THE ROLE OF SURGICAL MANAGEMENT OF NASAL AIRWAY OBSTRUCTION IN THE PATHOGENESIS AND MANAGEMENT OF ALLERGIC AND VASOMOTOR RHINITIS

Thesis

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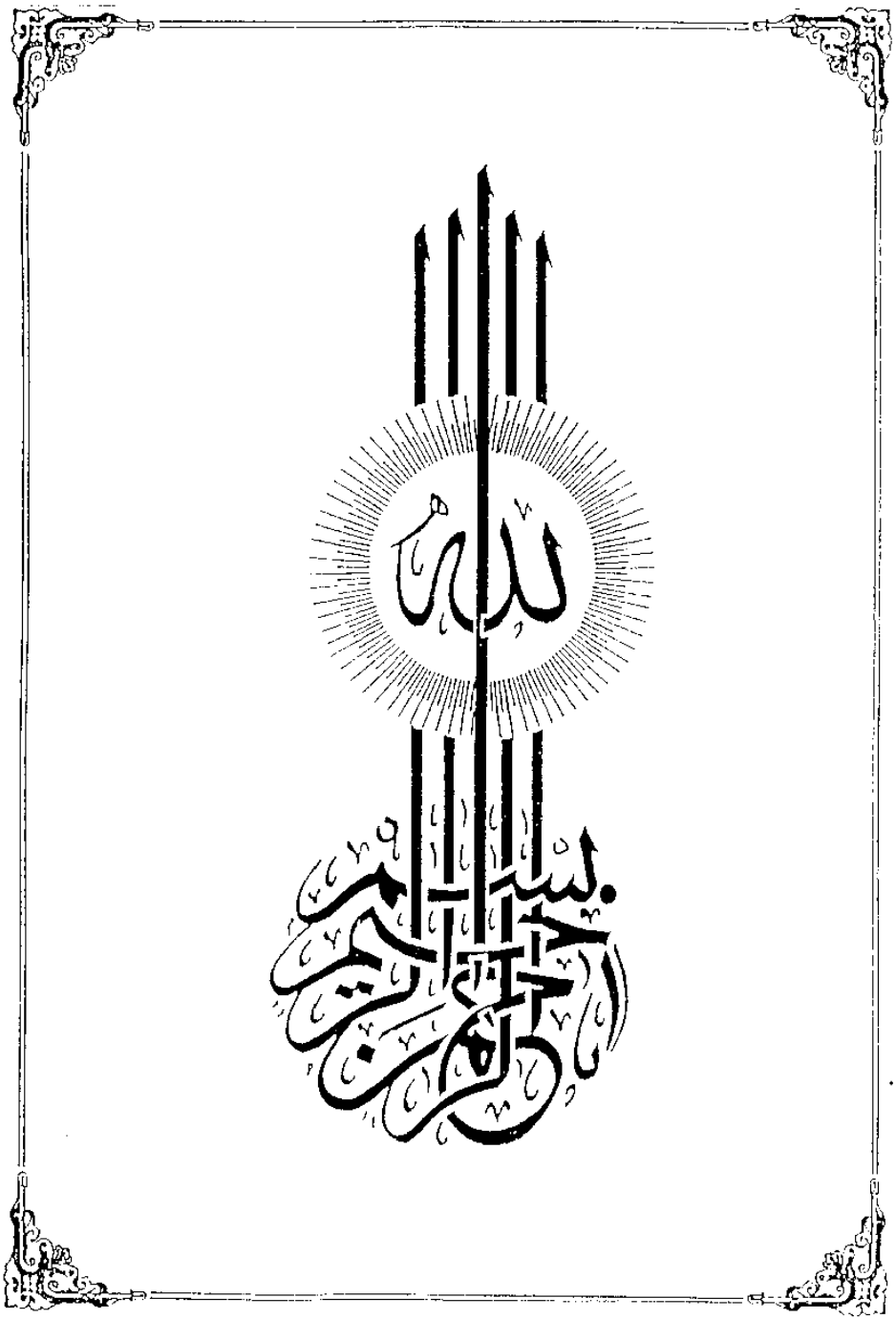

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Under ordinary circumstances, the nose is the first line of defence against noxious environmental air influences; this besides the air conditioning which is one of the most important functions of the nose. In order to accomplish such function properly, the nasal air current should take a certain way during inspiration and expiration allowing the air stream to be uniformly distributed all over the four surfaces of the nasal mucosa (septal and lateral walls). The presence of any mechanical defect will lead to alteration in airflow patterns and eventually causes air current to impinge directly on a localized area or areas of nasal mucosa, while depriving the rest of the mucosa from performing its function properly. This alteration of the airflow stream will lead to the following changes in the mucosa of the nasal passages; ciliary stasis, dryness, atrophy and crustation or hyperaemia and hypertrophy of certain mucosal areas where the air current is concentrated; lymphatic or venous obstruction of the other areas giving a boggy, pale and cyanotic appearance which may be associated with polypoidal changes of such areas; Altered aeration of the paranasal sinuses with its known harmful effects on the mucosal lining of such sinuses. This appearance is usually misdiagnosed as an allergic process. However we should not

depend mainly on the appearance of nasal mucosa in the diagnosis of an allergic process. The swelling and colour changes of nasal mucosa is due to lymphatic and/or venous obstruction which may be secondary to various pathological conditions producing nasal obstruction, hence leading to vasomotor rhinorrhea. So, we should differentiate between atopic or allergic process and else.

Atopic allergy is a specific process secondary to antigen-antibody reaction, however the diffusion of the inhaled allergens may not be sufficient to lead to a clinical allergic state while its concentration at localized areas may manifest this subclinical allergic tendency. It was also found that in these allergic patients, the extent and the severity of the attack increases and their response to treatment is unfavorably influenced by the presence of mechanical defects **(Spector, 1959)**.

Vasomotor rhinitis may be secondary to a primary autonomic imbalance, however this autonomic imbalance may be secondary to the mechanical defects. Also, the presence of such mechanical defects may cause a high concentration of inhaled irritants to react with the responsive mucosa in a way simulating the true allergic process, thus subreactive

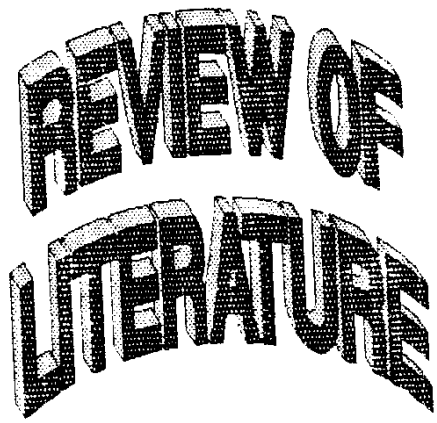
concentrations will be amplified to a degree enabling the reaction chain to be initiated.

In both states such airway obstruction, by disturbing the Bernouilli's phenomenon, will lead to stagnation of venous and lymphatic drainage of the nasal mucosa, hence a vicious circle will be created. This vicious circle will be potentiated by various factors including the mechanical defects, the mucosal changes, the autonomic imbalance and the iatrogenic administration of antihistaminics.

Surgical intervention in such cases is indicated, however there is marked controversy about the role of surgery. Some are against surgery, others are advocators of surgery in every case not responding satisfactorily to medical treatment, while the modest recommend the use of surgery for each case according to its own merits. The goals of surgery in such cases is to interrupt the vicious circle and thus stop the continuously increasing symptomatology. Surgical management of these patients may lead to: complete cure of the condition especially if the mechanical defects are properly corrected; prolongation of the disease free intervals for these patients which offer great improvement in their life; conversion of a possible autonomic and/or allergic condition from a manifest to a latent one which

offers clinical relief to the patient. Also it is well known the close relationship between the troubles of upper respiratory air passages and the lower ones.

The aim of the present study is to highlight such problem and to determine if surgery is to be undertaken or to be postponed in an allergic or allergic like states.



PATHOPHYSIOLOGY OF ALLERGIC AND VASOMOTOR RHINITIS

Pathophysiology of Vasomotor rhinitis:

The nasal mucosa is a highly vascular and highly innervated mucosa with a high reactivity potential. The Vasomotor and secretomotor status of the nose is constantly changing according to the normal nasal cycle. However in some conditions, this mechanism becomes either altered or exaggerated so that airway resistance and/or the amount of nasal secretions are increased to a significant symptomatizing degree.

Many factors were found to affect these responses the degree and the mode by which any factor affects the nasal mucosal reaction is a highly complex issue and the interactions of various factors which may coexist add to the complexity of this obscure issue.

Nasal mucosal reactions, may be altered by changes in the temperature and moisture content of the inspired air **(Drettner, 1963)**; tactile stimuli to nasal mucosa including the effect of local anatomic anomalies; postural factors **(Rundcrantz, 1969)**; medication **(Jackson 1970)**; exercise

(Dallimore and Eccles 1977); psychogenic factors **(Holmes, 1950)**; endocrinal factors and allergy **(Mygind, 1978)**.

Pathophysiological effect of local anatomical defects:

Local anatomical abnormalities in the nasal passages distort the airway and may induce a change in the reactivity of nasal mucosa so that normal variations are exaggerated and become symptomatic **(Kern and Arbour, 1976)**.

Normally, changes in the temperature and humidity of the inspired air induce certain compensatory changes in the reactions of the nasal mucosa. However, in patients with deviated septum these reactions become disturbed.

The effect of septal deviation or the presence of a septal spur causes the air current to impinge directly on a localized point of the mucosa. The disturbances that ensues depends on the patient.

In patients with true IgE mediated allergic rhinitis, this localized stream of air causes a high concentration of airborne allergen to react with the responsive mucosa. Thus subreactive concentrations will be amplified to a degree enabling the reaction chain to be initiated.

In other patients, such a specific mechanism may not be present but they, nevertheless, show intense pathologic reactions. It is postulated that in these persons, the localized continous exposure of a part of the mucosa to unconditioned atmospheric air with all its irritant factors may induce local irritation of trigeminal nerve terminals acting by the way of substance P-immunoreactive nerves setting in motion abnormal autonomic reflex response **(Lundblad, 1983).**

The nature of this autonomic reflex varies with the individual. In some persons sympathetic overactivity predominates, while in other persons, parasympathetic hyperactivity supervenes with the clinical picture now termed vasomotor rhinitis **(Lundblad, 1983).**

The reason of this different autonomic response in different people to the same stimulus is unknown. However it may be postulated that this is a part of the higher psychosomatic control emanating from the hypothalamus and varying the pathophysiologic response of the individual in response to non-specific stress according to his psychologic framework.

The pathophysiologic effects of local anatomic abnormalities on the airway are not restricted to the inconvenience of simple nasal obstruction complaint of the patient. Such deformities by causing disturbances in the local nasal physiology can have serious systemic effects.

Nasal stimulation in dogs produces marked changes in the breathing pattern with a large transient increase in pulmonary air flow resistance but without change in compliance **(Whicker et al., 1978)**. The results of these experiments can be extrapolated to humans as stimulation of trigeminal nerve endings in the nose can occur as a result of anatomical deformities and thus might presumably affect the lower airway unfavorably with increased resistance and a rise in the work of breathing.

Normally posture produces some changes in the reactivity of the nasal mucosal vessels these are accentuated by any anatomic deformity so that sleep may be disturbed. Increased nasal resistance or complete nasal obstruction may affect breathing in sleep by either affecting inhibitory reflexes which disrupt the process of establishing homeostatic set points in sleep, or by modifying the activity and synchronization of the various respiratory muscles **(Lavie et al., 1983)**. These effects are

accentuated by closure of the pharyngeal airway by inspiratory pressures against increased nasal resistance augmented by the dilator muscle hypotonus during sleep **(Cole and Haight, 1984).**

Similarly the cardiovascular system is affected with bradycardia and arrhythmias. This associations of respiratory and cardiovascular disturbance may be a factor in the genesis of sleep apnoea syndrome and periodic breathing during sleep in adults, and more drastically even, in children this may be associated with severe cardiac dysfunction and cardiomegaly.

Pathophsiology of allergic rhinitis:

Allergic rhinitis is an IgE-mediated hypersensitivity disease of the mucous membranes of the nasal airways characterized by sneezing, nasal blockage and discharge. There is little doubt that mediators released from mast cells play an integral part in the pathogenesis of nasal allergies. The sequence of events in the pathogenesis of these conditions is believed to be inhalation of antigen, deposition of antigen on the nasal mucosa and interaction of antigen with mast cell bound antibody. The subsequent release of chemical mediators causes clinical nasal symptoms.