

Frequency of Adhesion Formation after Septoplasty Using Nasal Septal Splints

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ABSTRACT

Background: Septoplasty is commonly performed to correct a deviated nasal septum and improve nasal breathing. However, postoperative adhesions (nasal synechiae) are a frequent complication that may cause recurrent nasal obstruction. Nasal septal splints are used to prevent adhesion formation, but evidence of their effectiveness in the local population is limited.

Objective: To determine the frequency of postoperative adhesion formation in patients undergoing septoplasty with nasal septal splints.

Methods: This single-arm prospective observational study conducted from 20 November 2025 to 20 February 2026 at the Department of ENT, Pak Emirates Military Hospital Rawalpindi, including 114 patients, having deviated nasal septum with nasal obstruction for more than 4 weeks. All patients underwent septoplasty under local anesthesia and bilateral nasal septal splints were placed at the end of surgery. Data were analyzed using SPSS-30. Association was assessed using Fisher exact test.

Results: Mean age of patients was 39.41 ± 12.04 years and mean body mass index (BMI) was 27.32 ± 2.84 kg/m². Majority of patients were males 80(70.2%). Among 114 patients who underwent septoplasty with nasal septal splints, postoperative adhesions were absent in 107(93.9%) patients, whereas 7(6.1%) patients developed adhesions. Postoperative adhesion formation showed a statistically significant association with gender ($p=0.024$), while no significant association was observed with age, BMI, socioeconomic status, or residential status ($p>0.05$).

Conclusion: A low frequency of postoperative adhesion formation was observed in patients undergoing septoplasty with nasal septal splints. Further comparative studies are recommended to evaluate their effectiveness against non-splint management.

Keywords: Nasal septum; Postoperative complications; Septoplasty; Surgical splints

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1. INTRODUCTION

Septoplasty is a common surgical intervention in the practice of otolaryngology that involves the correction of a deviated nasal septum (DNS) [1]. A deviated nasal septum may cause a variety of complications, including nasal obstruction, nasal patency, sinus infection, headache, and the alteration of the normal respiratory pattern [2]. In Asia, its use is increasing, driven by a high burden of DNS and contributing environmental and urbanization-related factors [3]. In Pakistan, septoplasty is also frequently performed, with a reported series of 174 patients showing a predominance of young males (mean age 27.5 years; 62.1% male), reflecting regional demographic patterns in surgical practice [4]. The aim of septoplasty is to correct the deviated nasal septum through the removal and modification of the deviated cartilaginous and bony structures in the nasal septum to allow the nasal passages to be more open and symmetrical [5].

Although the intervention is safe and effective, like all surgical interventions, septoplasty may be associated with complications. The complications reported in the medical literature include nasal bleeding, infection, septal hematoma, septal perforation, and the development of adhesions between the nasal septum and the lateral nasal wall [6].

Adhesion formation after septoplasty is one of the most common postoperative complications, also referred to as nasal synechiae [7]. It is characterized by the formation of adhesions as a result of contact between the exposed surfaces of the nasal septum and the lateral nasal wall during the healing process. It is one of the major complications that result in partial or total obstruction of the nasal passage. It leads to nasal obstruction, crusting, discomfort, and infection. Adhesion formation is said to occur in the early postoperative period, coinciding with mucosal damage and inflammation. The incidence of adhesion formation after septoplasty is variable [8].

Nasal septal splints are commonly used by medical professionals to prevent the formation of adhesions during septoplasty. These splints are thin, flexible plates, normally made from materials such as silicone, and are fixed bilaterally to the septum at the end of the surgical procedure [9]. The main function of septal splints is to ensure that the mucosal surfaces are not in contact with each other during the healing period, thus avoiding the formation of adhesions between the septum and the lateral nasal wall [10]. In addition, the septal splints play a crucial role in the stabilization of the septum, reduction of hemorrhage, and proper healing of the mucosal tissues [11]. They are normally fixed with stitches and removed after some days, depending on the surgeon's preference and the healing rate of the patient.

A study conducted by Kakar A et al. reported that 95% of patients undergoing septoplasty with nasal septal splints remained free from postoperative adhesions [12]. Septoplasty is a routine surgical procedure, and postoperative adhesions may adversely affect surgical outcomes by causing recurrent nasal obstruction and patient discomfort. Nasal septal splints are commonly used during septoplasty to minimize mucosal contact during healing. However, reported rates of postoperative adhesion formation among patients managed with nasal septal splints vary across studies. Limited local data are available regarding postoperative adhesion formation following septoplasty with nasal septal splints in the Rawalpindi population. Therefore, this study was conducted to determine the frequency of postoperative adhesion formation in patients undergoing septoplasty with nasal septal splints. In a study by Kakar A, et al. has shown that frequency of non-adhesion nasal septal splints after septoplasty was 95% [12].

Septoplasty is a routine surgical intervention, and adhesions may interfere with the success and outcome of the surgery and cause nasal obstruction. Nasal septal splints are commonly used to prevent adhesions, and their efficacy may differ in various studies. However, the effectiveness of nasal septal splints in the Rawalpindi population is lacking. Therefore, this study was conducted to determine the frequency of postoperative adhesion formation in patients undergoing septoplasty with nasal septal splints.

2. METHODOLOGY

A single-arm prospective observational study was carried out in the ENT Department of Pak Emirates Military Hospital Rawalpindi from 20th November 2025 to 20th February 2026. Ethical permission was taken from the institutional ethical review board of the hospital before starting the research work with reference number A/28/ 134.25 Dated: 30-10-25. Total sample size was 114 patients. The number of participants were estimated by using WHO sample size calculator while taking confidence interval 95%, margin of error 4% and anticipated frequency of non-adhesion nasal septal splints after septoplasty as 95% [12].

The inclusion criteria were patients of either gender, age between 18 to 60 years. Patients having deviated nasal septum and presenting with nasal obstruction either unilateral or bilateral for more than 4 weeks and planned for septoplasty were enrolled. Deviated nasal septum was considered when deviation of septum was ≥ 4 mm away from midline confirmed on nasal endoscopy [13]. Patients were excluded if there was history of previous nasal surgery or revision septoplasty, nasal polyps, turbinate hypertrophy, chronic rhinosinusitis, active nasal infection, use of anticoagulant therapy, immunosuppression or nasal trauma during last 6 months.

After explaining study procedure, written informed consent was taken from all participants. Confidentiality of patient information was maintained and participation was voluntary without any risk to patient. Basic demographic details including age, BMI, gender, socioeconomic status and residential status were documented at time of enrollment.

All patients underwent detailed clinical assessment including relevant history and ENT examination. Nasal endoscopy was performed for confirmation of septal deviation before surgery. Patients fulfilling eligibility criteria were scheduled for septoplasty procedure. The procedure was performed under local anesthesia. After appropriate positioning and aseptic measures, infiltration of 1% lignocaine with adrenaline (1:100,000) was given along the nasal septum to reduce

bleeding. A hemitransfixion incision was created at the caudal part of septum and sub-mucoperichondrial flaps were elevated on both sides. The deviated cartilaginous and bony components of septum were identified and either excised or repositioned in order to obtain straight septal alignment. During correction, at least 1 cm dorsal and caudal strut was preserved to maintain support of nasal framework. Hemostasis was achieved with bipolar cautery when required. After completion of septal correction, bilateral nasal septal splints composed of medical-grade silicone were inserted to avoid mucosal contact and reduce risk of adhesion formation. These splints contained airway tubes and were fixed using 3-0 prolene trans-septal suture. Routine nasal packing was not applied unless needed. Patients were observed for few hours after surgery and later discharged with advice of regular follow-up. The splints were removed on the 7th postoperative day. The patients were re-assessed at six weeks post-surgery, and nasal endoscopy was carried out to assess the formation of adhesions. Adhesions were defined as the formation of whitish or pinkish fibrous strands or tissue bridges, which are visible between the nasal septum and turbinates during nasal endoscopy. All procedures were performed by a single experienced ENT surgeon using a standardized surgical technique, having experience more than 5 years. The primary postoperative outcome was the presence or absence of nasal adhesions on endoscopic examination at six weeks follow-up. All patients included in the study has completed follow-up, and no patients were lost to follow-up or had missing outcome data during the six-week postoperative assessment period.

Collected data were analyzed using SPSS version 30. Qualitative variables including gender, socioeconomic status, residential status and efficacy were summarized as frequencies and percentages. Quantitative variables including age and BMI were presented as mean $\pm$ standard deviation or median (IQR), after checking normality through Shapiro Wilk test. Postoperative adhesions frequency was further stratified with respect to age, BMI, gender, socioeconomic status and residential status. Post-stratification comparison was performed using Fisher exact test (as cell count <5) and p-value ≤ 0.05 was considered statistically significant.

3. RESULTS

The study included total 114 patients. The mean age of the patients was 39.41 ± 12.04 years and mean BMI was 27.32 ± 2.84 kg/m² was recorded. Majority of the patients were male 80 (70.2%). In terms of socioeconomic status, most patients belong to low socioeconomic class 55 (48.2%), followed by middle 39 (34.2%) and high 20 (17.5%). Regarding residential status, 64 (56.1%) patients were from rural areas and 50 (43.9%) were from urban areas (Table-1).

Table- 1: Patient Demographics (n=114)

Demographics	Mean $\pm$ SD
Age (years)	39.41 $\pm$ 12.04
BMI (kg/m ²)	27.32 $\pm$ 2.84
Gender	
Male n (%)	80 (70.2%)
Female n (%)	34 (29.8%)
Socioeconomic Status	
Low n (%)	55 (48.2%)
Middle n (%)	39 (34.2%)
High n (%)	20 (17.5%)
Residential Status	
Rural n (%)	64 (56.1%)
Urban n (%)	50 (43.9%)

Among the 114 patients who underwent septoplasty with nasal septal splints, postoperative adhesions were absent in 107 (93.9%; 95% CI: 89.4%–98.3%) patients, whereas 7 (6.1%; 95% CI: 1.7%–10.6%) patients developed postoperative adhesions.

Table 2: Frequency of Postoperative Adhesion Formation After Septoplasty using Nasal Septal Splints (n=114)

Postoperative Adhesion Formation	n (%)	95% CI
Absent	107 (93.9%)	89.4%–98.3%
Present	7 (6.1%)	1.7%–10.6%

Postoperative adhesion formation was not significantly associated with age, BMI, socioeconomic status, or residential status ($p > 0.05$). However, gender showed a significant association ($p = 0.024$), with females having a higher frequency of adhesions (14.7%) compared to males (2.5%) (Table-3). A statistically significant association between gender and

postoperative adhesion formation was observed; however, this finding should be interpreted cautiously because of the small number of adhesion events.

Table- 3: Association of Adhesion Formation After Septoplasty using Nasal Septal Splints with Demographic Factors

Demographic Factors	Subgroup	adhesion formation		p-value
		Absent n(%)	Present n(%)	
Age (years)	≤40	58 (93.5%)	4 (6.5%)	1.000
	>40	49 (94.2%)	3 (5.8%)	
Gender	Male	78 (97.5%)	2 (2.5%)	0.024*
	Female	29 (85.3%)	5 (14.7%)	
BMI (kg/m ²)	≤25	28 (90.3%)	3 (9.7%)	0.388
	>25	79 (95.2%)	4 (4.8%)	
Socioeconomic Status	Low	50 (90.9%)	5 (9.1%)	0.151
	Middle	39 (100.0%)	0 (0.0%)	
	High	18 (90.0%)	2 (10.0%)	
Residential Status	Rural	58 (90.6%)	6 (9.4%)	0.133
	Urban	49 (98.0%)	1 (2.0%)	

Fisher Exact Test was used to calculate p value. *P-value<0.05 is significant

4. DISCUSSION

In the current study, there were no postoperative adhesions in 107 (93.9%) of the patients who underwent septoplasty with nasal septal splints, and 7 (6.1%) patients developed adhesions. This is a low incidence of postoperative adhesion formation in patients treated with nasal septal splints. No comparison group was used in the current study design, so it is not possible to draw any definite conclusions about the effectiveness of using nasal septal splints to reduce mucosal contact during healing.

The incidence of postoperative adhesion in the current study was low, which is similar to the results of previous studies. Ghouri et al. [14] reported adhesion-free results in 96.66% of the patients treated with septal splints and Asif et al. [15] found 96.7% of patients in the splint group to be free of adhesion after septoplasty. In the same way, Zaman et al. [16] reported no adhesion formation in patients with septal splints and Asif et al. [15] found that 96.58% of patients treated with silastic splints were free of adhesion formation. Together these results indicate that it is a common finding that few patients who undergo septoplasty with nasal septal splints will have low postoperative adherence.

But not all studies have been consistent in their results. In the splinted group, Saeed et al. [17] reported 91% adhesion-free rate which was not statistically significant. Mazumder et al. [18] noted that 4% of patients who had been splinted experienced the development of synechiae and noted postoperative discomfort with splint use (such as pain, nasal obstruction and vestibulitis). Meticulous postoperative care and nasal toileting may also play a role in adhesion outcomes, as Amer et al. [19] did not find a statistically significant difference between splint and non-splint groups ($p=0.734$). The differences in the results among the studies might be due to variations in surgical technique, splint materials, splinting duration, postoperative management, study sample size, and study designs.

There was a statistically significant difference between postoperative adhesion formation by gender, with the females having more adhesions than the males (14.7% vs 2.5%, $p=0.024$). This finding should be viewed with some caution, however, due to the low number of adhesion events overall ($n = 7$), making subgroup comparisons somewhat unstable and unrepresentative. Hussain et al. [20] also found no significant gender associations and considered the association between gender and adhesion formation. In the present study, no statistically significant association was found between postoperative adhesion formation and age, BMI, socioeconomic status or residential status. Previous studies have yielded similar results. [21]

There are a number of limitations to be noted for the present study. The first is that the study was done at one center, so the results might not be representative of other centers. Second, there is no comparison group to compare the effectiveness of nasal septal splints in the prevention of adhesion. Third, the total number of adhesion events was modest, which could have impacted the validity of subgroup analysis. Moreover, the length of follow-up was only 6 weeks, and thus might not accurately represent long-term postoperative results. Further multicenter comparative studies with larger cohorts, longer follow-up period, and uniform postoperative follow-up protocols are suggested to assess the utility of nasal septal splints after septoplasty.

5. CONCLUSION

A low frequency of postoperative adhesion formation was observed among patients undergoing septoplasty with nasal septal splints. No significant associations were observed between postoperative adhesion formation and age, BMI, socioeconomic status, or residential status. Although a statistically significant association with gender was identified, this finding should be interpreted cautiously because of the small number of adhesion events. Further comparative studies including non-splint groups are recommended to better assess postoperative outcomes associated with nasal septal splint use after septoplasty.

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Conflict of Interest: *Authors declare that there is no competing interest related to this research*

REFERENCES

- [1] Alghanem B, Almotairi N, Alrasheedi A. Septoplasty and nasal packs from otolaryngologists' perspectives: a cross-sectional survey. *Cureus*. 2024;16(2):e54691. doi:10.7759/cureus.54691.
- [2] Malpani SN, Deshmukh P. Deviated nasal septum a risk factor for the occurrence of chronic rhinosinusitis. *Cureus*. 2022;14(10):e30261. doi:10.7759/cureus.30261.
- [3] Kudas Z, Górka M, Stec W, Wojtkiewicz A, Piekarska M, Szerej K. The comprehensive review of deviated septum: anatomy, diagnosis, and treatment approaches. *Qual Sport*. 2025;37:57018. doi:10.12775/QS.2025.37.57018.
- [4] Yaqoob N, Yousaf S, Lakhari AA, Ali A, Kumar A, Khan F. Septoplasty in focus: clinical outcomes and complication patterns in a Pakistani cohort. *Pak J Health Sci*. 2025;6(7):263-7. doi:10.54393/pjhs.v6i7.3343.
- [5] Wu Y, Yu T, Zhang Z, Wang X, Gao S. The benefits of septoplasty for patients with deviated nasal septum and allergic rhinitis: a meta-analysis. *Sci Rep*. 2024;14(1):28855. doi:10.1038/s41598-024-80377-3.
- [6] Stępiński MJ, Banaszewski J. Intranasal synechiae as complications of rhinosurgical treatment: a review of current knowledge. *J Clin Med*. 2023;12(21):6831. doi:10.3390/jcm12216831.
- [7] Stępiński MJ, Banaszewski J. Risk factors leading to the formation of intranasal synechiae (adhesions) in patients who underwent septo- and septoturbinateplasty: a retrospective cohort study. *Ann Med Surg (Lond)*. 2025;87(6):3082-96. doi:10.1097/MS9.0000000000003223.
- [8] Besharah BO, Alharbi HA, Abu Suliman OA, Althobaiti HK, Mogharbel AM, Muathen SH. Endoscopic septoplasty versus conventional septoplasty for nasal septum deviation: a systematic review and meta-analysis of randomized clinical trials. *Ann Med Surg (Lond)*. 2023;85(8):4015-25. doi:10.1097/MS9.0000000000000984.
- [9] Siag A, Sionov RV, Gati I, Friedman M, Steinberg D, Gross M. Coating Doyle nasal silicone splints with a sustained release varnish containing antibiotics provides long-term protection from *Staphylococcus aureus*: an in vitro study. *Pharmaceuticals (Basel)*. 2025;18(11):1746. doi:10.3390/ph18111746.
- [10] Ivanova PP, Iliev G. Nasal packing in septal surgery: a narrative review. *Cureus*. 2023;15(3):e36488. doi:10.7759/cureus.36488.
- [11] Alhejaily MA, Alhejaily AA, Alosaimi AG, Bogari A, Aldosari B. Comparing nasal splints and quilting sutures in septoplasty: a systematic review and meta-analysis. *Indian J Otolaryngol Head Neck Surg*. 2025;77(2):1196-207. doi:10.1007/s12070-024-05310-6.
- [12] Kakar A, Ullah H, Ahmad B. Effectiveness of intranasal splints in preventing nasal adhesion. *Pak J Med Health Sci*. 2021;15(9):2512-4. doi:10.53350/pjmhs211592512.
- [13] Alghamdi FS, Albogami D, Alsurayhi AS, Alshibely AY, Alkaabi TH, Alqurashi LM, et al. Nasal septal deviation: a comprehensive narrative review. *Cureus*. 2022;14(11):e31317. doi:10.7759/cureus.31317.
- [14] Ghouri SM, Chaudry A, Shafi A, Nadeem M. Prevention of intra nasal adhesions by using intranasal splints after septoplasty. *Pak J Med Health Sci*. 2018;12(1):286-8.
- [15] Asif A, Ahmed A, Rafique U, Azam K, Malik NK, Manzoor M. Role of nasal splints in prevention of nasal adhesions following septal surgery at CMH Lahore: a comparative cross-sectional study. *Life Sci*. 2024;5(3):391-6. doi:10.37185/LnS.1.1.491.
- [16] Zaman H, Jan MU, Shah SM, Rastbaz S, Ali M. Comparison of outcome of septoplasty with and without intranasal splintage in patients admitted to a tertiary care hospital, Peshawar. *Ann PIMS Shaheed Zulfiqar Ali Bhutto Med Univ*. 2024;20(Suppl-1):437-43. doi:10.48036/apims.v20iSUPPL-1.1192.
- [17] Saeed I, Ahmad M, Mahmood K. A comparative study of intra nasal splints and repeated nasal toilet for the prevention of nasal adhesions in nasal surgery. *J Fatima Jinnah Med Coll*. 2012;6(3):46-50.
- [18] Mazumder JA, Mustafa MG, Delwar AHM, Rashid S, Rahaman MM, Ahmed S. Intranasal splint in nasal septal surgery: is it necessary? *Med Today*. 2020;32(2):126-9. doi:10.3329/medtoday.v32i2.48835.
- [19] Amer TR, Tomoum MO, Askar MH, Saafan ME. Using intranasal splints after septoplasty operations: a prospective cohort study. *Tanta Med J*. 2020;48(4):175-9. doi:10.4103/tmj.tmj_18_21.

- [20] Hussain SS, Ali SM, Hussain A, Khan MA, Khan KM, Shahzad J. Role of nasal splints in preventing adhesion formation in post-operative septoplasty patients. *Pak J Med Health Sci.* 2020;14(2):617-8.
- [21] Enam A, Zia S, Khyani IA, Khan N, Arshad I, Siddiqui TZ. Is splint really necessary in nasal surgeries? A randomized control trial. *Rawal Med J.* 2024;49(2):1-4. <https://www.rmj.org.pk/?mno=143280> [Access: October 29, 2025].