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SCARLET FEVER OTITIS

*Report on Two Years' Work at the Edinburgh City Hospital for Infectious Diseases.**

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AS the result of direct representation by the Scottish Society of Otology and Laryngology to the Public Health Committee of the Edinburgh Town Council, the latter body, in March 1920, appointed an Otologist to the hospital. His duties were to be as follows:—(1) To visit the hospital three times per week; (2) to see all cases in which ear symptoms were reported; (3) to instigate such treatment as he thought advisable and necessary for these ear cases, with a view to cutting short the otorrhœa and preventing the subsequent chronicity.

As by far the larger number of infectious cases in the hospital are scarlet fever, an operating theatre was arranged as centrally as possible in the scarlet fever block.

Method of Working.

The hospital is visited every Tuesday, Thursday, and Saturday at 10 A.M. Each ward is visited and inquiry made of the Sister in charge as to patients showing, or suspected of having, some ear condition. Fresh cases arising since the previous visit are examined, and the old ones re-examined as to progress. Old cases are not re-examined at every visit unless showing signs of extension of the disease, or other

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noteworthy feature. Notes are kept of all cases from the commencement till the patient is discharged from hospital.

In serious cases the visits are not limited to three per week, and the otologist is always at the call of the superintendent if necessity arises.

Special attention is paid to the mode of onset of the ear condition, as to temperature, pain, and headache, and character of the discharge, if any. The local appearances are also noted at the first and subsequent examinations.

Operations on scarlet fever patients are carried out in the theatre in the scarlet fever block; those on diphtheria patients in the diphtheria theatre; and the operations on measles and whooping-cough cases are performed in a side-room of the Sections.

In this paper it is proposed to deal only with scarlet fever cases, ear complications arising in the other exanthemata being too few to afford any real comparison.

Percentage of Cases:—In the year 1920-21, 158 cases were examined out of a total scarlet fever admission of 1524, *i.e.*, 10 per cent.

In 1921-22, 142 cases were seen out of 2204 admitted, *i.e.*, 6 per cent.

Date of Onset:—*At what Stage of the Fever is Otorrhœa most likely to arise?* In the year 1920-21, the week of onset was noted 136 times in 158 cases. The figures for the consecutive weeks show the first week to be the commonest period in which ear symptoms arise, viz., 42 times; the second, 27; and the third week, 23. The fourth and fifth weeks are almost equal with 16 and 14 respectively. Thereafter the incidence falls to 7 in the sixth week.

In 1921-22, out of 142 cases seen, 40 occurred in the first week, 37 in the second, 18 in the third, and 11 in the fourth. It will thus be seen that the otorrhœa commences most frequently during the first three weeks of the illness, with a marked inclination in the direction of the first week. Nineteen cases had ear discharge on admission; these are included in the first week.

Symptoms:—*Pain; Temperature; Discharge.* — Otalgia, when present, is a reliable signal of ear mischief, although it is not absolutely infallible. In has, on several occasions, been due to peritonsillar abscess. On a few occasions, impacted wax was the only finding. Ear discharge occurred, however, twice as often without pain as with it. And this has led to the

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observation that in the early stages—first and second week—pain is usually complained of, but in the later stages, from the third week onwards, pain is seldom experienced. More will be said of this later, under Adenoids (p. 501). With pain there is usually temperature. As the temperature is of more interest in connection with the presence or absence of mastoid complications, it will be dealt with in that section (p. 502).

Character of the Discharge.—In the majority of cases the discharge was purulent—44 and 33 in the respective years. Twenty-nine times it is described as mucoid or consisting of thick mucus.

Several times the discharge is noted as having a foul odour. Where there is no previous history of discharge (as ascertained by questioning the parents), and from my experience of otitis in diphtheria cases, I now associate the foul odour with diphtheria; I have obtained a positive report from meatal swabs sufficiently often to make it of diagnostic value, to myself at least. The odour on cotton-wool mops can only be described as a penetrating stench.

Local Appearances.—I have found it very difficult to say anything definite regarding the usual changes in the Tympanic Membrane. In the cases where there is no desquamation, it is comparatively simple. Every variation is seen, from the mild catarrh to the red bulging membrane with all landmarks obliterated. In the majority of cases the meatus contains a varying amount of desquamated epithelium. The membrane desquamates, and no amount of syringing will remove it sufficiently to give even an approximate view of that structure. Frequently one sees a tiny pulsating spot in a greyish white mass at the bottom of the meatus. It will be remembered that these notes are written from only two years' experience of scarlet fever at close quarters, but I wish to state that during this time I have *not* seen the tympanic membrane destroyed in a few hours, or even in a few weeks. In every case where a large perforation was sooner or later noted, a history of previous ear discharge has always been obtained. A suggested cause for the destruction of the tympanic membrane over a large area will be put forward later (p. 501).

Situation of Perforation—

	Anterior, etc.	Posterior.	Kidney-shaped.
1920-21	89	10	2
1921-22	49	2	3

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Rhinitis.—Mucopurulent rhinitis and early purulent rhinitis were noted forty-five times altogether in the two years. Its occurrence, however, was not always strictly noted, and therefore stress cannot be laid on this figure.

Adenoids.—If the child was not too ill, adenoids were sought for by palpation at this examination; if not, the possibility of their presence was noted as shown by mouth breathing and pinched nostrils, and they were sought for later. Adenoids were diagnosed 141 times. The otorrhœa in some of these cases dried up and the patients were discharged from hospital without operation. More will be said presently about this.

Treatment.

Paracentesis.—In the early days an attempt was made to perform paracentesis in every case in which the tympanic membrane was observed to be bulging. This was found to be impracticable, firstly, because the writer never does paracentesis without a general anæsthetic (ethyl chloride); secondly, as a result of this attitude it was necessary to obtain parental consent. It entailed sending a special messenger to the parents asking their attendance at hospital in order to give written permission. In favourable cases the paracentesis was done within six hours of observing the bulging drumhead. In some cases, even this was not early enough, as frequently when the patient was placed on the operating table, it was found that the membrane had already ruptured. A study of these cases, along with similar cases which occurred on the days when the hospital visit was not made, raises the question whether early paracentesis is the *sine quâ non* it is represented to be? The drumhead ruptures so easily and readily in children, and the period of pain is so short, that one cannot be dogmatic regarding early paracentesis. If adenoids were present they were removed at the same time as the paracentesis. The anæsthetic used was ethyl chloride.

Conservative Treatment.—This was carried out by the wet method in the usual way—instillation of H_2O_2 and regular syringing, the frequency varying with the amount of discharge.

Further Operative Treatment.—The writer must confess that he took up this work with the preconceived belief that the removal of adenoids, if present, was the surest method of curing the otorrhœa and preventing subsequent chronicity. He has acted upon this in his practice. Adenoids, and, as a

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rule, the tonsils also, have been removed in otorrhœa cases at the earliest date on which the physician in charge considered the child fit for operation. The results have shown that the average duration of the discharge after the removal of tonsils and adenoids is fourteen days. Thereafter, the ear has remained dry and the perforation has healed. The procedure up to this time has never failed in primary otorrhœas. A few cases with a history of previous discharge have failed to respond, but the majority of these have become dry. A high percentage of primary cases are dry in seven days. The rule at the Edinburgh City Hospital has been that no case of scarlet fever with otorrhœa was allowed to leave hospital with the ear discharging. The average stay in hospital of such cases, in the pre-operation period, was sixty-eight days in 1919. In 1920, the average duration was reduced to sixty-two days, and in 1921, it was still further reduced to fifty-two days.

Otorrhœa associated with adenoids dries up occasionally under conservative treatment, but the result is only temporary. Sooner or later the ear commences quietly and painlessly to discharge again, and so the vicious circle continues. This factor, in the writer's opinion, is the most important cause of the eventual destruction of a large area of the tympanic membrane in scarlet fever cases. Painless onset of otorrhœa at any stage of the fever is diagnostic of adenoids.

So strongly does one feel that the nasopharynx is the primary seat of otorrhœa in scarlet fever, that one would lay it down as an axiom that every case of scarlet fever in which adenoids are present, whether disclosing otorrhœa in hospital or not, should have the adenoids removed before leaving hospital, for otorrhœa is liable to develop with the first rhinitis the child acquires after leaving hospital. This has been proved over and over again. The writer is otologist to four ear clinics in Edinburgh and Leith. Parents are instructed to report to the most convenient clinic should ear symptoms arise, so that he is able to keep the children under further observation. At these centres cases have been seen which did not disclose otorrhœa while in Colinton Hospital, and yet they developed it within a month of discharge from hospital. One or two of them have been responsible for "Return Cases." Such is human nature, that parents who refused permission for operation at the City Hospital bring their children to the voluntary hospital for advice and treatment—presumably to consult a proper ear

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specialist at the voluntary hospital rather than at the "rate-paid" one.

It has been suggested that a fever hospital, with its virulent infections, was the least desirable place to leave a raw surface in the nasopharynx or oropharynx. Careful note was kept of the temperature, etc., after all tonsil and adenoid operations. On one or two occasions on the evening of operation the temperature rose to 100, but was normal next morning. In no case has there been any untoward occurrence. Cases heal rapidly and well.

Every patient was given a prophylactic dose of 500 units of diphtheria antitoxin before operation. They have been kept in the general ward and no effort has been made to segregate them in a side or special ward.

The instruments used were Sluder's enucleating guillotine and the Gottstein adenoid curette. General anæsthesia with ethyl chloride was administered.

I am inclined to think that operation should be carried out earlier than has been done, and I hope to do so in future. There is a difficulty in a rate-paid hospital that does not exist to the same extent in the voluntary hospital. Patients go voluntarily to the Royal Infirmary, but they are forced into Colinton by Act of Parliament. It is therefore necessary to hasten slowly and prove every point as one goes along. This will be more readily appreciated by the staffs of rate-paid hospitals.

Mastoid Complications.

Out of a total of 300 scarlet fever otorrhœas examined, 21 (7 per cent.) developed a mastoid complication. Of these, 10 had an extension of the disease, involving exposure of the lateral sinus; that is to say, when the mastoid cortex was removed, the lateral sinus was found exposed to a greater or less extent, and its wall more or less altered in appearance. On two occasions true perisinus abscess was encountered, where on the removal of apparently healthy bone a collection of pus under pressure escaped from around the sinus. Only one case of meningitis was observed and infection by way of the middle ear cleft in this case was doubtful.

Generally speaking, two types of mastoid complication were met with in practically equal numbers: (*a*) developing in the third week of the otorrhœa with pain, tenderness, œdema and

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usually a rise of temperature, on the average 101°—here a small quantity of pus was found in the antrum and the whole mastoid process intensely inflamed; (*b*) developing later in the otorrhœa, fourth or fifth week, usually quietly, without pain or tenderness, until the subperiosteal abscess appeared. Even then, temperature, as a rule, was absent. In these cases the mastoid process was an abscess cavity containing pus and small sequestra, only to be compared with cracked ice melting in a cup. When this was removed the sinus wall not uncommonly was found bathed in it. From three of the cases operated on, I have come to the conclusion that it is well to remove bone wide of apparent disease. Failure to do this in early cases delayed healing, and in one case necessitated a second operation for removal of sequestra. In no case was it necessary to perform the radical or modified radical operation.

Temperature.—Increase of temperature when present gives a reliable indication, but its absence does not necessarily imply absence of extensive disease.

Technique.—The simple mastoid operation was carried out in the ordinary way. When all macroscopically diseased bone had been removed, the cavity was thoroughly swabbed with methylated spirit. B.I.P.P. was rubbed into the bony surface and all excess removed. Iodoform worsted was lightly placed in position and the skin wound sutured with the exception of the lower angle. A few sterile swabs were placed over the wound and kept in position by a rubber bathing cap while the adenoid operation was performed. The first dressing with removal of stitches was undertaken on the fifth or sixth day, and, thereafter, daily dressing was the rule.

Removal of Adenoids.—Adenoids, when present, were removed in every case at the end of the mastoid operation. The method employed is as follows:—When the actual bone operation is finished and the wound is undergoing treatment with spirit and B.I.P.P., the anæsthetist is requested to stop the anæsthetic. By the time the wound is treated and the necessary stitches inserted, the patient is sufficiently "out" to have the adenoids curetted without fear of the cough reflex being absent. The temporary dressing being in position the patient is moved to the end of the table, and with the head hanging, the adenoids are curetted. The tonsils are not touched at this operation even should they require removal. Up to the present time there have been no untoward occurrences resulting from this

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method. On an average healing has taken place in three weeks with restoration of the hearing.

Bacteriology.—In practically every case the pus from the mastoid abscess has produced streptococcus on pure culture. In one case the pneumococcus was isolated, and one case was reported sterile.

Case Report.—The intracranial complication (meningitis) is reported in full :—

J. F., male, aged 9. Otitis media (left) arose on the eleventh day of disease.

29/1/21.—Pain in the left ear complained of; *L.T.M.* pinkish but not bulging; patient hears a whisper at 4". There is considerable post-nasal obstruction; enlarged submerged unhealthy tonsils; probable adenoids but no discharge from the ear.

2/2/21.—Discharge from the left ear commenced yesterday, very profuse; slight tenderness over the mastoid; thick mucoid pus. Perforation not seen.

23/2/1.—*L.T.M.* there is pulsating pus in the meatus; discharge is copious. There is no bulging of the membrane. The perforation is central—about the region of the umbo. The fauces are red.

26/2/21.—Pulse rate is fast. Temperature rose to 102, dropped to 99.6, rose to 102, and remained up for eight hours. Temperature commenced to rise a week ago and it has been gradually rising since. Left meatus contains thick mucoid pus. There is a little fullness of the posterior quadrant. The tongue is very dirty.

28/2/21.—Temperature rose to 104 yesterday. To-day it is 102. Left meatus is full of pus.

2/3/21.—There is still a good deal of discharge in the meatus. The temperature is swinging between 103 and 102—never below 101.

3/3/21.—The temperature suggested a meningitic condition; definite neck rigidity was found. Kernig's sign was present on both sides. Blood count as follows :—Total reds, 6,100,000; total whites, 24,000; polymorphs, 62.3 per cent.; lymphocytes, 35.3 per cent.; mononuclears, 1.3 per cent.; eosinophyls, 1 per cent. There has been no complaint of headache at any time; no vomiting; no irritability. The patient has at all times been perfectly lucid. Lumbar puncture was performed and the cerebro-spinal fluid was discovered to be under tension and cloudy. Fehling-reducing substance was absent. Organisms were found in the fluid, but they were all intra-cellular. It was decided to operate as soon as consent could be obtained. The usual incision was made. A thick cortex was quite unaltered, but on removing it the bone was found to be soft. There was a certain amount of muco-purulent secretion in the antrum and in some cells,

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including the tip cell. The surface of the tip of the mastoid was soft. There was no macroscopic connection between the mastoid process or antrum and the posterior fossa. The sigmoid sinus and cerebellar dura mater were exposed by operation. The sinus was healthy. The cerebellar dura was tense; it was incised. Cerebro-spinal fluid and some blood flowed at once. Before incising the dura mater the cavity was thoroughly cleansed with hot boric solution which produced the normal labyrinthine reaction. Thereafter the cavity was soaked with spirit and thoroughly bipped. The wound was lightly packed and left open. Instructions were given regarding lumbar puncture and anti-streptococcic serum.

Cerebro-spinal Fluid.—Direct film. A slight yellow deposit contained pus cells and gram-positive streptococci, mostly intracellular. Culture: a good growth of streptococci but the arrangement in chains not so typical as in direct film.

Patient died at 6 P.M.

In conclusion, I wish to acknowledge my indebtedness to Dr C. B. Ker, Superintendent, Edinburgh City Hospital, for much friendly help and encouragement, and to Drs A. Logan Turner and J. S. Fraser for suggestions and help as to the lines on which the present investigation should be carried out.

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