Vidian neurectomy

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SUMMARY

The author presents his experience with vidian neurectomy. 30 cases have been operated; 18 had bilateral nasal-sinus polyposis and 12 vasomotor rhinitis. The results are presented. The patients with bilateral nasal-sinus-polyposis were operated by bilateral polypectomy cleaning the sinuses according to the Ermiro de Lima technique and unilateral vidian neurectomy was simultaneously performed. On this side the results obtained were excellent in comparation with the other one.
The surgical technique is explained and some pathogenetic considerations are discussed.

INDICATIONS, TECHNIQUES AND RESULTS

GOLDING Wood published the first results about the vidian neurectomy in 1961. Afterwards, many others have worked in the same field (Poch Viñals (1972, 1973), Hiranandi (1966), Bouche, Frèche and Fontanel (1971), Mostafa (1973), Chandra (1967), Takahashi et al. (1973) and Montserrat (1973).
At the last World Congress in Venice, six papers were presented about this subject and all of them described successful results.
Nevertheless, the indications and results of this technique suggest the important physiopathologic questions about the biochemical allergic phenomenon on one side and the neurovegetative vasomotor phenomenon on the other.

PHYSIOPATHOLOGIC CONSIDERATIONS

The authors that have studied this subject emphasize that a good selection and diagnosis of the patients in which this technique will be performed is very important.
Golding Wood, in his first communications, thought that a neurectomy of the vidian nerve was indicated in chronic vasomotor rhinitis (CVR) and that this was its main indication. Notwithstanding, little by little, the indications of vidian neurectomy have been enlarging until today that some rhinologists (Poch Viñals, Takahashi, Chandra and Montserrat) perform this intervention for allergic rhinitis, vidian neuralgia, recurrent polyposis and crocodial tears syndrome.

Chronic vasomotor rhinitis has the following clinical symptomology which can be considered as pathognomic:

1. Nasal obstruction
2. Prolific mucus rhinorrhea
3. Sneezing crises

These symptoms are presented by aperiodic crises. Sometimes these problems occur more or less acutely and continuously.
It must be pointed out that these clinical symptoms are the same as those of allergic rhinitis, in which different types of dust with or without animal fragments or bacteria can act as allergens. The clinicians know the difficulties in making a differential diagnosis between chronic vasomotor rhinitis and allergic rhinitis. Therefore, in the last decades two different schools of thought have tried to explain these clinical symptoms by two different mechanisms.
On one hand there is the allergic theory of Richet. This theory has been greatly developed and today it uses biochemical phenomenon as its basis. These biochemical reactions determine the histologic reaction against the bacteria or foreign substance which in turn produces the immunologic phenomena.
It must be admitted that today the antigen-antibody reaction is not a hypothesis but something concrete which can be detected and measured. The antibodies are not some hypothetic proteins but they are immunoglobulins of known molecular weight whose chemical structure can be accurately approximated. Moreover, something is being learned about the intramolecular reaction between antigen-antibody: this existence of a biochemical mechanism which stimulates the allergic phenomenon cannot be denied.
On the other hand, physiology teaches that the parasympathetic system is responsible for mucosal vasodilatation, hypersecretion, and edema. These three phenomenona are presented in allergic rhinitis and in chronic vasomotor rhinitis and are responsible for the nasal obstruction and watery rhinorrea in these patients.
In 1910 Eppinger and Hess thought that the allergic symptoms were due to a neurovegetative imbalance. In fact many clinical phenomenona suggest a neurovegetative etiopathogenesis. The other previously mentioned authors have emphosized the following points concerning the vidian neurectomy:

1. Cervical sympathectomy produces watery rhinorrea and edema of the mucosa due to a resulting dominance of the parasympathetic system: Fowler in 1943 performed a gangliectomy of the left stellate ganglion. After the surgery the patient had attacks of nasal obstruction, edema of the mucosa, and sneezing bouts which lasted up to 15 minutes, but only on the left side of the nose. Upon seeing this case Golding Wood decided to section the main nasal parasympathetic nerve in future patients.
2. On the other hand, Golding Wood presents an anatomic scheme which could explain a long series of clinical facts. According, this the Great Superficial Petrosal Nerve (GSPN) is the principal element of the vidian nerve beginning in the superior salivatory nucleus (SSN). From here the nerve follows the same path as the facial nerve in going to the geniculate ganglion. The SSN is connected to

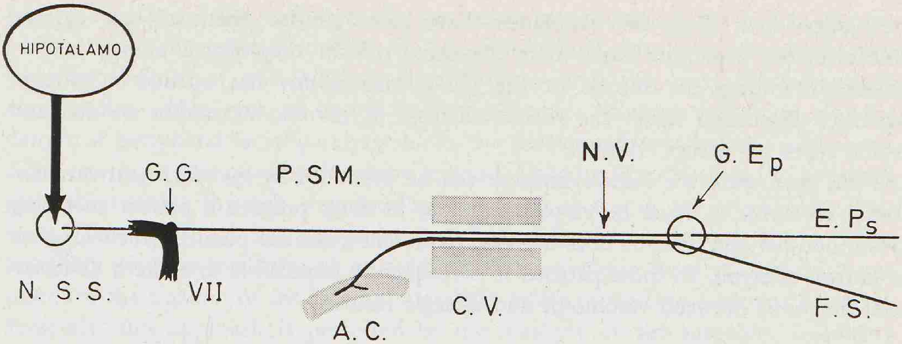

Figure 1 - N.S.S. - Superior salivary nucleous.
G.G. - Geniculate ganglion.
P.S.M. - Great superficial petrosal nerve.
A.C. - Carotid artery.
C.V. - Vidian canal.
N.V. - Vidian nerve.
G.E_p - Sphenopalatine ganglion.
F.P_s - Parasympathetic fibers.
F.S. - Sympathetic fibers.
According to Golding Wood.

the hypothalamus (Fig. 1). As is known, the hypothalamus is the regulator and integrating center of the neurovegetative system. Cortical, endocrine, emotional, psychological and probably other stimuli come to the hypothalamus. Here the nasal mucosal reactions to these stimuli are formed (Fig. 1). All of these arguments explain why emotional factors can greatly influence the nasal mucosa. In the same way, sexual excitation can reproduce the symptoms of edema and nasal obstruction very similar to a chronic vasomotor rhinitis.

On the other hand, the patients involved here have in general characteristic and well-defined physical features. They are usually asthenic or asthenico-athletic with a great emotional liability that adds an evident psychogenic overload.

Concerning the physiology of the neurovegetative system the work of Arris and Dale must be remembered (cited by Golding Wood, 1962). These authors proved that parasympathetic action and acetylcholine discharge are limited to acting through an isolated unit and have a local effect only. In contrast, the sympathetic system produces a more general and spreading reaction. As has been mentioned and will be discussed later, the same clinical features may have two absolutely different etiopathogenesis. On one hand, these clinical pictures can be caused by a chemical reaction produced by a concrete immunoglobuline with a specific antigen. On the other hand, the same clinical features can be determined by very different stimuli setting on the neurovegetative system.

Perhaps the phenomenona produced by the actions of acetylcholine and histamine can be explained. In the allergic reaction the intermediate substance is histamine, which is responsible for the clinical symptoms. In the parasympathetic response acetylcholine is the substance which determines the symptoms and it must be recognized that these two substances have some similar pharmacologic effects. Nevertheless, histamine has a more important role in anaphylactic allergy.

Notwithstanding, the success of the vidian neurectomy has opened a stronger question than over about the real mechanism of chronic vasomotor rhinitis and some types of allergic rhinitis.

As has been seen, the same symptoms can be produced by two different mechanisms. However, it must be emphasized that in daily practice a patient suffering from non-periodic rhinitis does not always present a clinical picture which suggests a known allergen. In these patients it is frequently impossible to make a differencial diagnosis between vasomotor and allergic rhinitis.

ANATOMICAL CONSIDERATIONS

That the vidian nerve originates at the junction of the GPSN and the Deep Petrosal Nerve (DPN). This latter nerve is classically considered as the final branch of the Jacobson nerve, which originates in the Anders ganglion of the glossopharyngeal nerve. Nevertheless, the studies of Michael and Champetier state that one of the terminal branches of the Jacobson nerve is not the DPN. This fact, according to Poch, would reduce the glossopharyngeal influence on the vidian nerve, which would continue being fundamentally parasympathetic. Moreover, the vidian nerve receives some sympathetic fibers from the carotid plexus (Fig. 1). All of these above fibers together constitute the vidian nerve. This nerve goes in a caudal direction and enters the vidian canal. The vidian canal is a tunnel in the inferior border of the lateral wall of the sphenoid sinuses, and it is situated in the anterior superior face of the petrous bone. If the sphenoid sinus is larger than normal the vidian canal can produce a herniation into the lateral wall of the inferior quadrant of the sphenoid sinus. The caudal vidian foramen is located in the funneled recess of the pterygomaxillary fossa, approximately one-half to one centimeter medial and inferior to the foramen rotundum. The vidian nerve exits from the caudal foramen, enters of the pterygomaxillary fossa, and goes to the sphenopalatine ganglion, which is situated close to the maxillary artery. It is imperative to keep all of these anatomic relationships in mind during the performance of a vidian neurectomy.

SURGICAL TECHNIQUES

Several surgical approaches have been proposed. Some of them would be made through the same vidian canal, such as the transpalatal approach by Mostafá and the transmeatal approach by Takahashi. Minis and Morrison (1971) have searched for the caudal orifice of the vidian canal, elevating the septal mucosa to the choana and continuing up to the antero-interior face of the sphenoid bone. The vidian nerve is situated at the external border of the choana, with the sphenopalatine foramen slightly above this location. The author has not had any experience with these approaches.

Golding Wood began treating CVR by using the transtemporal approach and sectioning the nasal parasympathetic nerve (the GPN) where it courses in contact with the petrous bone, between the geniculate ganglion and the vidian nerve's entrance into the cephalic orifice of the vidian canal. He soon abandoned this technique because it was intracraneal, carrying with it the usual possible neural complications. Moreover, an important inconvenience, although temporary, was the danger of peripheral facial paralysis due to the traction suffered by the facial nerve. After treating a few cases by the above method, Golding Wood decided to approach the vidian nerve through the maxillary sinus to arrive in the pterygomaxillary fossa. This approach was suggested by Carnochan for sectioning the superior maxillary nerve as treatment of intractible facial neuralgias. Seiffert used this same route for the ligation of the internal maxillary artery in treating posterior epistaxis. Presently, this approach is preferred by the majority of the surgeons, following Golding Wood, in performing the vidian neurectomy.

The patient is placed in the supine position with the head and trunk elevated 30° with the horizontal and the head rotated 20°, placing the side of the surgical field facing upwards.

The maxillary sinus must be opened following the Caldwell-Luc technique, which makes the vertex of the truncated maxillar antrum visible (Fig. 2). The surgeon must elevate the covering mucosa of this posterior vertex and then the bony wall appears in the surgical field. This wall is a flat area crossed in its superior aspect by a little transverse prominence. This prominence corresponds to the spheno-palatine artery. I believe that this prominence corresponds more to the internal

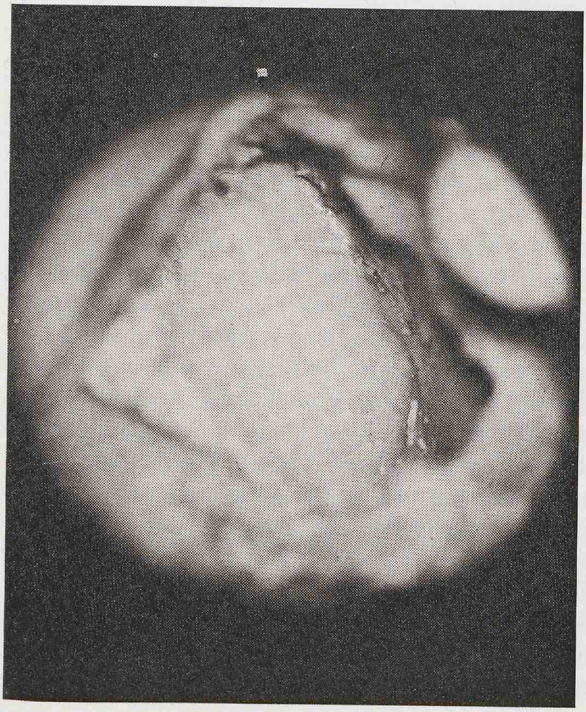

Figure 2. Posterior face of the maxillary antrum.

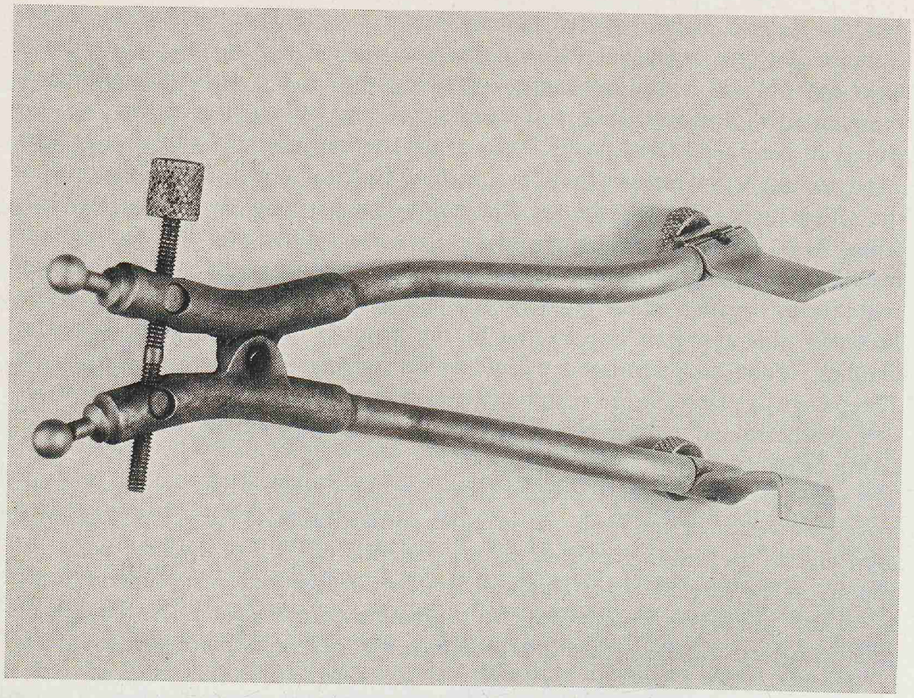

Figure 3. Soft tissues automatic retractor.

maxillary artery than to the sphenopalatine artery. Superior and lateral to this prominence there is a little bony area, usually fine and transparent, which separates the maxillary sinus from the sphenoid sinus.

The author removes a piece of bone approximately 1 cm square in area with a flat chisel immediately below the prominence of the sphenopalatine artery. Occasionally this prominence is not evident, in which case the chisel is applied to the superior border of the trapezoidal posterior face of the maxillary sinus. In general this face is very thin and this maneuver must be done delicately so as to not injure the vessels directly below. Then, the opening of the pterygomaxillary fossa is continued with two more chisel cuts, perpendicular to the first one, with one being at the medial border and the other at the lateral border of the same trapezoidal face. The resulting design of these chisel cuts shows a trapezoid with the uncut caudal border being shorter than the cut cephalic border. The final cut at the caudal border will free the piece of bone which covers the pterygomaxillary fossa and its contents.

If the surgical microscope was not installed earlier, it must be done now because its future use is imperative. The work is done at a magnification of 6 to 10 power with a focal lenght of 300 mm. For more operating convenience a static separator is placed to maintain the soft tissues open (Fig. 3). This instrument frees the surgical assistant and prevents the resulting head movements from a manual

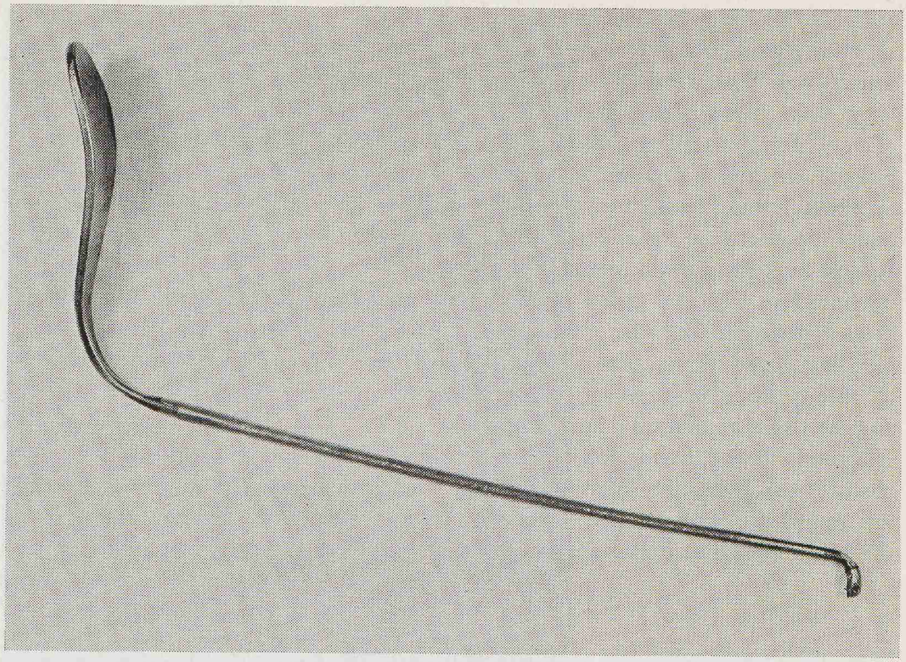

Figure 4. Elevator of the internal pheriostum of the pterygo-maxillary fossa.

separation, which would then put the operational field out of focus. A special elevator with its end in the form of a spatula has been constructed (Fig. 4). With this instrument the internal periostium is elevated from the borders of the bony aperture. Once the bone is elevated from the pterygomaxillary fossa's soft tissues, a Ferris Smith forceps or something similar is used to complete the bony aperture as cefalic and medial as possible in order to find the vidian nerve.

If the bony plate has been carefully removed the internal periosteum or the connective tissue covering the anatomical elements of the pterygomaxillary fossa can now be seen. This sheet of connective tissue is cut with a small hook-knife. It must be cut in a transverse direction, i.e., from lateral to medial, in order to not injure the internal maxillary artery which goes in the same direction under this sheet. Once this connective sheet is open a slow dissection of the fossal elements with a long fine forceps using a small piece of cotton at its end is begun.

An angled scissors that permits a dissection of the anatomical interfossal elements is used. This scissors must dissect in a transverse direction. With the small piece of cotton and this scissors the internal maxillary artery must be exposed up to its medial angulation (Fig. 5). This artery goes from lateral to medial in the superior third of the fossa and before it arrives at the medial border it turns inferiorly, (Fig. 6). The sphenopalatine artery originates at this medial angulation. From its beginning this artery goes in a medial and cephalic direction. Sometimes the sphenopalatine originates more caudally in the descending section of the internal maxillary artery. After the sphenopalatine artery is located, the surgeon must search for the superior maxillary nerve, which is another of the surgical references in the vidian neurectomy. Dissecting in a transverse direction above of the maxillar artery this large white nerve is seen going in a lateral direction. This nerve follows the roof of the pterygomaxillary fossa and some thin branches may be seen leaving its inferior surface. These branches go inferiorly in the direction of the internal maxillary artery in search of the spheno-palatine ganglion and constitute the communication between the superior maxillary nerve and the sphenopalatine ganglion. It must be kept in mind that this surgical area is very richly irrigated and bleeding can interfere with the vision of anatomical elements situated in the fossa. It has been experienced that the great quantity of vessels and even a small amount of bleeding cover the surgical field and hinder the surgeon's work more than the adipose tissue here. However, in the inferior two-thirds and the external areas the adipose tissue becomes the largest obstacle.

If a good view of the surgical field cannot be obtained or if an abundant hemorrage obscures the fossa, the internal maxillar artery can be clipped and sectioned. By this means the surgical field is enlarged. Sometimes it is more convenient to clip the sphenopalatine artery, especially if this artery, begins in the discending part of

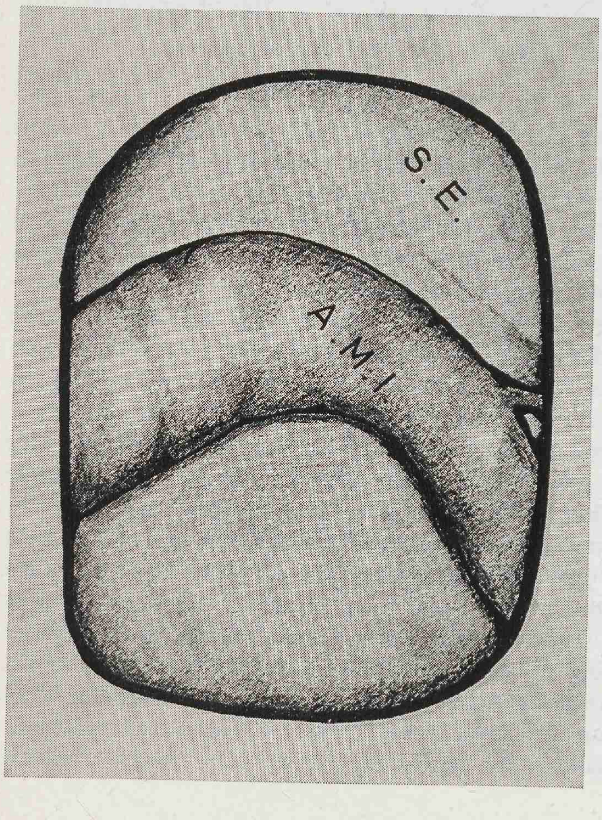

Figure 5. S.E. - Sphenoid sinus. A.M.I. - Internal maxillary artery.

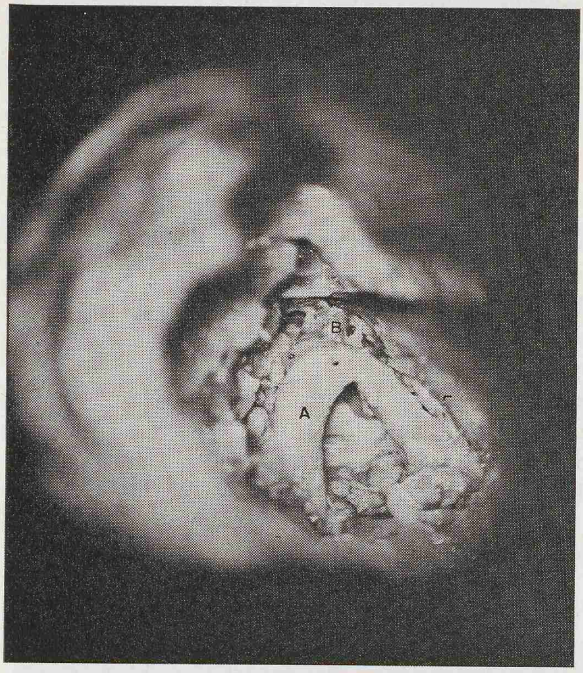

Figure 6. A - Int. maxillary artery. B - Sphenopalatine artery.

the internal maxillary artery. By drawing this artery inferiorly and laterally a little prominent bony area is found. This area is situated between the superior maxillar nerve above and the funneled bony area below. This funneled area begins in a medial and inferior direction and corresponds to the caudal foramen of the vidian canal. After crossing this area a white nerve branch can be seen coursing laterally which is the vidian nerve. With an otological hook the vidian can be lifted up and sectioned (Fig. 7 and 8).

With a flexible probe the diathermy coagulation of the proximal end of the sectioned nerve is performed. The probe has to have the terminal protected by an insulator. A bipolar coagulation system is more useful. Golding Wood uses a special conic probe which can be applied in the caudal foramen of the vidian canal. Its conic form does not allow it so sink into the canal. After this cauterization the operation is concluded.

In al cases the author forms a communication between the maxillary sinus and the inferior nasal meatus following the Abelló-Vila technique. In this technique a flap is made with the nasal mucosa which is sewed to the soft tissues in the canina fossa. A small piece of gelfoam is introduced into the aperture of the pterygomaxillary fossa and sulphamide powder into the sinus.

Occasionally it has been easier and more convenient to perform the vidian neurectomy as follows: Once the internal maxillary and the sphenopalatine arteries have been located, these arteries can be elevated in a supero-medial direction and the vidian nerve is exposed below running laterally. Due to the traction on the arteries, the nerve and the sphenopalatine ganglion are also lifted, thus giving the nerve a cephalic orientation in its course. It helps to rotate the patient's head to the contralateral side once the static separator has been placed.

RESULTS

Occasionally this operation has been difficult because the vidian nerve is not always easy to locate due to the large quantity of blood vessels in the fossa. Nevertheless, the author must admit that the most recent cases have had a shorter duration and fewer surgical difficulties, undoubtable to a growing experience with the operation. Neither opthalmologic complications, such as conjunctive dryness, nor post-operative hemorrage have been experienced.

We have performed this intervention on 30 patients and our results have been very good and comparable with those of other workers in this field.

Twelve of our patients had been suffering from chronic vasomotor rhinitis, with nasal obstruction, acqueous rhinorrhea and mucous congestion, with numerous sneezing attacks. Nine of these cases have shown a definite symptomatic improve-

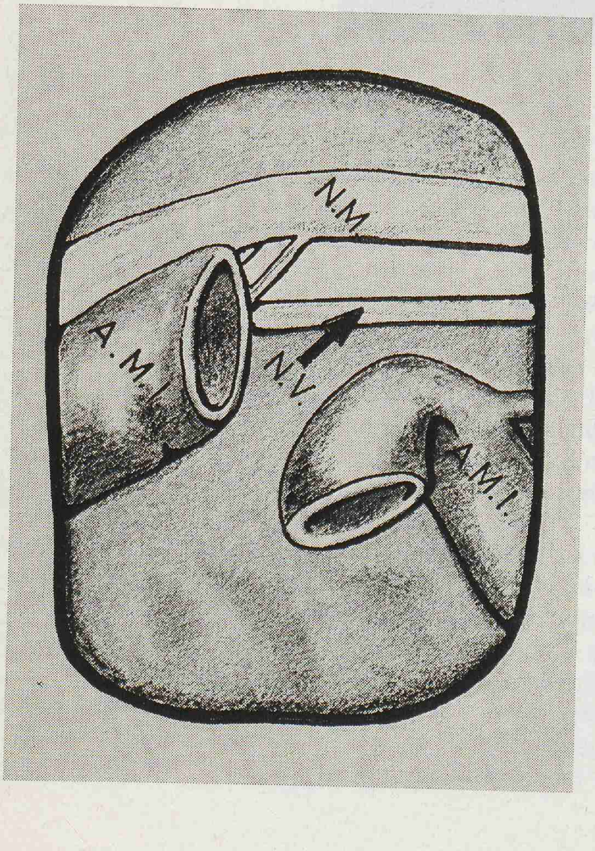

Figure 7. N.M. - Sup. maxillary nerve. A.M.I. - Int. maxillary artery. N.V. - Vidian nerve.

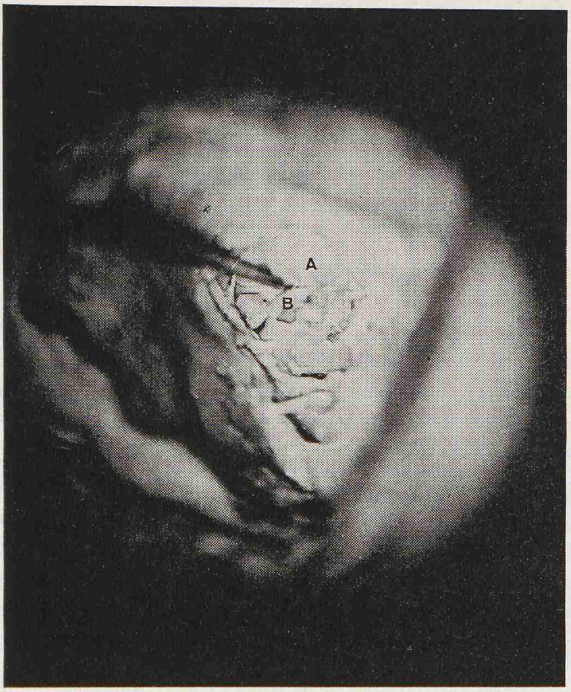

Figure 8. A - Distal end of the int. maxillary artery. B - Vidian nerve.

ment. The remaining 18 patients had bilateral nasal sinus polyposis, on which I performed a bilateral polipectomy, cleaning the sinuses according to the Ermiro de Lima technique. Simultaneously, I did a unilateral vidian neurectomy. This neurectomy was performed on the side which had the most polyposis.

Very good results have been obtained in 14 of 18 patients. The oldest cases were operated on three years ago, while the most recent ones are one year post-operative. Not one of these 14 has had a recurrences of polyps, mucosal edema, or subjective symptoms of obstruction on the neurectomy side. On the other hand, on the side without the neurectomy, 12 of these 14 have shown a reappearance of some or all of these signs. In the four unsuccessful cases two can be considered as technical failures, but it is believed that the surgical technique was correct in the other two (table I). It may be pointed out that 16 of the 18 polyposis cases

TABLE I

VIDIAN NEURECTOMY

CASES	RESULTS			
18	*Good*		*Bad*	
Mucosa edema Naso-sinoid polyps	Unilateral	Bilateral	Satisfactory technique	Unsatisfactory technique
	12	2	2	2

presented anatomo-pathologic signs which were either certain or compatible with allergy. The epithelium was almost always intact, seldom being broken by serous exudate. There was much eosinophylic infiltration with submucosal edema and enlarged mucous glands.

These results force a review of the etiologic considerations mentioned at the beginning of this article. Although an immunoglobulin study was not done on any of these cases, the clinical signs in the majority of the patients, as well as their pathologic anatomy, appear to confirm the existence of a very important allergic factor. It is difficult to accept the fact that a simple nerve resection could cause the disappearance of the allergic reaction, which is essencially biochemical.

Although Peel says that the biochemistry of the antigen-immunoglobuline reaction has usurped the importance of the autonomic contribution to the genesis of allergic phenomena, it is felt that the excellent results of the vidian neurectomy suggests that a disequilibrium of the autonomic nervous system is an element of the pathogenesis of allergic rhinitis which must be taken into account.

An apology is expressed to the reader for the lack of a satisfactory explanation concerning the etiopathogenic problems presented by the results obtained in this surgery. We must also remember that different authors has published the similar or better succeses by vidian neurectomy. Considering these results it must be suspected that, although accepting the allergic phenomenon as an antigen-antibody reaction, there probably are some neural mechanisms which intervene in this reaction.

RÉSUMÉ

L'auteur présente son expérience avec la neurectomie du nerf vidien. Il a operé trente cas, dix-huit avec polypose nasosinusienne bilatérale et douze avec rhinitis vasomotrice.

Les résultats y sont présentés. On a operé les deux côtés avec la technique de Ermiro de Lima dans les malades de polypose bilatérale. La neurectomie a été réalisé sur un seul côté et les résultats à long terme de ce côté ont été excellents en relation à ceux des côtés sans neurectomie.

La technique chirurgicale y est décrite et on fait quelques considérations d'ordre pathogénique.

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