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Effect of Septoplasty versus Septoplasty with Turbinate Reduction for Relief of Nasal Obstruction due to Deviated Nasal Septum

Aiman Fatima Naqvi, Muhammad Waqas Ayub, Asim Abbas, Haider Ali, Fizza Batool, Bakhtawar Meraj

Abstract:

Objective: Nasal obstruction has significant impact on life quality, with deviated nasal septum being the third most common cause. This condition involves nasal structural abnormalities that reduce airflow. This study evaluates the comparative effectiveness of septoplasty alone versus septoplasty combined with turbinectomy in patients presenting with a deviated nasal septum.

Study Design and Setting: This was a prospective, randomized comparative study conducted in ENT Department at CMH Hospital Malir. Patients underwent septoplasty with and without turbinectomy.

Methodology: A total of 88 patients underwent septoplasty for a deviated nasal septum. Participants were randomly assigned into two groups, with 44 patients in each. Group A underwent septoplasty alone, while Group B received septoplasty with turbinectomy. The nasal obstruction severity was evaluated using the NOSE score, with a mean preoperative score of (11.16±1.1) for septoplasty and (8.6±1.19) for septoplasty with turbinectomy. Surgical outcomes were assessed one month postoperatively using NOSE scores to compare the effectiveness of both procedures.

Results: Results revealed significant postoperative improvement in nasal obstruction symptoms, with both septoplasty alone and septoplasty with turbinectomy showing relief in symptoms. However, patients who underwent combined procedure experienced greater reductions in nasal blockage, congestion, trouble sleeping, and difficulty breathing during exertion. Statistical analysis confirmed that septoplasty with turbinectomy provided significant symptomatic improvement compared to septoplasty alone ($P<0.05$), emphasizing added benefit of turbinate reduction in improving nasal airflow.

Conclusion: Combining inferior turbinectomy with septoplasty is more effective than performing septoplasty alone in patients with nasal obstruction due to deviated nasal septum.

Keywords: Airway resistance, Nasal obstruction, Nasal septum, Turbinates, Septoplasty, Nasal septal deviation

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Aiman Fatima Naqvi *(Corresponding Author)*
Assistant Professor, Department of ENT
Tertiary Care Hospital Malir
Email: aimann394@gmail.com

Muhammad Waqas Ayub
Associate Professor, Department of ENT
Tertiary Care Hospital Malir
Email: waqasayub75@hotmail.com

Asim Abbas
Associate Professor, Department of ENT
Tertiary Care Hospital Malir
Email: aasiment@gmail.com

Haider Ali
Assistant Professor, Department of ENT
Tertiary Care Hospital Malir
Email: c.d.haider.ali@gmail.com

Fizza Batool
Post Graduate Trainee, Department of ENT
Tertiary Care Hospital Malir
Email: fizzabatool.hf@gmail.com

Bakhtawar Meraj
Post Graduate Trainee, Department of ENT
Tertiary Care Hospital Malir
Email: bakhtawar.meraj@gmail.com

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INTRODUCTION:

Nasal obstruction refers to the subjective feeling of inadequate airflow through the nasal passages. Nasal obstruction is a highly prevalent condition, experienced by 30 - 40% of the general population, and is most commonly observed by otolaryngologists.[1] Nasal obstruction is known to cause significant impact on quality of life. The studies showed that the prevalence of deviated nasal septum ranges from one-third of the general population to as high as 76%[2] and it is the third most frequent cause of nasal obstruction. In this condition there is structural abnormalities in the bony and cartilaginous parts of the nose that often leads to breathing difficulties, recurrent sinus infections, and sleep disturbances.[3] The much higher prevalence of nasal septal deviation (NSD) had been identified using advanced diagnostic methods, such as CBCT, with rates reaching up to 86.6%.[4]

Among individuals presenting with structural nasal obstruction, accurate evaluation of nasal septal deviation (NSD) poses a significant clinical challenge. Though NSD

is a common anatomical variation, it is often difficult to isolate its precise contribution to nasal airflow impairment and overall symptomatology and the reason of this complexity is the multifactorial nature of nasal obstruction, where other elements such as turbinate hypertrophy, mucosal inflammation, and nasal valve collapse may coexist and complicate the clinical picture. Thus it requires a comprehensive assessment including patient history, physical examination, endoscopic evaluation, and imaging studies, to determine whether NSD is the primary cause of obstruction or merely an incidental finding. Moreover, the subjective nature of nasal blockage symptoms and variability in patient perception further complicate the diagnostic process. Therefore, clinicians must exercise careful examination and utilize a combination of objective and subjective tools to accurately identify the role of NSD in structural nasal obstruction that can guide to appropriate management strategies.

The NOSE scale is a validated and reliable tool for used for subjective evaluation of nasal obstruction symptoms.[5] The NOSE questionnaire is designed to measure the severity of symptoms and the impact of nasal obstruction on patient's quality of life. It provides scores ranging from 0 to 100, with higher scores indicating more severe obstruction. Globally, septoplasty with or without turbinate modification shows significant enhancement in obstructive symptoms at long-term follow-up per both objective and subjective measures.[6] This treatment is widely accepted for structural nasal obstruction. A number of studies have demonstrated the effectiveness of septoplasty, with patient satisfaction rates ranges from 50% to 100%.[7,8]

A study conducted by Harvey RJ, concluded that nearly patients continue to experience nasal obstruction even after experiencing primary septoplasty.[9] A deviated nasal septum is often accompanied with inferior turbinate hypertrophy, that leads to increased airway resistance, particularly involving the contralateral nasal cavity. This may result in persistence of residual symptoms among patients postoperatively, which highlights the importance of addressing turbinate hypertrophy alongside septal deviation to attain optimal surgical outcomes and long-term relief from nasal blockage.

The incomplete correction of the septal deviation is the most common cause of persistent symptoms. However, other factors, such as nasal valve dysfunction, worsening allergic rhinitis, or inadequate treatment of turbinate hypertrophy, may also play a role.[10] Radiological evidence shows that compensatory enlargement of the inferior turbinate on the side opposite the septal deviation significantly increases nasal airway resistance, contributing to obstruction.[11] To address this, turbinate reduction is often performed alongside septoplasty to enhance nasal airflow, alleviate symptoms and enhancing the surgical outcomes and improve nasal airflow.[12] Although both septoplasty and septoplasty with turbinectomy are widely performed, there is a lack of robust comparative studies evaluating their outcomes in terms of nasal airflow, symptom relief, and patient satisfaction. There is insufficient research utilizing objective tools like the NOSE scale to compare the effectiveness of these procedures. Comparing the outcomes of septoplasty alone versus septoplasty with turbinectomy will help determine whether the combined procedure provides superior symptom relief and better long-term results.

METHODOLOGY:

This comparative study with RCT design was conducted at the ENT department of CMH Hospital Malir, Karachi. Duration of study was started from August 2024 to January 2025. Research was approved by the Institutional Review Board (IRB) in accordance with the standards of accepted medical ethics with reference number 11/24/IRB/KIMS.

In this study, patients were enrolled between age 18 and 50 years who presented with nasal obstruction due to deviated nasal septum (DNS), or anterior septal defect (ASD) or inferior turbinate hypertrophy. Participants were excluded with nasal polyps, epistaxis, nasal perforations, facial malformations, chronic sinusitis, and other nasal pathologies. Moreover, patients with a history with again nasal surgery and expecting females were also excluded minimize confounding factors.

The participants were selected using a non-probability purposive sampling method, including all patients who fill full the inclusion criteria during the study period. The sample size was calculated using OpenEpi version 3.0, based on mean NOSE score 11.16 ±1.1 and 8.6 ±1.19 for septoplasty and septoplasty with turbinectomy respectively, 95% confidence interval and 80% study power. The estimated minimum sample size was eight patients, with 4 per group, but a total of 88 patients were included, with 44 in each group to enhance validity of study result.

This study included patients suffering surgical procedure for deviated nasal septum at the ENT department of CMH after obtaining informed consent. Participants were randomly assigned into two groups using the coin toss method. Patients younger than 18 years or those with epistaxis, nasal polyps, chronic sinusitis, facial malformations, nasal perforations, were excluded from the study.

The study Participants were categorized into two groups: Group-A underwent septoplasty, while Group-B received septoplasty with turbinectomy. Surgery performed under general anesthesia.

Septoplasty was performed using either a Killian's incision or a hemitransfixation incision. For Group B, septoplasty was conducted following the same technique as in Group A, with nasal turbinectomy scissors used for turbinate resection and contralateral inferior turbinate was removed. In Group A, the nasal pack was removed after 24 hours,

whereas in Group B, it was removed after 48 hours.

The surgery procedures were completed by specialist otolaryngologist. *Nasal Obstruction Symptom Evaluation Scale (NOSE)* was applied to assess the NOSE score after one month of the surgery. All patients' characteristics were recorded on a proforma like age, gender, disease duration, NOSE score on *Nasal Obstruction Symptom Evaluation Scale***.**

All information was analyzed by using SPSS 20. Descriptive statistics were applied to determine the mean and SD for age, duration of disease, and NOSE score, while numbers and percentages were estimated for gender. To control the potential confounding, the data were stratified based on age, gender, and disease duration.

All participants were informed about the surgery. The surgical procedure was conducted by experienced surgeons. The surgeon was ensuring consistency for performing septoplasty and septoplasty combined with inferior turbinectomy surgical technique, to minimizing the variability. Patients were assigned, one surgeon of the two based on convenience.

To control the postoperative care through all patients. Patients were closely observed after the immediate postoperative period and throughout follow-up visits to measure the healing, for symptom and any possible complications. For clinical evaluation, endoscopic assessments and physical examinations were reported, and patient-reported outcome measurements such as visual analog scales (VAS) and NOSE scores for breathing comfort.

All relevant information reported as surgical notes. Furthermore documented the intra-operative findings, and postoperative meticulously for subsequent finding. This inclusive approach allowed for a strong comparison of outcomes between the two surgical techniques were evaluated and confirmed the findings under reliable clinical observations.

RESULT:

The assessment of demographic characteristics of study participants with deviated nasal septum suffering septoplasty and those suffering septoplasty with turbinectomy. The mean age and standard deviation of patients in the septoplasty group was 23.86 ± 6.13 years, while 30.65 ± 7.90 years in the septoplasty with turbinectomy group which was significantly higher. In the septoplasty group, majority 39 (53.4%) were males, while, 10 (66.7%) patients were female, and 34 (46.6%) were male in the septoplasty with turbinectomy group.

The paired sample t-test was applied to assess the effect of septoplasty on symptom severity in patients with DNS. The result revealed statistically significant progressed across all evaluated symptoms of the following treatment. For nasal blockage/ obstruction, the average score reduced significantly from 1.18 of a mean difference ($P < 0.001$). Similar substantial increased were observed in other symptoms, including nasal congestion/ stuffiness and sleeping trouble, where mean±SD scores reduced from 2.57 ± 0.82 to 1.39 ± 0.66 (difference: 1.18, $P < 0.001$) and from 2.45 ± 0.59 to 1.39 ± 0.75 (difference: 1.07, $P < 0.001$), one-to-one.

A prominent increased was also noted problem in getting enough air through the nose during exertion, with the mean score reducing from 2.39 ± 0.69 to 1.25 ± 0.78 ($P < 0.001$). The most significant improvement was observed in distress breathing through the nose, where the mean score reduced from 2.27 ±0.62 to 0.82 ±0.72, resultant in a mean difference of 1.46 ($P < 0.001$).

Research findings highlight the effectiveness of septoplasty in significantly reducing nasal symptoms and improving

Table-1: Pre-operative vs. Postoperative nose score comparison in septoplasty patients

Septoplasty	Preoperative		Postoperative		Paired t-test	
	Mean	SD	Mean	SD	Mean difference	P value
Nasal obstruction	2.64	0.685	1.45	0.820	1.182	<0.001
Nasal congestion or stuffiness	2.57	0.818	1.39	0.655	1.182	<0.001
Trouble sleeping	2.45	0.589	1.39	0.754	1.068	<0.001
Unable to get enough air through my nose during exercise or exertion	2.39	0.689	1.25	0.781	1.136	<0.001
Difficulty in breathing through my nose	2.27	0.624	0.82	0.724	1.455	<0.001
Total Score	12.3182	2.43781	6.2955	1.87492	6.02273	<0.001

Table-2: Pre-operative vs. Postoperative Nose score Comparison in Septoplasty with Turbinectomy Patients

Septoplasty with turbinectomy	Preoperative		Postoperative		Paired t-test	
Nasal obstruction	2.57	1.02	0.661	0.731	1.545	<0.001
Nasal congestion or stuffiness	2.59	0.89	0.693	0.655	1.705	<0.001
Trouble sleeping	2.55	0.82	0.548	0.582		<0.001
Struggled breathing through the nose during physical activity or exertion.	2.55	0.91	0.548	0.676	1.636	<0.001
Difficulty in breathing through my nose	2.45	0.93	0.589	0.759	1.523	<0.001
Total Score	12.7045	4.5682	1.77292	2.51875	8.13636	<0.001

breathing functionality in deviated nasal septum patients.

The effectiveness of septoplasty combined with turbinectomy in relieving nasal symptoms in patients having DNS by comparing preoperative and postoperative severity scores of symptoms. The outcome of paired t-test showed significant improvement across all assessed characteristics. The significant decrease in score of nasal blockage/ obstruction was observed postoperatively with a mean difference of 1.55 ($P < 0.001$). Similarly, nasal congestion or stuffiness presented a remarked able improvement, with average scores reducing from 2.59 ±0.89 to 0.69 ±0.66, with a mean difference of 1.71 ($P < 0.001$). A statistically significant reduction was also observed in trouble sleeping, where the mean score dropped from 2.55 ±0.82 to 0.55 ±0.58, reflecting a mean difference of 2.00 ($P < 0.001$).

During physical activity or exertion, in struggling to breathe through the nose, the mean score decreased significantly 1.64 ($P < 0.001$). The breathing trouble symptom, through the nose showed considerable improvement, through the mean score decreasing from 2.45 ±0.93 to 0.59 ±0.76, with 1.52 mean score difference ($P < 0.001$). Overall, the total symptom score showed a substantial reduction, declining from 12.70 ± 4.57 preoperatively to 1.77 ± 2.52 postoperatively, with a mean difference of 8.14 ($P < 0.001$).

The postoperative outcomes of septoplasty and septoplasty with turbinectomy were compared using an independent sample t-test. Patients undergoing septoplasty with turbinectomy showed significantly greater improvement in most symptoms, including nasal blockage or obstruction with a mean difference of 0.43 and P value= 0.011, nasal congestion or stuffiness yielding a mean difference of 0.50 and P value= 0.001. The turbinectomy group also showed significant improvement in trouble sleeping with a mean difference of 0.57 and $P < 0.001$ and difficulty getting enough air during exercise or exertion yielding mean difference of 0.34 and $P = 0.031$). For breathing trouble through the nose, no significant difference was observed ($P = 0.474$). The total mean score of symptoms was significantly lower in the turbinectomy group (mean difference: 1.73, $P < 0.001$). Study finding highlighted both procedures are effective in improving nasal symptoms, septoplasty with turbinectomy offers superior postoperative to relief for most symptoms compared to septoplasty alone.

DISCUSSION:

The present study highlights the comparative effectiveness of septoplasty and septoplasty plus turbinectomy in alleviating nasal symptoms among patients with deviated nasal septum (DNS).

The findings of the current study revealed a clear significant clinically improvement in nasal obstruction in patients who suffered with septoplasty. Participants informed consistent postoperative relief in across multiple symptoms like nasal blockage, disturbance in sleep, nasal breathing difficulty, and nasal stuffiness. These outcomes reinforce the well-established role of septoplasty as an effective modality for symptoms origins to a deviated nasal septum. In most of the cases, repositioning of the septum alone appears as satisfactory to restore functional airflow and improvement in day-to-day respiratory comfort.

The present study conclusion is in line with broadly consistent with the studies reported by Sommer et al[13]. and Alotaibi et al.,[14] These researches reported substantial improvements in septoplasty and also proved secondary benefits particularly in nasal blockage, disturbance in sleep, nasal breathing difficulty, and nasal stuffiness

The result from present study, emphasizes the clinical efficacy of both interventions as viable surgical options for patients presenting with a deviated nasal septum together with inferior turbinate hypertrophy. This outcome was determined by systematic evaluation of pre-operative and post-operative symptoms of patients, including nasal obstruction, difficulty in breathing, snoring, sleep disturbances, and overall patient-reported data related to quality of life. There was statistically significant improvement in air flow through nasal passage and reductive in symptoms of obstruction was observed among patients with both surgical approaches. The current research data analysis revealed that patients who underwent septoplasty combined with turbinate reduction, have achieved a superior degree of symptomatic augment than those treated with only septoplasty. This outcome enhanced the attributable to the dual modification of structural deviation and mucosal hypertrophy, which together contribute to nasal airway compromise.

The finding of this study closely aligns with a study reported from Pune, India by Karodpathy et al.,[15] who observed postoperative Nose scale scores improvement across both treatment groups, which is statistically significant and favoring the combined surgical intervention. Their findings are particularly informative like nasal blockage 2.6±0.5 vs 1.68±0.47 *(p<0.001)*, nasal congestion/ stuffiness 2.08±0.49 vs 1.56±0.506 *(p<0.001)*,, trouble sleeping 2.48±0.509 vs 1.76±0.435 *(p<0.001)*,, unable to get enough air through my nose during exertion 1.96±0.454 vs 1.56±0.506 *(p<0.001)*,, and total Nose score 11.16±1.1 vs 8.6±1.19 *(p<0.001)*, while septoplasty alone was effective in correcting deviation of the central nasal framework.

Taken collectively, these results underscore the importance of individualized surgical planning that considers the extent of turbinate hypertrophy in addition to septal deviation. For patients exhibiting substantial turbinate enlargement, the combined procedure may represent a more effective therapeutic strategy, leading to improved functional outcomes and greater patient satisfaction.

The results of present study demonstrate that combine the septoplasty and inferior turbinate reduction provides substantial pronounced relief in postoperative symptoms

like nasal blockage, congestion, troubled in sleeping and struggling in breathing during exertion in patients presenting with nasal obstruction and inferior to a deviated nasal septum complains.

These outcomes of study support the available literature, septoplasty plus turbinate suggest better improvements in longer outcomes compared to septoplasty alone.

Similar randomized study was reported from India by Sharma AR., observed a substantial enhancement in mean NOSE scores. after 1, 3, and 6 months postoperatively follow up (9.4 ±2.62 vs 5.10± 2.46), (6.26± 2.6 vs1.61 ±1.67) and (4.16± 3.11 vs 0.21± 0.41) (p= <0.001) respectively in patients undergoing septoplasty with inferior turbinectomy, compared septoplasty alone.[16] This outcome pattern was repeat in present study sample.

Another similar research was found conducted in Iran by Samarei R & Mabarian S.A., which compared at baseline, 6, 12, 24 and 48 months follow up in septoplasty with and without turbinectomy groups using mean NOSE scores 6 to 48 months (67.4 ±22.4 vs 69.0±29.4) (p= <0.001) to (35.0 ±20.8 vs 11.9 ±8.3) (p= <0.001) and VAS scores 7.4 ±23.3 vs 39.2 ±19.2(p=0.013) to 33.9 ±20.3 vs 12.0±11.5(p? 0.001) to evaluate the efficacy of earlier and more meaningful symptom relief in nasal obstruction[17].Both intervention researches revealed the statistically significant arguments on better symptom relief in Septoplasty with turbinoplasty group on all postoperative follow-ups.

For further support of this modality combining inferior turbinate reduction with septoplasty, a systematic review and meta-analysis by Ladjam et al[18], study conclusion established a statistically significant augment in NOSE score compared to septoplasty alone. The marked improvement in nasal blockage and congestion highlights the importance of turbinate reduction in improving nasal airflow. Inferior turbinate hypertrophy, which frequently accompanies DNS, significantly contributes to nasal obstruction. By reducing the turbinate size, septoplasty with turbinectomy decreases mucosal contact and airway resistance, explaining the observed symptomatic relief. Constant findings were reported in a study by Seden N et al., Inferior turbinate ablation combined with septoplasty does not provide any more benefit to the objective and subjective outcomes of patients than septoplasty alone.[19]

The significant reduction in trouble sleeping, with a mean difference of 0.57 and P < 0.001 further highlights the advantages of incorporating turbinectomy. Nasal obstruction is a well-established cause of sleep disturbances, including poor sleep quality and obstructive sleep apnea. The improved symptom scores in our study suggest that restoring nasal airflow through combined surgery positively influences sleep patterns, thereby enhancing overall patient well-being. Similar findings were reported by Mahmoud Elhabashy, who observed a subjective improvement in sleep quality among patients with obstructive sleep apnea and nasal obstruction following intranasal surgery. This effect was more pronounced in patients who underwent inferior turbinectomy alongside septoplasty, with a significant value of 0.003, compared to 0.005 for septoplasty alone.[20]

Though turbinectomy is an effective procedure for relieving nasal obstruction but it may cause complications including pain, bleeding, infection, crusting, nasal edema, and synechiae formation. Late complications may be more significant and include chronic nasal dryness, atrophic rhinitis, persistent crusting, hyposmia, and the development of empty nose syndrome, particularly after excessive or total turbinate removal. The findings of this study suggest that addressing both septal deviation and turbinate hypertrophy provides a more comprehensive solution for nasal obstruction. This aligns with a growing consensus in the literature encouraging for a combined surgical approach among patients with symptoms of nasal blockage due to deviated nasal septum. This study was conducted in CMH Hospital Malir only, which may limit the generalizability of its findings. Therefore, while the combined approach of inferior turbinectomy with septoplasty showed promising results, further studies involving diverse populations and clinical settings are needed to confirm its broader applicability and ensure consistent benefits across varied healthcare contexts.

CONCLUSION:

The findings of current study demonstrate the benefits of combine clinical intervention, turbinectomy with septoplasty on septoplasty alone in patients coming with the nasal obstruction and inferior to a deviated nasal septum complains. These surgical intervention suggest a superior symptomatic relief to nasal airflow impairment i.e., inferior turbinate hypertrophy and septal deviation. Despite the fact septoplasty ruins effective in straightening the nasal septum, while septal may not resolve nasal obstruction when turbinate enlargement persists. Inferior turbinectomy balances septoplasty by surgically tumbling the much of the hypertrophied turbinates, therefore expanding the nasal airway and moderating residual obstruction. Septoplasty having sustained improvement in objective nasal patency and patients subjective interpretations. Remarkably, patients who experienced the combine interventions (turbinectomy plus septoplasty) reported better statistically significant relief to symptoms including sleep disturbances. Moreover this cohesive intervention was related to better postoperative pain satisfaction and reduced the likelihood of necessity revision procedures and improvement in patient's quality of life. Also highlighted the personalized surgical planning with consider both factors septal alignment and turbinate size. Taken as a whole, integrating both procedures offers an augmentation and effective restoring optimum nasal function and long-term symptom resolve.

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Authors Contribution:
Aiman Fatima Naqvi: Idea conception, study design, data collection, analysis and interpretation, literature search, and drafting of the manuscript.
Muhammad Waqas Ayub: Analysis, interpretation, drafting of manuscript and data comparison.
Asim Abbas: Interpretation and critical revision of the manuscript.
Haider Ali: Interpretation, drafting of manuscript and data comparison.
Fizza Batool: Interpretation, and data comparison.
Bakhtawar Meraj: Interpretation, and data comparison

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