Sarcouncil journal of Medical sciences

ISSN(Online): 2945-3526

Volume- 03| Issue- 08| 2024

Research Article

Received: 20-06-2024 | Accepted: 15-07-2024 | Published: 16-08-2024

The Outcome of Using the Drilling Method in the Correction of Bony Deviation in Septoplasty

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Abstract: Nasal septal deviation is a common cause of nasal obstruction among the population. Physiological airflow models have demonstrated that 50% of the air that is inhaled travels via the nasal floor. Deviations in the maxillary crest and septal floor can hinder the overall patterns of flow. Performing surgical intervention to address these issues enhances the overall circulation and reduces the sensation of obstruction. This study aims to propose an alternative method for correcting bony spurs by utilizing electric drilling. The objective is to achieve a more precise excision with reduced intraoperative bleeding and postoperative numbness where. A study was undertaken in the Department of otorhinolaryngology - head and neck surgery at Al-Saddar Medical City, Al Najaf governorate, from January 2021 to January 2022. A total of 36 individuals underwent septoplasty. The group consisted of 21 males and 15 females, with ages ranging from 17 to 42 years. Each of them reported nasal congestion as their primary symptom. The electric drilling technique was employed to excise the deviated portion of the maxillary crest and vomeral spur, wherein the results we found the average drilling time was 7.22 minutes with a standard deviation of 1.17 minutes; the average blood loss during the procedure was 115.14 ± 9.52 milliliters. Post-operative hard palate numbness and upper incisors were present in four patients (11.1%) on the first day after the procedure, in only one patient (2.8%) after one week, and not present in any patients after one month. Conclusion: The electric drilling method offers a more precise removal of bony septal deviation, resulting in reduced bleeding during surgery and decreased numbness after the procedure. This study presents an additional viable alternative for the treatment of bony spurs. Septoplasty is a surgical procedure that involves drilling into the maxillary crest to correct septal deviation or remove a spur.

Keywords: Drilling Method, Bony Deviation, Septoplasty.

INTRODUCTION

The primary concern for otorhinolaryngology is nasal obstruction, with a septal deviation being the leading cause of this condition. The number is 30. Septoplasty is one of the most frequently performed surgery in the field of otorhinolaryngology.

The nasal septum plays a dual role, serving both functional and aesthetic purposes. The nasal septum constitutes the primary support structure of the external nose. The nasal septum divides the nose into two cavities, regulates airflow through the nasal passages, and provides support to the mucosal lining of the nasal cavities. [Beck, J. C. *et al*., 1999] The nasal septal swell body is a widened region of the anterior nasal septum located anterior to the middle turbinate at the internal nasal valve. Histological analysis of this tissue demonstrates an increased amount of venous sinusoids and a reduction in the number of glandular elements in comparison to the adjacent septal mucosa. The high proportion of venous sinusoids suggests the capacity to alter nasal airflow in a similar manner to the inferior turbinates.. [Enlow, D. H, 1990] This section refers to the most constricted area of the nasal air passage, which aids in guiding the movement of air in an upward and backward direction over the front part of the lower turbinate. The location of the structure is approximately 2 cm behind the front openings of the nose, and its size ranges from 55 to 83 square millimeters. The dimensions of the nasal valve are determined by the size of the inferior turbinate, which is an erectile tissue, and the position of the nasal septum. The nasal valve plays a substantial role in the resistance of the upper airway and generates the most turbulent flow of air. Consequently, any alteration in the dimensions of the inferior turbinate and misalignment of the septum at this level directly affects the nasal valve. The user's text is simply "(18)".

Physiological airflow models have demonstrated that 50% of inhaled air flows through the nasal floor.

The number 19. In addition to variations in the maxillary crest and septal floor, the size of the turbinates might also hinder the overall flow patterns [Kridel, R. W. H. *et al*., 2021]. By addressing each individual problem, the total flow is enhanced, and the obstructed sense is reduced. [Huizing, E. H. *et al*., 2015; Leung, R. M. *et al*., 2014]

DNS, or deviated nasal septum, can be classified into anterior dislocation, C-shaped deformity, S-shaped deformity, spur, and thickening. Clinical features include nasal obstruction, sinusitis, epistaxis, external deformities, and recurrent ear infections. The degree of obstruction varies

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DOI-https://doi.org/10.5281/zenodo.13333321

depending on the type of septum, and sinus ostia obstruction can impair ventilation. Epistaxis occurs when mucosa over the deviated septum is exposed to air currents, leading to crust formation. External deformities may also be observed alongside septal deformities. [Dalgorf, D. M] DNS increases the likelihood of developing middle ear infections. Septoplasty is a common surgical procedure in otolaryngology, focusing on reshaping, repositioning, and reconstructing to conserve cartilage. Indications for septoplasty include nasal passage obstruction, persistent or recurrent epistaxis, anatomic difficulties preventing adequate access in endoscopic sinus surgeries, providing access to the sphenoid sinus and pituitary gland in endoscopic trans-sphenoid skull base surgeries, enhancing CPAP therapy efficacy and patient compliance in patients with obstructive sleep apnea, and chronic sinusitis resulting from septal deviation. [Neskey, D. *et al*., 2018; Dhingra, P. L. *et al*., 2015]

PATIENTS AND METHODS

The study designs

This descriptive cross-sectional study was conducted in the Department of otorhinolaryngology - head and neck surgery at Al-Saddar Medical City, Al Najaf governorate, between January 2021 and January 2022.

Sampling of patients

A total of 36 cases (21 males and 15 females) within the age range of 17-42 years with septal deviation were included in this study.

All of the patients presented with nasal obstruction.

All participants were informed about the nature of the study and provided written consent.

Inclusion criteria:

The study included patients of both genders aged 17 years or older who presented with nasal obstruction due to septal deviation.

The exclusion criteria were as follows:

1. Patients with pre-existing medical comorbidities render them unfit for general anaesthesia. Patients with uncorrectable coagulopathy or those who are anticoagulated and unable to be held without anticoagulants during the perioperative period.
2 - Previous nasal surgeries.
3 - Other anatomical causes of nasal obstruction, e.g., choanal atresia, nasal valve collapse, concha bullosa.
4 - Patients who require additional nasal surgery, e.g., SRP, turbinoplasty, FESS.
5 - The patient presents with nasal polyps.

A preoperative assessment of all patients was conducted, during which a detailed history was taken. All patients presented with nasal obstruction as their primary complaint. In the context of the present illness, we inquired about the duration of the obstruction, its laterality (right, left, or bilateral), its severity, its progression (persistent or intermittent), and the presence of any factors that either exacerbate or relieve the condition. Subsequently, the patient was queried about any associated symptoms, including nasal discharge, postnasal drip, epistaxis, crusting, sore throat, snoring, headache, anosmia/hyposmia, nasal/facial pain, sneezing, and itching.

In addition, patients were queried about any medical conditions that might impact their suitability for GA, including ischemic heart disease, renal failure, liver failure, HT, and DM. Furthermore, we inquired about previous surgical procedures, particularly those involving the nose, any history of facial trauma, and the patient's smoking history.

A comprehensive examination of the nasal passages was conducted, encompassing the external nose, internal nose, and nasal septum. The nasal septum was examined for the presence of folliculitis, crusts, and caudal septal dislocation. Palpation of the nasal mucosa was conducted, and an assessment of nasal patency and airflow was performed. The postoperative assessment included an evaluation of the presence and extent of numbness, obstruction, and caudal dislocation. Complications included infection, haemorrhage, and a haematoma of the nasal septum. The assessment was conducted over a period of three months.

RESULTS:-

Table 1 shows the distribution of patients according to sociodemographic characteristics, including (age and gender). Mean age of patients was (27.67 ± 6.66) years, with older ages was (42.00) years and younger ages was (17.00) years, and the majority of patients were males (N=21, 58.3%).

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Table 1: The Distribution of patients according to sociodemographic characteristics (N=36)

Sociodemographic characteristics		
Age (years)	**(27.67 ± 6.66)**	**(17.0- 42.0)**
Gender		
Male	21	58.3%
Female	15	41.7%
Total	36	100.0%

Table 2 shows the distribution of patients according to drilling time (minutes) and amount of blood loss during operation (ml). Mean drilling time was (7.22 ± 1.17) minutes, with longer time was (10.0) minutes and shorter time was (5.0) minutes; mean blood loss during the operation was (115.14 ± 9.52) ml, with maximum blood loss was (140.0) ml and minimum blood loss was (100.0) ml.

(The amount of blood loss was calculated by subtraction the amount of saline irrigation from the total amount of blood at the suction container)

Table 2: The Distribution of patients according to operation time, drilling time, and amount of blood loss during operation (N=36)

Study variables	Mean ± SD	Range
Drilling time (minutes)	(7.22 ± 1.17)	(5.0- 10.0)
Blood loss (ml)	(115.14 ± 9.52)	(100.0- 140.0)

Table 3 shows the distribution of patients according to intra-operative complications, including (unilateral mucoperiosteal flap injury by drill and bilateral mucoperiosteal flap injury by drill). Unilateral mucoperiosteal flap injury by drill and bilateral mucoperiosteal flap injury by drill were not occur in any patient (0.0%).

Intra-operative complications	Number	%
Unilateral mucoperiosteal flap injury by drill		
Yes	0	0.0%
No	36	100.0%
Total	36	100.0%
Bilateral mucoperiosteal flap injury by drill		
Yes	0	0.0%
No	36	100.0%
Total	36	100.0%

Table 4 shows the distribution of patients according to post-operative complications, including (infection, septal hematoma, and bleeding). Post-operative infection, septal hematoma, and bleeding were not occurred in any patient after an operation.

Table 4: The Distribution of patients according to postoperative complications (N=36)

Post-operative complications	Number	%
Infection		
Yes	0	0.0%
No	36	100.0%
Total	36	100.0%
Septal hematoma		
Yes	0	0.0%
No	36	100.0%
Total	36	100.0%
Bleeding		
Yes	0	0.0%
No	36	100.0%
Total	36	100.0%

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The mean differences of VAS score for nasal obstruction (0-10) between pre-operative assessment and three periods of post-operative assessments, including (first week post-operative, one-month post-operative, and three months postoperative). There were significant differences between the means of VAS score for nasal obstruction between pre-operative assessment and three periods of post-operative assessments.

Table 5: The mean differences of VAS score between pre-operative assessment and three periods of post-operative assessments (N=36)

Study variable	Periods of assessments	N	Mean ± SD	Paired t-test	P-value
VAS score	Pre-operative	36	6.50 ± 1.52	**18.618**	**<0.001***
	First week post-operative	36	2.47 ± 1.54		
VAS score	Pre-operative	36	6.50 ± 1.52	**26.199**	**<0.001***
	One-month post-operative	36	1.03 ± 1.11		
VAS score	Pre-operative	36	6.50 ± 1.52	**23.147**	**<0.001***
	Three months post-operative	36	0.61 ± 1.13		

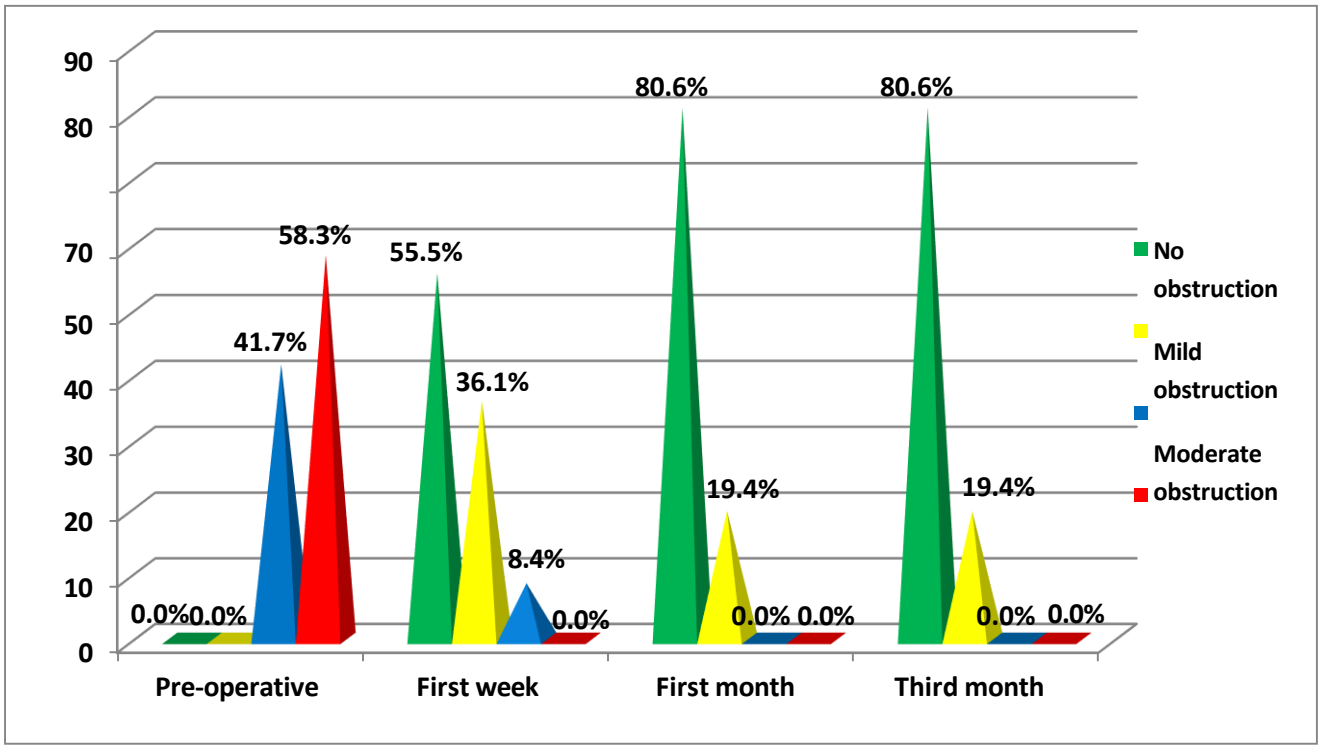

Fig 1: pre-operative and post-operative degree of nasal obstruction of the study group

DISCUSSION

Nasal obstruction is a common issue in otorhinolaryngology, with septal deviations being the most common cause. Septoplasty is a common surgery in otorhinolaryngology, and a septal deviation can occur when the septal cartilage moves off the crest or the basal crest itself, leading to nasal floor obstruction. Trauma in early childhood can cause the vomer and basal crest to shift to the side during development. Correction of this deviation requires bilateral flap elevation, using the Cottle elevator or No. 15 blade to remove the cartilaginous part and a 4-mm chisel for the bony part. The nasal spine is preserved in most cases. A study aims to provide a more controlled excision technique using electric drilling for bony spur correction, aiming to reduce intraoperative bleeding and postoperative

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numbness. The assessment of nasal obstruction is based on the visual analogue scale (VAS), which has been proven reliable and dependable in other studies.

In a study conducted by Shukla R. H. *et al*., (2019), it was demonstrated that the VAS score represents an effective framework for the evaluation of treatment responses following septoplasty.

The study cohort comprised 21 males (58.3%) and 15 females (41.7%), with a mean age of 27.67 ± 6.66 years. This male prevalence is consistent with the majority of other studies of septal surgery. For example, Kayahan, *et al*., (2016) reported a male-to-female ratio of 43:18. (51) Nevzat Demirbilek, *et al*., (2015) reported a male-to-female ratio of 44:27 (62%:38%).

Valsamidis, *et al*., (2019) reported a male-to-female ratio of 34:26 (56%:44%).

This discrepancy may be explained by the fact that males are more commonly exposed to trauma than females.

Nasal obstruction in our study, the presenting symptom of patients was nasal obstruction, which was present in all patients (100%).Rajguru, *et al*., (2017) 76% Jain L *et al* (2011) 74% Mane RS *et al* (2013) 100% Sathyaki D.C, *et al*., (2013) 100%.

These findings align with those of our study, which indicated that nasal obstruction was the primary presenting complaint of patients.

In the present study, all 36 cases exhibited a moderate to severe degree of nasal obstruction prior to surgery. Moderate obstruction was observed in 15 cases (41.7%), while severe obstruction was present in 21 cases (58.3%). At the one-week post-septoplasty mark, 20 patients (55.5%) exhibited no obstruction, (36.1%) demonstrated mild obstruction, and three cases (8.4%) exhibited a moderate degree of obstruction.

A statistically significant improvement (p-value <0.001) in nasal obstruction was observed at the first-week post-septoplasty. The underlying causes of nasal obstruction in these patients may be attributed to crustation, congestion, and edema. At the one-month and three-month follow-ups, the statistically significant improvement (p. value < 0.001) was sustained, with 80.6% of patients reporting no obstruction at the one-month mark and 80.6% at the three-month mark.

In a study conducted by Hsu, *et al*., (2016), 50 patients with septal deviation were observed. The results demonstrated a statistically significant improvement in nasal obstruction (P < 0.001) following septoplasty. Eren S B, *et al*., (2014) conducted a study involving eight participants.

The results of our study are in accordance with those of the aforementioned research.

Intraoperative findings

The mean drilling time was found to be (7.22 ± 1.17) minutes in our study.

The mean duration of drilling was reported by Abd-Elhafez, T.A. *et al*., to be (10.97 ± 1.33) minutes.

The mean blood loss in the drilling group was 115 ± 10.78 ml (46). The use of a high-speed drill and good exposure of the deviated crest or spur with the protection of the mucosal flap resulted in a reduction in intraoperative blood loss [Digman, R, 1956]. Excision of basal crest deviation by chiselling typically results in significant bleeding. This may be attributed to trauma to the incisive artery, which is situated on the superior aspect of the vomer. [Hussein, W. K. *et al*., 2015]

No patients sustained injuries to either a unilateral or bilateral mucoperiosteal flap as a result of drill use.
This can be attributed to the utilisation of a diminutive diamond burr under direct visualisation and with meticulous caution and the protection of the flap by the side of the speculum, Where the postoperative results were unremarkable. No cases exhibited evidence of bleeding, infection, haematoma, or other complications associated with the surgical procedure.

In their study, Gunaydin, *et al*., (2011) examined 100 patients who had undergone post-operative nasal packing (NP), a procedure that is comparable to ours. No instances of bleeding, septal haematoma, or infection were observed, which is consistent with the findings of our study in a similar vein. Ansari, *et al*., (2013) observed post-operative bleeding in 11.43% of patients who had undergone NP. This figure aligns with the findings of our study, which also reported no cases of haematoma. where in our study, the incidence of post-operative numbness of the hard palate and upper incisors was 11.1% on the first day, 2.8% on the first week, and 0% on the first month, and Almansoori, *et al*., (2018) reported a 2.1% incidence Abd Elhafez, T.A. *et al*., (2021)

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documented a 12.5% occurrence in the electric drilling group and Numbness of the hard palate and upper incisors may occur following septoplasty and appears to be associated with the utilisation of a chisel for the correction of maxillary crest deviation. [Choi, J. E. *et al*., 2021]

It can be posited that the low incidence of post-operative numbness following the utilization of electric drilling may be attributed to a reduction in exposure to mechanical trauma. The heat generated by drilling can be dissipated through continuous intraoperative irrigation with a normal saline solution. [Choi, J. E. *et al*., 2021]

This numbness is a consequence of trauma to the incisive nerve in the vicinity of the nasal floor. This paresthesia typically subsides shortly after septoplasty. [Choi, J. E. *et al*., 2021] This may account for the recovery of all patients during the first month following surgery, where the present study is limited in the following ways:

- The absence of objective methods for the assessment of nasal obstruction, such as acoustic rhinometry and rhinomanometry, represents a limitation of this study.
- The sample size was relatively small.

CONCLUSIONS

It can be concluded that the drilling technique is an effective and well-controlled method of excising only the deviated portion of the spur and maxillary crest, and the incidence of postoperative numbness of the hard palate and upper incisors is low.

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Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:
Al-Shammary, H.D.H. "The Outcome of Using the Drilling Method in the Correction of Bony Deviation in Septoplasty." *Sarcouncil journal of Medical sciences* 3.8 (2024): pp 1-7.

Publisher: SARC Publisher