

ORIGINAL ARTICLE

## Assessment of Nasal Obstruction With Rhinomanometry and Subjective Scales and Outcomes of Surgical and Medical Treatment<sup>☆</sup>



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### KEYWORDS

Rhinomanometry;  
NOSE scale;  
Visual Analogue  
Scale;  
Chronic rhinitis;  
Septal deviation;  
Septoplasty;  
Turbinoplasty;  
Nasal corticosteroids

### Abstract

**Introduction:** Prospective study of patients with nasal obstruction (NO) in order to measure therapeutic success by anterior active rhinomanometry (AAR), Nasal Obstruction Symptom Evaluation (NOSE) scale and Visual Analogue Scale (VAS) and to establish the correlation between these tests.

**Methods:** Patients with NO, on whom we performed an AAR, NOSE and VAS scales at baseline and after medical treatment (topical nasal steroid) or surgery (septoplasty, turbinoplasty or septoplasty and turbinoplasty). The nasal flow obtained by the AAR and the score of both subjective scales (NOSE and VAS) were compared and analysed.

**Results:** A total of 102 patients were included in the study. Surgical treatment resulted in statistically significant differences with the AAR and the subjective scales. While in patients with medical treatment there was an increase in the AAR nasal flow but without statistical significance ( $P=.1363$ ). The correlation between the AAR, the NOSE and VAS scales was measured finding a strong correlation between the NOSE and VAS scales only ( $r=.83327$ ).

**Conclusions:** The patients with NO treated surgically have better results when these are evaluated by AAR or with subjective scales. There is no significant correlation between AAR, NOSE and VAS scales, this is considered to be because the AAR and subjective scales are complementary and measure different aspects of NO. The AAR and subjective scales are useful tools to be used together for the follow up of patients with NO.

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**PALABRAS CLAVE**

Rinomanometría;  
Escala NOSE;  
Escala Visual Análoga;  
Rinitis crónica;  
Desviación septal;  
Septoplastia;  
Turbinoplastia;  
Corticoides nasales

## Evaluación de la obstrucción nasal mediante rinomanometría y escalas subjetivas y medición del éxito terapéutico médico y quirúrgico

**Resumen**

**Introducción y objetivos:** Estudio prospectivo de pacientes con obstrucción nasal (ON) a fin de cuantificar el éxito terapéutico mediante una rinomanometría anterior activa (RAA), la escala de Evaluación de los Síntomas de Obstrucción Nasal (NOSE) y la Escala Visual Análoga (EVA), y determinar la correlación que existe entre las pruebas.

**Métodos:** Realizamos RAA y valoración subjetiva mediante las escalas NOSE y EVA a pacientes con ON antes y después del tratamiento médico (corticoides tópicos) o quirúrgico (septoplastia, turbinoplastia o septoturbinoplastia). Comparamos y analizamos los resultados de las puntuaciones obtenidas en ambas escalas subjetivas (NOSE y VAS) con las mediciones en la RAA.

**Resultados:** Un total de 102 pacientes cumplieron los criterios de selección. Los resultados muestran que la mejoría de la ON, tras tratamiento quirúrgico, es evaluada más positivamente si la herramienta de medición es la RAA. Por el contrario, el tratamiento médico mejora el flujo nasal medido con la RAA, pero sin significación estadística ( $p=0,1363$ ). Medimos la correlación entre RAA, escalas NOSE y EVA y hallamos solo una correlación positiva entre las escalas NOSE y EVA ( $r=0,83327$ ).

**Conclusiones:** Los pacientes quirúrgicamente tratados por ON presentan mejores resultados cuando estos se evalúan mediante RAA o con escalas subjetivas. No existe una correlación significativa entre RAA y las escalas NOSE y EVA; esto se considera debido a que la RAA y las escalas subjetivas son complementarias y miden diferentes aspectos de ON. La RAA y las escalas subjetivas son instrumentos útiles para emplearlos de forma conjunta en el seguimiento de pacientes con ON.

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**Introduction**

Nasal obstruction (NO) is defined as the discomfort caused by an inadequate air flow or an increase in air flow resistance through the nostrils. One of the most common symptoms, NO can be caused by anatomic malformation, septal deviation or inflammatory processes such as chronic rhinitis.<sup>1,2</sup>

Objective assessment of the nasal respiratory tract can be useful in clinical evaluation of the NO symptom, for the evaluation of patients with sleep apnoea, for allergen challenge tests, for medical and surgical pre- and post-treatment approach and for nasal physiology research.<sup>3-5</sup>

Active anterior rhinomanometry (AAR) is an objective examination method for studying the mechanical resistance that the nostrils offer upon being penetrated by the air column during the different phases of breathing. Given that AAR measures nasal flow and pressure gradient that moves air flow during normal breathing, it offers a physiological quantification of nasal permeability. It is the method most often used for investigation and clinical evaluation of nasal flow resistance in breathing.<sup>6-8</sup>

The AAR procedure allows us to ascertain the relationship between anatomical malformations and their functional repercussion. This reduces both the error of overestimating clear septal deviations (from the anatomical point of view, but in which there are turbinate wall compensations that permit correct flow with nasal cycles within normality) and the error of underestimating specific septal deviations

**Table 1** Degree of Nasal Obstruction (NO) Among Men and Women.

Degree of nasal obstruction	Men (ml/s)	Women (ml/s)
Normal	>700	>630
Mild obstruction	600–700	530–630
Moderate obstruction	500–600	430–530
Serious obstruction	300–500	230–430
Severe obstruction	<300	<230

Source: Fabra.<sup>6</sup>

(which impact the valve area and have a strong functional repercussion as the vestibule fossa section varies). In addition, AAR makes it possible to study the effect of nasal hyperreactivity.<sup>3,7-11</sup>

In AAR, the diagnostic parameters of normality in baseline conditions depending on total nasal flow at 150 Pa of pressure is >700 cm<sup>3</sup>/s for men and >630 cm<sup>3</sup>/s for women. Nasal flow below this is classified into various levels of NO (mild, moderate, serious and severe) depending on the reduction in the sum of the flows in both nostrils<sup>6</sup> (Table 1).

The Nasal Obstruction Symptom Evaluation (NOSE) scale (Table 2) is a disease-specific questionnaire that serves as an instrument to establish the state of symptoms in patients with NO. It is a sensitive, reliable and validated scale that is quick and simple to complete; Its use with adults with NO has potential in demonstrating adequate results in research

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