



## ORIGINAL ARTICLE

# Nasal Septum Surgery: Evaluation of Pre and Post-operative Respiratory Function in Patients with septal deviation by Acoustic rhinometry and Rhinomanometry

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### ABSTRACT

*With regard to the critical role of septoplasty in clinical management of patients with nasal septal deviation, who also suffer from chronic episodes of nasal obstruction in most cases, this study aimed at elucidating the efficacy of this therapeutic in improving patients' respiratory function. In this comparative cross-sectional study, respiratory functions of 100 patients with the nasal septal deviation who had attended Boo Ali Hospital in 2011 and 2012 were determined before and after septoplasty operation according to rhinomanometry and acoustic rhinometry. The mean age of the patients was 24.67 years and 75 percent were female. According to rhinomanometry air flow was significantly increased while notable decrease was observed in nasal resistance ( $P < 0.05$ ). All records of acoustic rhinometry except the length of second constriction in both sides were markedly differed after septoplasty ( $P < 0.05$ ). Based on the obtained results in this study and previous similar researches it can be concluded that respiratory function in patients with nasal septal deviation can be considerably improved after septoplasty.*

**Key Words:** Respiratory function, Septoplasty, Rhinomanometry

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### INTRODUCTION

Nasal septal deviation is one of the most common anatomic variations that may lead to various health difficulties in patients referred to ENT clinics. Depending on anatomical findings the condition is classified into different types and their particular associated treatments [1, 2]. Due to respiratory complications and sleep disorders most cases undergo open or endoscopic septoplasty requiring a specialized surgical method [3, 4]. Although septoplasty can achieve significant and successful results, in some cases the operation fails to completely correct the deviation or may even aggravate the patient's complications and cause repeated hospitalization [5, 6]. Thus, proper use of appropriate techniques for amelioration of respiratory disorders plays a crucial role in enhancing the results of septoplasty operation [7, 8]. Rhinomanometry and acoustic rhinometry as two of the most applied tests for objective measurements of nasal airways are able to assess nasal volume and nasal cross sectional areas in different distances from nostril and also to locate the minimal cross sectional surface of the nose and nasal airway obstruction; hence, these tests can be a useful method for diagnosis of nasal congestion and evaluation of septoplasty results [9-11].

With regard to the importance of septoplasty and its vital role in the recuperation of patients suffering from nasal septal deviation, in this study, we aimed to evaluate pre and post-operative respiratory condition of these patients using rhinomanometric and acoustic rhinometric assessments.

## MATERIALS AND METHODS

In this comparative cross-sectional study, we evaluated patients selected by consecutive sampling who had complaints of nasal septal deviation and were referred to ENT clinics at the Boo Ali hospital in Tehran during the years 2011 and 2012. Based on medical history and rhinoscopic examination, 100 patients who were at least 16 years old underwent septoplasty surgery. Pre and post-operative data of rhinomanometry (MPR-2100, Nihon Kohden Co, Ltd, Japan) and acoustic rhinometry (SRE-2100, Rhini Metrics Co, Ltd, Denmark) assessments were compared.

An informed written consent was received from each individual after clarification of the study protocol, which was approved by the ethical committee of Tehran Medical Branch of Islamic Azad University. Collected data, expressed as mean and standard deviation values, were analyzed with SPSS software (Version-13). The Paired t-test was used for evaluation of rhinomanometry and acoustic rhinometry. P value <0.05 was considered significant.

## RESULTS AND DISCUSSIONS

The mean age of patients who underwent septoplasty in this study was  $24.76 \pm 4.52$  years. In total, 75% of patients (75 patients) were male and 25% (25 patients) were female. Except the length of the second constriction in both sides, our result indicated a significant difference in all other measured factors after surgery ( $P < 0.05$ ). Rhinomanometry tests revealed that pre-operative resistance of nasal airways (Mean: 0.385) decreased remarkably after septoplasty (Mean: 0.381) ( $P=0.0001$ ). Furthermore, post-operative nasal airflow (Mean: 385) was significantly increased after the operation (Mean: 388) ( $P=0.0001$ ). Considering the average length of left and right first constriction, most patients showed a notable reduction after surgery ( $P=0.0001$ ,  $P=0.002$ ; respectively). Although, the area of the first constriction was significantly increased in both sides post-operatively ( $P=0.0001$ ), area of the second constriction was improved only in the left side ( $P=0.033$ ). On the other hand our measurements demonstrated a substantial increase in the left and right nasal volume in all patients ( $P=0.0001$ ). As one of the most common complications of respiratory airways among ENT patients, nasal septal deviation is typically managed through septoplasty [12]. Regarding that objective evaluations of nasal airway patency are a key element in observation of the patient's respiratory health, various methods including rhinomanometry and acoustic rhinometry are developed to monitor nasal obstruction and related disorders [13, 14]. Our study introduces a comparison of objective methods results before and after septal surgery in a standard manner.

Although both the anterior and posterior nasal septal deviations were considerably improved in our study, a 2010 study conducted by Garcia *et al* demonstrated that in comparison to posterior septal deviations, deviations in anterior part of the nasal septum can be much more vital in patients' respiratory function [15]. Results of rhinomanometry and acoustic rhinometry tests in this study confirmed enhanced respiration. Also, in an investigation of patients with nasal septal deviation Bulcun *et al* concluded that septoplasty can improve nasal symptoms of pulmonary function tests and bronchial hyper responsiveness after surgery [16]. Evaluation of septoplasty patients with rhinomanometry, health status scale and computed tomography by Vural *et al* suggested that compared to the pre-operative values, the patients manifested a significant decrease in Nasal Obstruction Symptom Evaluation scores and total nasal airway resistance [17]. Computational analysis of aerodynamic pattern by Chen *et al* showed that the decreased nasal airflow in patients with nasal septal deviation may result in several respiratory disorders [18].

Post-operative assessments in our study were also suggestive of a synchronous improvement in nasal airflow and the overall respiratory function. Anterior septal reconstruction of patients with deviated nasal septum by Most *et al* indicated that septoplasty is effective in refining both airway function and patients aesthetic evaluation which was validated by a quality-of-life index [19]. Conforming to the results of rhinomanometry and acoustic rhinometry objective evaluations of nasal openness in this study and comparison with other studies, we highly advocate septoplasty as a part of clinical management of patients with nasal septal deviation that can significantly improve respiratory function.

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