"VASOMOTOR RHINITIS"

THESIS SUBMITTED BY

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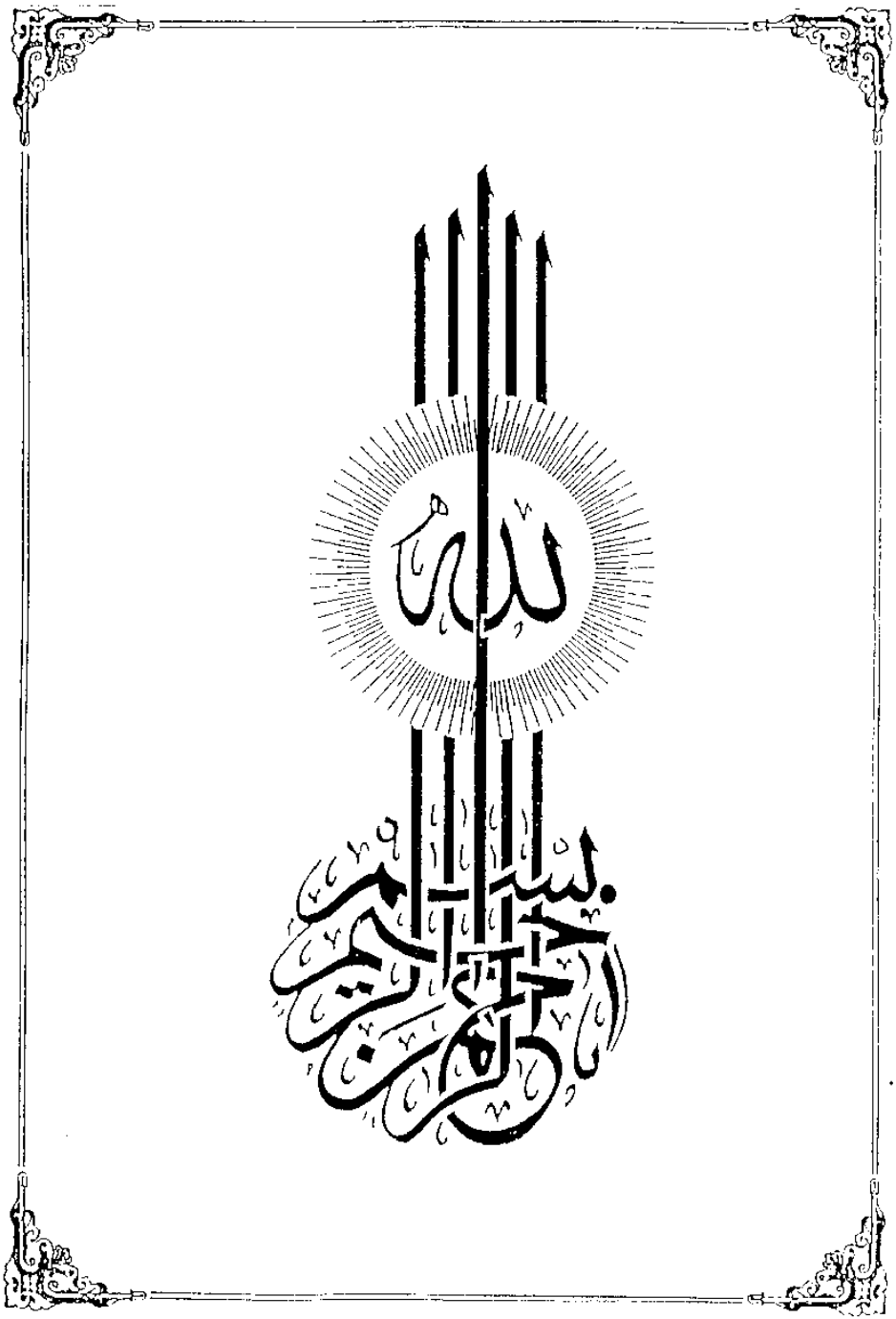

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Imbalance of the autonomic neural control of the nasal vasculature is an ill-recognized and often misdiagnosed problem in rhinologic practice.

It is fairly common for the rhinologist to encounter a patient complaining of nasal obstruction,nasal discharge and sneezing with or without ocular symptoms,headache,aural or sinus problems.
To most practitioners,a diagnosis of nasal allergy seems the most logical answer to this clinical problem.The patients are therefor assaulted with a wide variety of antiallergic measures.

However on closer scrutiny,most of these patients lack many of the criteria necessary for a diagnosis of allergy and if there are any variations in their symptoms with a seasonal or temporal pattern,the triggering factors are usually not antigenic.

It is postulated that in such patients exageration of the normal nasal cycle and responses occur as a result of some factors.These factors include changes in environmental humidity and temperature;exercise;changes in posture;endocrinal disturbances; changes in the emotional state;local anatomic defects;and some drugs,usually administered for non-nasal conditions.
Clinical and experimental evidence suggest that these abnormal responses occur through a parasympathetic overactivity induced through a variety of mechanisms.

As these patients are usually diagnosed as having nasal allergy,they are treated by antiallergic drugs which,accidentally seem to benefit quite a number of patients with this vasomotor instability.
However modern medicine usually does not rely on half-measures and as a fairly accepted pathophysiology has been recognized for this affection,a trial has been made to treat this disorder in a logic manner,viz.by decreasing the parasympathetic predominence suspected as being at its origin.
Various surgical techniques have been developped to interrupt the parasympathetic supply to the nose with favourable long-term improvement in most patient recognized as having the so-called vasomotor rhinopathy syndrome.

It therefor seems worthwhile to differentiate between true allergic rhinopathy and vasomotor rhinopathy so as not to undertreat two different and,if properly managed,potentially highly controlable diseases.

In the following outline an attempt will be made to clarify the relevant points in nasal anatomy and physiology, the different clinical aspects of this affection and the methods to differentiate various forms of rhinopathies;and finally present the different lines of treatment suggested for the optimum relief of the patient.

A) Vascular supply

The blood supply of the nose is derived from the external and internal carotid systems with a confluence of the two systems at a level above and anterior to the attachement of the middle turbinate to the lateral wall of the nose.

The external carotid system contributes to the greater part of the nasal vasculature mainly through the sphenopalatine artery,a terminal branch of the maxillary artery.Other smaller branches of the maxillary artery include the greater palatine artery and the pharyngeal artery.The facial artery gives the superior labial artery and the lateral nasal arteries which share in the blood supply of the nose.

The internal carotid system contributes through the ant--erior and posterior ethmoidal arteries.Both vessels are small especially the anterior ethmoidal artery which may be absent.

A-THE ARTERIAL SUPPLY:[Figs. 1-2]

1-The sphenopalatine artery:

This is the main branch supplying blood to the nose.It is a terminal branch of the maxillary artery in the pterygopalatine fossa.It entersthe nose through the sphenopalatine foramen at the posterior end of the superior meatus with a branch of the sphenopalatine nerve.

On entering the nasal fossa,it breaks up into three branches:

1-The inferior turbinate artery which supplies the inferior turbinate and part of the common and inferior middle meatus. It has a main trunk which leaves the sphenopalatine artery and runs downwards and forwards to the posterior tip of the inferior turbinate where it divides into three main branches,the antral artery and the medial and lateral terminal arteries.

2-The middle turbinate artery leaves the sphenopalatine artery and runs along the lateral surface of the turbinate to the lower border of the bone where it enters the bony canal at the junction of the middle and posterior thirds of the bone where it breaks into three terminal branches.

3-The nasopalatine artery passes along the anteroinferior border of the sphenoid to the septum.Before it leaves the lateral wall it gives off the superior turbinate branch which anastomoses with the anterior and posterior ethmoid arteries. The nasopalatine artery has two main branches,the superior

branch on the perpendicular plate and the inferior branch just above the maxillary crest.The latter breaks into two further branches one of which passes through the incisive foramen.

[Burnham,35]

2-The greater palatine artery:

This branch of the maxillary artery descends through the greater palatine canal with the greater palatine nerve and gives off two or three lesser palatine arteries.It emerges on the oral surface of the hard palate through the greater palatine canal, runs forwards in a groove near the alveolar border of the hard palate to the incisive canal where it passes upwards to anastomose with the terminal part of the nasopalatine artery.

3-The pharyngeal artery:

This is a small branch of the maxillary artery in the pterygo--palatine fossa which passes posteriorly through the pharyngeal canal and is distributed to the mucosa of the roof of the nose pharynx,sphenoid sinus and auditory tube.

4-The anterior ethmoidal artery:

This is branch of the ophthalmic artery passing from the orbit to the anterior cranial fossa through the anterior ethmoidal canal.It passes through a slit-like aperture on the side of the crista galli into the mucous membrane of the nasal fossa where it descends on a groove on the deep surface of the nasal

bone and then leaves the nasal cavity by passing between the distal border of the nasal bone and the upper border of the lateral nasal cartilage to the nasal tip.

Itsupplies branches to the dura,frontal sinus and anterior ethmoid cells.

It may be absent either unilaterally (14%) or bilaterally (2½%) [Shaheen,67]

5-The posterior ethmoid artery:

This is a branch of the ophthalmic artery leaving the orbit through the posterior ethmoid foramen to enter the poserior ethmoid cells and then supply the nasal mucosa.

In some cases it may arise directly from the circle of Willis.

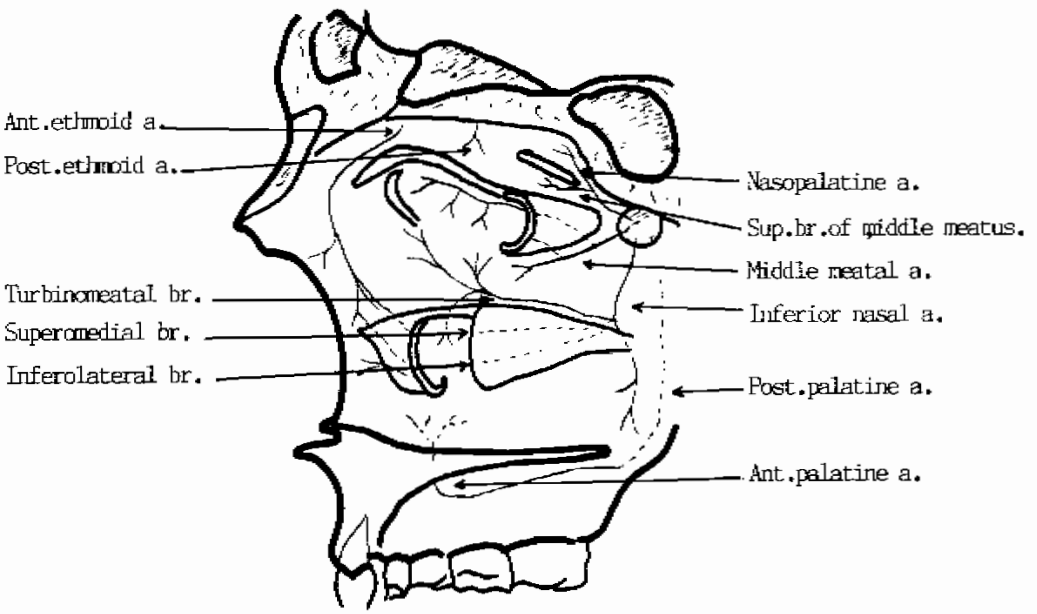

FIG. 1- ARTERIAL SUPPLY OF THE LATERAL NASAL WALL

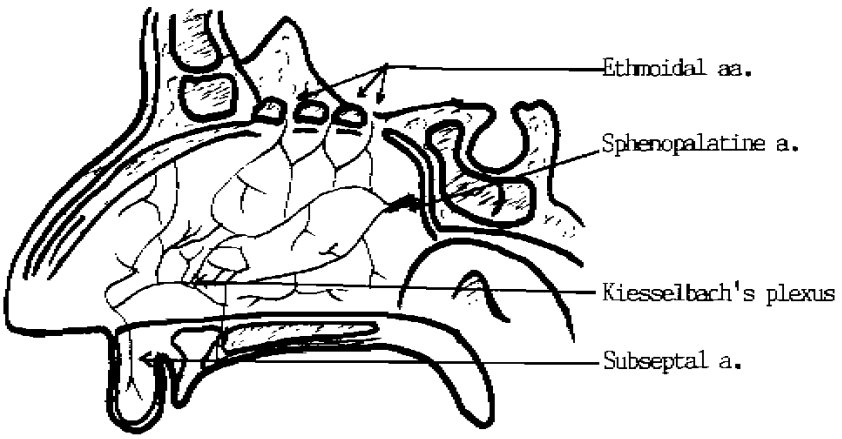

Fig.2-ARTERIAL SUPPLY OF THE MEDIAL NASAL WALL

B-THE VENOUS DRAINAGE: [Fig.3]

The venous drainage of the nose passes along three main channels:the anterior facial vein,the ethmoidal veins and the sphenopalatine vein.

The anterior facial vein drains into the common facial vein with the anterior branch of the retromandibular vein leading ultimately into the internal jugular vein.

The ethmoidal vein passes through the cribriform plate and is connected with the venous plexus of the olfactory bulb or with the veins located on the orbital aspect of the frontal lobe of the brain.

Other ethmoidal veinsconnect with the superior ophthalmic vein and with the veins and blood sinuses of the dura including the superior sagittal sinus.

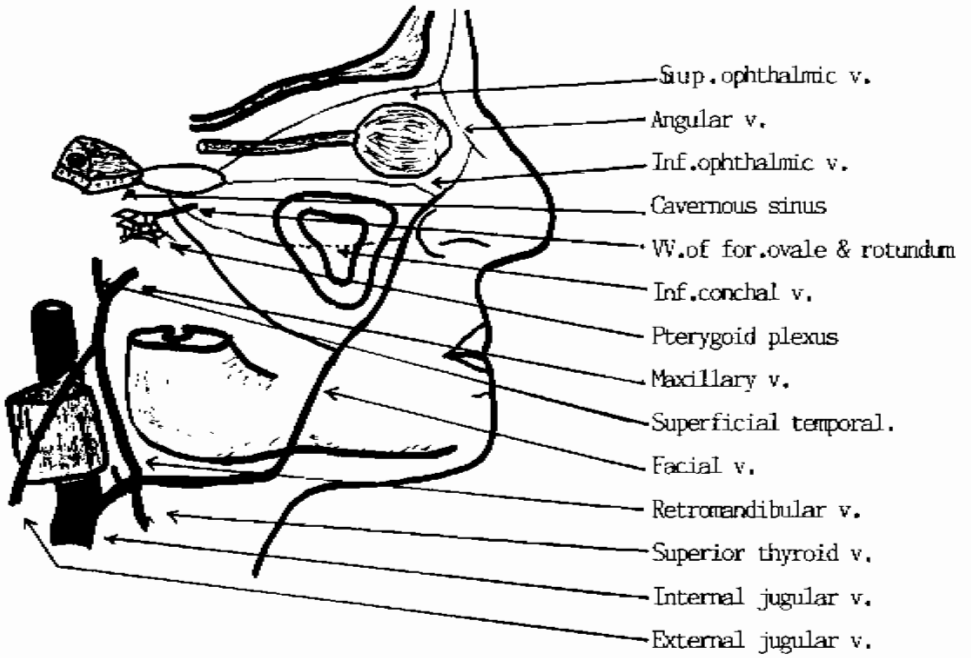

Fig.3 VENOUS DRAINAGE OF THE NOSE AND FACE

C-THE VASCULAR BED: [Fig.4]

1-The arterioles:

A network of arterioles lies close to the periostium or peri-chondrium and gives off various branches.Some of these branches anastomose freely with one another forming arterial arcades superficial to the major arteries.

The continuation of the trunks from which these arcades originate run perpendicular to the surface dividing into several arterioles which spread out beneath the mucous membrane to supply the subepithelial capillary plexus.The same vessel also supplies

the glandular and periostial capillary plexuses[Dawes and Pritchard,35] These minute arterioles course in three parallel rows in a postero-anterior direction.THe most superficial row lies under the mucosa,the second is associated with the serous and mucous glands and the deepest adjacent to the periostium[Ritter,70]

2-The venules:

The venules are much more numerous and larger than the arterioles. There are two main venous plexuses:a superficial system consisting of small veins and a deeper system formed of larger vessels.Veins from the deep plexus often loop around the arterioles and anastomose with each other.Anastomotic channels exist as well between the deep and superficial systems of venules. The large veins of the deep plexus run at right angle to the arterioles and have unusually thick walls .
Between the capillaries and venules,sinusoids are present surrounded by fine fibrils of smooth muscle and sphincters at both ends forming an erectile tissue-like configuration.

3-The terminal vascular system:

This is the vascular system interposed between the arterioles and the venules.It comprises two main entities namely the capillary system and the arteriovenous anastomoses.
These last can bypass the capillary bed and shunt blood directly from the arterioles to the venules.This shunt offers less resistance to the passage of blood and would be a preferential

pathway were it not supplied by control devices increasing its impedance and allowing the capillary bed to fill.

a-The capillary system:

Two main classes of capillaries are found in the nasal mucosa. These are the true,reticular or nutritive capillaries;and the thoroughfare capillaries.

1-The reticular capillaries arise from collaterals or arterioles or from the metarteriole.At this level,the blood flow can be interrupted by means of the precapillary sphincter.

The reticular capillaries form three main plexuses:

-The subepithelial plexus immediately beneath the basement membrane.THis plexus is supplied from a small arteriole arising from the superficial arterial arcade.It drains into the superficial venous plexus.

-The glandular plexus disposed in a basket-like manner.The arteriole enters the gland where it breaks into capillaries which loop around the acini and then communicate with each other before draining into venules at the margin of the gland.The glandular duct is also surrounded by a capillary plexus.

The blood from each gland is collected by several venules lying outside it.THese venules join together to form a short vein which soon enters a vein from the deep plexus.

-The periostial or perichondrial plexus receives arterioles from periostial arteries and drains into the deep venous plexus.

2-Thoroughfare or direct capillaries:these are in direct communication with the arterioles.They are much narrower than the arteriole and the venule.

Three segments can be defined:the metarteriole having muscle cells,a proximal segment which is less muscular,and a distal segment devoid of muscle cells.The segment segment is the prevenule having no muscle cells and finally the venule having muscle cells.[van der Eeckhaut,66][Cauna,70].

b-Arteriovenous anastomoses:

These anastomoses are part of the chemopressoreceptor system and short-circuit the capillary bed.They are supplied by control devices to modulate the distribution of blood flow.

There are three main types of arteriovenous anastomoses:

-X-shaped anastomoses:these are the simplest in structure.The arteriole aproaches the venule and both come in contact with a communication at the site of contact.

-H-shaped anastomoses:an intermediate segment is interposed between the arteriole and the venule.

-Glomerular anastomoses:a complex sinuous segment develops between the arterial and venous elements.This variety is rich in control systems with a high innervation density,hence the name neuromyoepithelial glomus.

c-The control systems:

These are only present in arteriovenous anastomoses,usually