TABLE V.—*The Principal Features of the Four Proved Cases*

Case and Age	Mode of Infection	Day of Jaundice	Leucocytosis	Blood Urea	Albumin	C.S.F.	Agglutination	Leptospirae	Day of First Dose of Serum	Total Dose	Length of Illness
Male (15)	Bathing	5th, severe	+	mg. 106	+	Normal	1:3,000 ⁺ 7th day	—	6th	c.cm. 100	12 wks.
II Male (14)		None	—	95	+	Pleocytosis 226	1:3,000 ⁺ 11th day 1:10 ⁺ 5th day	—	2nd	120	5 „
III Male (20)	„	4th, slight	±	121	+	Normal	1:3,000 ⁺ 6th day	Blood ⁺ 3rd day	3rd	140	4 „
IV Male (29)	Watercress work	5th, very severe	+	865	+	Normal	1:100 ⁺ 13th day — 9th day	Liver P.M.	9th	80	(Death)

explain this finding, and stated that it was unique in his experience. He was inclined to doubt the diagnosis of Weil's disease in this case, though clinically the patient's condition was most suggestive of it. The dosage of serum to be given and the route of administration have never been laid down. From these cases it would appear that, so long as it is given early and in a dose of at least 40 c.cm. a day, it is as effective when injected into muscle as it is when put into the blood stream. It will be seen that the ultimate result and the length of illness are in direct proportion to the day of disease on which the serum is given—four and five weeks of illness in Cases II and III, compared with twelve weeks and death in Cases I and IV respectively. Serum was never used during the secondary rise of temperature, and this always settled without specific treatment.

In addition to specific treatment, which has already been described, it is important to maintain the urinary secretion. With this end in view all cases were treated with a high-carbohydrate protein-free fluid diet. The urine was maintained alkaline with potassium citrate, and, when necessary, glucose saline was given intravenously. The bowels, which tended to be constipated, were kept open with enemata. In Table V the four proved cases have been compared. The salient and important features of their illness have been recorded and the value of early serum treatment has, I think, been demonstrated.

Summary

Four proved cases of Weil's disease are here recorded. Three of these occurred as the result of bathing in one river, while the fourth patient was infected from the same river, in which he worked. The possibility of early diagnosis is stressed, while the need for early specific treatment is demonstrated. Three other clinically suggestive but unconfirmed cases are reported. Certain points of unusual interest about the different cases are discussed.

It gives me great pleasure to record my indebtedness to Major H. C. Brown, who carried out all the agglutination tests in these cases and gave me much invaluable help. I am indebted also to Dr. Hamilton Fairley, whose opinion in Cases I and II was of the utmost value. The remaining laboratory investigations were carried out for me by Drs. Athole Ross and Charles Wrigley, honorary pathologists to the Royal Hampshire County Hospital: my thanks are due to them. I am very grateful to my partner, Dr. G. B. Wainwright, for his introduction to Cases I and II.

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MASTOID OPERATIONS

A FURTHER SURVEY

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

In November, 1937, we published in this *Journal* (p. 954) the results of a series of cases operated on for chronic otorrhoea. This series did not include the cases cured by nasal or pharyngeal treatment, but only those requiring mastoid operations. We classified the operations used as Schwartze's, conservative, modified radical, and radical mastoid operations, and gave our definition of these methods. In reviewing these cases we were able to draw certain conclusions and to suggest indications for and contraindications to the various operations. During the past year we have applied these indications to our cases, and it may be of interest to publish the results.

There is such a slight division between acute mastoiditis and early chronic otorrhoea that can be cured by a Schwartze's operation that we will exclude this class of case from our analysis and confine ourselves to cases of well-established chronic otorrhoea. We have operated on eighty ears in seventy-nine patients, the one bilateral case having had two modified radicals. Of these, twelve had conservative mastoid, forty-five had modified radical, and twenty-three had radical mastoid operations.

The Conservative Mastoid Operation

The conservative mastoid operation when successful gives such satisfactory results that one is apt to attempt it even when contraindications are present, and in three of our cases we adopted this method in spite of finding cholesteatomatous material in the antrum. One of these has since been converted into a radical, and another requires re-operation. The third developed a post-audicular abscess, which was drained, and eight months after operation the ear became dry, and has now been dry for a month, but it is doubtful if it will remain so. Including these three cases, of the twelve conservative operations, eight resulted in dry ears, of which two broke down again and one has been re-operated upon; four have never dried up, and one of these has been operated on again.

The six successful cases had central perforations, except one which had a low posterior marginal perforation with granulations growing from the tympanic ring external to the tympanic membrane. This patient has

had a dry ear with good hearing for ten months, and it is the occurrence of a case like this that makes it difficult to choose cases for this operation. The factor which made us think it was worth trying in this instance was the presence of greenish glairy fluid in the mastoid antrum and air cells, and the absence of any cholesteatoma or granulations in the antrum and attic. All the five cases with central perforations had cellular mastoids with glairy fluid in the cells. This seems to be the best indication for a conservative operation, and, as is seen, six of our cases with this condition were successful and three of the five which did not result in dry ears had a similar mastoid condition. These three patients were aged 9, 24, and 25 years, and the only factor common to them was the long duration of the otorrhoea before operation. We thus see that the cases in this year's series bear out the conclusions we came to last year, and the main reason why our figures are not better is that we did not invariably follow our own indications, as the temptation to try the operation in the first instance is very great. If now we examine this series and exclude from it the cases we should have excluded if we had followed our own indications strictly, we find that eight would have had this operation; five of the eight have dry ears, and the other three are well and have only a mucous discharge from the middle ear. Of the remaining four cases, one has a dry ear, two have again been operated on, and the fourth is suffering from giddiness and has been recommended for further operation.

Our indications for the conservative mastoid operation can now be revised and stated. We consider that it should be confined to those cases in which:

1. The chronic otorrhoea cannot be cured by conservative treatment or surgical treatment to the nasopharynx.
2. The perforation is not in the attic, in Shrapnell's membrane, or in the high posterior region.
3. The mastoid is cellular with glairy fluid in the cells.
4. Granulation or cholesteatoma is absent in the antrum or attic.

The Modified Radical

We have performed forty-five modified radical operations during the year. This operation can be briefly described as a classical radical mastoid operation with this modification: that the tympanic membrane and malleus are not removed and the middle ear is therefore not unduly disturbed.

Of the forty-five patients, twenty-one have dry ears; in eighteen the ears remain moist, but are satisfactory in that there is no indication for any further surgery and it seems probable that the majority will become dry in the course of time. No recent information can be obtained from the remaining six cases as they live too far away. In no case is there any indication for further operation.

Of these cases twelve had cholesteatoma in the attic and antrum and fourteen had polypi or granulations in the external auditory meatus; eight had had previous mastoid operations, either Schwartz or conservative; and twelve had high posterior marginal perforations. The cases which do not come into these categories had central perforations and were not suitable for a conservative operation because of the presence of granulations in the antrum or attic. The type of case with the large reniform perforation forms many of those which are moist but satisfactory: it is often difficult to get the middle ear dry after operation.

On the whole we are satisfied with these operations and see no reason to alter the indications given in our previous paper. There is one modification in operative technique which we have adopted with success in four cases. In the past, cases which were otherwise suitable for a modified radical have had a radical mastoid performed because there was a cholesteatoma in the attic that could not be cleared without removing the malleus. In these four cases the head of the malleus was excised, the neck being cut through just above the short process, and the attic was cleared, leaving the tympanic membrane intact.

The indications for a modified radical operation are thus:

1. Cases which need a mastoid operation and are not suitable for a conservative mastoid.
2. Cases in which there is enough tympanic membrane left to make it worth preserving.

The Radical Mastoid

We have performed a radical mastoid operation in twenty-three cases, of which six are dry and sixteen are moist but satisfactory. We expect many of the latter to be dry in the course of time. Of the six that are dry, the average time taken was three and a half months. In all the cases the middle ear was very seriously disorganized, and seven had had previous mastoid operations—three the Schwartz, two the conservative, and two the radical mastoid. It may seem somewhat unsatisfactory that only six of the ears are absolutely dry, but it is not easy to see what alteration in technique would improve the results. The figures are probably misleading, as all these cases have been operated on in the last twelve months, and those described as "almost dry" and "very satisfactory, moist," when last seen soon after operation and some months ago, are not included with the dry ears.

Among these cases there is only one which seems likely to need further operation, and this is a case in which the meatus has become extremely narrowed so that it is difficult to treat the cavity.

Conclusion

In our previous paper we stated that the objects of any mastoid operation were: (1) to make the patient safe with regard to intracranial complications; (2) to preserve the hearing; (3) to cure the suppuration and so produce a dry ear; and (4) to avoid prolonged after-treatment. The conservative operation is the only one to achieve all these objects when successful, but when the ear remains moist it fails to fulfil, in our opinion, the most important essential—that is, make the patient safe. This, we believe, is literally of vital importance, and that is why only twelve patients of the seventy-nine have had this operation. The modified radical operation fulfils object No. 1, sometimes No. 2, often No. 3, and never No. 4. The classical radical fulfils object No. 1, rarely No. 2, occasionally No. 3, and never No. 4.

Thus the method of choice is the conservative operation, in the rare cases where it is not contraindicated: it is applicable to only 10 per cent. of the cases attending the clinic. If that operation is contraindicated, the modified radical operation is performed in about 60 per cent. of cases. The remainder, some 30 per cent., require a radical operation because the complete disorganization of the middle ear contraindicates any other method.

The degree of destruction of the middle ear does not appear to depend on the duration of the infection, for

the average age of the patients in the various groups is, somewhat to our surprise, almost identical: conservative mastoids, 23 years old; modified radicals, 25½ years; radicals, 24 years.

Summary

A survey is given of cases operated on for chronic otorrhoea during the past year.

The results of the various operations are examined.

Indications for the choice of each method are discussed.

ASSOCIATION OF STAMMERING AND THE ALLERGIC DIATHESIS

BY

A. M. KENNEDY, M.D., F.R.C.P.

*Professor of Medicine in the University of Wales and Director
of the Medical Unit, School of Medicine, Cardiff*

AND

D. A. WILLIAMS, B.Sc., M.D.

*Deputy Medical Superintendent, Llandough Hospital, Cardiff;
Late Assistant in the Medical Unit, School of
Medicine, Cardiff*

The mechanism of speech is a complicated process in which the diaphragm, the muscles controlling the vocal cords, and those of articulation, as in the palate, tongue, and lips (with the teeth), are mainly concerned. Further, these structures are under the control of the central nervous system, and ideas therein originated are given expression in speech through association fibres, the speech centres, and the centres controlling these peripheral muscles. The uninterrupted flow of speech depends upon the proper functioning and co-ordination of all these structures, central and peripheral. Stammering does not depend upon any gross anatomical defect, but is due, apparently, to some disturbance of this essential co-ordination between the various factors responsible for the production of speech. But what is the underlying cause of this disturbance?

Although usually described as a disorder of speech, stammering is really something more, and certain traits of character may be observed in the stammering child. He is often "nervous" and excitable—sometimes with a tendency to suppressed anxiety—and this mental tension often produces physical tension. A general tendency to excitability and nervousness has been noted in family histories and also a tendency for stammering to run in families, but, notwithstanding a rather unstable and nervous temperament, the stammerer is usually intelligent and has a good brain.

One morning, some months ago, three asthmatics happened to present themselves at this medical unit for interview, one shortly after the other. There would have been nothing remarkable in this but for the extraordinary coincidence that each proved to be a stammerer. The thought immediately occurred to one of us (A. M. K.) of the possible association of stammering with asthma and, having regard to the allergic aetiology of the latter, other allergic manifestations. Recalling some resemblance in certain features of allergic individuals and stammerers, it appeared that an inquiry into the presence or absence of allergic manifestations in the personal history of the stammerer and his family might yield results of some note. Accordingly arrangements were made to examine a con-

secutive series of 100 children who suffered from stammer.

Through the kind offices of Dr. Greenwood Wilson and Dr. Colston Williams (medical officers of health and school medical officers) of the city of Cardiff and county of Glamorgan respectively, we were enabled to examine 100 school children selected by head teachers because they were stammerers. These were children, 5 to 14 years of age, who were attending elementary schools in Cardiff and the neighbouring towns of Penarth, Caerphilly, and Bargoed, and were representative of town, suburban, and industrial areas. The parents or guardians were invited to bring them for special examination. Some children, however, came unaccompanied and, as it was thus impossible to obtain any family or other history, they were discarded. Likewise two adopted children, whose foster parents knew nothing of their family history, were also discarded. Again, in certain cases the speech defect proved to be dependent upon some anatomical fault, such as cleft-palate or hare-lip, and in others the children were mentally retarded and the power of speech was immature. Some exhibited nasal speech or were mere "lispers." None of these was a stammerer, and so all were excluded from the investigation. No other selection was made, and the remainder were examined in rotation until 100 true stammerers had been seen.

Each child was examined personally and the parent or guardian cross-questioned. Careful inquiry was made for any personal or family history of allergy or allergic inheritance, and questions were asked in regard to such allergic manifestations as asthma, eczema, hay-fever, migraine, and urticaria. Caution was often necessary in framing the questions relative to family history, for some parents were inclined to boast that theirs "was always a healthy family" or that "there never was any trouble or disease in our family." Some seemed to think that questions, particularly in regard to skin eruptions—eczema and urticaria—cast rather a reflection on them, whereas most quite freely admitted if there was any incidence of asthma in the family. With tact and patience, however, the family history usually came out clearly and the parent became quite interested. With regard to migraine we accepted as evidence headaches, periodically recurring and severe, principally unilateral or over the temple and throbbing in character, often accompanied by visual disturbances and vomiting, and all against a background of good health.

It was not unusual in such cases to get a history of stomach trouble, sickness, vomiting, or "bilious attacks," without any mention of associated headaches until direct questions were asked. Apart from the question of migraine note was taken of any aversion to or gastro-intestinal upsets following particular foods, or "fastidiousness" regarding food generally, exhibited by the child and suggestive of food allergy. The family history on both paternal and maternal sides was carefully sifted, and at the same time the opportunity was taken of noting whether there was any family history of stammering and whether the child was right- or left-handed.

Of the 100 children examined eighty-one were boys and nineteen girls; eighty-nine proved to be right-handed and eleven left-handed; and a family history of stammer was present in sixty-five cases and absent in thirty-five.

Incidence and Nature of Allergy Present

I.—CHILDREN WITH A PERSONAL HISTORY OF ALLERGY (52 CASES)

(a) Fifty-two children gave a *personal* history of allergic manifestations, as shown in the following table: