THE SURGERY OF NASAL ALLERGY

P. H. Golding—Wood, F.R.C.S.

It is generally accepted that cases characterised by sneezing, watery rhinorrhoea, and obstruction from a livid swollen mucosa, fall into two fairly distinct groups. Most authorities regard both groups as allergic, qualified as specific and non-specific, atopic and non atopic, intrinsic and extrinsic, or simply as allergic and extra-allergic.

Irrespective of the terms preferred, it is apparent that the first implies definable allergen-antibody reaction with release of histamine, and perhaps other chemical mediators such as heparin and 5-hydroxytryptamine. The second excludes this without implying other specific aetiological cause. It is with this second group that I am primarily concerned. Elsewhere, (Golding—Wood 1961, 1962) I have contended that these cases are due to a variety of stimuli that provoke localised parasympathetic overactivity with excessive release of acetyl-choline. Pharmacologically, this closely resembles histamine, hence the clinical similarity of these two groups; the allergic due to antigen-antibody reaction and the cholinergic from non-specific causes.

Autonomic influences

The nasal mucosa characteristically responds to every stimulus; emotional, endocrine or physical, by alteration of vasomotility and increased secretion. Feelings of frustration, resentment or guilt, sexual excitement, and events such as menstruation and pregnancy frequently induce hyperaemia, hypersecretion, and often obstruction in the nose (Holmes et al 1950).

These changes are mediated by mucous glands, smooth muscle ,and capillaries of the respiratory mucosa. These are under autonomic control and parasympathetic impulses induce muscle contraction, and hypersecretion of salt-free fluid (Negus 1957, Malcomson 1959). Cases of vasomotor rhinitis represent merely an aggravation of normal responses.

TABLE I

Clinical Features	Allergic	Cholinergic
Sneezing and Rhinorrhoea	Seasonal due to pollens Perennial due to occupational dusts.	Frequent paroxysms over many years. Occasionally unilateral.
Lacrimation	Usual	Frequent
Nasal mucosa	Typically bluish, swollen and soggy	Variable
Nasal eosinophilia	Marked	Frequent, but less intense.
Skin sensitivity tests	Positive reactions related to history	Negative or non-specific
Response to antihistamines	Good	Variable
Polypi	Frequent and large	Occasional and small
Associated asthma	Frequent (40%)	Occasional (15%)

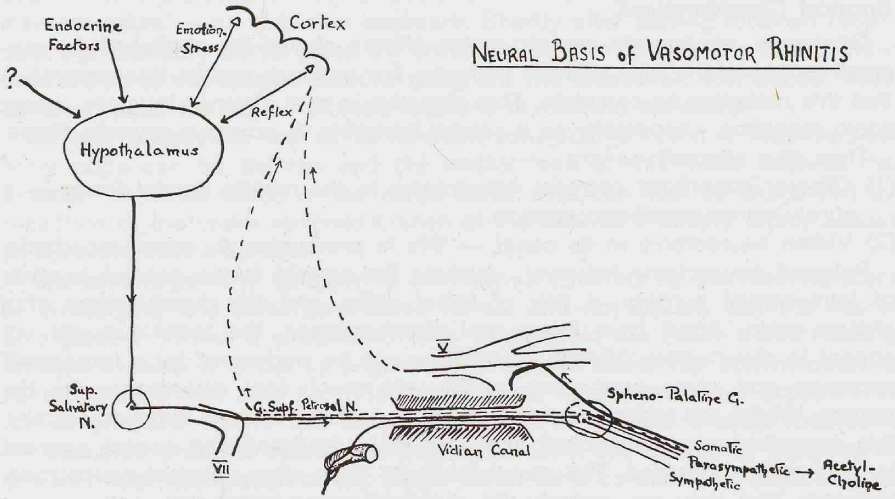
The general management of the allergic groups requires no comment, but we should note that allergic constitution is not the only factor involved. Even in seasonal pollinosis symptoms are not consistently related to the pollen concentration of inspired air (Van Hoorn 1958). That the occurence of allergic

attacks is partly conditioned by variations in autonomic balance has been strikingly demonstrated by Van Dishoeck (1961) who found that unilateral stellate block markedly increased local response to a small nasal stimulus. Interplay of these factors reasonably accounts for the border-line cases that occasionally occur.

The Neural Basis of Vasomotor Rhinitis

Cholinergic cases mostly occur between 20—40 years of age, and are frequently initiated by emotional tensions even in stable personalities. Once begun, the somatic disturbance continues independent of the psychic disturbance that provoked it. Endocrine effects are often contributory, and as attacks are often provoked by simple nasal stimuli reflex activity is clearly important.

My hypothesis of the parasympathetic mechanism of vasomotor rhinitis can be presented diagrammatically (Fig. 1).



NEURAL BASIS of VASOMOTOR RHINITIS

Diagrammatic representation of the Neural Basis of Vasomotor Rhinitis (reproduced from J. Laryng. by permission of the Editor).

Diagramme représentant la Base neurologique de la Rhinite vasomotrice

The hypothalamus, the reflex and integrative centre of the autonomic system, responds to emotional stimuli, endocrine changes, and perhaps other factors. Similarly, it initiates reflex activity in response to afferent stimuli from nasal mucosa. These afferent pathways are not wholly understood; apart from somatic trigeminal pathways, purely autonomic afferents apparently exist (Golding-Wood 1961).

In response to hypothalamic stimuli, the superior salivatory nucleus fires parasympathetic impulses that travel over the greater superficial petrosal nerve to the spheno-platatine ganglion. This ganglion receives parasympathetic, sympathetic, and somatic fibres for distribution, but only parasym-

pathetic fibres relay here. They exert their mucosal effects by release of acetyl-choline.

Racial, constitutional and other genetic factors set the trigger pressure, but do not alter the mechanism.

Conservative Measures

Simple psychotherapy, rational adjustment in the patient's mode of living, and simple drugs, principally Ephedrine 15 mgm. t.d.s., increased as required, or antihistamines used for their anticholinergic effect, often suffice for relief. Zinc ionisation has its place.

When obstruction from hypertrophic and hyperplastic turbinates predominates, cauterisation or submucosal diathermy of the turbinates is generally sufficient. Nasal polypi, if present, are removed.

There remains a residue of intractable cases, the patient being considerably handicapped by severe paroxysmal sneezing and copious rhinorrhoea. These can now be relieved by suitable surgery.

Surgical Considerations

Obviously, cholinergic secreto-motor effects should be abolished by surgical section of the final effector pathway. For optimum results it is imperative that this resection be complete. This objective is best attained by a pre- ganglionic resection - especially as it seems desirable to preserve somatic fibres.

Thus, the alternatives are : —

(1) Greater superficial petrosal neurectomy in the middle cranial fossa — a purely parasympathetic section.

(2) Vidian neurectomy in its canal — this is predominantly parasympathetic.

Petrosal neuroctomy however, involves the patient in the greater hazards of intra-cranial surgery, a risk of facial palsy, and the disadvantage of a shaven scalp. Apart from these real disadvantages, the technique will not appeal to rhinologists. Vidian neurectomy can be performed by a transantral exposure and gives equivalent results with much less disturbance for the patient. Whilst the technique involves ligation of the internal maxillarly artery, this procedure alone does not alter mucosal secretions and cannot account for the results attained. The parallel effects seen after petrosal neurectomy indicates that they are entirely the result of parasympathetic section.

Alcohol injection about the spheno-palatine ganglion has its advocates, but it would seem impossible by such means to attain either the precision or the permanence of surgery.

TABLE II

	Results Cases	Complete Relief (sneezing & rhinorrhoea)
Petrosal Neurectomy	3	3
Vidian Neurectomy	71	66
	74	69

These cases, now followed up to seven years, represent a success rate of 93% in otherwise completely intractable cases.

Operative Technique

Under general anaesthetic with hypotension to minimise bleeding, the maxillary antrum is opened as for a Caldwell Luc. The antral mucosa is generally normal, but, in about 15%, it is markedly thickened and infiltrated by chronic inflammatory cells. If this impedes access it is stripped out.

The posterior wall of the antrum is removed and subsequent steps are simplified by use of the Zeiss microscope — preferably with a 300mm. objective to allow comfortable working distance. The periostium is opened. The internal maxillary artery which crosses the operative field more or less transversely is displayed by scissor dissection. The artery is held on a hook whilst its main trunk and branches are defined and secured in extra-large Cushing type clips. The artery is preserved in continuity or divided between clips, as seems expedient. A small vein or two run near the artery, but there is no evidence of the venous plexus often mentioned.

The maxillary nerve is defined above the artery. Whilst a small rugine is used to bare the face of the sphenoid, the nerve is traced back to the foramen rotundum — an essential landmark. Shortly after leaving foramen rotundum the maxillary nerve gives off branches that travel medially and slightly downwards to the spheno-palatine ganglion. The dissection now traces these bundles whilst the rugine sweeps medially across the sphenoid.

Several millimetres medial to foramen rotundum a more or less vertical bony ridge can be defined and the medial face of this leads back to the anterior funnelled mouth of the vidian canal. This can best be exposured by resection of the upper terminal branch of the internal maxillary artery almost to spheno-palatine foramen.

The spheno-palatine ganglion in man appears merely as the meeting point of converging and ermergent nerve fibres, and not as any definite neural enlargement. Whilst it is elevated on a small hook, the vidian nerve running forward towards it is cut by angled sickle-shaped knife. The spheno-palatine nerve bundles can now be reflected upwards to complete the exposure of the vidian canal 10—12 mm. medial and rather inferior to foramen rotundum. An insulated probe is inserted in the vidian canal and diathermy coagulation ensures both destruction of the vidian fibres for a considerable distance and local haemostasis.

Completion of the operation requires only suture of the buccal incision. With familarity, this operation seldom requires more than 20 — 25 minutes, but it is not easy and requires all the precision of modern temporal bone surgery.

Side Effects and Complications

A nasal mucosa hitherto swollen, generally shrinks to normal with improvement of the airway. The inferior turbinate often appears sligthly pallid, and this may persist. A slight stickiness of nasal secretions may be noted, but I have never seen any crusting and other trouble that might be feared in a dry nose. Subsequent nasal function seems unimpaired.

Section of the vidian nerve abolishes normal lacrimation — as indicated by Shirmer's test. The accessory glands and goblet cells of the conjunctiva however, remain active, and protect the patient from the kerato-conjunctivitis sicca that attends the dry eye of the Sjögren syndrome or postirradiation

injury. Some temporary ocular discomfort may occur, but is easily relieved by artificial tear drops. Whilst this is true in the British and probably other temporate climates, caution may be necessary in hot, dry, and dusty climates which might well aggravate the ocular effects.

In 2—3% of cases, the vidian canal is unexpectedly wide, its lumen about 4 mm. Too small a probe may thus be inserted through it into the middle cranial fossa. To this accident I attribute the two cases of abducens palsy and ophthalmic analgesia that have provided the only significant complication of this series.

Use of a blunt headed and shouldered probe of suitable size prevents this penetration and with this precaution there seems no reason for recurrence of similar complication.

Technical difficulty may be imposed by thick bone, excessive fat in pterygo-palatine fossa, or bleeding sufficient to obscure vision, but these are surmountable.

Normally, both sides can be completed in one session, but to facilitate physiological observations it has been usual to allow an interval of four weeks.

On the operated side, effects are immediate and in some 30% a marked improvement occurs on the contralateral side within three weeks. This might be due to reduction of afferent stimuli to below threshold intensity. Similar bilateral effects occur in the experimental cat (Malcomson 1959) so can hardly be psychogenic.

In several cases the second operation, deferred through bilateral effect has later been requested through relapse on that side only.

Recurrence

Given complete neurectomy, I have only seen one partial recurrence giving relatively trivial return of symptoms, and this five years after operation. In another, tests disclosed inadequate resection and return of symptoms after six months, but this case is reported as a failure.

Conclusion

This operation provides effective and now apparently safe operation for intractable cases of non-specific sneezing rhinorrhoea, and compelling proof of its cholinergic origin.

Complete neurectomy will ensure virtually uniform success, but the surgeon's responsibility is considerable. Inadequate resection is useless, and the subsequent scarring in the pterygo-palatine fossa will deny any later attempt.

SUMMARY

It is generally recognised that sneezing, watery rhinorrhoea and nasal obstruction by oedematous mucosa may be produced by allergic reaction to definable allergens, and at least as frequently by a variety of emotional, endocrine or physical stimuli that do not provoke antibody reaction.

It is contended that these factors provoke autonomic dysfunction resulting in localised parasympathetic overactivity. The cholinergic effects thus induced in the nasal mucosa closely resemble the histaminic effects of true allergy. Nevertheless, the clinical differentiation is seldom difficult despite the

existence of border-line cases due to true allergic effects that may be influenced quite profoundly by autonomic activity.

Seventy four severe and otherwise intractable cases of cholinergic type have been treated by resection of the parasympathetic pathway in petrosal or vidian nerve with almost uniform relief for periods up to seven years.

The respective merits of these operations are discussed and the preferred technique of vidian neurectomy by trans-antral approach is described. Given correct indication, clinical failure appears due only to technical inadequacy and relapse is unusual after complete neurectomy. The few complications so far encountered are discussed together with measures whereby they may be minimised or prevented.

LA CHIRURGIE DE L'ALLERGIE NASALE

Il est généralement reconnu que l'éternuement, la rhinorhée aqueuse et l'obstruction nasale avec muqueuse oedématiée peuvent être causés par une réaction allergique à des allergènes définis et au moins aussi fréquemment par une stimulation émotionnelle, endocrinienne ou physique, qui ne provoque pas de réaction d'anticorps.

Il est discutable que ces agents provoquent un disfonctionnement autonome, résultant dans une hyperactivité parasympathique localisée. L'effet cholinergique ainsi induit dans la muqueuse nasale ressemble de près aux effets histaminiques de l'allergie vraie. Néanmoins, la différentation clinique est rarement difficile en dépit de l'existence de cas mixtes dûs aux vrais effets allergiques, qui peuvent être influencés très profondément par une activité autonome.

Soixante-quatre cas sévères et intraitables du type cholinergique ont été traités par la résection du faisceau parasympathique dans le nerf pétreux ou vidien avec soulagement presque uniforme pour des périodes allant jusqu'à sept ans.

Les mérites respectifs de ces opérations sont discutés et la technique de choix de la neurectomie du nerf vidien avec l'approche trans-antrale est décrite. La réappariton après une neurectomie totale est excessivement rare et dans les bonnes indications les récidives sont uniquement dûes aux mauvaises techniques chirurgicales. Les complications sont peu nombreuses et rares, et les mesures aidant à les diminuer ou à les éviter sont discutées.

BIBLIOGRAPHY

Dishoeck H. A. E. van	1961	Rapp III 7e Congt. Int. Oto-Rhino-laryng.
Golding-Wood P. H.	1961	J. Laryng., 75 232
" "	1962	J. Laryng., 76 969
Holmes T. H., Goodell H., Wolff S., & Wolff H. G.	1950	The Nose, Springfield, Illinois.
Hoorn J. G. van & Dishoeck H. A. E. van	1958	Pract. Oto-rhino-laryng. 20 315
Malcomson K. G.	1959	J. Laryng. 73 73
Negus V.	1957	Ann. Otol. Rhinol. Laryng. 66 344

P. H. Golding Wood, F.R.C.S., Kent County Ophtalmic & Aural Hospital, Church Street; Maidstone/Kent - England.