MASTOID OPERATIONS

BY

WALTER HOWARTH, M.A., M.B., F.R.C.S.*Surgeon to the Ear, Nose, and Throat Department,
St. Thomas's Hospital*

AND

GEOFFREY BATEMAN, B.M., F.R.C.S.*Chief Assistant to the Department*

Several different mastoid operations are in common use, and the object of this paper is to discuss these in order to estimate the value of and the indications for each. There is little need to discuss acute infection of the mastoid. When operation is indicated Schwartz's is the one almost universally performed. There are many minor variations in technique, particularly in after-treatment, but we do not propose to consider these technical points.

There is, on the other hand, much difference of opinion about the choice of operation for chronic otitis media. The first point to be decided is whether one is necessary. In the majority of cases seen in hospital practice the patient has had little or no previous treatment for his otorrhoea, and it is usually impossible at the first visit to say whether he will require operation. We make it a rule to give these patients adequate conservative treatment and to observe the results of this before coming to a decision. Adequate conservative treatment consists merely of aural hygiene. The ear is syringed daily with normal saline, and spirit drops are instilled. When the ear is cleaned up by this method granulations may be cauterized with silver nitrate, and accurate observations of the state of the middle ear and hearing can be made. An appreciable number of the cases of chronic otorrhoea are cleared up in this way, but if after six weeks there is no improvement and no need arises for some simple operation such as the removal of adenoids or tonsils, then a mastoid operation is advised.

The objects of a mastoid operation for chronic otorrhoea are: (1) to make the patient safe as regards intracranial complications, such as extradural abscess, lateral sinus thrombosis, meningitis, brain abscess, and facial palsy; (2) to preserve the hearing; (3) to cure the otorrhoea; (4) to avoid the necessity for prolonged supervision.

Clearly the most important aim is to make the patient safe. The radical mastoid operation, which was for many years almost universally employed in this clinic, achieves this, but only by sacrificing objects (2) and (4), and often (3) as well. We were therefore stimulated to find some alternative, and the conservative method used by many surgeons seemed the ideal operation, provided that the claims made for it were verified. With the view of finding to what extent it achieved the objects just set out, and to discover, if possible, any contraindications to it, we decided for a definite period to treat all cases of chronic otorrhoea under our care at the hospital: by the conservative method, with or without a muscle graft. The cases were therefore consecutive ones and not selected in any way.

Conservative Mastoid Operation

The technique consists in exposing the mastoid antrum and clearing out the diseased mastoid air cells. The aditus is enlarged by removal of the outer wall of the attic. The incus can then be seen, and this is also removed. The bony posterior meatal wall is left. The skin is sewn up, a small corrugated rubber drain being inserted in the bottom of the wound. A modification is to turn down a flap of temporal muscle on an anterior

pedicle so as to obliterate the cavity. If this procedure is employed the wound is sutured without drainage.

A third method which we have used on rare occasions deserves mention, as we feel that it has its place in the surgical treatment of chronic otorrhoea. The bone surgery is done as before, but at the end of the operation the wound is left open and packed. The meatus and the wound are then syringed daily with a mild antiseptic, 1/2 per cent. eusol, and in two or three weeks the ear will probably be dry. The post-auricular wound can then be closed with a temporal muscle flap if, as often happens, the bone does not granulate quickly. This operation is not included in our series, as the cases in which it was employed are too few.

For over two years we aimed at using the conservative mastoid operation in all cases of chronic otorrhoea which needed surgery. There were, however, cases in which the disease was so gross that this method would obviously have been valueless and others in which a previous operation had rendered it impracticable; these were treated by the radical mastoid operation. During this two-year period eighty-three conservative mastoid operations were performed. In thirty-six of these cases the middle ear became dry and the patients were rendered symptom-free, except for a varying degree of deafness, though on the whole the hearing is very good after a conservative mastoid operation. In twenty-five cases some discharge from the ear continued, but this appeared to come only from the middle ear, and it seemed unlikely that any further operation would be necessary. Seventeen cases have needed a further operation because the discharge persisted and alarming symptoms developed. The remaining five have a persistent discharge and, in our opinion, will require further operation before the ear is in a satisfactory condition. Thus, in eighty-three cases there were thirty-three successes (43 per cent.), twenty-five qualified successes (30 per cent.), and twenty-two failures (27 per cent.).

These results show a good proportion of successes, but the failures have made a great impression on us, as at the second operation it was usual to find a large suppurating cavity in the mastoid high up in the region of the tegmen antri and roof of the aditus, very often with the dura forming one of the walls of the cavity. The dura is then thickened and covered with granulations, and the patient is potentially in a dangerous condition. These findings have been very constant in the cases which have been reopened, and are most disquieting. Some of the cases requiring a second operation had been dry before they started to discharge again. This brings all cases under suspicion for a time, and we cannot feel entirely satisfied even with those which have ceased to discharge. Of the seventeen cases operated on a second time eleven have had a radical and six a modified radical operation.

We therefore reached the conclusion that the conservative method was not suitable for all cases of chronic otorrhoea requiring operation. As, however, 43 per cent. did become symptom-free with a dry ear it appeared to be a good operation provided some criteria for the selection of cases could be found.

Analysis of the Cases

Analysis does bring forward some factors common to the successes and common to the failures:

Hearing.—On the whole the successful cases heard well; some successes had poor hearing, whereas in some of the worst failures, with attic cholesteatoma, it was very good.

Cholesteatoma.—This can be taken as a definite contraindication to the conservative operation. It is sometimes difficult to diagnose before, but can usually be diagnosed when the aditus is enlarged during the operation. In this case the modified radical method is substituted for the conservative operation arranged for previously.

Polypi and Granulations.—We have had several successes with the conservative mastoid operation, in spite of the presence of polypi, which thus cannot be taken as a definite contraindication; they should, however, be carefully removed when operating. They are usually found to arise from the posterior meatal wall, external to the tympanic membrane, and often have a process passing through the perforation and lying in the tympanic cavity. This should be sought for and removed, as it keeps up the discharge and is difficult to treat by cauterization. If the polypi are removed at the beginning a fair idea of the state of the middle ear can be obtained and the type of operation then be decided upon.

Site of Perforation.—This is the most important factor in planning the proper operation. Cases with central perforations on the whole do well. Those with marginal perforations do badly, whilst the conservative operation is definitely contraindicated in cases with attic perforations. The majority of successful cases have been those with a low perforation which does not extend to the tympanic ring.

Nature of Discharge.—A scanty, very smelly discharge contraindicates a conservative operation because it usually indicates a cholesteatoma. A mucoid or muco-purulent discharge predisposes to success, but cases in which this occurs should have adequate treatment first, as they can often be cleared up without operation on the mastoid.

The Modified Radical Operation

This is indicated in all cases in which the conservative operation is contraindicated, except where such gross damage has been done to the tympanic membrane and ossicles that there is almost nothing to preserve and the hearing is so badly damaged that no hope remains of obtaining a useful ear. In these cases the radical mastoid has no disadvantages as compared with the modified radical, and a shorter post-operative period of treatment may be expected.

We have performed the modified radical operation in twenty-five cases. In no instance has any further intervention been required. The hearing is, on the whole, as good as could be expected after a conservative mastoid operation. Two months usually elapse before the ear is dry; but it may take longer.

In the modified radical mastoid operation as performed by us the antrum is opened and all infected air cells cleared. The posterior meatal wall is taken down and the bridge removed. The outer attic wall is next extirpated. A Körner flap of the posterior meatal wall is then cut and is pulled out through the meatus to give a good view of the middle ear. Polypi are removed and any overhanging shelves of bone chiselled away. The ossicles and remains of the tympanic membrane are left untouched, though a grossly diseased incus may with advantage be removed. The flap is put back and the cavity packed with ribbon gauze impregnated with bismuth subgallate, iodoform, or some other suitable antiseptic. The wound is then completely sewn up. The packing is left for seven days and is then changed on alternate days. Packing is usually stopped fifteen days after the operation. The cavity is inspected regularly

and any excessive granulations are cauterized with silver nitrate. A dry, epithelialized cavity may be expected in two months.

The results of this operation are satisfactory in making the patient safe, and with regard to the hearing and to the cure of the otorrhoea. The patient must be seen fairly regularly afterwards, as wax tends to collect in the cavity, and if this is left for long it leads to reappearance of the discharge.

In the light of the analysis of these cases we have been able to work out a scheme for the treatment of chronic otorrhoea as follows. The patient when first seen is thoroughly examined, and any focus of sepsis in the nose or nasopharynx is dealt with. Conservative treatment for the ear is instituted and any polypi or granulations are cauterized weekly with silver nitrate. At the end of six weeks the cases are reviewed and those not making satisfactory progress are recommended for operation. Those with a central perforation, fairly good hearing, and a discharge which does not smell offensive are selected for a conservative mastoid operation. These patients may expect to have a healed wound, a dry ear, and an ear that will require no further attention, four weeks after operation.

Cases with polypi but fairly good hearing are chosen for either a conservative or a modified radical operation. At the time of operation the first step is the removal of the polypi and inspection of the middle ear. If the perforation is not marginal a conservative mastoid operation is performed, but if the perforation is marginal, and particularly if the discharge is offensive even after six weeks' treatment, the choice is a modified radical.

Those cases with a cholesteatoma, marginal perforations, an offensive discharge, or excessive granulations are treated by a modified radical operation, even if the hearing is bad, whilst the radical mastoid is reserved for cases with gross destruction of the tympanic membrane and ossicles and those with such complications as facial paralysis or extradural abscess, when complete drainage must be established.

K. Lindemann (*Z. Orthop.*, 1937, **66**, 4) discusses the nature of the process described as "intra-uterine amputations," which is said to be due to constriction of the limbs by amniotic bands, etc. He describes twenty-four cases of peromelia investigated both clinically and radiologically. He first discusses twenty-two cases of "amputation" of the forearm with stumps of varying length and shape, thirteen of which showed rudimentary knob-like projections; in most cases there was definite hypoplasia of the elbow-joint, and in seven dislocation or subluxation of the head of the radius, which was also hypoplastic. Three cases showed radio-ulnar synostosis, and the majority of the longer stumps were provided with rudimentary fingers. Lindemann then describes five cases of abnormalities of the lower limbs, including one of a female infant with bilateral peromelia of the thighs, bilateral dislocation of the hip, and other defects. A number of cases showed defects of both upper and lower limbs. Thus in the majority of cases of peromelia the limb defects are not only multiple but on radiological examination show associated changes which can hardly be due to mechanical causes but seem rather to suggest a close connexion between peromelia and other hereditary somatic defects. The author concludes, therefore, that most cases of peromelia are due to non-mechanical factors, and suggests that the terms "spontaneous amputation" or "constriction defect" should be reserved for those cases in which the "amputated" part of a limb is actually found, during or after birth.