

extreme cases I have found it better to cut away the lower part of the nasal process and thus slightly encroach on the anterior antral wall, so as to gain a freer nasal passage, care being observed to avoid any unnecessary removal of the mucous membrane, which might, of course, lead to a cicatricial narrowing sufficient to neutralise any temporary widening thus obtained.

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### **DIRECT TREATMENT OF THE EUSTACHIAN TUBE, WITH ANALYSIS OF RESULTS IN 71 CASES.**

BY J. WALKER WOOD.

IN a previous paper published in this JOURNAL (9) I made a short study of some of the pathological conditions affecting the Eustachian tube and briefly recorded the findings in 650 cases. Since that paper was written I have examined fully 500 more cases with the naso-pharyngoscope. I now propose to record my personal experiences of the direct or indirect treatment of the Eustachian tube. It is to be understood that much of this work was purely experimental with the object of demonstrating the value or otherwise of a new method of treatment. The experience now gained in the use of this instrument leads me to express the opinion that in the naso-pharyngoscope we have a valuable instrument of exact investigation—a fact not as yet sufficiently appreciated. It is a simple instrument if used in a dexterous and successful manner, but it has certain disadvantages. These are: (1) slight magnification which may cause misinterpretation of the pathological picture. (2) Limitation and distortion of the area under examination, causing the posterior lip of the tube to appear nearer to the eye of the observer than the anterior. (3) Operative manipulations upon the tube are rendered somewhat difficult owing to the magnification and distortion thus described. (4) Operative manipulations upon the tube, if carried out frequently (*i. e.* more than once or twice a week), are liable to cause a distressing rhinitis.

In order to overcome the difficulties of treatment with the Holmes' instrument, I experimented with Hays' pharyngoscope, Yankauer's speculum, and Gyergyai's instrument. My experiments seem to show first that for diagnosis and most cases of treatment Holmes' instrument cannot be excelled; secondly, Yankauer's speculum is the more valuable instrument in direct treatment of the tube when it can be used, but is much less useful in diagnosis. Only 35 per cent. of cases can be treated by the direct method of

Yankauer's (Yankauer's speculum), the others by the indirect method of Holmes (nasopharyngoscope and Eustachian applicator).

The pharyngoscope, with its brilliant illumination, while enabling one to obtain a beautiful picture of the nasopharynx as a whole, I have found to be impracticable in the treatment of the tube. Gyergyai's instrument I first used at the time of the International Congress of Medicine (August, 1913) under the supervision of its inventor. Later I obtained an instrument, but found it less satisfactory than Yankauer's—its introduction is more difficult and the stretching of the palate is greater; also the leverage required to bring the mouth of the Eustachian tube into position for treatment is likely to cause distortion and be misleading. Patients complained more with this instrument, a complaint with Yankauer's speculum being rare if suitable cases are chosen.

Literature on the subject is already growing, and before recording my own experiences of direct treatment, I will briefly review the more important work already done.

Gyergyai in 1910 was the first to experiment with straight tubes in the direct examination of the Eustachian tube and nasopharynx, and to record his experiences. In a later article (17), February, 1913, he describes a new method of dilating the orifice and tube as far as the isthmus, by means of a dilator devised by himself. Gyergyai records six cases, five of which presumably are cases of chronic middle-ear catarrh (although not definitely stated to be such by the author), one a chronic middle-ear suppuration—active in one ear, residual in the other. In all of these cases a strikingly great improvement resulted from dilatation, but the writer does not state if his results were permanent.

Holmes (1) is of the opinion that 90 per cent. of ear cases are due to diseases in or about the Eustachian tube. Tinnitus, he says, is frequently due to the pressure of an enlarged inferior turbinal upon the anterior lip of the tube, or may be due to adhesions in Rosenmüller's fossa. Remove the posterior end, or break down the adhesions, and the tinnitus will go. Braislín (2) also found tinnitus was very often due to tubal swelling, or adhesions in the fossa of Rosenmüller. He recommends "blood-letting" by multiple incisions made in the mouth of the tube, or painting the tube with a 5 per cent. solution of silver nitrate, and breaking down the adhesions in the fossa with the finger while the patient is under an anæsthetic. A similar procedure to the last was recommended some years ago by Emerson (3), who records eleven cases in all of whom bands or degenerated adenoid masses or granules were

present in Rosenmüller's fossa. Of these eleven cases, seven were cases of chronic dry catarrh of the middle ear with tinnitus. In five cases the tinnitus was cured and was improved in two as a result of his operative procedures. Those cases which were slightly deaf were greatly improved, but those markedly deaf remained *in statu quo*. The two other cases were those of chronic middle-ear suppuration, both of over two years' duration. Recessal adenoids present. Rapid, permanent cure in both after removal.

In summary at the end of his paper Emerson arrives at the following conclusion as to the effect of treatment. He says: "Results when after-treatment is followed are particularly good in removing abnormal sensations, restoring uniform hearing without fluctuations, in the partial or complete relief of tinnitus and in the prevention of recurring salpingitis."

Holmes (4), in a later article, tabulates the effect of treatment of the Eustachian tube in eighteen cases of chronic otitis media (dry catarrh). A study of the table shows that in 8 cases the hearing was improved, in 5 greatly, by treatment. Of those 8, 5 exhibited some pathological condition of Rosenmüller's fossa, either in the form of bands, adenoid granules or adenoid remains. The other 3 were typical examples of the catarrhal conditions affecting the Eustachian tube, a class of case also amenable to treatment, although not giving results as good as those in which bands, etc., are present.

With regard to the tinnitus in these 18 cases, as a result of treatment 6 were cured and 8 were not. Briefly, then, the effect of treatment was, first, *deafness*, 18 cases treated, 8 improved, 10 unaltered; second, *tinnitus*, 14 cases treated, 6 cured, 8 unaltered.

Usually, the tinnitus is more responsive to treatment than the deafness, and in those cases where bands or adenoid granules are found in Rosenmüller's fossa one may safely give a favourable prognosis. This is also the experience of Yankauer (5), who quotes six cases of tinnitus without deafness due to excessive secretion in Rosenmüller's fossa. Four of those cases were permanently cured of the noises in the head by the direct treatment of that recess.

#### ATROPHIC SALPINGITIS.

The atrophic conditions of the Eustachian tube proved the most unsatisfactory in my hands so far as treatment is concerned. In some cases it is true the tinnitus has disappeared and the deafness has been temporarily improved, but generally any improvement has been evanescent. The class of case to which I refer is that in

which there is an atrophic patulous Eustachian tube with a thin, dry and bloodless mucous membrane, possible atrophy of the intratympanic structures and substance of the drum itself, which usually is unduly mobile, though it may be partially fixed together with ossicular ankylosis. These patients are usually markedly deaf and complain of distressing tinnitus. The treatment adopted in these cases has been an endeavour to improve the local blood-supply and to stimulate the inactive mucous membrane. For this purpose I have given three preparations a careful trial. They are: Iodine Vasogen 6 and 10 per cent., Mandl's pigment, and Dionin 2 per cent. The last preparation (Dionin) has been highly recommended by Dr. Randall, of Philadelphia (6), for the treatment of otosclerosis and the chronic adhesive processes affecting the middle ear. In this connection I may mention that an atrophic, widely open Eustachian tube is usually found in otosclerosis. Altogether twelve cases were treated for one month by these three different methods. In each case the mouth of the tube and the tube itself was painted as far as the isthmus every second day and a small quantity of the medicament injected into the middle ear. In addition a small dose of pot. iodide twice a day was prescribed for each patient.

The results are now given in tabular form:

	Iodine Vasogen 6 per cent. increased to 10 per cent.	Mandl's pigment.	Dionin 2 per cent.
(a) Tinnitus.	* 3 cases greatly improved; 3 slightly improved; 6 unaltered	6 cases treated are unaltered	† 2 cases tinnitus increased; 4 unaltered.
(b) Deafness.	2 cases slight temporary improvement; 10 unaltered	Unaltered in all†	1 case greatly improved; others unaltered.‡

\* Two of these three cases have since relapsed (February, 1914).

† Later these cases returned to their normal condition.

‡ In many of these cases recorded as unaltered a slight improvement was noticed immediately after treatment, an improvement frequently showing an increase of as much as 10 inches for the hearing distance of the watch. In one or two cases this continued for about twelve to fourteen hours, the usual duration being only a few hours. In none was the effect permanent.

#### ACUTE SALPINGITIS.

From the position of the pharyngeal ostium of the tube, it is obvious that any inflammatory condition of the mucous membrane of the nose, post-nasal space or pharynx, must be particularly liable to spread to that of the tube, and later the middle ear, setting up an acute otitis.

No.	Name.	History.	Ear.	Eustachian tube and fossa.	Treatment.	Result.
1	Miss T —	Attacks of pain in ear and throat. "Stuffy" in ears. Duration: off and on for 1 month.	No sign of inflammation. Anterior segments of drum fixed. Marked deafness. Watch: 3 in. acoumeter: 12 in.	Acute salpingitis. Posterior lip granular. Mucus in mouth of tube. Adenoid remains in fossa. Eustachian obstruction	Fossa curetted. Tube painted with argyrol up to 40 per cent.	Cured. Hearing impaired.
2	Mrs. B — (Canada)	Cold in head 5 days ago. Pain in ear for 1 day	Drum normal. Slight redness of Shrapnell's membrane radiating down malleus. Tinnitus. "Stuffy feeling" in ear	Acute salpingitis. Mucus in tube. Eustachian obstruction. Mucopus in Rosenmüller's fossa	Tube painted with argyrol 40 per cent. every second day for 2 weeks	Complete cure and relief of tinnitus.
3	Mr. A —	Earache for 3 days. No cause known	Drum normal in appearance. No redness. Ear is described by patient as "feeling bunged up"	Acute salpingitis	Tube painted with argyrol, 40 per cent., every second day	Cure
4	Mr. P —	"Caught cold" 14 days ago. No trouble with ears before	Slight deafness and pain. Cracking in ear when swallowing. The mucous membrane of middle ear inflamed; shows through drum. Tinnitus	Acute salpingitis. Eustachian obstruction	Tube painted with argyrol 30 per cent. every second day	Cured.
5	Mr. B —	Awakens in morning with pain in ear and throat. Recent nasal obstruction	Drum catarrhal. Slight deafness and full feeling in ear. Tinnitus	Acute salpingitis. Post-nasal catarrh	Nasal obstruction. Turbinal relieved by cautery. Tube painted with argyrol 40 per cent. frequently. Post-nasal swabbing with zinc chloride 15 gr. to oz.	Cure and relief of tinnitus.
6	Mr. A —	Deafness and pain in left ear for 14 days; no cause known	The mucous membrane of tympanum shines through drum. Redness of Shrapnell's membrane. Eustachian obstruction and tinnitus. Later fluid exudation in tympanum. Watch: 1 in. Whisper: 6 in.	Acute salpingitis. Exudation in mouth of the tube. Fossa congested and swollen, but no bands or adenoids	Tube painted with increasing strengths of argyrol up to 40 per cent. Duration of treatment 6 weeks	Cured. Watch now heard at 3½ feet and whisper at 8 feet.
7	Mr. F —	Tonsillitis followed by pain in ear. Duration of "earache" 3 weeks	Acute otitis. Later, fluid in ear	Acute salpingitis. Tube swollen, inflamed; mucous discharge. Eustachian obstruction	Tube painted with argyrol 30 per cent. Rest in bed, fomentations	Became chronic and later developed acute mastoiditis.

No.	№	History.	Ear.	Eustachian tube and fossa.	Treatment.	Result
8	Dr.	Old case of chronic dry catarrh. At frequent intervals has attacks of pain in the ear and throat, worse at night. Hearing permanently worse after attacks	Drum indrawn, reddened, slight amount of serous exudation in tympanum. Tinnitus.	Acute salpingitis. Tube much congested and swollen. Granular condition of the lateral fossa. Eustachian obstruction	Fossa curetted, and painted with zinc chlor. 30 gr. to 1 oz. Tube painted with argyrol 30 per cent. every second day	Cured. Attack last 3-4 weeks present. Patient was well in ear. Has had no trouble for 3½ months (1914).
9	M. M.	"Cold in the head" 7 days ago. No previous ear trouble	Acute otitis. Small perforation. Tinnitus	Acute salpingitis. Adenoids in fossa. Eustachian obstruction	Adenoids curetted. Argyrol 30 per cent. Tube painted every second day for a fortnight	Cured. Healed. Perforation.
10	Mrs.	Sore throat 1 month ago. Pain in ear for 2 days. Perforation. Discharge. No pain now	Small perforation in postero-superior quadrant of membrane. Profuse watery discharge	Acute salpingitis. Discharge in mouth of tube	Tube painted every second day with argyrol 40 per cent. and a small quantity injected through catheter into middle ear	Cure. Perforation healed. Healed. Perforation.
11	Mr. J.	Three weeks ago had a "sore throat," followed by pain in the ear and throat. Suppuration in this ear, right, in childhood. Radical mastoid operation (left ear) in 1903	Old perforation behind malleus. Profuse discharge of thin watery fluid. Acute otitis. No pain now. Tinnitus	Acute salpingitis. Profuse muco-purulent discharge from ear. Hypertrophy of the mucous membrane of the post-pharyngeal wall	Tube painted with argyrol 30 per cent. Argyrol also injected through catheter into middle ear. Local treatment for ear.	Treated for 2 weeks without improvement. Became operative.
12	Miss	Pain in left ear for 2 days, then free discharge. Has had trouble (discharge) with this ear before	Acute exacerbation of chronic middle ear catarrh (suppurative). Perforation in Shrapnell's membrane. Free discharge	Acute salpingitis. Exudation in mouth of tube	Tube painted with argyrol 40 per cent., and a small quantity injected into tympanum. Repeated twice a week	Perforation healed in a fortnight.
13	Miss	Pain and cracking in left ear. Followed "cold" 3 weeks ago	Drum indrawn, no sign of inflammation. Inflation sound, indicated gumming together of walls of tube	Acute salpingitis. Very intense. Some small petechial hemorrhages in mouth of tube	Tube painted at first with zinc, 30 gr. to 1 oz., later argyrol, 30 per cent., twice a week	Complete relief and tinnitus

The inflammation may be limited to the tube itself (Cases 1, 2, 3, 13), or may involve the mucous membrane of the middle ear as well (Cases 4, 5). Later secretion may be thrown out (Cases 6, 7, 8), and ultimately the drum may perforate (Cases 9, 10, 11, 12). The symptoms are fully given in the table and explain themselves. With regard to results, 13 cases were treated; 9 were cured, although 2 resulted in impaired hearing (Cases 1 and 10). Two cases were complete failures. My results are very similar to those of Holmes (7), who treated 11 cases with 2 failures. (See pp. 120, 121.)

#### CHRONIC SALPINGITIS.

Cases of chronic salpingitis are very frequent. I consider that a chronic primary inflammation of the Eustachian tube is one of the principal ætiological factors in the production of dry middle-ear catarrh, and as such its importance cannot be exaggerated.

Cases of chronic salpingitis may be divided into two main groups: (1) Primary, and (2) secondary.

(1) Primary: A chronic catarrhal inflammation of the Eustachian tube arising by way of the naso-pharynx, spreading to and, later, affecting the middle ear. This group of cases can be further subdivided into (a) inflammation with excessive secretion, *i. e.* the early cases of chronic catarrhal salpingitis; (b) inflammation without secretion, *i. e.* a later stage of the form just mentioned and one usually preceding atrophic salpingitis; (c) chronic inflammation with bands or adhesions in Rosenmüller's fossa.

#### *Treatment of Chronic Catarrhal Salpingitis.*

The mouth and tube were painted every second day with a solution of one or other of the following preparations. Zinc chloride 30 gr. to oz., silver nitrate solution 1-16, argyrol 15-40 per cent., the choice depending on the amount of inflammation and the effect of the previous application. Applications were made every second day by means of the naso-pharyngoscope and Eustachian applicator. Small quantities of the various solutions were in many cases forced up the tube to the tympanum, but in no instance was a reactionary inflammation of the middle ear produced. The results of treatment in 24 cases are now given:

(A) Hearing improved by amounts varying from 15 to 100 per cent. and tinnitus cured, 10 cases. In 3 cases fibrous bands in fossa removed with the curette.

(B) Hearing improved, tinnitus unaltered, 2 cases.

(C) Tinnitus improved, hearing unaltered, 2 cases.

(D) No alteration in either, 6 cases; 1 case bands in fossa removed.

(E) Cases still under treatment, 4. One case bands in fossa removed.

*Chronic Salpingitis with Bands or Adhesions in Rosenmüller's Fossa.*

These cases I consider are of sufficient importance to justify separate consideration. According to Roget (8) adhesion of the Eustachian tube with the posterior pharyngeal wall is a frequent cause of adhesive changes in the tympanic cavity. From my recent observations I doubt very much if this is so. A more likely supposition is that in those cases in which bands are found in the fossa and an adhesive process in tympanum, the causes responsible for one are also responsible for the other. The two conditions usually go together, and it is unusual to find one without the other (9).

Although possessing no absolute proof at present, I believe that in all cases of chronic salpingitis and middle-ear catarrh with adhesions a chronic microbic infection is present of a similar nature to that responsible for chronic rheumatism. The two diseases have many points of resemblance, some of which I just mention.

(i) Those countries in which chronic rheumatism is most prevalent are also those in which chronic middle-ear catarrh is, viz. Holland, Germany, Norway, Switzerland, and locally in some parts of Great Britain (10).

(ii) Both conditions are more common in women than men.

(iii) Acute rheumatism predisposes to chronic as does acute middle-ear catarrh to chronic.

(iv) The course of the disease and its results are similar, *i. e.*—inflammation, pain, effusion, adhesions and disability.

(v) Chronic rheumatism has been demonstrated to be due to infection arising from the throat (11), and rheumatoid arthritis from the teeth (12). Why not middle-ear catarrh from the naso-pharynx?

(vi) Both conditions are peculiarly liable to be affected by the weather; sufferers with middle-ear catarrh are more deaf in the damp weather, and rheumaticky people stiffer.

Further consideration will, no doubt, recall many other points of great similarity.

Adhesions in Rosenmüller's fossa and bands in the naso-pharynx



are by no means uncommon. In the fossa these bands may be single or multiple, firm or mere delicate threads, or the whole fossa may be obliterated by a fibrous web. In the naso-pharynx fibrous bands may extend from the lateral walls to the Eustachian cushions, or from the cushion to the posterior extremity of the inferior turbinate, or from one Eustachian eminence to the other (13) or right across the pharynx from one lateral wall to the other. The posterior edge of the septum may also be continued outwards into the post-nasal space by a sickle-shaped fibrous expansion dividing at its lower extremity, one limb passing to each Eustachian eminence. In the mouth of the tube bands or webs are rare; I have only seen one case. Probably the large naso-pharyngeal bands, and in some instances the symmetrical bands found in Rosenmüller's fossa, are developmental, but in the majority of cases the bands found in the fossa are post-inflammatory adhesions. Syphilitic scars, scars from operations (removal of adenoids) and traumatism excluded.

*Treatment.*—In all cases it is advisable to clear out the fossa, as firm bands in this region must have an influence in causing Eustachian insufficiency. In five cases this has been done. It is difficult to estimate the value of this proceeding alone, as in all cases treatment directed to the catarrhal condition of the tube has also been instituted. The results, therefore, are included in those of the treatment of chronic salpingitis.

(2) Secondly: A catarrhal inflammation of the Eustachian tube arising from or kept up by the passage of septic irritating matter passing from the middle ear to the naso-pharynx.

Chronic suppurative otitis media is a frequent cause of chronic salpingitis which in turn may become suppurative. The chronic inflammatory condition of the tube aggravates or maintains the suppuration in the middle ear, which in its turn increases the tubal inflammation and a vicious circle is established. Suppuration continuing about the tympanic orifice of the tube after a mastoid operation is frequently observed. If in these cases a naso-pharyngoscopic examination is made the mouth of the tube will be found to be swollen, containing pus or muco-pus. The floor of the tube is usually red and granular, like raw beef, and in extreme cases may even be ulcerated or covered with granulations. Direct treatment of the mouth and lumen of the tube is generally most satisfactory, and I have found in these cases that if the vicious circle is broken by the application of a weak solution of silver nitrate 1 in 16, or argyrol 30 per cent. and the injection of a small quantity within the lumen of the tube, the suppuration rapidly ceases.

No.	Name.	History.	Ear condition.	Naso-pharyngoscopic examination.	Treatment.	Result.
1	A. B.—	Mastoid operation 18 months ago	Ear still discharging. Granulations in lower part of mastoid cavity	Large granulation found in mouth of tube	Granulation in mouth of tube removed by aid of nasopharyngoscope and Eustachian forceps. Tube painted with zinc chlor. and injected. 6 applications and injections only Tube painted and injected with argyrol 30 per cent. twice a week. Under treatment 2 weeks	Cure. Cessation of discharge.
2	Mr. M.—	Radical mastoid operation in 1910	Free discharge from tympanic portion of mastoid cavity	Pus in mouth of tube. Chronic salpingitis	Tube washed out and painted with argyrol 40 per cent. 3 times a week for six weeks Tube painted with argyrol and middle ear irrigated <i>per tubam</i>	Still discharging. Under treatment.
3	Miss E.—	Mastoid operation in 1906 for chronic supuration of 8 years' duration	Kidney-shaped perforation around malleus Mucoid discharge	Chronic salpingitis		Cured. Discharge rapidly lessened and perforation closed.
4	Miss Mc'L.—	Mastoid operation in May, 1913	Perforation small below umbo. Profuse mucopurulent discharge	Chronic salpingitis		Cured. Rapid lessening of discharge and healing of perforation by August, 1913. Ear dry, but perforation not healed.
5	Mr. B.—	Radical mastoid operation in November, 1912, for cholesteatoma	Discharge free. Accumulations of inspissated pus removed weekly	Pus in mouth of tube. Chronic salpingitis	Tube painted, and middle ear irrigated with argyrol, silver nitrate, zinc chlor. twice a week for 4 months	
6	Miss T.—	Pain in left ear for 2 days, then discharge. Discharge intermittent all her life	Medium-sized perforation behind malleus This drum perforated for many years	Chronic salpingitis. Adenoids in Rosenmüller's fossa	Fossa curetted. Tube painted with argyrol 30 per cent. for 1 month	Cure. Discharge ceased and perforation closed.

No.	Name.	History.	Ear condition.	Naso-pharyngoscopic examination.	Treatment.	Result.
7	Mr. W---	Chronic suppuration of the middle ear many years (both ears)	Right ear, large perforation behind malleus. Left ear, attic perforation. Discharge in both ears small in amount	Chronic salpingitis (both sides)	Both tubes painted regularly and tympanum injected with argyrol 30 per cent.	Cure. Right ear quite dry in 3 months, and perforation healed. Left ear, no discharge, but still a perforation.
8	Mr. M---	Radical mastoid operation in 1906 for chronic suppuration after scarlet fever	Tympano-mastoid cavity contains inspissated pus	Chronic salpingitis. Pus in mouth of tube. Adenoids in fossa	Adenoids removed. Painted tube and injected tympanum with argyrol 30 per cent.	Mastoid cavity not quite dry yet. Discharge now only mucoid. Under treatment.
9	Mr. F---	Radical mastoid operation December, 1912, for chronic suppuration of 10 years' duration	Débris and pus in tympano-mastoid cavity	Adenoid remains in fossa. Chronic granular salpingitis	Fossa curetted. Tube painted and cavity injected with argyrol 30 per cent.	Under treatment.
10	Mrs. H---	Right ear, acute middle-ear suppuration, then mastoiditis. Operation, April, 1912	Perforation in drum high up behind malleus. Intermittent discharge. Drum red	Chronic salpingitis. Adenoid remains in fossa	Adenoids curetted. Tube painted and tympanum injected with argyrol 30 per cent. for 2 months.	Cured. Ear dry and perforation closed.

The danger of re-infection of the mastoid cavity from the naso-pharynx has led many otologists to devise methods to ensure the sealing up of the Eustachian tube, and one of the newest is that devised by Yankauer (15), who claims to be able to cure 60 per cent. of cases of chronic middle-ear suppuration by closure of the Eustachian tube without mastoid operation. It is obvious that so long as the Eustachian tube is patent, there is an ever-present danger of naso-pharyngeal infection spreading to the ear or mastoid cavity, but whether or no closure of the tube alone is sufficient to arrest a suppurative middle-ear process I am unable to judge, not having tried Yankauer's method.

The result of treatment in ten cases is appended in tabular form giving full details. It will be seen that arrest of suppuration was brought about in 7 of the 10 cases. The other 3 cases are still under treatment and are steadily improving. (See pp. 125, 126.)

#### TREATMENT OF AFFECTIONS OF NEIGHBOURING PARTS.

By neighbouring parts are included those areas or structures bordering on or in some way related to the pharyngeal ostium of the Eustachian tube, and included in this section are the following conditions :

- (1) Enlarged posterior ends inferior turbinals. Hypertrophic salpingitis. Polypoid degeneration of inferior turbinals. Post-nasal polypi.
- (2) Adenoid remains in Rosenmüller's fossa; bands; adenoid granules; degenerated adenoid masses (granular).
- (3) Accessory sinus conditions.
- (4) Varicose veins about the mouth of tube.

#### (1) *Turbinal Conditions.*

I am quite of the opinion of Holmes that hypertrophy of the posterior end of the turbinate plays a much more important part in causing Eustachian insufficiency and its resulting otitis than deposits in the anterior part of the nose. The frequent association of tinnitus and an enlarged or polypoid posterior end pressing upon the anterior lip of the Eustachian tube is too common an occurrence to pass without notice. In some of these cases there seems to be a process of general hypertrophy of the mucous membrane of the post-nasal space, for besides hypertrophy of the inferior turbinal, (usually bilateral), there may be, and often is, hypertrophy of the cushion of the tube; of the mucous membrane of the roof and posterior pharyngeal wall, and also of the posterior edge of the

nasal septum. There may be hypertrophy of the cushion of the tube without other structures being involved, as there may also be inferior turbinal hypertrophy without involving the cushion and other structures, and with no aural symptoms whatsoever.

In these cases of general hypertrophy the Eustachian tube is always narrowed, the middle ear catarrhal in the early stages, and in the later sclerosed with partial fixation of the drum and ossicles from an extension of the process of hypertrophy to the tympanic cavity. Politzer (14) has observed that fatty degeneration of the muscular apparatus of the pharyngeal portions of the tube takes place in cases of old-standing naso-pharyngeal catarrh,<sup>1</sup> and I think it is more than possible that a similar fatty degeneration of the intra-tympanic muscles may take place in the hypertrophic condition of which I am writing.

### *Hypertrophic Salpingitis.*

#### *Case.*

Mrs. A. B——, the wife of a doctor, had been deaf for years from chronic middle-ear catarrh. Drum catarrhal, indrawn and partially fixed. Constant low-pitched tinnitus. Three years ago a submucous resection operation done for a badly deviated septum. So far as the correction of the septal deformity was concerned, the operation was apparently quite successful, but she still continued to complain of nasal obstruction and stuffiness. Inferior turbinals cauterised on several occasions without marked benefit. In February of this year (1913), I examined her with the naso-pharyngoscope and had great difficulty in obtaining a satisfactory view of the mouth of the tube, owing to the swelling of the posterior lips of the tubes. The presence of this swelling was confirmed on using Hay's pharyngoscope, when it was observed that the swelling of the cushion was sufficiently great to encroach upon the posterior choanæ, and to partially block them. There was also a chronic salpingitis. The cushion was much congested and scarlet in colour.

Hearing, February, 1913:

	Right.	Left.
Small watch . . . . .	Contact . . . . .	Contact.
Large watch . . . . .	18 in. . . . .	20 in.
Meatus fork C <sup>1</sup> . . . . .	— 30 secs. . . . .	— 18 secs.
Weber . . . . .	Equal.	
Rinne . . . . .	Negative (both).	

The cushions were painted regularly with argyrol for some considerable time, the method adopted being that with the Yankauer speculum.

An astringent post-nasal paint was also prescribed for daily use by the patient.

My notes on succeeding dates are as follows:

March 17.—“Posterior lips still large, red and inflamed.”

March 31.—“Swelling less. Posterior lip now only size of an ordinary hypertrophy.”

April 14.—“Swelling of cushion is less, now only a little more than normal. Nasal catarrh and breathing better. Hearing greatly improved.”

<sup>1</sup> In this condition hypertrophy of the mucous membrane is the rule.

May 1.—“Cushion normal. Hearing still improving. Drums are now devoid of catarrh.”

August 22.—“After another course of regular painting of cushion and Eustachian tube, tinnitus quite disappeared.”

Hearing:

	Right.	Left.
Small watch . . . . .	6 in.	8 in.
Large watch . . . . .	2 ft.	2½ ft.
Meatus tuning-fork C¹ . . . . .	—10 secs.	—8 secs.
Rinne . . . . .	Negative.	
Weber . . . . .	Equal.	

A somewhat similar case to this has been recorded by E. F. Potter (16), in which the patient complained of a feeling of stuffiness in the nose. On examining the naso-pharynx two large red swellings were seen projecting from the sides of the cavity, obstructing to a considerable extent the view of the choana. The following diagnosis was made: “Abnormally large cartilaginous extremities of the Eustachian tube; anatomical abnormality.”

### *Enlarged Posterior Ends.*

#### *Cases.*

Mr. W —, aged eighteen. Stuffiness in the nose and ears. Occasional tinnitus. Intermittent Eustachian obstruction. Much enlarged “mulberry” posterior ends (bilateral), encroaching and pushing on one side the anterior lip of the tube. Posterior end removed by snaring through the nose. Mouth of tube painted several times with zinc chloride, 30 gr. to oz. Result: relief of symptoms.

Nurse W —, aged thirty-five. Chronic middle-ear catarrh. Tinnitus. Right ear worst. Intermittent Eustachian obstruction right ear. Slightly deaf both ears. Enlarged posterior end on the right side pressing on the anterior lip of the tube. Posterior end was removed by snare through nose and completely relieved the tinnitus. No effect on deafness.

### *Post-nasal Polypus.*

#### *Case.*

Captain W —. Deaf in left ear; duration ten years. Nose blocked; deviated septum to left; accident eighteen years ago. Left membrana tympani indrawn and partially fixed. Naso-pharyngoscope. Large post-nasal polypus extending from choana over anterior surface of the mouth of tube and anterior lip into the mouth proper, which it fills. Polyp arises from inferior turbinate. Tubal area much congested. Varicose veins on anterior lip extending into choana. Under a general anæsthetic deviation of septum corrected by a submucous resection and post-nasal polypus snared. Tube painted (Holmes’ method) after operation with argyrol 20 per cent. daily for a fortnight.

	February 13 (when first seen).	August, 1913 (six months after operation).
Small watch . . . . .	9 in.	18 in.
Large watch . . . . .	2½ ft.	6 ft.
Meatus tuning-fork C¹ . . . . .	—40 secs.	—10 secs.
Weber . . . . .	Referred to left ear.	
Rinne . . . . .	Negative.	

(2) *Adenoid Remains.*

The varied appearances presented are referred to in the writer's previous article in this Journal. The treatment in all cases is the same: removal of all degenerated and diseased tissues.

When limited to the fossa of Rosenmüller, this can easily and expeditiously be carried out under cocaine anæsthesia and with Yankauer's speculum, using a maxillary antrum curette (smallest size) with a flexible stem which can be bent in a direction suitable for each case. The proceeding is painless and there is but little bleeding. Bridges of fibrous tissue can also be removed in a similar fashion. Following removal, I am in the habit of painting the fossa with a weak solution of arg. nit.

Adenoid remains on the roof and posterior wall of the naso-pharynx are ideal breeding-grounds for the particular group of micro-organisms associated with post-nasal catarrh, and no doubt when local conditions are favourable to their growth they are, by extension, the exciting cause of acute salpingitis and otitis (see "Acute Salpingitis"). The occurrence of the so-called "throat organisms" in aural discharges is too well known to need further comment.

*Operation.*—The naso-pharynx should be sprayed with a 10 per cent. solution of cocaine ten minutes before operation. Then, under the direct guidance of the naso-pharyngoscope, the roof and posterior wall should be gently curetted, special attention being paid to all folds, recesses and necrotic areas. Bleeding may be fairly free, and it may be necessary to withdraw the naso-pharyngoscope from time to time as the prism becomes obscured. The post-nasal space in the interval may be advantageously sprayed with a weak astringent solution.

*Results.*—To estimate the value of treatment is well-nigh impossible, for the reason that rarely do these adenoid remains cause characteristic symptoms. They may be, and are, responsible for post-nasal discharges, acute and chronic salpingitis, suppurative and non-suppurative middle-ear catarrh, and tinnitus without deafness (Rosenmüller's fossa).

"Prevention is better than cure," and if by treatment one is enabled to prevent a patient becoming deaf from successive attacks of acute salpingitis and otitis, good is done impossible of statistical estimation. Three typical cases are briefly mentioned although 25 cases have been treated and are referred to in other sections.

*Cases.*

Miss C—, aged forty. Chronic middle-ear catarrh. Constant low-pitched tinnitus. Adenoid remains in fossa. Removed under cocaine anæsthesia with curette and Yankauer's speculum. Tinnitus greatly improved but not cured. Deafness unaltered.

Commander L—, aged thirty-eight. Slightly deaf in both ears. Duration five to six years. Constant low-pitched tinnitus. Left ear worst. Naso-pharyngoscope. Large masses of granular adenoids in each fossa. Left Eustachian tube deformed. Under N<sub>2</sub>O adenoid masses curetted and left tube dilated. Both tubes painted every second day with argyrol 20 per cent. *Result*: Tinnitus cured; deafness much improved, i. e. small watch, increase of hearing distance from ten to twenty-five inches.

*Remarks*: Neither with the finger nor the post-nasal mirror would these adenoid remains have been recognised.

Mr. H—, aged twenty-two. Chronic catarrh of the middle ear (bilateral). Tinnitus severe. Adenoid remains in each fossa. Under cocaine anæsthesia and with Yankauer's speculum, granular remains removed with curette. *Result*: Tinnitus cured. Deafness unaltered.

*(3) Accessory Sinus Conditions.*

While either the maxillary or frontal sinuses may drain into the post-nasal space, it is the sphenoidal with which we are particularly concerned, as it always drains into this area.

In a certain number of cases, by the aid of the naso-pharyngoscope, the orifice of the sphenoidal sinus may be seen and recognised without the removal of the middle turbinate bone, its recognition being greatly aided by the presence of pus exuding from the sinus. The nose is first prepared by shrinking the mucous membrane with a weak cocaine and adrenalin solution. The instrument is then passed along the floor of the nose until the tip reaches the posterior edge of the hard palate, the lens being turned directly upwards. The orifice of the sinus between the middle turbinal and septum will come into view in the lower part of the field of the naso-pharyngoscope. It may be necessary to rotate the instrument a little to right or left.

A sphenoidal sinus suppuration may be easily overlooked or called post-nasal catarrh if one relies wholly on the post-nasal mirror. Neither must the relationship of the sphenoidal sinus to the Eustachian tube be forgotten, as discharge from the sinus almost invariably flows over the middle turbinate bone into a Eustachian ostium.

In these cases the floor of the tube is red, swollen and œdematous, and may even suggest raw beef in appearance. I have seen one such case.



(4) *Varicose Veins.*

From further experience in the use of the naso-pharyngoscope I am inclined to think that in my previous paper the number of cases in which I stated that varicose veins were found was put at too high a figure (198). I have now examined close on 1500 cases, and my more recent observations lead me to think that in only about 15 per cent. of cases are true varicose veins found. They are then almost invariably associated with an enlarged posterior end or other abnormal conditions about the posterior choanæ. Veins larger than those normally found in this region are frequently encountered, but are variations within physiological limits.

There is a close connection between the veins of the tympanic cavity and those of the Eustachian tube. If these communicating plexuses become engorged with blood, they may have an influence in regulating the lumen of the tube.

The treatment in pronounced varicosity on general principles should be an attempt to obliterate the vessel. In only one case have I done this.

*Case.*

Mrs. McL—, aged thirty-seven, complained of loud tinnitus in the right ear. No deafness. Ears normal. Naso-pharyngoscope, slight hypertrophy of right posterior end with a large, tortuous varicose vein radiating from it and spreading out in a fine plexus about the mouth of the tube. The nasal cavity was well anaesthetised with cocaine and with the aid of a long galvano-cautery point, encased in a piece of rubber tubing, and under the direct control of the naso-pharyngoscope the vessel was obliterated for a considerable distance. By the following day all tinnitus had quite disappeared and the fine plexus of veins about the mouth had also gone. It is now four months since this was done and there has been no return of the tinnitus.

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## REPORTS FOR THE YEAR 1913 FROM THE EAR AND THROAT DEPARTMENT OF THE ROYAL INFIRMARY, EDINBURGH.

*Under the care of A. LOGAN TURNER, M.D., F.R.C.S.E., F.R.S.E.*

### PART II.

#### STATISTICAL TABLES.

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##### AFFECTIONS OF THE NOSE. (1777)

###### I. *The External Nose.*

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Fracture of nasal bones . . . . .	4
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###### II. *The Nasal Cavities.*

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Atrophic rhinitis (fœtid) . . . . .	24
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