

RHINOMANOMETRIC DILATATION TEST

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Everyone admits that nasal reflexes play a primordial role in haematosiis as creator of resistance to the passage of air. Also the nose is the starting point of naso-respiratory reflexes. The same respiratory function may have a part in sinus, tubal and pharyngeal pathology. The interest in nasal respiration is derived from this variety of actions and is the reason for its being studied more and more closely.

The permeability of the nose to a column of air is subject to numerous static and dynamic changes which may be expressed by the resistance that they offer to the passage of the air during the respiratory act. There are several methods for detecting this resistance. Very briefly we are going to mention only those which have the most clinical interest:

1. In general practice, initial information on the nasal respiration is taken from the data obtained during anamnesis. However, these data are not always precise since they depend on the purely subjective appreciation of the patient and, moreover, at times they are difficult to evaluate by the observer.

2. More objective information is given by the anterior rhinoscopy. Two important objections may be made to this exploration. The first is that it is subject to the judgement of the observer; the second is that the mere fact of introducing a nasal speculum often leads to errors. In fact, the introduction of this instrument widens the vestibule, the vestibulo-fossal strait and the valve (speculum test) and also may quite easily deform the caudal border of the upper cartilage.

3. Rhinohygmometry (Glatzell) is the simplest objective method. Its main drawback is that it only registers the expiratory phase and this information is of a very secondary interest since the true respiratory work is carried out during inspiration.

4. Rhinomanometry is carried out with a conveniently graduated U tube, filled with liquid. One of its ends is connected to a nasal fossa whilst the other end is free. The movement of the liquid which follows the intranasal differences of pressure allows a visualisation of the changes which take place in this pressure during inspiration and expiration. In view of the speed with which the liquid moves, it gives a fairly imprecise reading. Also it may be subject to variations which depend on the type of liquid used, and of the cross-section area of the pressure tube.

5. Finally, rhinology, in its search for a more precise method, has perfected an exploration which gives graphic recording of the nasal resistance in a true and continuous manner throughout the respiratory cycle and without interruption during the period considered necessary.

This rhinomanometry studies the pressure and time parameters at a rate we consider constant. It may even record, at the same time, the variations in the amount of nasal respiratory air.

We use this manometric exploration using an instrumental built by "Racia" according to instructions given by Dr. Guillen. It is made up of a mercury micromanometer which affords the possibility of detecting very weak pressure differences. The resistances offered by the passage of the respiratory current are converted into losses of charge, that is, in the pressure differences between the nostril and the choanas. The recording is effected by connecting the manometer to one nostril. Through this, the loss of charge on the opposite side between the external nasal aperture and the choana is picked up and transmitted to the manometer. The graphic recording is carried out with the aid of an electronic amplifier.

In clinical practice, the recordings may be taken under different conditions:

1. They may be taken with the head erect or in lateral decubitus to the right or the left.

2. In the subject's normal state or altering the relation of the movable structures (speculum test).

3. The recording may be made without provoking any modification of the congestive state of the pituitary mucosa or after causing a vasoconstriction or the other way around, by causing congestion of the turbinate by compression on the jugular vein (Dishoeck).

These different tests may be combined by carrying out the speculum test with the vasoconstriction or studying the charge loss with the head in different positions since the graphs may vary because of the action of gravity (Cottle). This large number of recordings to study a patient's nasal permeability implies a great loss of time, only possible in specialised centres with sufficient staff. Simple rhinomanometry only informs us of good or bad nasal respiration, but tells us nothing about the location of the obstacle that can produce it. This drawback is the one that has induced us to present this paper to you with the purpose of insisting on the utility of the speculum test described by van Dishoeck and Cottle with which this investigation may be enormously simplified at the same time as it retains its diagnostic value. If we bear in mind that the elements which are normally implied in nasal resistance are, on the one hand, the vestibulo-fossal strait and the valve, and, on the other hand, the turbinates, eliminating one of these, according to the response of the other we shall have some information on the location of the obstacle or disorder which causes the bad nasal respiration.

The dilatation test eliminates the obstacle of the vestibulo-fossal strait by opening the valve. It is very simple to perform. The manometer is connected to a nasal fossa and with a Killian type nose speculum introduced into the vestibule of the side to be examined, and by opening its valve, the patient is made to breathe. When the test is positive, the pressure differences recorded go down, since the larger obstacle, which in this case is situated in the vestibulo-fossal strait, diminishes and we are only left with the resistances caused by the turbinates. When it is negative, the recordings are not modified because the greater resistances are in the turbinates.

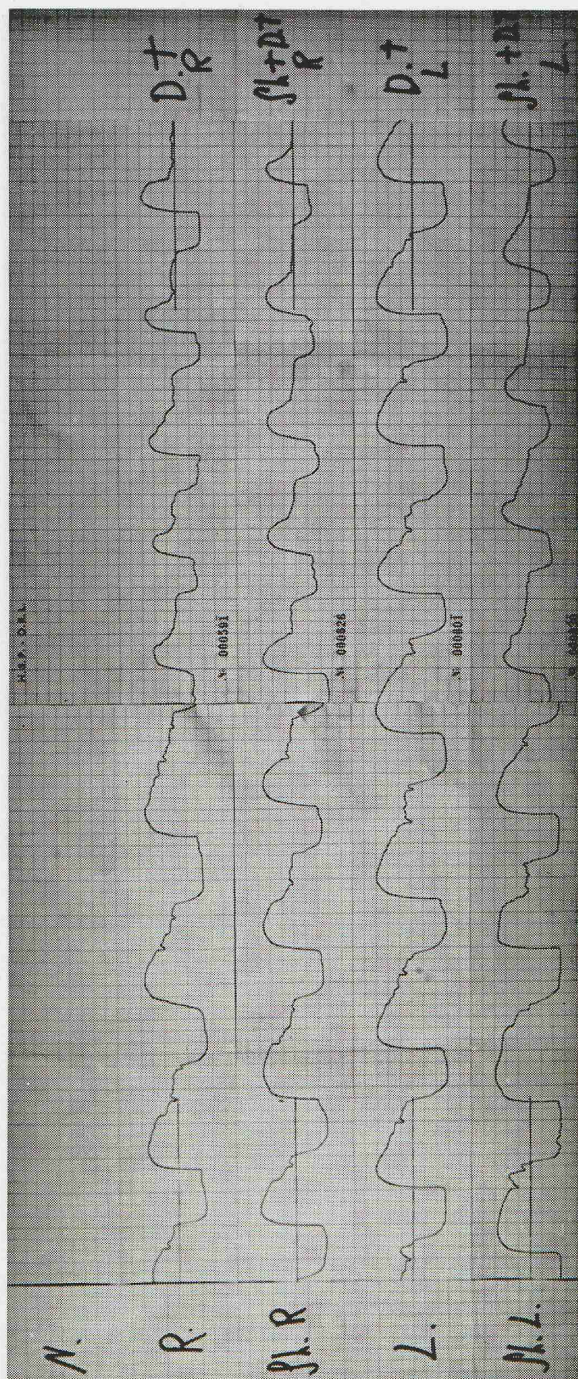


Figure 1.

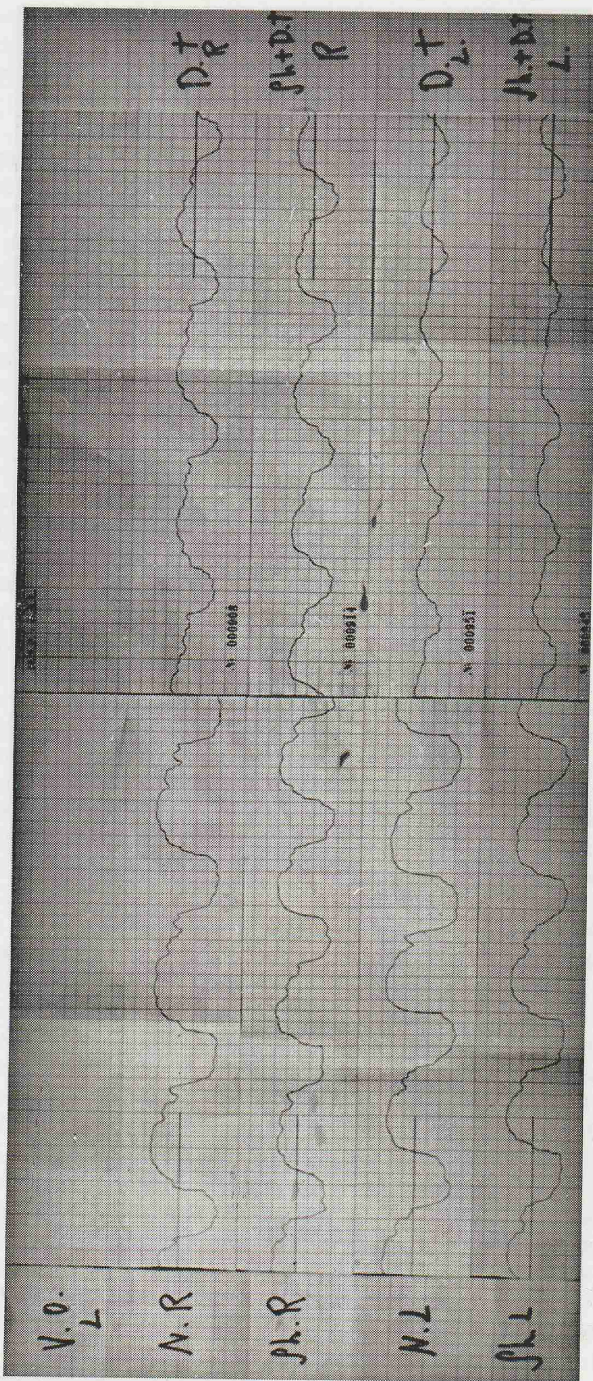


Figure 2.

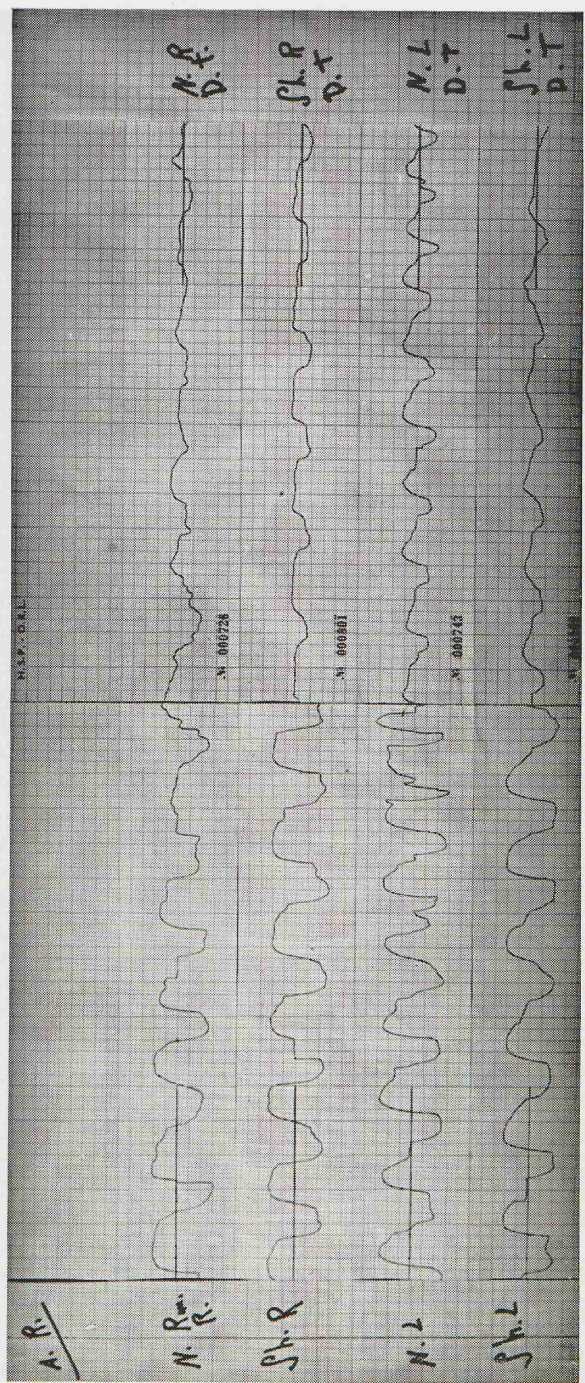


Figure 3.

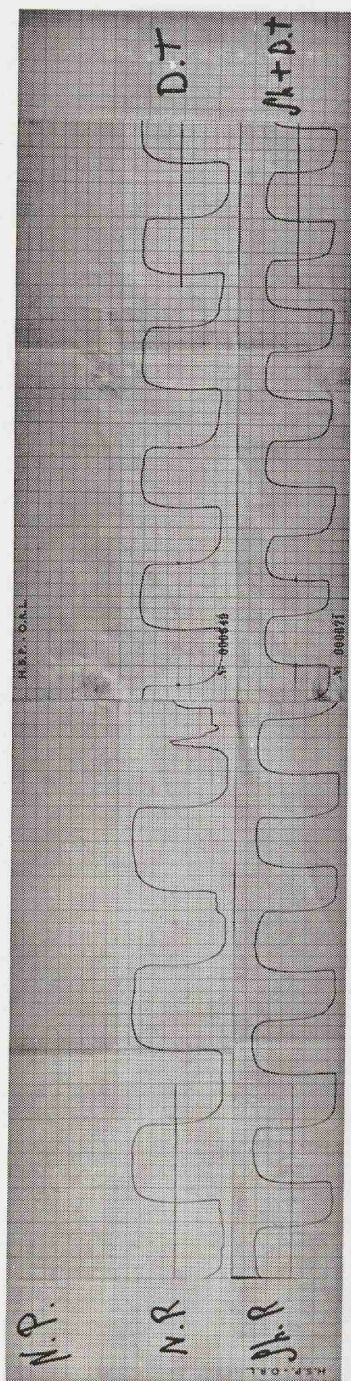


Figure 4.

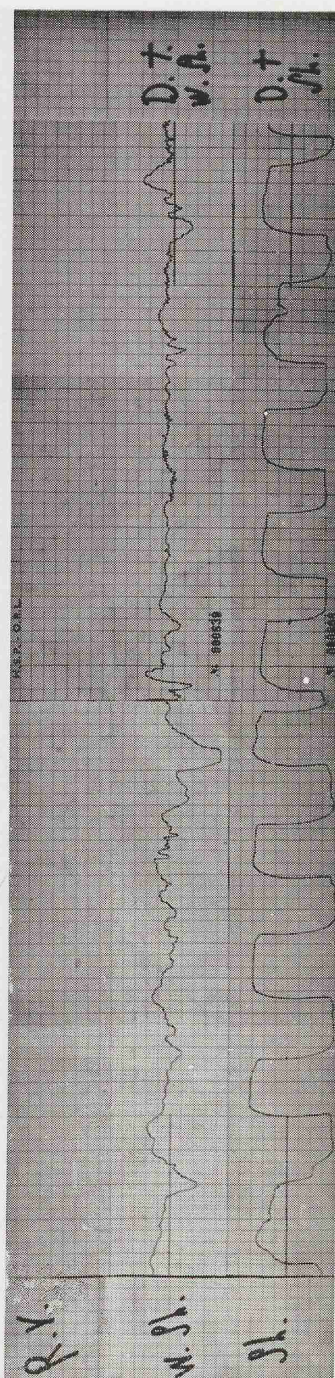


Figure 5.

During the performance of the test, care must be taken to proceed gently in order not to cause painful or troublesome sensations which can alter the patient's respiration and, therefore, the graph.

We present some rhinomanometric graphs obtained during the past year, which show the utility of the dilatation test. These recordings have been made at a speed of 15 mm. per. sec. The instruments are calibrated so that each mm. movement in the abscissae axis corresponds to 2 mm. water pressure. The recording paper is divided into 5 mm. squares so that each square along the ordinate axis corresponds to one third of a second and in the abscissae to 10 mm. water pressure.

In these five graphs, on the left are the curves without dilatation in normal position and with shrinkage. On the right the curves are made with the speculum. The first corresponds to a normal subject the second to a patient with obstruction of the vestibulo-fossal strait. The last three belong to patients with disorders in the rear areas; the 3rd corresponds to atrophic rhinitis, the 4th to a naso-sinuso-polyposis and the 5th to a vasomotor rhinitis.

In the 1st, 2nd and 3rd we see how the dilatation test reduces the pressure differences because in these cases the greatest resistance is situated at the valve level which is where the speculum acts. When the greatest resistance is situated behind the vestibulo-nasal strait, the speculum modifies little or nothing.

Although the curves in some cases are not fully demonstrative, since the nasal cycle may at times simulate more or less a rear obstruction and in others, the clinics and remaining exploration may make them unnecessary, there is no doubt that in some patients of doubtful diagnosis where there is a coexistence between alterations of the mucosa and deformities in the anatomical structures, the rhinomanometric dilatation test may be of obvious utility.

RÉSUMÉ

On passe en revue plusieurs procédés pour rechercher la perméabilité du nez à l'air respiratoire.

On juge que le plus objectif et celui qui peut donner les meilleurs renseignements est la rhinomanométrie électronique qui étudie les différences de pression ou de perte de charge entre la fosse nasale et la choane.

Avec ce procédé, on peut effectuer une série de Tests dont l'un des plus intéressants, par sa simplicité d'exécution et les données diagnostiques qu'il peut apporter, est le «Test du Spéculum».

On présente quelques graphiques réalisés chez plusieurs patients atteints d'obstruction du détroit vestibulo-fossal, de rhinite atrophique, de polypose naso-sinusale et de rhinite vasomotrice, le tout montrant son utilité dans le diagnostic de la localisation de l'obstruction nasale.

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