AN ANALYSIS OF 1430 CASES OF NASAL DISEASE WITH HEADACHE AS A SYMPTOM. ITS CAUSE, POSITION AND THE EFFECT UPON IT OF OPERATION AND TREATMENT.

by

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AN ANALYSIS OF 1430 CASES OF NASAL DISEASE WITH
HEADACHE AS A SYMPTOM. ITS CAUSE, POSITION AND
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INTRODUCTION.

The term headache is an ambiguous one and it may mean much or little according to the type of patient who complains of this symptom. Almost all patients suffering from affections of the nose or accessory sinuses will complain of headache, at one time or another, and many people go through life with chronic headache and are treated for it by the usual remedies such as aspirin and phenacetin, etc., when the seat of the trouble is an untreated condition of the nose or its sinuses.

There are many general causes of headache which must be remembered, and eliminated before a diagnosis of nasal headache is made. Such are, constipation, anaemia, high blood pressure, eyestrain, or neurasthenia, but in the last named it is wise to search for a diseased sinus condition underlying, as this, untreated is a very common cause of neurasthenia. This is claimed by Watson Williams in an article on Headache in the Lancet 1922.
MATERIAL.

The material on which this paper is based is collected from patients attending the Ear, Nose and Throat Department of the Royal Infirmary between 1914 and 1923 inclusive. Those cases of sinus disease where no pain was complained of, have also been included.

The difficulties in a task such as this are many and in the first place the cases in the earlier years are not as fully taken as one would have wished them to be. Many patients can now remember very little about their symptoms and consequently the information is rather unsatisfactory.

Each patient was written to and those who could do so were asked to report at the department, and were there examined thoroughly.

Those who lived out of Edinburgh had sent to them a typed questionnaire as to their symptoms and the result of treatment and operation.

The latter group was not as satisfactory as the former, because it was left to the patient to say whether or not there was any improvement in his or her condition. The disadvantages of this method are obvious.

In all, 1430 cases were investigated and definite information as to their condition was obtained from 329 patients (23%). Many had died or gone abroad in/
in the interval and many answers to the questionnaire were so unsatisfactory that the cases had to be discarded as useless.

DISTRIBUTION AND ANATOMY OF 5TH NERVE.

The distribution of the 5th Nerve has an important bearing on the subject of pain in connection with nasal and accessory sinus disease.

The 5th nerve is sensory, with the exception of a small motor root which accompanies the 3rd division of the nerve. The surface areas supplied by the 5th nerve are minutely described by Morriston Davies in Brain 1907. He bases his results on cases after extirpation of the Gasserian Ganglion, and he says that the surface areas supplied with sensation by the nerve vary in individuals to a slight degree.

Speaking generally the 5th Nerve supplies with sensation the skin of the face and scalp back to the vertex. It supplies the nasal mucous membranes, the conjunctivae and the buccal mucous membrane and also part of the tympanum with sensation. Erb describes 3 cases of loss of taste from syphilis or trauma of the 5th Nerve.

The Trigeminal or 5th Nerve divides into 3 branches which proceed from the Gasserian Ganglion, lying at the apex of the petrous portion of the temporal/
temporal bone, where it joins the great wing of the sphenoid. The branches are 3.

(1) Ophthalmic Division.
(2) Maxillary Division.
(3) Mandibular Division.

The ophthalmic division lies in the outer wall of the cavernous sinus and is therefore in direct relationship to the sphenoidal sinus which lies antero-inferior to the cavernous sinus.

The Maxillary Division lies in the outer wall of the cavernous sinus also and leaves the skull through the foramen ovale, and the mandibular division through the foramen rotundum.

SPHENOPALATINE GANGLION.

This ganglion is situated in the sphenomaxillary fossa and lies just below the maxillary division of the 5th, from which it receives two sensory filaments. The ganglion is believed to consist of sympathetic stellate neurones. It has a sensory and a motor root; the motor root is the great superficial Petrosal nerve from the Facial, and it joins the sympathetic root to form the Vidian nerve. This nerve goes through the Vidian canal in the floor of the sphenoidal sinus and enters the sphenomaxillary fossa to join the ganglion. Branches/
Branches of the Ganglion (after Sluder).

(a) Ascending
(b) Descending
(c) Internal
(d) Posterior

(a) Orbital to the sphenoid and ethmoid cells.
(b) Palatal.
(c) Posterior Superior Nasal, to mucous membrane of nasal fossa.
(d) Pharyngeal.

The ganglion sends off sympathetic fibres by means of the Vidian nerve and the carotid plexus to the cervical sympathetic and sends branches to the cervical nerves and ganglia. The nerves supplying the muscles of the neck and arm come into close association with these fibres and that explains the fact that pain is sometimes felt in the arm, neck and mastoid in sphenoiditis and sphenopalatine ganglion neurosis.

POSITION OF SINUSES. PATHS OF INFECTION.

The nasal accessory sinuses are in very close relationship to the interior of the skull, the brain and meninges, and any disturbance of function or disease of these sinuses will be likely to be manifested in/
in discomfort or pain. The sinuses are in direct communication with the outer air through the nose, and infection can easily penetrate to them. Another path of infection is through the large veins on the nose which empty themselves into the venous sinuses of the brain.

Methods by which Pain is produced.

Pain may be caused in three ways:

(1) By irritation of the branches of the 5th Nerve.
(2) By direct action on brain or meninges as from pressure.
(3) By absorption of toxic products.

Sinus Groups.

The sinuses are divided into 2 groups:

1. Anterior or superficial group.
   (a) Frontal  
   (b) Anterior Ethmoid  
   (c) Maxillary Antrum

2. Posterior or Deep group.
   (a) Posterior Ethmoidal Sinuses  
   (b) Sphenoidal Sinuses.

INNERVATION OF SINUSES.

The Frontal sinus is innervated from the ophthalmic division of the 5th nerve by its anterior frontal branches.
The Anterior Ethmoidal Cells are supplied with sensation by the Ethmoidal branches of the nasociliary nerve, and this nerve also sends branches to the sphenoid. The nasociliary nerve is a branch of the ophthalmic division of the 5th.

The Posterior Ethmoidal cells are supplied by the posterior superior nasal branches from Meckel's ganglion.

The Maxillary Antrum is supplied with sensation by the posterior superior alveolar branches of the Maxillary division of the 5th.

Swelling or congestion of the sinuses may therefore set up pain varying in intensity with but not always in direct proportion to the degree of inflammation, as a small amount of catarrh and congestion may cause very severe pain whereas a chronic purulent infection may cause very little discomfort; this all depending on efficient drainage of the affected sinus.

**SLUDER'S VACUUM HEADACHE.**

It has been claimed by Sluder and others that the pain may be caused by air in the sinuses becoming absorbed and forming a partial vacuum, and the negative pressure producing further congestion. The openings of the sinuses are small compared with the size of the sinuses and they drain into a narrow space, and therefore a small amount of inflammation may cause the openings to become blocked, and secretion will be prevented/
prevented from getting away.

Baer explains the smallness of the openings of the sinuses in this way. He says that in the process of evolution the openings have become smaller gradually, because in the lower animals the sinuses are all intimately connected with the olfactory function which requires to be more highly developed than in man of the present day, and from disuse, the sinuses in man are no longer required for the olfactory function and have therefore closed up, but for a small opening.

The vacuum headache is most easily understood in the frontal sinus case where the middle turbinal, either from enlargement of itself or from pressure upon it from a deviated septum, shuts off the frontal sinus osteum completely.

A vacuum results and from irritation of the nasal branches of the ophthalmic division of the 5th Nerve the characteristic frontal pain results.

It may be a simple turgescence of the turbinal which causes the obstruction, and when the tissues shrink the osteum is again opened and the secretion gets away with complete relief of symptoms. A chronic hypertrophic Rhinitis or even an Acute Rhinitis may produce the same effect.

The same holds good for the other accessory sinuses though to a lesser degree.

It is possible that the pain arising from the condition/
condition of enlargement of the middle turbinal, where it is jammed against the septum, is not due to this condition per se, but is due to the blocking of the frontal sinus opening as described above; similarly marked deviations of the septum may act in the same way.

Old standing suppurative sinusitis is very often quite painless as is also the condition of recurrent polypi; this being explained by the fact that the discharge in those cases usually finds an efficient outlet, also changes take place in the mucous membrane rendering it less capable of absorbing toxic products.

Periodicity.

The pain of nasal sinus disease is usually more marked in the morning although it is stated by Campbell and Fuller in an article on Surgical Headache in the Canadian Medical Journal 1925 that headache due to sinus disease is more marked when the patient is in the recumbent position; certainly the sinus drains best in the erect posture, which is in favour of the latter view, but for the former view it has been said that the floor of the sinus is the most sensitive part.

Watson Williams in the Lancet 1922 states that he believes the periodicity to be due to climatic conditions tending to increase or decrease the virulence of infection.
Anything increasing congestion increases the pain, for example stooping, or any sudden movement such as sneezing or coughing.

Francis White in an article on Sinusitis in the New York Medical Journal and Record 1924 states that there are 2 causes of headache in nasal sinus disease. (1) Excessive pressure due to faulty drainage and (2) Bone and nerve involvement.

LOCALISATION OF PAIN.

Localisation of pain in nasal and accessory sinus disease is extremely difficult. The task of classification has been attempted many times but cases continually crop up which do not in any way conform to the classified groups.

Siegmund Auerbach in his monograph "Headache" says that speaking generally pain in the upper inner corner of the orbit, or in the frontal regions, denotes anterior sinus disease and pain deep in the head, denotes posterior sinus involvement.

Campbell and Fuller in their article mentioned above, describe the segmental location of pain as follows:-

Frontal Pain.

Frontal pain may be due to three conditions:-

1. /
1. Disease of anterior ethmoidal cells, when it is between the eyes.
2. Disease of Antrum; pain is along the supraorbital nerve, accompanied usually by some pain over the affected sinus.
3. Frontal sinus involvement; pain is along the supraorbital nerve.

Temporal Pain.
Temporal pain may be due to 4 causes:-
1. Posterior ethmoid involvement.
2. Sphenoiditis.
3. Enlargement of Turbinals (middle).
4. Deviation of the septum.

Vertical Pain.
Vertical pain may be due to the same four causes as temporal pain.

Occipital Pain.
Occipital pain also may be due to the same 4 conditions.

With the exception of 43 cases of maxillary antrum disease, all the 1430 patients whose cases have been used in this paper complained of headache in various situations.
CASES WITH NEGATIVE FINDINGS.

There were 23 patients who complained of headache and on examination there was nothing abnormal in the nose or sinuses, as determined by physical examination, transillumination and X-ray.

The position of the headache in those cases was as follows:

Frontal . . . . 14
Occipital . . . 2
Bridge of nose . . 2
Temporal . . . . 1
Vertex . . . . 1
Diffuse over head . . . 3

SINUS DISEASE AS A CAUSE OF HEADACHE.

ANTERIOR SINUS GROUP. (FRONTAL, ANTRUM.)

FRONTAL SINUS GROUP.

The first group of cases to be considered is the Frontal Sinus group. Of these cases there were 49 uncomplicated by any other pathological condition and of the 49 only one sinus was affected in 39 cases while in 10 both sinuses were involved.
SYMPTOMS. ACUTE.

The symptoms complained of in almost all the acute cases were, pain over either eye, depending on the side involved, usually a feeling of obstruction on the affected side and sometimes purulent or mucopurulent discharge from the affected nostril.

The pain showed marked periodicity and in most cases was at its worst about 11 a.m., gradually wearing off about 2 or 3 p.m.

Discharge was not marked in the acute cases and an ordinary coryza or influenza had apparently been the starting point for the condition in a large proportion of cases. In one, that of a man aged 40, a herpes of the face preceded the sinus suppuration but probably the sinus disease was primary and the herpes was merely the reaction of the overlying skin to the infection in the sinus, or possibly the two conditions had nothing to do with one another.

Oedema of the forehead and eyelids of the affected side is a common symptom, and the eye may be displaced downwards and forwards by the pressure of pus on the sinus.

PHYSICAL SIGNS.

On examination of the nose in cases of frontal sinus inflammation there may be nothing abnormal to be seen, or there may be pus in the middle meatus but/
but X-Ray appearances and transillumination will help in doubtful cases, the affected side being darker than
the normal.

Ewing's sign is an almost constant sign in frontal sinus disease, in fact Sluder says it is always present. If pressure is exerted over the trochlea, which lies under the supraorbital margin at the junction of its middle and inner thirds, pain is complained of and Ewing was the first to mention this. It is explained by the fact that the floor of the frontal sinus is very thin in this position. Pain may also be elicited on movement of the eyeball, as the pulley of the superior oblique goes round the trochlea and any pull on this muscle will cause discomfort.

Many patients consult ophthalmologists on account of headache when reading or doing close work, when frontal sinusitis is the underlying condition.

On convergence of the eyes necessary for accommodation the superior oblique is in action and therefore produces pain.

The skin over the affected sinus may show hyperaesthesia and there may be tenderness on deeper pressure.

**TREATMENT, ACUTE.**

The treatment carried out in all the 42 acute cases was conservative, that is to say menthol inhalations, electric head light baths and occasionally an alkaline nose wash.
TREATMENT CHRONIC.

Of the 7 chronic cases all were operated on. Three had a Radical Killian operation and four the intranasal operation, whereby the frontal opening was enlarged by means of a rasp and the sinus irrigated with a solution of boracic.

SYMPTOMS. CHRONIC. PHYSICAL SIGNS, CHRONIC.

The symptoms in the chronic cases were almost the same as in the acute cases. The pain was in the same position and was occasionally relieved by the discharge of pus from the nose; purulent discharge was present in all 7 cases and on examination of the nose there was nothing abnormal to be seen apart from the presence of pus and a certain amount of general swelling of the mucous membrane. Swelling of the skin and subcutaneous tissues over the affected sinus was present in 4 of the chronic cases and displacement downwards and forwards of the eyeball in 3.

AFTER RESULTS.

19 Patients reported or replied to the questionnaire, 11 being acute cases, and they were completely cured after conservative treatment. The result was practically instantaneous and they have had no return of symptoms, though several years have elapsed.

Two chronic cases reported and they had both had the/
the Radical Killian operation. In neither had there been any return of symptoms and the result was immediate in their cases also.

The remaining 6 of the 19 patients who reported were definitely improved by treatment or operation and in none of the patients who reported was the result a failure.

**POSITION OF PAIN.**

The position of the pain in every case was over the eye of the affected side or over both eyes, and in 3 cases it was also complained of in the temple of the affected side. It is usually a most agonising and unbearable pain and of a throbbing character although it may be sharp and neuralgic. In the more chronic cases it is often only a feeling of weight. This is described by Pavey Smith.

Baer says that in acute frontal sinus suppuration the pain is sharp and shooting but in the chronic stage it is dull and more diffuse.

**FRONTAL SINUS DISEASE WITH OTHER SINUS COMPLICATIONS**

There were 39 cases in this group and of these 25 had Ethmoidal disease as a complication, 10 had the maxillary antrum affected and 4 had pansinusitis.
AFTER RESULTS.

Twelve results were ascertained in this group of 39. 6 were absolutely cured, 5 were improved and 1 was a failure.

Of the 6 who were cured two had frontal sinus disease, ethmoidal disease and polypi. The treatment carried out in both cases was a Killian operation, removal of middle turbinate and removal of polypoid and diseased tissue by means of Luc's forceps.

Two further cured cases had Frontal sinus disease, antral disease and ethmoidal disease, and in them the operation performed was an intranasal frontal and antrum operation with removal of diseased ethmoidal tissue. One case had Frontal Sinus and Antrum involved and had the intranasal operation on both these sinuses, while one case, that of Pansinusitis had a Double Killian Operation, Double Radical Antrum and Double Ethmoid operation. The sphenoids in this case were not opened and after a course of vaccines the patient was completely cured, and some years later had had no return of symptoms.

POSITION OF PAIN.

The position of pain in the frontal sinus cases with ethmoidal disease was over the usual frontal sinus site and also in the temple. In the frontal and antrum cases it was over the frontal region and cheek/
cheek and temple and in the pansinusitis cases the pain was mainly frontal, but also in temples and vertex.

It almost seems as if the pain of frontal sinus inflammation was so overwhelming and fixed itself on the patient's mind to such an extent that the pain due to other sinus involvement, sinks into insignificance beside it and the frontal pain is remembered to the exclusion of the other.

A few of the patients who reported, complained of having had lesser attacks, since the primary one, brought on by cold and exposure, as for example in France during the war, but in most cases these attacks were slight and gradually ceased recurring.

Again some patients returned, perhaps some years after, complaining of a return of the same symptoms as before, and on examination another sinus was found to be affected and the primary condition cured.

CASES DESCRIBED.

In several cases, conservative treatment was tried unsuccessfully and operative interference had to be resorted to in the end; as for example in the case of a student who came complaining of acute maddening pain above the left eye of 3 days duration, from 9 a.m. to 2 p.m., with no discharge, and no obstruction. On examination the septum was slightly deviated/
deviated to the left, but there was no pus visible.

On palpation the floor of the left frontal sinus was tender and X-ray showed blurring of the sinus. Conservative treatment was instituted for two days with no improvement, and then the frontal osteum was enlarged and the sinus irrigated after removal of the middle turbinate.

After this the patient was completely relieved but had, as well, a course of autogenous vaccines.

A very interesting case was that of a man who after influenza developed agonising pain in the left supraorbital region and also had what was evidently a typical Jacksonian epileptic fit with vomiting. On examination of the nose there was nothing abnormal, but there was marked tenderness over the left frontal sinus. All the sinuses were blurred on X-Ray. A Killian operation was performed and the dura mater exposed and incised. There was pus under tension inside the dura and this was evacuated.

The patient was gravely ill and made a very slow recovery. Three months later he had a second Jacksonian fit, and also aphasia. This lasted only for a short time, and it was not thought advisable to operate further. From that time the patient made a rapid recovery and has been perfectly well, and even after a severe attack of influenza one year ago no further symptoms have manifested themselves.

SUMMARY.
SUMMARY.

FRONTAL SINUS CASES.

Number of Uncomplicated Cases 49
Single Sinus affected · 39
Both Sinuses affected · 10
(Acute) Conservative treatment 42
(Chronic) Operated on · 7

Results ascertained · · 19
Cured · · 13
Improved · · 6
Failures · · 0

Of the Cured
2 (chronic) Radical operation.

Frontal Sinus cases complicated by other Sinus Involvement · · 39
Frontal and Ethmoid · 25
" " Antrum · 10
Pansinusitis · · 4

Results ascertained 12
Cured · · 6
Improved · · 5
Failure · · 1

Cured /
Cured.

Frontal, Ethmoid and Polypi, (3 cases.) Treatment.

Killian. Middle Turbinectomy.

Removal of Ethmoid tissue.

Frontal and Ethmoid without Polypi (1 case)

Killian. Middle Turbinectomy.

Removal of Ethmoid tissue.

Frontal Antrum and Ethmoid (1 case)

Intranasal Antrum.

" Frontal.

Removal of Ethmoid tissue.

Frontal and Antrum (1 case)

Intranasal Frontal

" Antrum.

Pansinusitis (1 case)

Double Killian.

Double Radical Antrum.

Double Ethmoid (External)

Failure. Frontal and Antrum (1 case)

Intranasal Frontal

" Antrum.

Result. Headache as before. Still discharge.
MAXILLARY ANTRUM CASES UNCOMPLICATED.

The next group of cases to be studied were the Maxillary Antrum cases.
There were 184 of these cases uncomplicated by any other pathological condition and of these 151 had only one sinus affected and in 33 both sinuses were involved.

SYMPTOMS.

The symptoms complained of were, purulent discharge, headache varying in site and intensity, but by far the greater number of patients complained of pain in the region of the supraorbital margins, and the next site in order of frequency was the cheek of the affected side over the malar bone.

PHYSICAL SIGNS.

There was oedema of the side of the face in a few of the cases and also oedema of the eyelids. Nasal obstruction was a common symptom, as was anosmia.

In the chronic cases a bad odour was frequently present and there was post-nasal discharge in a large proportion of patients. Of the 186 cases 43 or 23% complained of no pain at all, these cases all being chronic in type.

A/
A considerable number of the patients complained of having had asthma for many years before the onset of sinus trouble and several had been suffering from ozoena for some time. Influenza appeared to be the causal factor in a fair proportion of cases but this fact was not as prominent as in the frontal sinus cases. Many of the patients dated their symptoms from the removal of teeth in the upper jaw and two patients dated their symptoms from an accident, one a fracture of the upper jaw and the other was kicked in the face by a horse and this started the nasal condition.

One patient complained of suddenly going blind in the right eye 10 days before admission. He had frontal pain on the right side and pus was seen on both sides of the nose. On X-Ray examination both antra were dull. After a Double Radical Antrum operation the sight of the eye returned rapidly.

**POSITION OF PAIN.**

The position of the pain complained of in this group of uncomplicated antral cases was as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontal</td>
<td>51</td>
</tr>
<tr>
<td>Cheek</td>
<td>24</td>
</tr>
<tr>
<td>Bridge of nose</td>
<td>12</td>
</tr>
<tr>
<td>Temple</td>
<td>8</td>
</tr>
<tr>
<td>Mastoid</td>
<td>5</td>
</tr>
<tr>
<td>Occiput</td>
<td>3</td>
</tr>
<tr>
<td>Frontal/</td>
<td></td>
</tr>
</tbody>
</table>
Frontal and Bridge of Nose  8
Behind eyes   . . .  3
Frontal and Occiput  . .  1
Frontal and Vertex  . .  2
Frontal temple and occiput  .  1
Typical 5th nerve neuralgia  .  1
Simply described as headache  .  20
No pain complained of  .  43

From this it would appear that the pain may be in any part of the head, but the majority complained of pain in the frontal region and over the cheek of the affected side.

A usual sign of antral disease is pain when the upper teeth on the affected side are tapped sharply, this being due to the fact that the dental nerve is in close proximity to the floor of the antrum.

**PHYSICAL EXAMINATION.**

On examination of cases of antral disease the appearances are almost constant. Pus in the middle meatus with a varying amount of oedema of the middle turbinate is what is usually seen. The pus may or may not be visible on posterior rhinoscopy. In acute cases there may be nothing apparently abnormal. X-Ray and transillumination are both very valuable as aids to diagnosis but the only certain test for suppuration/
suppuration is proof puncture. This slight operation consists in passing a trochar and cannula through the medial wall of the antral cavity from the nose, under the inferior turbinate; the cavity may then be irrigated after evacuation of its contents.

Several of the cases described were found to have a sinus from a tooth socket extending into the antrum, and in one case a tooth was removed from the antral cavity at the operation.

**TREATMENT.**

The treatment carried out apart from the major operative treatment was proof puncture and irrigation. In some cases head light baths were given with good result. The intranasal operative route is used in the more acute cases where there is definite mucopus in the sinus. This operation consists in making an opening into the antrum from the nose with Tilley's burrs and enlarging it if necessary with bone-cutting instruments.

This operation is satisfactory provided that the condition is not far advanced, but in old-standing cases with marked suppuration, the radical operation is advocated.

**AFTER RESULTS.**

In this group of 184 uncomplicated cases of antral disease 110 were operated upon, and 74 had proof puncture.
puncture and irrigation. The results of this latter form of treatment in the more acute cases were good, as the sinus contained muco pus, and in some, one proof puncture and irrigation were sufficient.

82 cases had the Radical operation and in 29 the intranasal route was adopted.

57 of the group of 184 cases were traced and it was found that 42 were completely cured, 11 were improved and 4 were failures.

Of the 42 cured, 25 were operated on, 19 having the Radical operation and 7 the intranasal route was adopted.

17 of the cured had no operative interference but proof puncture and irrigation; 11 patients were definitely improved; but two had a markedly deviated septum which had not been touched and this might account for the symptoms being present though to a lesser degree.

Another patient who stated that she had noticed great improvement on the condition, had been suffering from neurasthenia; the headache was diffuse and changed its position therefore it is probable that the pain was due to her condition.

It is never safe to label a patient as neurasthenic until sinus mischief has been eliminated because it is an extremely common cause of mental depression/
depression and neurasthenia. Another female patient was suffering from marked anaemia and another complained of pain in mastoid region and occiput, also of nasal discharge, very probably the last patient had ethmoidal or sphenoidal suppuration or both, which would account for the symptoms. She could not attend the department to be re-examined, but stated that the symptoms and more especially the pain were definitely less marked than when the primary condition of antral suppuration was present.

Of the four failures 3 had the Radical operation and 1 the Intranasal. In one of the patients who had the Radical operation the suppuration was of dental origin.

There was nothing unusual noted in any of these 4 patients.

3 of them could not be re-examined, and it was not possible to see what was the actual state of affairs in the nose.

The fourth was re-examined and the nose was absolutely clean and the antral opening patent; but the patient still complained of pain on the left cheek although no cause for it could be found. All teeth seemed to be sound.
ANTRAL DISEASE COMPLICATED BY DISEASE IN OTHER SINUSES

The cases numbered 145; of these 134 were complicated by Ethmoidal disease, 9 had frontal sinus suppuration and 2 had the sphenoid affected.

SYMPTOMS.

The symptoms complained of again were nasal discharge, obstruction and headache. The position of pain complained of in the mixed cases was too uncertain to be of any value. In the two sphenoid cases the pain was definitely in the vertex as well as frontal and on the cheek.

AFTER RESULTS.

Results were ascertained in 32 of the 145 cases, and so might be expected the number of patients who were cured is not so great as in the group of simple antrum cases.

12 were cured in this group, 24 were improved and there were 6 failures.

Of the 12 cured, 11 had antral and ethmoidal disease; 10 were operated on, the operation being a Radical Antrum and removal of middle turbinal with ethmoidal tissue. One had had conservative treatment, this consisted in a single proof puncture and irrigation followed by menthol inhalation.
The last case of this series of cured was one of Frontal, Antral and Ethmoidal suppuration and the treatment carried out here was a Radical Antrum, Radical Frontal, opening up and removal of ethmoidal tissue with Grünwald Forceps.

It is of no value to describe minutely the 24 cases which were improved by operation and treatment, but it may be instructive to mention the cases where treatment failed.

These cases numbered 6.

There were 4 cases of antral disease with polypi and ethmoidal suppuration; one had had innumerable operations for removal of polypi by means of snares and still had polypi present; this patient had also had a double intranasal antrum before coming to hospital but on examination both antra required the Radical operation. This was done and even after that the condition was not improved. The ethmoidal cells were also opened up and polypi removed at this time, the sphenoid was not opened and it is possible there was mischief there causing all the symptoms.

The other 3 of the 4 were cases of polypi also and after Radical antrum operations and removal of polypi, on re-examination there were still polypi present.

The 5th case in the series of failures was one of Frontal, Antral and ethmoidal disease without polypi, and/
and the operation performed was the intranasal one with opening up of ethmoid cells and removal of diseased tissue.

The 6th was one of ethmoidal suppuration and antral catarrh. A middle turbinectomy and opening up of ethmoids was done and conservative treatment instituted for the antrum.

This patient on re-examination had antral suppuration and there was also pus coming from the region of the ethmoidal cells.

**SUMMARY.**

<table>
<thead>
<tr>
<th>Uncomplicated cases of Antral Disease</th>
<th>184</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Sinus affected</td>
<td>151</td>
</tr>
<tr>
<td>Both Sinuses &quot;</td>
<td>33</td>
</tr>
<tr>
<td>Operated on</td>
<td>110</td>
</tr>
<tr>
<td>Radical</td>
<td>82</td>
</tr>
<tr>
<td>Intranasal</td>
<td>28</td>
</tr>
<tr>
<td>Conservative Treatment</td>
<td>74</td>
</tr>
<tr>
<td>Results ascertained</td>
<td>57</td>
</tr>
<tr>
<td>Cured</td>
<td>42</td>
</tr>
<tr>
<td>Improved</td>
<td>11</td>
</tr>
<tr>
<td>Failures</td>
<td>4</td>
</tr>
</tbody>
</table>

Of the cured

| Operated on                          | 25  |
| Radical                              | 18  |
| Intranasal                           | 7   |
| No operation                         | 17  |
Failures  4 - all operated on.

(1) Dental origin. Radical.
(2) Intranasal Operation.
(3) " "
(4) Radical operation. Condition as before. Still headache.

Antral disease complicated by other Sinus involvement

Antrum and Ethmoid  134
" " Frontal  9
Sphenoid  2

(Neither of the sphenoid cases reported.)

Of the Ethmoid cases 103 had polypi.

Results ascertained  .  .  .  42
Cured  .  .  12
Improved  .  .  24
Failures  .  .  6

Cured. (1) Frontal Antrum and Ethmoid.

Operation. Intranasal Frontal and Ethmoid and Radical Antrum.

(2) Ethmoid and Antrum - 11 cases.

10 operated on. 1 treated by proof puncture, irrigation and menthol.
10 operated on. Radical Antrum and intranasal ethmoid operation.

Failures:

(1) Frontal Ethmoid and Antrum  1.

Operation. Intranasal Antrum and Ethmoid.
(2) Ethmoidal Suppuration and Antral Catarrh.  
Operation: Middle turbinectomy.

(3) Ethmoidal disease, polypi and antral suppuration.  

(4) Ethmoid and Antral Suppuration, 3 cases.  
Operation: Radical Antrum and Intranasal Ethmoid.
POSTERIOR GROUP OF SINUSES.

The Posterior Sinus group of cases is the next to be studied. This includes anterior and posterior Ethmoid Cells and Sphenoidal sinus. It is impossible to differentiate between the anterior and posterior ethmoids and therefore all cases are defined as ethmoidal disease.

ETHMOIDAL SINUS GROUP UNCOMPLICATED.

SYMPTOMS.

The symptoms complained of varied very much, but all complained of pain in various parts of the head.

Once more the position of the pain was frontal in a large proportion of cases, but many complained of the pain being diffuse over the whole head.

Nasal obstruction was a common symptom and also discharge, which in many cases was of long standing.

PHYSICAL SIGNS.

Protrusion or displacement of the eyeball, redness and swelling round the eye at the inner canthus were noticed on several occasions and post-nasal discharge was also a frequent symptom, many of the patients had had innumerable operations for removal of Polypi.
The physical signs in the nose varied. The cases with polypi frequently shewed nothing by anterior rhinoscopy except masses of polypi, but apart from that condition, pus high up in the nose (and often seen by posterior rhinoscopy) was almost a constant feature.

The only noticeable condition in some cases was a certain amount of oedema of the middle turbinals, and in a few cases proved later by operation to be undoubted cases of ethmoidal disease; the nose appeared normal by rhinoscopy but in view of the symptoms and the X-Ray picture, operation was decided on.

POSITION OF PAIN.

The position of pain in the uncomplicated Ethmoidal sinus cases was:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontal</td>
<td>34</td>
</tr>
<tr>
<td>Bridge of nose</td>
<td>2</td>
</tr>
<tr>
<td>Diffuse headache</td>
<td>27</td>
</tr>
<tr>
<td>Frontal temple and occiput</td>
<td>2</td>
</tr>
<tr>
<td>Frontal and Vertex</td>
<td>14</td>
</tr>
<tr>
<td>Mastoid</td>
<td>1</td>
</tr>
<tr>
<td>Behind eyes</td>
<td>1</td>
</tr>
</tbody>
</table>

The rest were uncertain as to the position of pain.

AFTER RESULTS.

There were 87 cases of uncomplicated Ethmoidal disease and of those 46 had polypi in the nose.
70 of the cases were operated upon and of these 18 had Sluder's operation performed, and in the remaining 52 the old method was used.

The disease was unilateral in 37 of the cases and bilateral in 50.

15 cases reported; 7 were cured, 6 improved and there were 2 failures.

Of the 7 cured, 4 had the old operation and 2 Sluder's method. One of the cases was apparently cured by menthol inhalations and a nasal douche; in this case there was definite blurring of the ethmoids by X-Ray and after treatment the X-Ray photograph showed no blurring. Of the 6 patients who were definitely improved as to their symptoms, 4 had the usual operation and 2 Sluder's method. Of the cases which showed improvement, as a general rule the patient complained of the nasal discharge being still troublesome but the headache had gone or was much improved. This shewed that the operation had at least increased the facilities for drainage if it had not effected a cure.

Of the two cases in which treatment or operation had failed, one had Sluder's operation and the other the old method. They both had copious pus coming from the olfactory cleft and the X-Ray shewed blurring still in the ethmoidal cells so that sinus disease was active in spite of treatment.
SLUDER'S OPERATION.

Sluder's operation is a more radical and complete operation than the older one because the ethmoidal tissue is removed up to the cribriform plate and back to the sphenoid. The operation however is not unconnected with risk, because if the cribriform plate is thinner than normal or if the natural openings for the olfactory nerves are bigger than normal, it is easy to understand how the Sluder knife in performing the upward stroke may penetrate the plate and a path for infection to the brain and meninges is laid open. This actually happened in a case of a man over 70 who was operated on for polypi by Sluder's method and died 4 days later of meningitis. It is more likely to happen in old age when the ethmoidal cells have been the seat of disease for many years and the bone has become thinned out.

From the few results as yet obtained in this department it is impossible to give the preference to either operation as the results obtained are almost equal; but the numbers are very small and therefore of little value and deceptive.

ETHMOIDAL DISEASE COMPPLICATED BY DISEASE IN OTHER SINUSES.

The cases in this group numbered 24, and of these 20 had sphenoidal disease as a complication and 4 had pansinusitis.
SYMPTOMS AND PHYSICAL SIGNS.

All the cases complained of discharge from the nose which was also postnasal, and pain in the head. All showed pus in the nose.

AFTER RESULTS.

All the 20 cases of ethmoid and sphenoid disease were operated on and results were ascertained in 11 cases. Five patients were absolutely cured, and 5 were improved.

CASES.

Only one case was a failure; the patient was a girl of 20 who complained of frontal headache, obstruction in the nose and discharge from the R. side, the headache being on both sides and worst in the morning.

On examination there was pus in the Right olfactory cleft and the X-Ray picture showed blurring of all the sinuses on that side. The Right Middle Turbinate was removed, the naso-frontal duct enlarged, ethmoids and sphenoid opened and found to be diseased.

This patient states that the headaches are even worse than before operation, and the discharge still continues from the same side.

The question of antral suppuration occurs here as that sinus was evidently not investigated in 1922. This case might thus be a case of pansinusitis incompletely treated.

One interesting case was that of a woman aged 45, who/
who had foul discharge from the left side of the nose and polypi present. She had had an intranasal antrum operation on that side with no benefit.

On examination there was pus in the left middle meatus and olfactory cleft, and the middle turbinate was polypoid.

She later had a radical antrum and the left ethmoids and sphenoid opened. They were diseased, and after this operation the patient was very much improved and only very rarely had discharge from the left nostril and no headache.

One important feature in the case was the recurring mental depression which came on whenever the nasal condition was at its worst. This has been mentioned before in this paper as being a common symptom of sinus disease.

**POSITION OF PAIN.**

The position of pain in these cases was:

- Frontal . . . 9
- * Sluder Syndrome . . 5
- Bridge of nose . . . 2
- Frontal and Vertex . . 1
- Vertex . . . 1
- Behind eyes . . . 1
- Diffuse . . . 1

*SLUDER*/
SLUDER SYNDROME.

"Pain at the root of the nose in and about the eye, upper jaw and teeth extending back to the temple, about the zygoma to the ear, emphasised at the mastoid but always severest at a point 5 cm. behind this, thence back to the occiput and neck, and it may extend to the scapula and shoulder and in severe attacks to the forearm and hand, and even finger tips."

This pain is usually described as gnawing, and the distribution of the pain is explained by the sphenopalatine ganglion, having intimate relation with the 5th and 7th nerves, the sympathetic and cervical plexus as described under anatomy of the 5th nerve.

OPERATION.

The operation performed in this group was the same as for the former ethmoidal group, except that the sphenoid was opened as well. In 14 cases Sluder's method was used and in 6 the old method.

The cases which were cured numbered 5. Three had Sluder's operative method and 2 had the old method. Of those who were improved only, 3 had had the old operation and 2 Sluder's. The case which was a failure had been operated on by Sluder's method for bilateral ethmoidal and sphenoidal disease.

PANSINUSITIS GROUP.

There were 4 cases in this group and all 4 were operated on, but unfortunately not one of the 4 reported/
reported or replied to the questionnaire.

SYMPTOMS.

The symptoms were headache and nasal discharge. The position of the pain was:

- Frontal . . . . 1 case
- Vertex . . . . 1 "
- Frontal and Bridge of Nose 1 "
- Vertex and Frontal . . 1 "

POLYPI.

In connection with the posterior group of sinus cases may be included 39 cases of polypi treated as such by simple removal of the polypi by means of snare and Luc's forceps. There was no treatment directed towards the sinuses.

RESULTS.

The results ascertained were 29. 12 were cured, 14 improved and 3 failed. Polypi recurred in only 8 of the 29 cases. The pain was frontal and more marked in the morning, being a dull tight feeling in the nose and frontal region.

Obstruction, anosmia and watery discharge were complained of in all cases.

SUMMARY.
### SUMMARY.

<table>
<thead>
<tr>
<th>Description</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases of Uncomplicated Ethmoid disease</td>
<td>87</td>
</tr>
<tr>
<td>Operated on</td>
<td>70</td>
</tr>
<tr>
<td>Sluder's operation</td>
<td>18</td>
</tr>
<tr>
<td>Middle Turbinectomy and removal of Ethmoidal tissue</td>
<td>52</td>
</tr>
<tr>
<td>Unilateral</td>
<td>37</td>
</tr>
<tr>
<td>Bilateral</td>
<td>50</td>
</tr>
<tr>
<td>Results ascertained</td>
<td>15</td>
</tr>
<tr>
<td>Cured</td>
<td>7</td>
</tr>
<tr>
<td>Improved</td>
<td>6</td>
</tr>
<tr>
<td>Failures</td>
<td>2</td>
</tr>
<tr>
<td><strong>Cured:</strong> Mid. Turbinectomy and removal of Ethmoid tissue</td>
<td>4</td>
</tr>
<tr>
<td>Sluder's operation</td>
<td>2</td>
</tr>
<tr>
<td>Menthol Inhalations</td>
<td>1</td>
</tr>
<tr>
<td><strong>Improved:</strong> Old operation</td>
<td>4</td>
</tr>
<tr>
<td>Sluder's operation</td>
<td>2</td>
</tr>
<tr>
<td><strong>Failures:</strong> Old operation</td>
<td>1</td>
</tr>
<tr>
<td>Sluder's operation</td>
<td>1</td>
</tr>
<tr>
<td>Cases of polypi treated as such</td>
<td>89</td>
</tr>
<tr>
<td>Results</td>
<td>29</td>
</tr>
<tr>
<td>Cured</td>
<td>12</td>
</tr>
<tr>
<td>Improved</td>
<td>14</td>
</tr>
</tbody>
</table>
Failed . . . 3

Polypi recurred in 8 of the 29 cases.

Ethmoidal Disease with other Sinus Complications.

Ethmoid and Sphenoid cases . . . . 20

Pansinusitis . . . . . 4

Ethmoid and Sphenoid cases operated on . . . . 20

Results obtained . . . . 11

Cured 5 (Sluder 3 )

Improved 5

Failure 1

Pansinusitis operated on . . . . 4

Results:

None ascertained.

COMMENTARY.

This completes the collection of sinus cases and from the above data it will be seen that the sinus most frequently diseased is the maxillary antrum, also that the results of operation in this sinus and in the frontal sinus are better than in the others.

It will also be noted that if more than one sinus is affected the chance of ultimate complete recovery is less.

The posterior group of sinuses is less satis-

factory/
satisfactory in the matter of treatment than the anterior group.

The position of the pain of frontal sinus and antral disease is constant or nearly so, but the pain due to disease in the posterior group may be in any of the positions referred to.

The result of operation on the posterior group is as a rule to lessen the headache markedly, but in many cases the discharge continues, showing that disease is still present.
CASES IN WHICH HEADACHE IS ASSOCIATED WITH AFFECTIONS OF THE NASAL CAVITIES.

CASES WITH SEPTAL DEVIATION UNCOMPPLICATED.

The operation most frequently done in an Ear, Nose and Throat Department apart from removal of tonsils and adenoids is undoubtedly Submucous Resection of the Septum.

SYMPTOMS.

Many patients come complaining of frontal headache and nasal obstruction, the latter usually unilateral, and it is discovered that there is a deviation of the septum.

It is impossible to say that Submucous Resection will cure the headache, and unless the deviation is marked or unless the middle turbinate is pressing on the septum, it is the practice in this department to leave it to the patient to decide whether the operation is to be performed or not; after explaining to him the facts for and against operative measures.

The symptoms complained of in these cases were unilateral obstruction and headache.

PAIN.

The pain may be merely a heavy feeling, or a sense of stuffiness in the nose, or it may be a feeling of weight/
weight on the bridge or a tightness as if the skin of the nose was being stretched, but some patients complained of severe frontal pain.

Where the middle turbinal was pressed upon by the septum the pain was different in character and was temporal or occipital or in the vertex, and in some cases even extended to the shoulder. This brings forward the question whether this is not merely a sinus headache as described by Sluder, brought on by the pressure of the middle turbinal closing the entrance to the various sinuses opening into the middle meatus; this pressure being due in the first place to the septal deviation.

There was no periodicity noticeable in these cases but as a result of congestion of the nasal mucosa consequent on the recumbent position, the pain or discomfort was often more marked in the morning.

**AFTER RESULTS.**

During the 10 years from 1914 to 1923 inclusive, there were 108 cases of deviated septum, all of which had headache or pain in some part of the face as a symptom.

In these 108 cases no other abnormal condition was noted.

99 cases had submucous resection performed, and 22 results were ascertained.

Of the 22, 17 were cured, 5 improved both as regards/
regards nasal obstruction and pain, but complained of occasional recurrence of symptoms similar to those experienced before operation.

All the cases which reported were either cured or improved, and therefore the figures argue strongly for operation but it must be remembered that only 22 results were obtained or roughly 20%. The figures are very small and therefore deceptive. There is no doubt that many patients have submucous resection performed, who do not really require that operation, and who therefore are not relieved by it.

**TIME WHEN IMPROVEMENT NOTICED.**

It was noted in those patients who were cured of their symptoms by submucous resection that the relief appeared at varying periods after operation; the majority stated that immediately after the inflammation coincident upon the operation subsided, they were completely cured, others were not relieved until 3 weeks or even longer time had elapsed.

There is no doubt that unless the operation is thoroughly and completely performed, and the cartilage removed back to the perpendicular plate of the ethmoid it is of no benefit.

There may be a marked deviation low down in the septum which appears to be causing obstruction, but/
but it is the slight deviations high up which are the most important ones, and it is in this latter type where the operation is sometimes incomplete and a spur is removed which was causing little trouble while the high deviation is left untouched.

The traumatic cases are the most difficult to deal with, the cartilage tending to be split, and having healed with the formation of fibrous tissue rendering the mucous membrane extremely friable.

The operation consists in dissecting the mucous membrane off both sides of the septal cartilage along with the perichondrium and removing the cartilage piecemeal, then allowing both flaps of mucous membrane to hang down in the form of a curtain in the middle line.

---

**CASES OF SEPTAL DEVIATION COMPLICATED BY OTHER ABNORMAL CONDITIONS IN THE NOSE.**

The cases of septal deviation complicated by other conditions in the nose numbered 87, and of these 64 were operated on.

6 had polypi in the nose and presumably were cases of sinus disease. All 6 complained of heavy frontal pain, but it is impossible to say to which condition/
condition the pain was due, as none of the 6 reported. 55 cases had enlarged turbinals as a complication, 34 inferior and 11 middle turbinals, and 10 had both middle and inferior conchae enlarged. 10 cases had the middle concha pressed upon by the septum.

20 cases had a coincident Hypertrophic rhinitis, 4 had adenoids and 2 were discovered on examination to have catarrh of one maxillary antrum.

**SYMPTOMS.**

In all those cases the pain complained of was the typical one of septal deviation, viz. a tight heavy feeling over the bridge of the nose and frontal pain as well. In the cases with middle turbinal enlargement the pain was temporal or on the vertex or occiput as stated above.

Unfortunately only 17 of the 87 patients could be traced, or a little over 19%.

7 of the 17 were cured by operation and the cases were as follows:-

One case of deviation of the septum with enlargement of inferior and middle turbinals, the middle turbinals being jammed on both sides by the septum. The result of operation was a complete cure, the operation being resection of the septum and Middle and Inferior Turbinotomy on both sides.

There were 5 cases of deviation with engorgement of the inferior turbinals. In 4 cases it was the turbinal/
turbinal on the opposite side from the deviation which was affected and in one case that of the same side.

AFTER RESULTS.

The result was a complete cure in all 5 cases after submucous resection and inferior turbinotomy.

The last of the 7 cases which were cured was a case of deviation complicated by adenoids. The result of removal of adenoids and submucous resection was completely satisfactory.

The cases which showed only improvement numbered 7, and of these 6 had submucous resection and inferior turbinotomy and one had resection and removal of adenoids. These patients still have frontal pain and nasal obstruction though to a lesser degree than before operation.

There were 2 failures in cases which showed a very marked deviation and also adenoids. In both these cases when they were re-examined a deviation high up was still present, showing that the operation had been incomplete.

Out of the 55 cases which shewed turbinal enlargement along with the septal deviation, the inferior turbinal of the opposite side was affected in 39%, that of the same side in 25%, and both inferior turbinals were involved in 35%. In the cases of middle turbinal enlargement that of the same side was enlarged in 55%, that of the opposite side in 25%, and both middle turbinals in 20%.
SUMMARY.

Simple Deviation of Septum. Cases 108

Operated on 99

Results ascertained 22

Cured 17) all operated on.

Improved 5)

No case reported in which the result was a failure.

Deviation of the Septum.

Complicated by other conditions in the nose.

Cases 97

Operated on 64

Septum and Polypi 6

" " Turbinals 55

(Inferior 34)

(Middle 11)

(Both 10)

Middle Turbinals Jammed 10

Hypertrophic Rhinitis . 20

Adenoids . 4

Antral Catarrh . 2

Results ascertained 17

Cured . 7

Improved . 9

Failed . 2
<table>
<thead>
<tr>
<th>Status</th>
<th>Procedure</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cured:</td>
<td>Submucous and Double Turbinotomy (Middle and Inferior)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Submucous and Inferior Turbinotomy</td>
<td>5</td>
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<tr>
<td></td>
<td>&quot; &quot; Removal of Adenoids</td>
<td>1</td>
</tr>
<tr>
<td>Improved:</td>
<td>Submucous and Inferior Turbinotomy</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Adenoid Removal</td>
<td>1</td>
</tr>
<tr>
<td>Failures:</td>
<td>Submucous and Removal of Adenoids</td>
<td>2</td>
</tr>
</tbody>
</table>
TURBINAL ENLARGEMENT APART FROM GENERAL HYPERTROPHIC RHINITIS.

Another common condition seen in patients complaining of headache and nasal symptoms is enlargement of inferior or middle turbinals or both.

The enlargement of inferior turbinals is of less import than when the middle turbinal is involved as in the latter case it prevents drainage from the middle meatus and olfactory cleft.

SYMPTOMS - INFERIOR TURBINAL.

The symptoms complained of in the majority of cases of inferior turbinal enlargement were, nasal obstruction, watery discharge, and a feeling of heaviness in the head, also sneezing but in many cases a definite frontal headache was complained of and the discharge was often purulent.

Some patients described the headache as a feeling as of a tight band drawn round the top of the head, and there was no particular periodicity noted, although it is made worse on stooping, this being due to congestion as described before.

SYMPTOMS - MIDDLE TURBINAL.

The pain complained of in the cases of middle turbinal enlargement was different and was temporal or/
or on the vertex or occiput and mastoid; this is probably only experienced when the turbinal has enlarged sufficiently to press on the septum or to occlude the openings of the sinuses in the middle meatus. It is questionable if enlargement of either middle or inferior turbinates would cause pain by itself, apart from that already described as being due to pressure, and is it not more a feeling of stuffiness and heaviness due to being unable to breathe through the nose, rather than actual headache?

The number of cases of turbinal enlargement in this group is 170 and this does not include cases of vasomotor rhinitis where the swelling was intermittent.

Of the 170 cases 96 were operated on and in 17 the operation was middle turbinotomy and in 69 it was inferior turbinotomy, while both operations were done in 10 cases.

Of the 17 cases which had middle turbinotomy the turbinate was jammed against the septum in 14.

AFTER RESULTS.

The results ascertained in this group numbered 39; 22 were cured, 12 improved and in 5 the treatment failed.

In the group of cases which were cured 10 had inferior turbinectomy and 4 had cautery to the inferior conchae; 8 cases had inferior and middle turbinotomy.
The results of treatment on this group showed themselves rapidly; and when the congestion due to operation passed off the improvement was noticed at once.

5 cases were completely unsuccessful, 4 cases of inferior turbinal enlargement and 1 case of middle turbinal enlargement. In the last case the X-Ray picture showed blurring of the sphenoids, but the patient refused to have further operative interference.

**SUMMARY.**

<table>
<thead>
<tr>
<th>Cases of Enlargement of Turbinates Operated on</th>
<th>170</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Turbinectomy</td>
<td>17</td>
</tr>
<tr>
<td>Inferior Turbinectomy</td>
<td>69</td>
</tr>
<tr>
<td>Double Turbinectomy</td>
<td>10</td>
</tr>
</tbody>
</table>

| Results ascertained | . . . | 39 |
| Cured | . . . | 22 |
| Improved | . . . | 12 |
| Failures | . . . | 5 |

Treatment in those cases.

Cured. Inferior Turbinates

| (Inferior Turbinectomy | 10 |
| (Cautery | . . | 4 |

Middle/
Middle and Inferior Turbinates

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbinectomy</td>
<td>6</td>
</tr>
<tr>
<td>Cautery</td>
<td>2</td>
</tr>
</tbody>
</table>

**Improved.**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Turbinates</td>
<td>5</td>
</tr>
<tr>
<td>Turbinectomy</td>
<td>5</td>
</tr>
<tr>
<td>Inferior Turbinates</td>
<td>6</td>
</tr>
<tr>
<td>Turbinectomy</td>
<td>5</td>
</tr>
<tr>
<td>Cautery</td>
<td>1</td>
</tr>
</tbody>
</table>

**Failures.**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Turbinectomy</td>
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<tr>
<td>Inferior Turbinectomy</td>
<td>3</td>
</tr>
<tr>
<td>Cautery to Inferior Turbinals</td>
<td>1</td>
</tr>
</tbody>
</table>
CAUSES OF HEADACHE OTHER THAN ALREADY DESCRIBED.

There are many conditions in the nose apart from the ones already mentioned which may give rise to headache either by absorption of toxins or by causing obstruction to the air intake.

ADENOIDS in children and adults are a very fruitful cause of headache and general discomfort.

SYMPTOMS.

The symptoms complained of are usually snoring, mouth breathing and nasal discharge. Headache is a more common symptom than is usually thought. In the 10 years 193 cases of adenoids had headache, and doubtless this is only a small proportion as it is a symptom not often inquired into, and the information is not often volunteered.

By far the greater number complained of the pain being frontal, or about 60%; the bridge of the nose and between the eyes were the next sites in order of frequency and some complained of pain in the vertex and occiput.

Adenoid vegetations in the nasopharynx frequently cause dulling of the mental faculties and a general lack of tone so it is easy to understand how they may produce headache.
AFTER RESULTS.

26 of the cases of adenoids replied to the questionnaire or reported at the department. 16 of the patients were completely cured of the headache and other symptoms by operation. 7 were improved and in 3 the operation failed to do good.

148 of the 183 cases were operated on. One of the cases in which operation failed developed ozoëna and that was why the symptoms had not abated. Another described by letter the symptoms of sinus disease so plainly that it was easy to diagnose the condition; this had apparently supervened on the primary condition.

HYPERTROPHIC RHINITIS is a very common condition and is nearly always associated with some headache or sometimes only discomfort. There were 97 patients who had this form of rhinitis and complained of headache as a symptom. It was usually frontal or diffuse in character.

ATROPHIC RHINITIS accounted for 62 patients complaining of headache and this headache was practically constant.

It has been noticed that so long as a patient perseveres with the usual ozoëna treatment he or she is almost free from symptoms, but as soon as the daily treatment/
treatment is discontinued the fetor, discharge and headache reappear. The treatment consists in first getting rid of all crusts, then packing the nose with 10% glucose which acts as an antiseptic then following with the daily use of a nasal douche. This douching has to be continued for the rest of the patient's life, as a rule. Several operations have been invented for ozoena, and some claim to have had wonderful results but operative interference has not been used in this department.

There were 16 cases of Rhinitis Sicca in this group of "Other causes of headache" and Acute Rhinitis caused headache in 7 cases. This last was most likely a general systemic headache which often accompanies a "cold in the head".

There were 16 cases of Vasomotor Rhinitis and in this condition the headache, like the swelling of the mucous membrane, was intermittent.

SPHENOPALATINE NEUROSIS.

There were 3 cases of this condition with the typical very severe pain which was described before as "Sluder's Syndrome". It is believed that it is caused by inflammation in the ganglion itself which is formed by the junction of the Maxillary and Vidian Nerves.

The result of treatment is dramatic in these cases. \(\frac{1}{2}\) minim of Saturated Cocaine Solution applied over the area/
area occupied by the ganglion stops the symptoms immediately.

If the inflammation is originating in the sphenoidal sinus, (that is central to the ganglion) cocaine is of no use whatever. Two of the cases were instantly relieved of the pain and had no recurrence, the third was relieved temporarily but the condition recurred and cocaine had to be reapplied with complete success.

RHINOLITHS. One case complained of severe frontal headache.

NASAL DIPHTHERIA. One case was brought to the department because of severe headache and unilateral nasal discharge. In this case of course the headache was caused by the diphtheria toxin circulating in the blood.

FURUNCULOSIS OF THE NASAL VESTIBULE can give rise to very severe neuralgic pain which spreads from the root of the nose on to the forehead; there were 3 cases of this kind in the group.

PAPILLOMA OF THE NASAL VESTIBULE. One case complained of neuralgia of the supraorbital nerve on the same side as the lesion.

EPITHELIOMA OF THE INFERIOR TURBinate was the condition present in one patient who complained of constant frontal headache and "a growth in the nose".
ABSCESS OF THE SEPTUM causes severe neuralgic pain as an abscess does in any position in which it happens to be, but more so in the septum because of the cartilage underlying the mucosa which limits the swelling and renders it more tense.

TUBERCULOSIS OF THE SEPTUM caused headache in one patient and

BLEEDING POLYPUS OF THE SEPTUM in another.

OSTEOMA OF THE FRONTAL SINUS was found at operation on one case which had frontal sinus pain quite typically, and the pain showed marked periodicity.

SYPHILITIC ULCERATION OF THE SEPTUM was accompanied by severe frontal headache in 2 cases; this headache was worst at night which is quite typical of specific headache. After suitable antisyphilitic treatment the headache completely disappeared in both cases.

IN EPISTAXIS there is in almost every case a preliminary headache, or it may only be a feeling of fullness in the head. There were 8 cases of epistaxis who complained of this. The headache is due to increase of blood pressure and congestion, and is always relieved by the bleeding.
AFTER RESULTS.

The results ascertained in this group were 44. There were 21 cured and 19 improved and 4 failures.

HYPERTROPHIC RHINITIS.

In the Hypertrophic group there were 9 cured and of these 6 had the usual nose wash and menthol inhalations, and 3 had vaccines as well.

There were 6 who showed marked improvement and all of these had alkaline nasal douches and menthol inhalations.

One case which was treated with cautery to the inferior turbinates was a failure.

ATROPHIC RHINITIS.

In the Atrophic Rhinitis group as is to be expected, there were no cases cured, but all who reported stated that as long as they continued treatment the condition was very much improved.

VASOMOTOR RHINITIS.

In the Vasomotor Rhinitis group 3 patients were improved: 2 with nose wash and menthol inhalations and one with Calcium Lactate and Belladonna internally. One was a failure and he had been treated with the cautery.

EPISTAXIS.

The treatment in the cases of Epistaxis consisted in/
in the application of the cautery to the vessel above and below the bleeding point followed by the application of an ointment containing ammoniated mercury.

In 5 patients this effected a cure and in one case which was cured a menthol and pareleine spray was used following cauterisation.

2 cases were improved by cauterisation and the application of ointment.

Both methods are directed towards keeping the mucous membrane over the area soft and preventing the area from crusting.

The headache in all these "other causes" was mainly frontal with the exception of the Sphenopalatine ganglion cases, in which the pain is absolutely typical and has been described already.

**SUMMARY.**

<table>
<thead>
<tr>
<th>Other Causes of Nasal Headache</th>
<th>Cases 405.</th>
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<tbody>
<tr>
<td>Adenoids</td>
<td>183</td>
</tr>
<tr>
<td>Hypertrophic Rhinitis</td>
<td>97</td>
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<tr>
<td>Atrophic</td>
<td>62</td>
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<tr>
<td>Rhinitis Sieca</td>
<td>16</td>
</tr>
<tr>
<td>Acute Rhinitis</td>
<td>7</td>
</tr>
<tr>
<td>Vasomotor Rhinitis</td>
<td>16</td>
</tr>
<tr>
<td>Sphenopalatine Neurosis</td>
<td>3</td>
</tr>
<tr>
<td>Rhinoliths</td>
<td>1</td>
</tr>
<tr>
<td>Nasal Diphtheria</td>
<td>1</td>
</tr>
<tr>
<td>Furunculosis</td>
<td></td>
</tr>
</tbody>
</table>
Furunculosis of Vestibule  .  .  .  3
Papilloma of  "  .  .  .  1
Epithelioma of Inferior Turbinate  1
Abscess of Septum  .  .  .  .  .  1
Tuberculosis of Septum  .  .  .  1
Bleeding Polypus of Septum  .  .  .  1
Osteoma of Frontal Sinus  .  .  .  1
Epistaxis  .  .  .  .  .  .  .  .  8
Syphilitic Ulceration of Septum  .  2

Results obtained  .  .  .  44
Cured  21
Improved  19
Failures  4

Hypertrophic Rhinitis.
Cured  9 (Vaccines 2.
(Nose wash and Menthol 7.)
Improved  6 Nose wash and Menthol 6.
Failure  1 Cautery 1.

Atrophic Rhinitis.
Cured  0.
Improved  6 (Ozoena treatment 6.)

Vasomotor Rhinitis.
Improved  3 (Ca Lactate and Belladonna 1)
Failure  1 (Cautery 1.)

Sphenopalatine Neurosis.  Cured  3 (Cocaine)

Syphilitic/
Syphilitic Disease.

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<tr>
<th></th>
<th>Cured</th>
<th>Improved</th>
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<tbody>
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<td></td>
<td>2</td>
<td>1</td>
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(Antispecific treatment.

Epistaxis.

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<tr>
<th></th>
<th>Cured</th>
<th>Improved</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
<td>2</td>
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</table>

(Cautery and Ointment 5
(Cautery and paroleine 1

Many of the conditions mentioned in this last group can in no way be described as nasal, e.g. Diphtheria, Syphilis, etc., but the cases have been included in order to complete the collection as they all came complaining of headache and the local manifestation of disease was in the nose.
COMMENTS.

The conclusions which may be drawn from the results of operation and treatment in the various groups of cases are on the whole very indefinite.

As already stated the number of patients who reported was disappointingly small and in many who did report the description of symptoms and the whole history were vague. It largely depended on the patient's intelligence whether the case could be used or not. Possibly those who did not reply to the questionnaire were cured, and certainly many who reported at the department had almost forgotten that they had ever had any trouble in the nose.

It was difficult to separate the various sinus cases into their own groups. Anterior and posterior ethmoid sinusitis should have been distinguished one from the other, but it was impossible to do so; it was also difficult in some cases to distinguish the acute cases from the chronic, this depending on the fullness with which the case had been taken at the first visits.

The results of operation in the sinus cases are on the whole encouraging and in many cases even if the patients were not completely cured, the headache was relieved. This symptom is the most depressing one and renders a patient quite unfit for mental or/
or physical activity.

Many people have tried to describe and localise the pain of sinus disease definitely, according to the sinus affected, without much success. It will be noticed from the detailed list of the various positions of the headache in the different sinus groups that it is a very variable quantity.

The after results in the Septal deviation group may possibly give a somewhat exalted idea of the success of operation. In the results ascertained no failures were found, but in actual fact the operation is not always followed by cessation of headache and relief of obstruction.

As stated before, only 22% of the cases which had been operated on could be followed up.

It is interesting to note that such a large proportion of cases of adenoids had headache as a symptom. It is a fact not often enquired into, and the information is not often volunteered, so that probably many more children actually have headache than it has been hitherto believed.

In the last group of cases "Causes of Headache other than already described" the conditions have not a great deal in connection with actual nasal headache, but merely complete the set of 1430 cases where headache was complained of.
LIST OF REFERENCES.

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Morriston Davies: "Distribution of 5th Nerve". Brain 1907.

Pavey Smith: Lancet 1923.

Sluder: "Headache of Nasal Origin".
