

# Passive anterior rhinomanometry and inhalation provocation through the nose

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## SUMMARY

*In order to understand better the pathology of the respiratory tract the importance of the nose and especially the importance of examining the nose is stressed. The method of passive anterior rhinomanometry is described and the advantages of this method for the passive testing of inhalation allergens are mentioned. Some indications for nasal surgery in allergic patients are discussed.*

The nose is the beginning of the normal physiologic respiratory tract. The relation between it and the lungs is obvious, but far from being completely understood. The function and physiology of the lungs is well known and based on abundant research, however the nose, in terms of research and clinical understanding, has been the most neglected area in the respiratory tract. At the present time, there is still no uniform test for nasal function. Although advances in pulmonary function studies and pneumospirometry are well accepted in clinical medicine, nasal provocation testing is generally not well understood. Investigation of nasal function is primarily dependent upon one physician and what he sees with his eyes on rhinoscopic examination of the nose. Testing of the nasal mucosa is rarely ever carried out in an objective manner, and the testing of nasal airway resistances generally speaking, has been confined primarily to the investigational laboratory. It is very difficult for the examiner to appreciate anatomical problems in the non-visible portions of the naso-respiratory tract. Anterior rhinoscopy and indirect nasopharyngoscopy are grossly insufficient for thoroughly examination of the nose in many cases.

Careful examination of the nasal mucosa and of its secretions will give better insight into the manifestations of respiratory pathology. Unfortunately, respiratory tract disease, involving the mucous membranes from the nose to the bronchioles, in the past has been diagnosed and named by descriptions which the patient has given to the physician, rather than the pathologic picture that the examiner sees in the patient. Chronic coughing is called bronchitis, but in most cases, the secretion irritating the bronchi is produced in the nose and through a post-nasal

drip is irritating to the laryngo-pharynx. Indeed, most of the time, there is no secretion in the bronchi. In otitis media also, the course source of initial pathology is usually the nasopharynx instead of the middle ear itself.

A careful anterior and posterior rhinoscopic examination is particularly important in non-atopic (intrinsic) asthmatic patients. The mucosa of the nose reacts similarly to the mucosa of the lower respiratory tract, and in both areas, the secretions produced will be similar. In atopic (extrinsic) patients, the clinical symptoms are dependent upon how the allergen in the inspired air travels to reach the mucosa of the shock organ. Atopic nose breathers experience more problems with allergic rhinopathia, and atopic mouth breathers experience more problems with asthma. Normal nasal respiration is of utmost importance for the following reasons:

1. Physiological "air-conditioning" of the inspired air.
2. Removal of potential allergens and bacteria from the inspired air.
3. Transportation of oxygen.
4. For promoting a maximum restful state while sleeping in a recumbant position (a poor night's rest is basic to a stressful state which can provoke an intrinsic type of disease, such as bacterial allergy).

It is incumbent upon us to encourage better investigation of the nose, not only by otorhinolaryngologists, but by all physicians who deal with respiratory tract diseases. Care should be taken to investigate the entire act of inspiration and expiration, both through the mouth and through the nose. The importance of bronchial secretions, for diagnosis, is well known, and concurrently, a better knowledge of the contents of nasal secretions should be basic to the treatment of rhinologic disorders.

Clinical observation of a new patient is very important:

1. The character of your patient's respiration is he a nose or mouth breather when at rest, and then again, when slightly stressed during questioning.
2. What is the frequency of his breathing at rest?
3. Careful observation of the structures of the nose in relationship to the whole face.

A slight deviation of the nasal tip or columella can mean inherent pathology within the nasal vaults and particularly in the posterior portion of the nasal airways which are usually hidden by normally congested mucosa. Pathology in this part of the nose may mean a difficult blowing-out procedure and perhaps an impossible drainage of the sinuses.

4. Inspection of the interior of the nose must be done with careful regard to the character of the nasal mucosa and secretions.
5. Examination of the nasopharynx should be performed with special attention to nasal secretions, their contents and their type.
6. Observation of the patient's act of blowing his nose.

One can hear when the nasal mucosa is vibrating severely as the nose is being blown. The trauma sustained by sheering forces which occurs as congested

nasal tissues are forcibly vibrated, appears to be one of the prime factors in the development of nasal polyps and hypertrophied nasal mucosa in chronic allergic rhinosinusitis.

7. Observation of your patient's method of sniffing.

This gives the examiner information about the action of the nasal valve. Frequently, chronic sniffing and snoring at night may promote pathological states, particularly in the turbinates, which are so often found to be swollen in hypertrophic rhinitis.

8. A review of the patient's sleeping habits is very important.

What is your patient's position of best rest? How many hours of uninterrupted sleep per night does he ordinarily get? Does he consider his time spent in bed as being restful? Then by examining the nose, the physician may be able to evaluate more objectively just how the patient sleeps and what might be possibly the causes of more laboured respiration during sleep.

The need for an objective rhinologic test beyond visual examination is very important. In 1970 we introduced the method of passive rhinomanometry (van Dishoeck and van Dishoeck, 1970). This method, using positive pressure input of a known quantity of air flow, has been a simple and effective method of studying the nasal airway. With a simple water manometer we measure the amount of air that does not traverse through the nasal chambers, and record this resistance in millimeters of water pressure. All testing is done passively, and therefore the "lung pump" is eliminated from interfering with this objective test of the nose. Using this method, we are able to investigate the hyperreactivity or hypercongestability of the turbinate erectile tissue, in both atopic as well as nonatopic nasal allergic states. The influence on the mucosa in the recumbent position as well as in the erect position with jugular compression has also been studied. (Ramey and van Dishoeck, 1971).

In order to investigate more thoroughly the various reactions of nasal mucosa, we are now able to introduce into the nose many types of antigens by use of passive rhinomanometry. Provocation of nasal tissues can be performed without provocation of the lung as long as the patient is not actually breathing during the test. Therefore, the test is called passive inhalation in comparison with passive rhinomanometry. Even with children, the method of investigation is easy to perform. It is not the measurement of the amount of pressure increase that is important, but rather the fact that a pressure increase actually appears during the test. Similarly, it is the fact that a pressure increase does appear in lung provocation tests that reflects the importance of this test. Vital capacity is also studied during the lung provocation test, and the importance lies in the fact that a decrease in the vital capacity will occur in patients who have a positive test. This method of investigation is not unpleasant for the patient, for a strong reaction can easily be reversed by a nasal decongestant. Up to the present time, we have not found any cases where severe bronchospasm or generalized angioneurotic edema, have occurred during nasal provocation testing.

In order to perform accurate provocation testing, there must be certain stipulations:

1. The general condition of the patient must be good. Therefore, a good night's rest preceding the testing, is necessary.
2. A common cold (upper respiratory tract vital illness) must be arrived.
3. Good cleansing of the nasal vaults, before testing, appears to be very important to ensure that the nasal allergens are able to penetrate into the nasal mucosa. This is certainly easy to perform in the nasal airways.

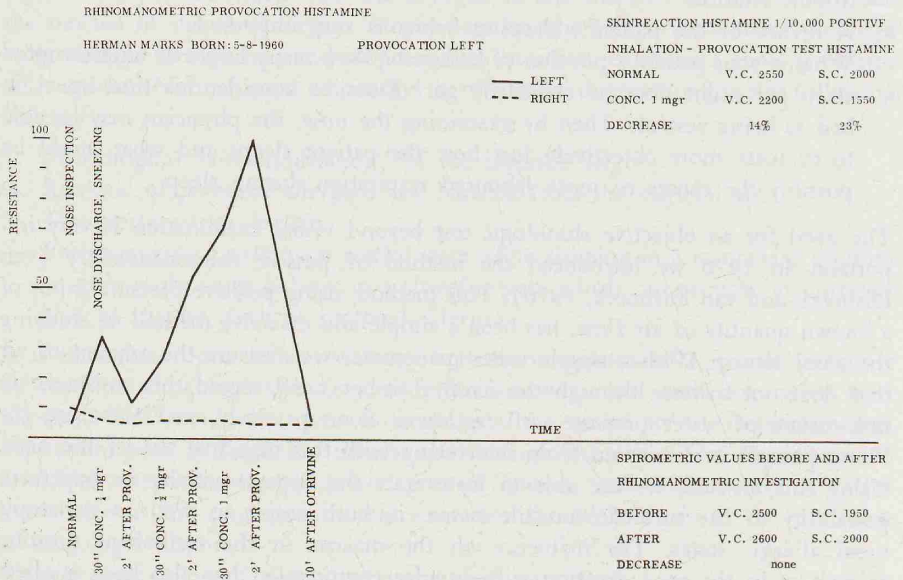
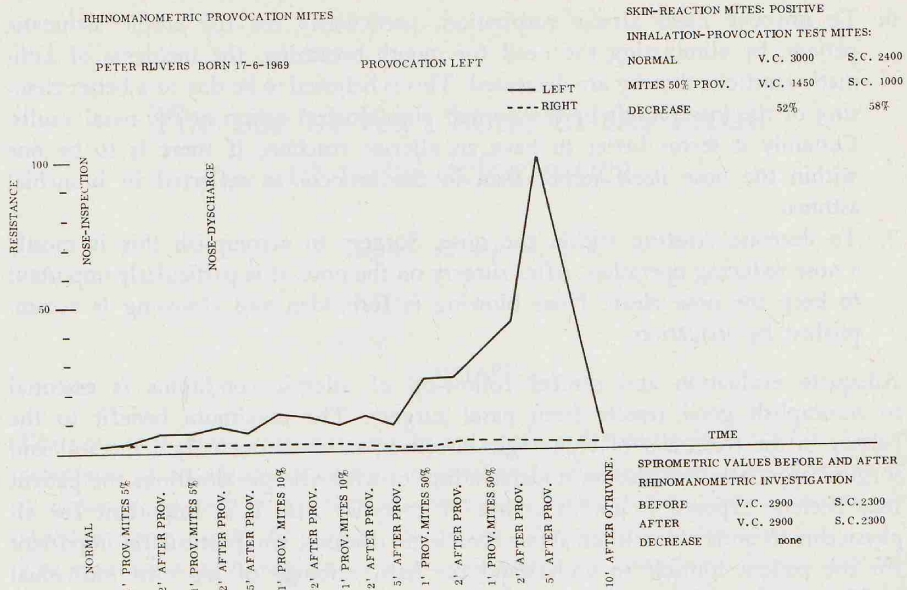


Figure 1

Figure 1 shows a histamine threshold level determination with provocation on the left side of the nose. There is an immediate measurable congestive response of the nasal mucosa. On the horizontal axis of the graph, the difficult concentrations of the histamine administered and the times of provocation are plotted. The vertical axis shows the nasal resistance pressure in millimeters of water. After the nasal pressure has reached the maximum, a nasal decongestant is given, and some minutes later the nasal pressure returns to the level as at the beginning of the test.

Figure 2 shows a Mite provocation test which has been performed in a similar manner. As is well known, the Mite is nearly the same antigen that is commonly found in house dust. In the right lower corner, the result of a lung function test is shown. In the upper right corner the result of a lung provocation test is given. These investigations have proved to be a simple and effective method for further investigation of the nose and lower respiratory tract. Positive pressure, passive anterior rhinomanometry, as a three second test of the pressure of the nose and nasal provocation testing, have given us a better idea of allergic reactions.



SPIROMETRIC VALUES BEFORE AND AFTER RHINOMANOMETRIC INVESTIGATION		
BEFORE	V. C. 2900	S. C. 2300
AFTER	V. C. 2900	S. C. 2300
DECREASE	none	

Figure 2

It is important for the rhinologic surgeon to understand the pathology of the whole respiratory tract and to know preoperatively what the expected improvement after surgery will be. In this manner of thinking, we arrived at the following indications for surgical correction of the nose.

1. To improve nasal inspiration and create a better physiological air stream and thereby create less stressful respiration.
2. To eliminate habitual sniffing.

Habitual sniffing reflects a constant irritation due to abnormalities present in the region of the nasal valve. This can be improved by surgery of the nasal valve areas 1 and 2.

3. To improve the cleansing of the nose, particularly in the act of blowing the nose.

Surgical correction for this is primarily in areas 4 and 5. Special care must be taken to avoid widening the nasal vaults excessively, since in wide nasal airways blowing of the nose is not as effective, due to the lack of sufficient air pressure being created.

4. To remove a nasal spur which is a constant irritation to the nasal turbinate. The surgery for this is primarily in area 4.
5. To improve the character of the patient's night rest, and thereby improve the general condition of the patient. Intranasal surgery can also improve the nasal airways sufficiently to decrease snoring and to allow the patient to be able to sleep better on both sides, rather than on one side. Surgical correction in these cases may involve reconstruction of all the nasal areas.

6. To improve nasal airway respiration, particularly for the atopic asthmatic patient, by eliminating the need for mouth breathing, the incidents of asthmatic reactions thereby are decreased. This is believed to be due to a better changing of the inspired air by the normal physiological action of the nasal vaults. Certainly it seems better to have an allergic reaction, if there is to be one within the nose itself rather than in the bronchi as reflected in bronchial asthma.
7. To decrease crusting within the nose. Surgery to accomplish this is mostly a nose reducing operation. After surgery on the nose, it is particularly important to keep the nose clean. Nose blowing is forbidden and cleansing is accomplished by irrigation.

Adequate evaluation and careful follow-up of allergic conditions is essential to accomplish good results from nasal surgery. The maximum benefit to the patient in the treatment of rhinologic disorders, involves not only a medical and surgical approach, but also an understanding of what allergic situations the patient may become exposed to in his course of everyday life. It is important for all physicians to understand more about rhinologic diseases, and particularly important for the patient himself to understand the basic etiology of his own individual problem more completely.

#### RÉSUMÉ

Pour mieux comprendre la pathologie du tractus respiratoire l'auteur met en évidence l'importance du nez et surtout l'importance de l'investigation du nez. Une respiration par moyen du nez est très importante pour les poumons; l'observation du patient doit être minutieuse.

La méthode de la rhinomanométrie antérieure passive est décrite et en particulier sont mentionnés les avantages que cette méthode a pour l'investigation des tests passifs des allergènes d'inhalation.

A la fin chez des patients soit disant allergiques quelques indications pour des interventions chirurgicales au niveau du nez sont discutées.

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