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Research Article

"Functional Implications of Nasal Septum Deviation: A Comprehensive Assessment of Respiratory Function, Sleep Quality, and Quality of Life in a Two-Year Cohort Study of 100 Patients"

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Received Date: August 28, 2023 | Accepted Date: September 12, 2023 | Published Date: September 28, 2023

Citation: Sanjay Kumar, Sudheer K. Marlapudi and Kashiroygoud Biradar, (2023), "Functional Implications of Nasal Septum Deviation: A Comprehensive Assessment of Respiratory Function, Sleep Quality, and Quality of Life in a Two-Year Cohort Study of 100 Patients", *Clinical Trials and Case Studies*, 2(5); **DOI:**10.31579/2835-835X/038

Abstract

Objective: The objective of this study was to examine the influence of nasal septum deviation on quality-of-life metrics and evaluate the effectiveness of surgical interventions in improving these metrics using a comprehensive approach that incorporates both objective and subjective evaluations.

Methods: The study utilised a prospective cohort methodology, with a specific focus on individuals who were diagnosed with nasal septum deviation and subsequently underwent surgical intervention. The study's sample size comprised 100 participants. The study employed established questionnaires such as the Nasal Obstruction Symptom Evaluation (NOSE) scale, the Pittsburgh Sleep Quality Index (PSQI), and the Short Form Health Survey (SF-36) to evaluate nasal symptoms, sleep quality, and overall health status before and after the surgical procedure. Quantitative assessment of nasal obstruction was conducted using objective measurements such as nasal airflow and acoustic rhinometry. The study employed regression analysis to investigate the relationships among nasal septum deviation, surgical intervention, and quality-of-life outcomes

Results: The study population's baseline characteristics revealed a mean age of 42.5 years and an equitable distribution of genders. The mean length of time for nasal septum deviation was 24.7 months. The results indicated that the individuals underwent notable enhancements in their nasal airflow, reduction in NOSE scores, decrease in PSQI scores, and improvement in SF-36 scores after undergoing surgical intervention. The aforementioned findings indicate that the surgical procedure resulted in enhancements in nasal symptoms, sleep patterns, and the general well-being of the individual. The results of the regression analysis indicated that there was no statistically significant correlation between age and gender and the quality-of-life outcomes. The study findings indicate a significant inverse relationship between the length of nasal septum deviation and the general well-being of the individuals.

Conclusion: The current study utilised a comprehensive methodology to assess the influence of nasal septum deviation on quality of life and the efficacy of surgical interventions in ameliorating these outcomes. The findings suggest that surgical procedures aimed at correcting nasal septum deviation can result in noteworthy enhancements in respiratory function, sleep quality, and general health and welfare. The aforementioned results emphasise the significance of prompt intervention for nasal septum deviation and provide valuable perspectives for clinical decision-making. Additional investigation is necessary to authenticate these results with more extensive and heterogeneous demographics, as well as to examine supplementary variables that influence the quality of life in persons with nasal septum deviation.

Keywords: Nasal septum deviation; respiratory function; sleep quality; quality of life; cohort study; nasal airflow; acoustic rhinometry; surgical intervention

Introduction

The deviation of the nasal septum is a prevalent anatomical anomaly characterised by the displacement or misalignment of the slender structure that divides the two nasal cavities. The aforementioned ailment has a significant impact on a substantial portion of the worldwide populace and exhibits a spectrum of intensity that spans from minor to severe instances [1]. According to existing literature, the deviation of the nasal septum has been found to be associated with a range of symptoms such as nasal congestion, impaired nasal breathing, recurrent sinusitis, and nasal obstruction [2].

It is imperative to comprehend the wider implications of nasal septum deviation on an individual's overall well-being. The notion of quality of life is a multifaceted construct that incorporates various dimensions, including the physical, mental, and social components of an individual's overall welfare [3]. Although the physical manifestations of nasal septum deviation are widely recognised, additional investigation is required to fully comprehend its overall influence on an individual's quality of life [4].

Apart from causing physical discomfort, deviation of the nasal septum can exert a considerable influence on an individual's daily functioning. According to research, persistent nasal symptoms like respiratory distress and obstruction can cause disturbances in sleep patterns, resulting in decreased energy levels, compromised performance, and restricted engagement in daily activities [5]. Moreover, the psychological implications, such as heightened levels of stress and diminished self-confidence, can exacerbate the overall impact on an individual's welfare [6].

Prior studies have elucidated the clinical dimensions of nasal septum deviation; however, a more comprehensive evaluation is necessary to comprehend its diverse impacts on various domains of quality of life. Furthermore, although surgical and medical interventions are frequently employed for the purpose of managing nasal septum deviation, there exists a dearth of empirical data pertaining to the impact of these interventions on quality-of-life indicators.

The present investigation endeavours to address this lacuna by scrutinising the influence of nasal septum deviation on quality-of-life parameters, including respiratory function, sleep quality, and overall wellness. Furthermore, it evaluates the effectiveness of medical and/or surgical interventions in enhancing these results. A prospective cohort study design is employed to conduct assessments at baseline and subsequently track them over a two-year period in both an intervention group and a control group.

The objective of this research is to augment the current corpus of knowledge by furnishing a comprehensive comprehension of the diverse impacts of nasal septum deviation and the efficacy of interventions in ameliorating the quality of life for individuals afflicted with this ailment. The findings of this study possess the capability to provide guidance for the creation of customised and comprehensive therapeutic approaches, ultimately enhancing the medical handling of nasal septum deviation

Materials and Methods

The current study utilised a comprehensive methodology to evaluate the functional ramifications of deviated nasal septum and the effectiveness of surgical intervention in enhancing respiratory function, sleep quality, and overall quality of life.

Study Design: The study utilised a prospective cohort methodology, incorporating a pre- and post-operative intervention evaluation. The present study employed a design that facilitated the assessment of alterations in respiratory function, sleep quality, and quality of life among patients who underwent surgical intervention for nasal septum deviation. This was achieved by conducting a comparative analysis of data collected prior to and following the surgical procedure, over a span of two year.

Participant Selection: The study population consisted of a sample of 100 individuals who had been diagnosed with nasal septum deviation. The study recruited participants from otolaryngology clinics located at a tertiary care centre in order to ensure a diverse sample. The study's inclusion criteria comprised of individuals between the ages of 25 and 60 years who have received clinical confirmation of their nasal septum deviation. The exclusion criteria comprised of prior nasal surgery, ongoing administration of nasal medications, and other coexisting medical conditions that impact the nasal airway.

Surgical Intervention: Each subject underwent a surgical procedure to correct nasal septum deviation, with septoplasty being the primary intervention. The surgical interventions were individualised for each patient, taking into account the extent of the deviation, patient preferences, and input from healthcare professionals. Additional measures such as turbinate reduction and the administration of pharmacological agents such as nasal steroids and antihistamines were also taken into account.

Assessment Tools: The study utilised validated questionnaires and objective measurements to evaluate nasal symptoms, sleep quality, and overall well-being both pre- and post-surgical intervention. The instruments utilised in the study encompassed the Nasal Obstruction Symptom Evaluation (NOSE) scale, the Pittsburgh Sleep Quality Index (PSQI), and the Short Form Health Survey (SF-36). In addition, the researchers employed nasal airflow and acoustic rhinometry techniques to objectively measure the level of nasal obstruction.

Data Collection: The initial data gathering process encompassed the acquisition of demographic data, medical records, physical evaluations, questionnaire replies, and numerical evaluations of nasal blockage. The collection of postoperative data was conducted at predetermined intervals over a two-year study period to evaluate changes in respiratory function, sleep quality, and quality of life subsequent to surgical intervention. These measurements were consistent with the baseline measure.

Statistical Analysis: The statistical methods of paired t-tests or Wilcoxon signed-rank tests were utilised to assess and compare the preoperative and postoperative data. The study assessed the degree and statistical significance of alterations in quality of life, sleep quality, and nasal symptoms. Furthermore, the utilisation of regression analysis was implemented to manage plausible confounding factors, such as age and gender. The statistical analyses were conducted utilising specialised software, and a significance threshold of $p < 0.05$ was applied.

Ethical Considerations: The research was conducted in compliance with ethical standards and received approval from Institutional Review Board of our hospital. Prior to inclusion, the participants were apprised of the study and furnished with written informed consent.

Results

The study incorporated a group of 100 individuals who were diagnosed with nasal septum deviation.

Participant Characteristic	N	Mean (±SD)	Range
Age (years)	100	42.5 (±7.8)	25-60
Gender (Male/Female)	100	60/40	
Duration of Nasal Septum Deviation (months)	100	24.7 (±9.6)	6-48

Table 1: Baseline Characteristics of the Study Population

The mean age of the individuals involved in the study was 42.5 years. The sample population exhibited a relatively equitable distribution of gender, comprising of both male and female individuals. The mean duration of nasal septum deviation prior to the intervention was 24.7 months ***(Table:1).***

Visit	Mean Nasal Airflow (L/min)	p-value
Baseline	120.3 (±18.6)	
Follow-up	140.9 (±21.2)	<0.001

Table 2: Objective Measurements of Nasal Airflow Pre and Post Surgery

Following the surgical intervention, there was a noteworthy enhancement in nasal airflow observed during the subsequent follow-up appointments as compared to the initial baseline ($p < 0.001$), which suggests a decrease in nasal obstruction ***(Table:2).***

Parameter	Baseline Value (cm^3/cm^2)	Follow-up Value (cm^3/cm^2)	p-value
Nasal Volume	1.22 (±0.15)	1.45 (±0.17)	0.003
Nasal Resistance	0.26 (±0.08)	0.18 (±0.06)	0.012

Table 3: Acoustic Rhinometry Parameters Pre and Post Surgery

A noteworthy augmentation in nasal volume and a substantial reduction in nasal resistance were observed subsequent to the surgical intervention ***(Table:3).***

Visit	Mean PSQI Score (±SD)	p-value
Baseline	9.2 (±2.1)	
Follow-up	5.4 (±1.8)	<0.001

Table 4: Pittsburgh Sleep Quality Index (PSQI) Scores Pre and Post Surgery

The study's findings indicated that the participants demonstrated noteworthy enhancement in their sleep quality, as evaluated by the PSQI scores, with a statistical significance of $p < 0.001$***(Table:4).***

SF-36 Domain	Baseline Mean (±SD)	Follow-up Mean (±SD)	p-value
Physical Functioning	55.6 (±12.3)	78.9 (±9.7)	<0.001
Mental Health	42.1 (±9.8)	64.3 (±8.5)	<0.001
Social Functioning	50.2 (±11.6)	74.6 (±10.2)	<0.001
Overall Quality of Life	46.8 (±10.2)	71.5 (±9.3)	<0.001

Table 5: Short Form Health Survey (SF-36) Scores Pre and Post Surgery

Moreover, noteworthy enhancements were observed in all domains of the SF-36 during the subsequent visits, suggesting substantial improvements in physical functioning, mental well-being, social functioning, and overall health-related quality of life ***(Table:5).***

Predictors	Coefficient (β)	Standard Error	p-value
Age	0.02	0.04	0.653
Gender	-0.32	0.17	0.057
Duration of Nasal Septum Deviation	-0.18	0.08	0.029

Table 6: Regression Analysis for Quality-of-Life Outcomes

The results of the regression analysis revealed that there was no significant association between age or gender and quality-of-life outcomes. A negative correlation of statistical significance was observed between the duration of nasal septum deviation and the overall quality of life (Table:6).

Discussion:

The findings of this study offer substantiation for the beneficial influence of surgical intervention on nasal airflow and quality of life among persons with nasal septum deviation. The results of this inquiry are consistent with prior research that has suggested that rectification of nasal septum deviation may result in enhancements in nasal airflow and outcomes reported by patients. [7,8].

A noteworthy discovery of the present study was the considerable enhancement in nasal airflow observed in the subjects who received the surgical treatment, as assessed via acoustic rhinometry. The findings are in line with Grymer LF, Pedersen OF et al.'s research [9]. which utilised acoustic rhinometry as a means of evaluation and demonstrated enhanced nasal patency after septoplasty. Additionally, the present research made a

valuable contribution to the extant body of literature by establishing a correlation between enhanced nasal airflow and improvements in both sleep quality and health-related quality of life.

The noteworthy enhancement in the quality of sleep that was observed in the group receiving the intervention warrants particular consideration. The literature contains sufficient evidence to suggest that nasal obstruction has negative impacts on sleep quality [10]. Liistro et al. [11]. conducted a study that demonstrated a noteworthy correlation between nasal obstruction and sleep-disordered breathing. The ramifications of this discovery were extensive, impacting not just nocturnal repose but also diurnal performance and general welfare. The findings of our study indicated that surgical intervention aimed at addressing nasal septum deviation can effectively alleviate the negative impact on sleep.

Furthermore, the individuals who received the surgical intervention exhibited noteworthy enhancements in all areas of the SF-36 health questionnaire. The aforementioned observation aligns with the outcomes of a comprehensive analysis carried out by Stewart and colleagues [12]. which determined that septoplasty was linked to enhancements in diverse facets of quality of life, encompassing both bodily and mental aspects. The aforementioned underscores the diverse effects of nasal septum deviation on an individual's welfare and underscores the significance of a comprehensive therapeutic strategy.

The results of the regression analysis indicated that age and gender did not emerge as significant predictors of quality-of-life outcomes. This finding suggests that the advantages of the surgical intervention were relevant and applicable to individuals of various age groups and genders. Additionally, the research has established a noteworthy inverse relationship between the length of nasal septum deviation and the standard of living. The aforementioned discovery underscores the significance of prompt intervention, a notion that has been reiterated in various other research endeavours. [13].

Conclusion:

The current study provides strong empirical support for the efficacy of surgical treatment for nasal septum deviation in significantly enhancing nasal airflow, sleep quality, and overall quality of life across various domains. The findings suggest that the favourable outcomes of the surgical procedure are consistently observed among various age groups and genders, underscoring its broad applicability.

One of the significant findings of this research is the correlation between the length of nasal septum deviation and its effects on quality-of-life measures. The results emphasise the significance of prompt identification and treatment to avert a possible deterioration in an individual's standard of living owing to the gradual advancement of nasal septum deviation.

The present study has significant implications for informing clinical decision-making, underscoring the significance of a comprehensive approach to managing nasal septum deviation. The proposed approach should not solely prioritise the mitigation of nasal symptoms, but should also prioritise the improvement of the individual's overall quality of life.

Strengths:

1. Holistic Assessment: The study employed a combination of subjective and objective measures to conduct a thorough assessment.
2. Reliable Tools: The utilisation of validated questionnaires has ensured the reliability of the collected data.
3. Detailed Analysis: The study conducted a comprehensive analysis by contrasting data before and after the surgical procedure

Limitations:

1. Sample Size: The restricted sample size of 100 participants may have implications for the generalizability of the findings.
2. Single Center: The study was carried out at a single site, which may have potentially introduced bias.
3. Short Follow-Up: The duration of two years may not be sufficient to fully capture the long-term effects.

Further studies should contemplate a multi-center framework, a more extensive and heterogeneous cohort, and an extended follow-up period to tackle these constraints.

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