SPIROMETRY AS AN OBJECTIVE TOOL FOR NASAL PATENCY

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Abstract : Spirometry can be used as an objective tool for measuring nasal patency. it is sensitive, easy to perform, comfortable to patient. The only limitation being that it only can be done in institution.

Keywords: spirometry, nasal patency,.

INTRODUCTION :

For many years numerous workers in the field of Rhinology have been fascinated by attempts to measure nasal airway patency. Like-Glatzel mirror held under nostril and resulting area of condensation due to breath was measured. Zwaardmakers hygroscopic method in 1889 by analyzing shape and size of spots made by breathing. In 1903 Courtade first used anterior rhinomanometry.

1940 Uddstromer used facemask divided into compartment in order that spirometric measurements pertaining to both nose and mouth could be made. In our study, hundred subjects were evaluated by spirometry which were including 16 Normal persons, 42 Deviated nasal Septum, 28 Nasal polyps and 14 persons of Rhinitis with age ranging from 20 to 60 years.

MATERIAL AND METHODS :

The material of the present study consisted of the following groups,

- A) 1) Normal persons – 16 Normal adult individuals.
- 2) Persons with Deviated Nasal Septum – 42 Deviated nasal septum Either right sided or left sided.
- 3) Persons with Nasal polyposis – 28 Nasal polyposis either right sided Nasal polyp, left sided nasal polyp or bilateral nasal Polyposis
- 4) Rhinitis – 14 Patients either Allergic Rhinitis or vasomotor rhinitis not having acute symptoms.

B) Spirometer & mouthpiece [Specially designed (Fig - 1)]

SPIROMETRY TEST: It was decided to measure the ventilation in the form of maximum breathing capacity as a parameter to assess the functional average patency of nasal passage. Recording of MVV values (Maximum breathing capacity) MVV values through nose and mouth as per details given below were recorded with the help of Spirometer.

- 1) Subject was asked to sit comfortably on stool in front of Spirometer apparatus.
- 2) Subject was instructed to breath through the specially designed mouthpiece (Fig-2) of Spirometer and rubber catheters having rubber caps snugly fitting in nostrils.

Reading were taken on the paper like:

A. Total Nasal Patency Index (TNPI) = MVV through both nostrils X 100/MVV through mouth

B. Right Nasal Patency Index(RNPI)= MVV through right nostrils x 100/MVV through mouth

C. Left Nasal Patency Index (LNPI) = MVV through left nostril x100/MVV through Mouth

This ratio will be expressed as percentage of normal ratio designed as nasal patency index. Spirometric readings were taken in four ways,

1. MVV through mouth with both nostrils closed.
2. MVV through both nostrils with mouth closed.
3. MVV through Right nostril with mouth and Left nostril closed.
4. MVV through Left nostril with mouth and Right nostril closed.

RESULTS :

Table I – Average values in Normal persons

Total NPI	- 88.93%
Right Nostril NPI	- 85.00%
Left Nostril NPI	- 78.75%

Table II - Average values in deviated Nasal Septum.

I) Right sided DNS	
Total NPI	- 80.00%
Right NPI	- 62.25%
Left NPI	- 74.58%
II) Left sided DNS	
Total NPI	- 81.25%
Right NPI	- 79.63%
Left NPI	- 67.23%

Fig : I

Fig : II

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Table III - Average values in Patients of Nasal Polyposis

I)	Bilateral Nasal Polyposis	
	Total NPI	- 77.28%
	Right NPI	- 61.90%
	Left NPI	- 62.89%
	Right sided Nasal polyp	
	Total NPI	- 73.61%
	Right NPI	- 61.10%
	Left NPI	- 68.28%
II)	Left sided Nasal polyp	
	Total NPI	- 78.76%
	Right NPI	- 74.73%
	Left NPI	- 52.81%

Table IV - Average values by spirometric reading in Rhinitis.

Total NPI	- 82.84%
Right NPI	- 75.18%
Left NPI	- 76.67%

DISCUSSION :

Above observations and readings show that Nasal patency can be measured with the help of Spiro meter in order to evaluate patient's complaints and confirming the pathology leading to nasal obstruction. We can conclude and correlate the symptoms, which will be helpful for management. There are many inherent problems associated with this investigation not the least being that one measuring a moving target. As the subject breaths in, the nasal apparatus flattens and faster the air flow inward the more due alar cartilage and upper lateral cartilage are drawn inwards, increasing nasal resistance breathing outward through nose the opposite will happen causing a decrease in nasal resistance.

CONCLUSION :

- 1) Spirometry is useful test for nasal respiratory function and provides objective assessment of nasal airway patency, which can be retained as record.
- 2) The method is easy to handle and sensitive.
- 3) The method is clinically applicable and recordable. It is simple to perform and comfortable to subject.
- 4) In this study we found, the only disadvantage being that since Spirometer was used by chest physicians, so this method can be used in institution or hospitals.

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