

Report of 1088 cases of ear disease treated in the Glasgow Western Infirmary, from 6th November 1877, till 28th May 1881, with observations / by Thomas Barr.

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REPORT
OF
1088 CASES OF EAR DISEASE

TREATED IN THE GLASGOW WESTERN INFIRMARY,

FROM 6th NOVEMBER 1877, TILL 28th MAY 1881,

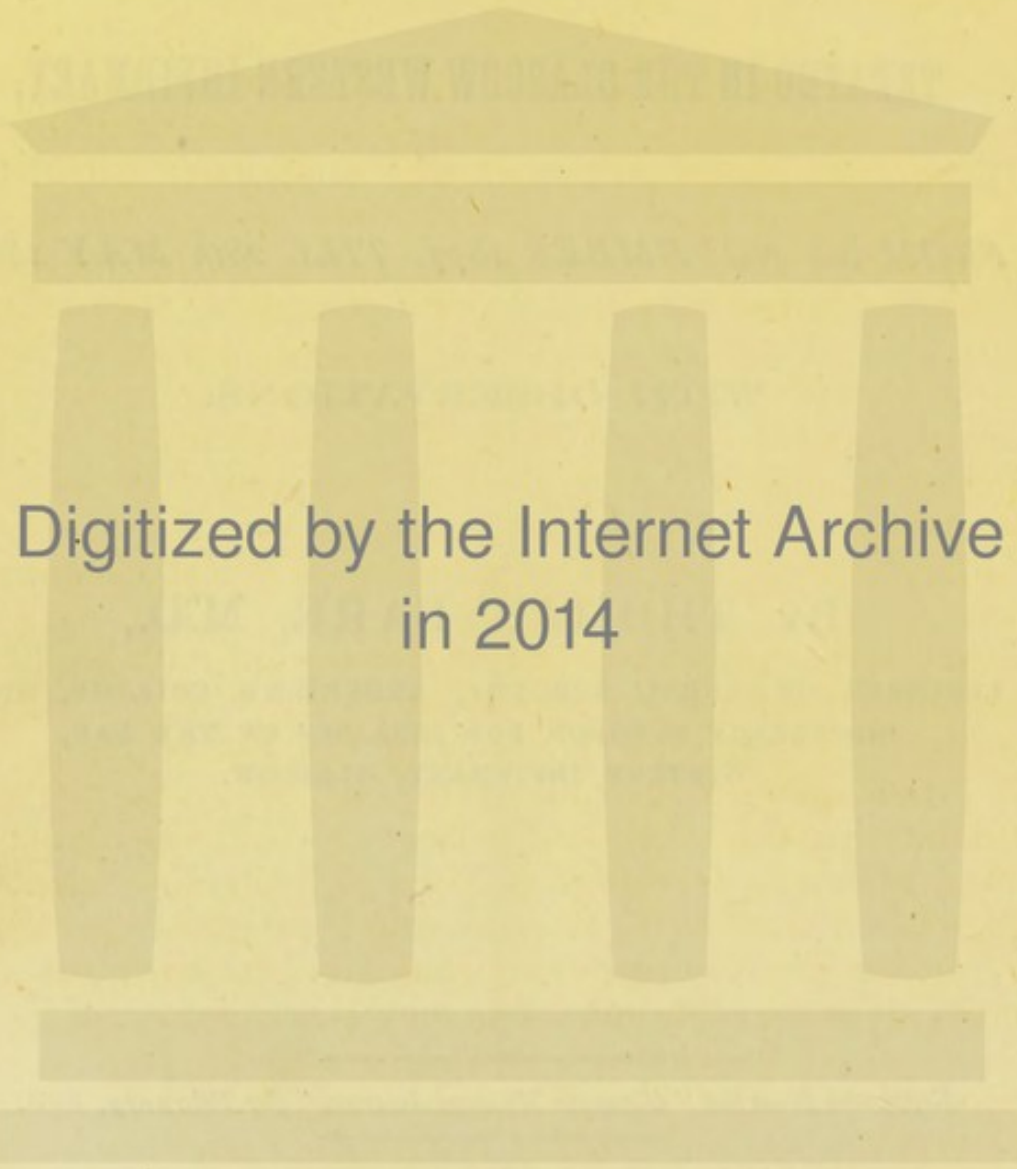
WITH OBSERVATIONS.

BY THOMAS BARR, M.D.,

LECTURER ON AURAL SURGERY, ANDERSON'S COLLEGE, AND
DISPENSARY SURGEON FOR DISEASES OF THE EAR,
WESTERN INFIRMARY, GLASGOW.

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REPORT OF 1088 CASES OF EAR DISEASE TREATED
IN THE GLASGOW WESTERN INFIRMARY, FROM
6TH NOVEMBER 1877, TILL 28TH MAY 1881, WITH
OBSERVATIONS.

THE department for diseases of the ear in the Western Infirmary was opened for the first time on the 6th November, 1877, and was placed under my superintendence. During the first year it was open to patients only once a week. This was, however, found insufficient, partly in consequence of the large number of patients who presented themselves for advice, and partly because of the necessity for more frequent interviews with patients in order that the applications, &c., essential in the treatment of ear diseases, should be used with sufficient frequency. After the first year, therefore, attendance was provided twice a week, namely, on Wednesday and Saturday, at 3 P.M., for patients suffering from aural disease.

I may be permitted to mention, for the information of those unacquainted with this department of the Western Infirmary, that the Dispensary for Diseases of the Ear is exceptionally well provided with instruments and apparatus for the proper examination and treatment of patients, as well as with diagrams for the effective teaching of aural surgery to students. In 1878, when I went to Vienna, in order to see the practice of the famous aural surgeons of that city, the directors kindly granted a considerable sum of money to be spent in the purchase of aural instruments and apparatus in Vienna, where, in consequence of its being the great centre of teaching of aural surgery, the cheapest and best instruments are to be had. The greater number of the instruments in the ear department of the Infirmary were provided by the best makers in Vienna, according to a list written for me at that time by Professor Politzer, the recognised head of this branch of the profession.

An important and, I believe, a very essential feature of the aural department is the help which it affords to the visiting physicians and surgeons, when an ear complication exists, or is suspected to exist, in any patient under their care in the

wards of the Infirmary. When, for example, deafness, pain in the ear, otorrhœa, or facial paralysis exists, or where giddiness or headache, due to unknown causes, are notable symptoms in any case in the ward, the physician will properly and naturally desire the opinion of a specialist as to the state of the organ of hearing. I am much pleased to say that all the physicians have in this way asked and received my services. In injuries of the head, again, attended by the escape of blood from the ear, the surgeon frequently wishes to know the condition of the tympanum and of the walls of the external auditory canal. It has been my pleasing duty, not unfrequently, to be asked to see and report on such cases. This part of the duties of an aural surgeon, connected with a large general hospital, is most conducive to the advancement of the knowledge of aural pathology, and of the relations of morbid states of the ear to the general system.

Since the opening of this department a very considerable number of students and medical practitioners have attended the clinique, and I am sure they must have profited by the large number and varied character of the Diseases of the Ear which they had the opportunity of seeing. I should be much pleased to see a still larger number of students giving a share of their attention to this part of the body, so much neglected in the past. In addition to the practical work of the clinique, I commenced a course of systematic instruction last winter, when I gave twenty lectures to a class numbering 15 students. My class this year numbers upwards of 30 students.

In connection with the teaching of this branch of medicine, I may be permitted to make the following quotation from the report of a Committee of the Otological Section of the British Medical Association, on the "Promotion of the Study of Aural Surgery," which has been just issued.*

"The Committee is deeply impressed with the importance of the subject, and considers that the evident want of knowledge among practitioners in matters concerning ear diseases stands greatly in the way of their being able to deal promptly and effectually with cases of an acute character, and accounts for the very large number of neglected chronic cases which are met with in daily practice.

"After carefully considering all the suggestions received, and discussing the various means for promoting the study of aural

* See also published Lecture by Author on *Importance of a Knowledge of Diseases of the Ear to the Student and General Practitioner of Medicine*. Glasgow: Alex. Macdougall, 66 Mitchell Street, 1881.

surgery, your Committee has arrived at the conclusion that all candidates for admission into the profession should have a practical knowledge of at least the essentials of otology, and that, as *compulsory* attendance on lectures and hospital practice might be deemed undesirable, the object in view can be best attained by the licensing bodies including otology among the subjects for examination."

My table of cases includes only those presented for treatment at the dispensary department. But serious affections of the ear, such as certain mastoid diseases, are also treated in the wards by the visiting surgeons who often co-operate with me in the treatment of such cases. We hope, by and bye, to have a few beds specially allotted for the accommodation of patients suffering from the more serious forms of ear-disease.

The following tables and summaries have been gathered from notes taken under my own personal supervision according to a scheme used by me at the Western Infirmary, a reduced copy of which I have appended. The results of treatment are not given in these tables. It has not been possible to obtain reliable statistics on the results attained by treating such a large number of dispensary patients whose attendance, in many cases, is irregular and uncertain. In my analysis, however, of the individual diseases, I shall take up the comparative efficacy of different modes of treatment.

My Report includes a total of 1,088 cases of ear disease, of which 668 were in males and 420 in females. The disease was limited to the right ear in 285 and to the left in 287 cases. Both ears were affected with the same disease in 516, or nearly a half of the whole number of cases.

Synopsis of Cases showing the side affected, the Sex of the Patient, and the percentage of Cases in which the different Sections of the Ear were affected.

EXTERNAL EAR, (Auricle and External Auditory Canal).	{ Right 53, Left 41, Both 59,	{ Male 96, Female 57,	{ Total 153=14 per cent of the whole number of cases.
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MIDDLE EAR, (Tympanum, Eustachian Tube, and Mastoid Cells)	{ Right 231, Left 243, Both 413,	{ Male 537, Female 350,	{ Total 887=81½ per cent of the whole number of cases.
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INNER EAR, (Vestibule Semicircular Canals and Cochlea, with the Auditory Nerve).	{ Right 1, Left 3, Both 44,	{ Male 35, Female 13,	{ Total 48=4½ per cent of the whole num- ber of cases.
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Detailed Report of Cases of Ear Disease classified according to the part of the Ear affected, the Sex of the Patients, and the Side affected.

	Male.	Female.	Right	Left	Both	Total Cases
I. EXTERNAL EAR.						
(AURICLE AND EXTERNAL AUDITORY CANAL),						
<i>A. Auricle.</i>						
1. Chronic Eczema Impetiginodes, ...	2	7	3	4	2	9
2. " " Squamosa, with great thickening, ...	0	3	1	0	2	3
3. Lupus of Lobule, ...	...	1	1	...	...	1
4. Congenital Absence (with absence of ext. aud. canal), ...	1	...	...	...	1	1
<i>B. External Auditory Canal.</i>						
1. Obstruction with cerumen, epidermic scales, &c., ...	58	22	20	15	45	80
2. Otitis Externa Acuta, or acute diffuse inflammation, ...	12	9	11	8	2	21
3. Otitis Externa Chronica, or chronic diffuse inflammation, ...	4	2	1	2	3	6
4. Polypi in external auditory canal, ...	3	...	2	1	...	3
5. Otitis Externa Circumscripta, or boils in the ear, ...	4	4	4	3	1	8
6. Otomycosis, or fungi in the ear, ...	...	1	1	...	...	1
7. Chronic Eczema, with great contraction of canal, ...	1	4	1	2	2	5
8. Exostosis, ...	3	...	1	1	1	3
9. Foreign Bodies, ...	8	4	7	5	...	12
Total for External Ear, ...	96	57	53	41	59	153
II. MIDDLE EAR.						
(TYMPANUM, EUSTACHIAN TUBE, AND MASTOID CELLS).						
<i>A. Affections of Tympanic Membrane.</i>						
1. Traumatic Rupture of Tympanic Membrane,	4	2	2	4	...	6
2. Acute Inflammation of Tympanic Membrane, or acute myringitis, ...	3	...	1	1	1	3
<i>B. Affections of Middle Ear not attended by Perforation of the Tympanic Membrane.</i>						
1. Acute Catarrh (pathological changes, hyperæmia and swelling of the mucous membrane of the whole or only a portion of the middle ear, with mucous or serous exudation, and some admixture of pus cells),...	46	30	18	20	41	76
Carry forward, ...	53	32	21	25	42	85

	Male.	Female.	Right	Left.	Both.	Total Cases
II. MIDDLE EAR—Continued.						
Brought forward,	53	32	21	25	42	85
2. Subacute Catarrh (the same pathological changes as in the acute form, but of longer duration and with less painful symptoms, seldom purulent admixture in exudation),	31	18	11	8	30	49
3. Chronic Dry Catarrh (varied pathological changes, such as, thickened and dry mucous membrane, inspissated secretion, adhesions, false bands, rigidity of chain of bones, indrawn, thickened, or atrophied tympanic membrane, &c.,) ...	178	113	34	57	200	291
<i>c. Affections of Middle Ear attended by Perforation of the Tympanic Membrane.</i>						
1. Acute Purulent Inflammation, or Otitis Media Acuta (more intense inflammation and swelling of the mucous membrane of the middle ear than in the acute catarrh; the exudation, muco-purulent, or purulent and spontaneous perforation of the tympanic membrane),	34	17	22	21	8	51
2. Chronic Purulent Inflammation, or Otitis Media Chronica. This disease, with its consequences, forms the large class of "running ears" or otorrhœas. Pathological changes:—Chronic inflammation and swelling of the mucous membrane of the middle ear, with more or less destruction of tympanic membrane; in advanced stage there are thickenings, adhesions, &c.	142	105	83	70	94	247
3. Consequences and Complications of Chronic Purulent Inflammation :—						
<i>a. Affecting Tympanum.</i>						
1. Polypi growing from one or other of the walls of the tympanum,	37	28	30	26	9	65
2. Granulations springing from the mucous membrane of tympanum,	9	4	4	6	3	13
3. Secreting process ended, leaving behind partial destruction of membrane, cicatrices, adhesions, thickenings, &c., producing deafness, and often "tinnitus aurium,"	25	22	10	10	27	47
4. Caries of walls of tympanum,	1	3	3	1	...	4
<i>b. Affecting Mastoid Region.</i>						
1. Acute periostitis over mastoid process, ...	4	...	2	2	...	4
2. Acute purulent collection in the mastoid cells,	2	2	3	1	...	4
Carry forward,	516	344	223	227	413	860

	Male.	Female.	Right	Left.	Both.	Total Cases
II. MIDDLE EAR.—Continued						
Brought forward,	516	344	223	227	413	860
3. Chronic purulent collection in mastoid cells, with fistular orifices in the cortical part of the mastoid process,	6	4	4	6	...	10
4. Necrosis,	3	...	2	1	...	3
5. Osseous cicatrices over mastoid process,	2	...	1	1	...	2
<i>c. Affecting Parts adjacent to the Ear.</i>						
1. Facial paralysis,	5	2	3	4	...	7
2. Interior of cranium; death from meningitis; no post-mortem,	2	...	...	2	...	2
<i>d. Non-inflammatory Affections of Middle Ear.</i>						
a. Otalgia or pain in the ear, without any appearance of pathological change. (Supposed neuralgia of tympanic plexus), ...	3	...	1	2	...	3
Total of Middle Ear,	537	350	213	243	413	887
III. INNER EAR AND AUDITORY NERVE.						
1. Disease of labyrinth of unknown nature, ...	8	5	...	1	12	13
2. Disease of labyrinth, clearly of syphilitic origin,	4	...	...	...	4	4
3. Disease of labyrinth, the result of injuries,	4	...	...	...	4	4
4. Disease of labyrinth, presenting Mènière's group of symptoms,	4	4	1	2	5	8
5. Cinchonism,	1	1	...	...	1	1
6. Tinnitus aurium, without defect of hearing,	1	1	...	...	2	2
7. Congenital deafness with dumbness, ...	9	3	...	...	12	12
8. Dumbness from deafness occasioned by disease after birth,	4	...	...	...	4	4
Total of Inner Ear,	35	13	1	3	44	48

Scheme showing the relative frequency of the Diseases at the different ages of life.

Under 2 years,	17
From 2 till 10 years,	168
" 10 till 20 "	278
" 20 till 30 "	230
" 30 till 40 "	142
" 40 till 50 "	94
" 50 till 60 "	101
" 60 till 70 "	42
Above 70 years,	16
Total,	1,088

OBSERVATIONS.

These 1,088 separate cases of diseases of the ear were exhibited in 1,000 patients, as in 88 persons, a different and well marked disease existed in each ear. This is shown in the following table:—

Chronic dry catarrh in the one ear and—

1. Chronic purulent inflammation in the other,	43
2. Excess of cerumen in the other,	10
3. Acute catarrh in the other,	8
4. Acute purulent inflammation in the other,	4
5. Subacute catarrh in the other,	4

Chronic purulent inflammation in the one ear and—

6. Impacted cerumen in the other,	8
7. Subacute catarrh in the other,	7
8. Acute purulent inflammation in the other,	4

Total,	88
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These 88 are recorded in the case book as instances in which combinations of well marked diseases existed in the same person. But the cases are much more numerous where, in a slighter degree, probably unnoticed to the patient, two different ear diseases co-existed in the one person. For example, impacted cerumen in the one ear very often co-exists with some degree of chronic dry catarrh not only in the same ear but in the other. In like manner acute catarrh of one ear much more frequently occurs in persons with some chronic catarrh of the same or of the other ear than the table indicates. We may say, indeed, that *if one ear is affected with a chronic disease it is comparatively rare to find the other ear perfectly normal in structure and function.*

It will be observed also, as a notable fact, from the total summary of cases, that in 516 persons the *same* disease existed in both ears. The thousand patients, therefore, presented at least a total number of 1,604 diseased ears which were examined and more or less regularly treated.

I have, unfortunately, not been able to gather the proportion of cases in which pathological conditions existed in the nasal and pharyngeal spaces. It is now recognised as one of the well established points of aural pathology, that this region is not only frequently the place of origin of ear diseases, but that its morbid conditions have a most important influence on the course and issue of affections of the middle ear. In a very large proportion of my cases, there was congestion, swelling, thickening, or hypertrophy of the whole or part of the nasopharyngeal mucous membrane. Indeed, in our modes of examination and in our methods of treatment, attention to the

naso-pharyngeal cavity was always looked upon as only of secondary importance to the ear itself.

In the ear diseases of childhood and adolescence (463 of my cases, or 42½ per cent of the whole, were in persons under 20 years of age), these naso-pharyngeal affections were found to play a specially large and important part in the etiology and course of ear diseases. This is due to the special tendency, at that period of life, to hypertrophy and outgrowths of the glandular tissue in the upper pharyngeal cavity, constituting, in its more pronounced form, the so-called adenoid vegetations in the roof of the pharynx. In the acute and subacute catarrhs and inflammations of the middle ear in childhood, with their great tendency to relapses, the real *fons et origo* of the mischief is frequently in this space. Generally in such cases I explore the upper pharyngeal cavity with the index finger introduced through the mouth, and in a very large proportion I find an exuberant growth or hypertrophy of the adenoid tissue, or pharyngeal tonsil of Luschka. These growths appear in the forms of either tongue-shaped, or globular, or flat excrescences, chiefly on the posterior superior wall, from which, however, they not unfrequently extend to the posterior nares, when they interfere with the due permeability of the nasal passages. The result of this interference is shown in the habitually open mouth, abolished nasal breathing, and sunken *alæ nasi*. The successful treatment of these adenoid growths had a most beneficial influence upon the ear, as well as upon the general health.

The large number of diseases of the middle ear (887), and the proportionately small number of diseases of the inner ear (48) is worthy of notice, and may have excited the surprise of the reader. From the latter category, I have excluded all but what I considered *primary* disease of the nervous apparatus of hearing. Undoubtedly, with the advance in the knowledge of the pathological anatomy of the ear and the improvements in the objective mode of examination, cases of so-called nervous deafness have become much fewer. Nervous deafness has been defined as that in which the patient hears nothing and the doctor sees nothing. But it would be wrong to assume that because no change is to be seen in the tympanic membrane and no abnormal state of the Eustachian tube is discovered, the nervous apparatus is the sole or primary seat of disease. Important changes may, for example, exist in the fenestral membranes or in the recesses leading thereto, which cannot be recognised either by ocular inspection or by any other mode of examination. It is now well known that

when diseases, such as chronic dry catarrh, or chronic purulent inflammation, have existed for a length of time in the middle ear, the structures of the labyrinth become at length involved, and we have what is termed secondary disease of the labyrinth. It is, therefore, probable that in many of the cases tabulated under the head of chronic dry catarrh, 291 in number, and of chronic purulent inflammation with its consequences, 408 in number, the pathological process had invaded the interior of the labyrinth. This adds another to the many reasons why disease of the middle ear should be promptly and effectively treated. Even the group of symptoms included in the term Ménière's disease, namely, deafness, tinnitus, giddiness, and nausea, may be called forth by diseased processes in the middle ear, especially by such processes as would lead to undue pressure upon the fluid of the labyrinth from the tympanic side. If a person, however, with normal hearing, become affected suddenly with marked deafness, great noises in the ear, and perhaps also with giddiness and nausea (symptoms most frequently associated with constitutional syphilis, mumps, or traumatic injury), and, on examining the ear soon after, no evidence of disease be found in the external or middle ear, and if, at the same time, the osseous conduction of sound is markedly impaired, there is clear evidence of a primary pathological condition in the labyrinth or auditory nerve.

The cases in which the inner ear becomes gradually involved, on the other hand, are generally the result of the extension to the structures of the labyrinth of disease which has begun in the middle ear.*

I intend, in future papers, to describe the chief methods of treatment which I have carried out in these 1,088 cases of ear disease, with the results so far as these could be ascertained. On the subject of treatment, I shall confine myself at present to my experience, as gained by the treatment of these cases, of the value of paracentesis of the tympanic membrane, an old operation which has of late years been revived, and the value of which has been much discussed by aural surgeons.

I have practised incision of the membrane in two classes of my cases; first, when there was purulent, mucous, or serous exudation in the cavity of the tympanum, or in the interstices of the layers of the tympanic membrane; and

* See paper by author on "Value of the tuning fork in the diagnosis of disease of the auditory nerve."—*The Glasgow Medical Journal*, October, 1879.

secondly, when there was no fluid exudation in the tympanum—the condition being that designated in my table as chronic dry catarrh.

I have found the operation of greatest value in the *first* class of cases. In purulent collections in the middle ear, the incision of the membrane decidedly alleviated the pain, and shortened the evil effects of pressure upon the ossicular chain and the walls of the middle ear. It probably also obviated such a loss of the substance of the membrane as would have taken place had we waited for spontaneous rupture. In these ways the operation tended, it is hoped, to preserve the future integrity of the organ. In some cases I have increased an already existing small opening, or made a fresh opening in a better situation, with very advantageous results. I have not seen a discharge from the ear continue for any length of time after incision in this way. The operation was of especial value in those cases of purulent collection in the middle ear where the membrane was thickened and more unyielding in consequence of previous disease, and where, therefore, the process of spontaneous rupture was rendered more difficult. In such cases, timely incision of the membrane might prevent, we may reasonably suppose, the extension of the disease to the labyrinth or to the meninges. It is to be noted that when the membrane has become thickened, its rigidity and opacity may obscure very much the signs of purulent collection usually exhibited by the membrane. If great pain exist in the ear, and if there be marked tenderness over the mastoid process, with shooting pains over the side of the head, and decided impairment of hearing, an exploring opening should be made in the membrane, even although no bulging or characteristic change of appearance point out the existence of matter behind it.

With respect to mucous and serous exudation in the middle ear, I have practised incision of the membrane in a considerable number of such cases. Where the quantity of secretion was such as to produce a very distinct saccular bulging, often of a yellowish colour, at the posterior part of the membrane, as we sometimes see in children who have subacute catarrh of the middle ear, I have incised usually at once. In such a case the operation is generally free from pain. When, on the other hand, the quantity was not sufficient to cause a marked bulging of the membrane, and when the Eustachian tube was freely permeable, my practice has been to employ inflation, effective treatment of the naso-pharyngeal mucous membrane, general treatment, &c., and this was frequently sufficient.

Most patients have a strong aversion to the operation, and it is as well to avoid it if other treatment will suffice.

If, after a short trial of the treatment just mentioned, improvement was not evident, in consequence probably of the exudation being of a thick, viscid character, and the Eustachian tube being difficult to inflate thoroughly, incision was then resorted to, and the viscid mucus forced out through the opening by means of the air douche; in some cases the aid of forceps was required to ensure the evacuation of the strings of mucus. I believe that in such cases the timely incision may prevent those important and permanent structural changes in the tympanum which form a considerable proportion of that large class of diseases included under the head of chronic dry catarrh of the middle ear. This class of cases, as will be observed from my summary, numbers 291, or about 27 per cent of the total, and presents the most intractable form of ear disease which comes under the notice of the surgeon.

It is well, however, to keep in mind that, as in all other catarrhal affections, exudative catarrhs of the middle ear are not to be dealt with by exclusively local treatment. We may remove the exudation by incising the tympanic membrane, or by frequent use of the air douche, but the tendency to the catarrhal process in the middle ear may continue, with consequent recurrences of the mucous or serous exudation. Hence, general tonic or alterative treatment is often of great importance in fluid exudation into the middle ear, especially when that is of a recurrent character. Lately, a patient came under my notice, whose tympanic membrane had been incised several times, with distinct but transient benefit. The deafness always recurred, and he gave up purely aural treatment, until after the lapse of some time he was advised by a physician, who was not an aural specialist, to try the use of a tonic, composed of strychnia, quinine, and iron, three times a day. To the patient's surprise, after the use of this medicine for a short time, the hearing gradually improved, and ultimately it seemed to be permanently improved, if not completely restored. I mention this instance simply to emphasise what I have pointed out, that it is not always wise to trust to purely surgical and local treatment in such cases.

The *second* class of cases in which I practised incision of the membrane were those of chronic dry catarrh, with no fluid exudation, and where tinnitus aurium was a marked symptom. In some of them, after the incision, I injected alkaline solutions through the Eustachian tube into the tympanic cavity, with the object of stimulating the mucous membrane.

That the fluid injections did reach the tympanum, I had ocular proof, on examining the seat of the incision immediately after the injection. I have also, in some cases, made multiple incisions, especially in the posterior fold of the membrane, in order, by the contraction of the cicatricial tissue, to brace up a too flaccid membrane. Only on one occasion have I divided the tendon of the tensor tympani muscle, in order to relieve most distressing tinnitus in connection with chronic dry catarrh of the middle ear. This was ineffectual in relieving the patient. I may here state that I have never yet succeeded in retaining a permanent opening in the tympanic membrane. This agrees with the recorded experience of most other aural surgeons. On the whole, my experience of cutting operations on the tympanic membrane, *when no fluid secretion exists*, has not convinced me of their great value. They are probably most useful when done to rectify a too flaccid condition of the membrane. In other cases I have sometimes noticed more or less transient improvement in the hearing, or decrease of the tinnitus, but hitherto, in my experience, the operation of incision of the tympanic membrane in chronic dry catarrh has not been at all notably successful.

In a future paper, I hope to give a critical analysis of the largest and most important class of my cases, namely, chronic purulent inflammation of the middle ear, with its consequences, from which we shall be able to deduce important practical, and especially therapeutic, information.

*Scheme in Use in the Western Infirmary for recording the
Cases of Ear Disease.*

AURAL DEPARTMENT.

Diagnosis—R.

L.

No.

Date

Name

Age

Occupation

Residence

History of Affection

Tinnitus

Discharge

Pain

General Health

Family Tendency to Ear Disease

Giddiness

Headache

Articulation

HEARING DISTANCE.

RIGHT EAR.

LEFT EAR.

	Before Treat- ment.	After Air- Bag.	After Catheter.	Before Treat- ment.	After Air- Bag.	After Catheter
Watch						
Whispered Voice						
"Hörmesser"						
Perception by Bones of Head						
Tuning Fork						
Watch						
"Hörmesser"						
Patient's Own Voice						

OBJECTIVE EXAMINATION.

RIGHT EAR.	LEFT EAR.
Auricle Mastoid Ext: Aud: Canal TYMPANIC MEMBRANE	

Cavity of Tympanum
 Eustachian Tube
 Nasal Passages
 Pharynx
 Remarks (Operations—how performed, &c.)

TREATMENT AND COURSE.

DATE.	HEARING DISTANCE.		
	Watch.	Hörmesser.	Whispered Voice.

Table 1. Summary of the data collected during the study.

Year	Month	Day	Time	Location	Species	Count
1998	Jan	15	08:00	Forest	1	1
1998	Jan	15	08:00	Forest	2	1
1998	Jan	15	08:00	Forest	3	1
1998	Jan	15	08:00	Forest	4	1
1998	Jan	15	08:00	Forest	5	1
1998	Jan	15	08:00	Forest	6	1
1998	Jan	15	08:00	Forest	7	1
1998	Jan	15	08:00	Forest	8	1
1998	Jan	15	08:00	Forest	9	1
1998	Jan	15	08:00	Forest	10	1

Table 2. Summary of the data collected during the study.

Year	Month	Day	Time	Location	Species	Count
1998	Jan	15	08:00	Forest	1	1
1998	Jan	15	08:00	Forest	2	1
1998	Jan	15	08:00	Forest	3	1
1998	Jan	15	08:00	Forest	4	1
1998	Jan	15	08:00	Forest	5	1
1998	Jan	15	08:00	Forest	6	1
1998	Jan	15	08:00	Forest	7	1
1998	Jan	15	08:00	Forest	8	1
1998	Jan	15	08:00	Forest	9	1
1998	Jan	15	08:00	Forest	10	1

Table 3. Summary of the data collected during the study.

Year	Month	Day	Time	Location	Species	Count
1998	Jan	15	08:00	Forest	1	1
1998	Jan	15	08:00	Forest	2	1
1998	Jan	15	08:00	Forest	3	1
1998	Jan	15	08:00	Forest	4	1
1998	Jan	15	08:00	Forest	5	1
1998	Jan	15	08:00	Forest	6	1
1998	Jan	15	08:00	Forest	7	1
1998	Jan	15	08:00	Forest	8	1
1998	Jan	15	08:00	Forest	9	1
1998	Jan	15	08:00	Forest	10	1

Table 4. Summary of the data collected during the study.

Year	Month	Day	Time	Location	Species	Count
1998	Jan	15	08:00	Forest	1	1
1998	Jan	15	08:00	Forest	2	1
1998	Jan	15	08:00	Forest	3	1
1998	Jan	15	08:00	Forest	4	1
1998	Jan	15	08:00	Forest	5	1
1998	Jan	15	08:00	Forest	6	1
1998	Jan	15	08:00	Forest	7	1
1998	Jan	15	08:00	Forest	8	1
1998	Jan	15	08:00	Forest	9	1
1998	Jan	15	08:00	Forest	10	1

Table 5. Summary of the data collected during the study.

Year	Month	Day	Time	Location	Species	Count
1998	Jan	15	08:00	Forest	1	1
1998	Jan	15	08:00	Forest	2	1
1998	Jan	15	08:00	Forest	3	1
1998	Jan	15	08:00	Forest	4	1
1998	Jan	15	08:00	Forest	5	1
1998	Jan	15	08:00	Forest	6	1
1998	Jan	15	08:00	Forest	7	1
1998	Jan	15	08:00	Forest	8	1
1998	Jan	15	08:00	Forest	9	1
1998	Jan	15	08:00	Forest	10	1