upon the external auditory meatus as a by no means unimportant structure for the hearing function.

For drainage after a single mastoidectomy he used a fine rubber tube containing a wick of narrow ribbon gauze which was left in place for forty-eight hours in order to form a channel down to the antrum for further drainage with a gauze wick only. From many years' experience he found alcohol (50 per cent.) an excellent bactericide and since using it as a routine had seldom been troubled by secondary infection of the wound. He certainly agreed that there was an increasing tendency to close the wound at the time of operation.

Preservation of hearing was a very important factor in mastoid surgery, and in this respect the conservative mastoid operation had proved its value. The removal of the incus meant usually no more than a loss of acuity in hearing. If there was more than this loss of acuity one must look elsewhere for the impairment, for example, in the round or oval window or in the nerve itself.

Exposure of the dura should always be considered as a potential danger of infection to the intracranial contents and treated accordingly.

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