

What You Need To Know – Objective Assessment of Nasal Patency – Why it is Important

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The nose is the guardian angel of the respiratory tract. It has several important physiological functions which include air-conditioning, filtering inspired air, and smell. The nasal mucosa also has an important immunologic role in defending against inhaled foreign pathogens and allergens. To serve these important functions, a patent nasal passage is needed.

Nasal obstruction is a common symptom which is difficult to quantify clinically. The etiologic factors for nasal obstruction include anatomic variations of the nose and various local and systemic diseases. Hence, objective assessment of the nasal airway will aid diagnosis, treatment, research and medico-legal documentation⁽¹⁾.

During the last 10 to 20 years, attempts have been made to quantify nasal patency. This is an exciting time in the field of rhinology in both basic research and clinical practice. The technological advancements and greater insights into understanding of normal nasal functions and their relationship with other organs have spurred research in this field. The aim of this paper is to emphasize the importance of objectively measuring nasal patency in clinical practice.

1. Why objective measurement of nasal patency is important?

The nasal septum divides the nose into 2 compartments. Three turbinates protrude into each cavity from the lateral wall. This slit-like shape of the nasal cavity creates a turbulent inspired air stream and provides two-thirds of the total respiratory resistance. Erectile tissue in the nose, especially the inferior turbinates, fluctuates greatly in size depending on physiological changes (eg. nasal cycle, body temperature, posture and exercise) and response to inflammation.

Structural malformations (such as a septal deviation), mucosal swelling or a combination can result in nasal obstruction. The sensation of impaired nasal patency is a common symptom, causing patients to seek professional advice and treatment. Often, the sensation of a blocked nose is subjective. The doctor may find a perfectly patent airway and yet the patient will insist that his nose is clogged up. Therefore, an objective measurement of the airway would help to locate the site of obstruction and to render appropriate treatment.

2. How can we perform an objective assessment?

Methods used to objectively measure nasal patency and resistance include rhinomanometry and acoustic rhinometry. These two methods provide complementary and important objective information concerning the nasal airway. In general, rhinomanometry provides information about nasal airway flow and resistance, while acoustic rhinometry tells us about the anatomic cross-sectional area of the nasal cavity.

(A) Rhinomanometry

Rhinomanometry is well established as a useful clinical method for objective assessment of nasal patency. Nasal resistance to airflow is calculated from measurements of nasal airflow and transnasal pressure. In 1983, standardisation of rhinomanometry was established and accepted worldwide⁽²⁾. The nasal resistance is calculated from the measurement of the nasal airflow at a fixed transnasal pressure point and is expressed in Pa/cm³/s. Three types of rhinomanometry can be used: active anterior rhinomanometry (AAR), active posterior rhinomanometry (APR), and passive anterior rhinomanometry (PAR).

AAR uses a face-mask and one nostril is sealed off with adhesive tape. A hard plastic tube is passed through this tape to measure the nasopharyngeal pressure. It is a dynamic test that studies nasal ventilation, showing the nature of the air stream and a difference in the shape of the inspiratory and expiratory limbs of the individual nasal cavity. This method is well standardised and it is the most common and accurate method for clinical use. The major disadvantage of this method is that it cannot be performed in the presence of a septal perforation or a complete unilateral nasal blockage.

B) Acoustic rhinometry

In contrast, acoustic rhinometry does not measure airflow parameters but explores the geometry of the nasal cavity. The principle of acoustic rhinometry is that an audible sound (150 – 10,000 Hz), propagated in a tube, is reflected by local changes in acoustic impedance⁽³⁾. This method provides estimates of cross-sectional endonasal areas and the endonasal volume. It helps to define objectively the structural and mucosal components of the nasal passage. Since its

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introduction, there has been an explosion of research using this tool. Due to the rapid acquisition of data that can be completed in a minute, it has become a valuable clinical and research tool. Patient tolerance is excellent, even in children.

3. What are the indications for objective assessment?

Functional nasal airway measurement is important in the understanding of nasal physiology, and is a useful diagnostic tool in patients with nasal disorders. The sensation of nasal obstruction, nasal resistance and minimal cross-sectional area are three distinct parameters of nasal patency that are more or less related to each other⁽⁴⁾. A combination of these techniques represents the state of the art for a functional and quantitative study of the nasal airway.

The relevance of objective assessment of nasal resistance and patency have been documented in many rhinological situations:

- (a) It can be used to differentiate if the nasal obstruction is structural or mucosal in nature by conducting the test before and after topical decongestion.
- (b) Objective testing is useful in the quantitative assessment of the benefit of therapy. It can be used

to assess the effectiveness of septoplasty and turbinoplasty in alleviating nasal obstruction.

- (c) In the research of nasal physiology, it provides quantitative information on the response of the nasal mucosa to intranasal challenges with allergens and other types of physical and chemical stimuli.
- (d) Objective data on the nature of the nasal airway can be used for medico-legal documentation.

In conclusion, clinical data has shown that rhinomanometry and acoustic rhinometry are very useful and reliable diagnostic tools in the assessment of obstructive nasal disorders.

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