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ORIGINAL RESEARCH ARTICLE

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TO COMPARE THE EFFICIENCY OF ENDOSCOPIC VS CONVENTIONAL OR OPEN SEPTOPLASTY CONCERNING TYPE AND EXTENT OF DEVIATED NASAL SEPTUM IN PATIENTS VISITING OPD OF ENT DEPARTMENT

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ABSTRACT

BACKGROUND

Deviated nasal septum (DNS) is a prevalent cause of nasal obstruction and related complications such as sinusitis, epistaxis, and obstructive sleep apnoea. Septoplasty remains the primary surgical intervention, with endoscopic techniques gaining popularity due to enhanced precision and visualization.

INTRODUCTION

Conventional and open septoplasty techniques have traditionally been used to correct DNS, but both are associated with limitations including suboptimal visualization and higher complication rates. Endoscopic septoplasty, introduced in the 1990s, offers a minimally invasive alternative with improved outcomes. This study compares the outcomes of endoscopic, open, and conventional septoplasty.

METHODOLOGY

A prospective observational study was conducted on 75 patients (17–60 years) with moderate to gross DNS at Hind Institute of Medical Sciences, Barabanki. Patients were consecutively enrolled and equally divided into three groups: Endoscopic (Group A), Open (Group B), and Conventional (Group C) septoplasty. Surgical outcomes, symptom resolution, and postoperative complications were compared.

RESULTS

The mean operative time was significantly shorter in the Endoscopic group (32.16 ± 7.13 min) than in the Conventional (47.40 ± 8.38 min) and Open (55.84 ± 11.07 min) groups ($p < 0.001$). Symptom resolution was highest in the Endoscopic group for nasal obstruction (90.91%), headache (92.31%), postnasal drip (100%), hyposmia (91.67%), and epistaxis (80.00%). Fewer complications such as bleeding (12.00%), synechiae (4.00%), and mucosal tears (4.00%) were observed in this group. No septal perforations occurred in any group. Endoscopic septoplasty is safer and more effective for moderate to severe DNS, but open septoplasty remains the choice for complex deformities.

CONCLUSION

Endoscopic septoplasty demonstrated superior outcomes compared to open and conventional techniques, offering reduced operative time, fewer complications, and better symptom resolution. It is a safer and more effective surgical approach for treating nasal obstruction due to DNS.

Review Process: Double blind Peer Reviewed by Reviewer Board Members

KEYWORDS

Deviated nasal septum, endoscopic septoplasty, conventional septoplasty, nasal obstruction, surgical outcomes, complication rate.

INTRODUCTION

Nasal obstruction caused by a deviated nasal septum (DNS) is a common clinical concern in otolaryngology. It significantly impairs patients' quality of life by causing breathing difficulties, nasal congestion, snoring, and in severe cases, conditions like sinusitis, epistaxis, obstructive sleep apnoea (OSA), and contact point headaches. DNS affects approximately 22% of newborns and up to 90% of adults [1,2]. While trauma is a frequent cause, it can also result from birth injuries or asymmetric cartilage growth during early childhood [3]. In many cases, particularly those involving severe deviation, surgical correction becomes necessary. Historically, submucous resection (SMR) was the standard approach, but its invasive nature often led to complications such as excessive tissue removal and structural destabilization. This led to the adoption of conventional septoplasty (CS), which offered a more conservative technique with fewer complications. However, CS has limitations including inadequate visualization, difficulty addressing posterior deviations, and a higher risk of residual deformities [4,5]. To overcome these issues, endoscopic septoplasty (ES) was introduced by Lanza et al. in the early 1990s [6]. By using rigid endoscopes, ES allows improved anatomical visualization and precise correction with minimal tissue damage. Studies have shown ES to offer better symptom relief, faster recovery, and lower complication rates compared to CS, especially in cases with localized septal spurs or limited deviations [7-9]. Additionally, tools such as the NOSE scale have validated its effectiveness in improving nasal airflow and reducing obstruction-related symptoms [10]. Despite its advantages, ES requires advanced surgical skills, costly equipment, and may not be suitable for all cases—particularly extensive or complex deviations [11,12]. As such, treatment choice must consider patient-specific anatomy, type and extent of deviation, and available surgical expertise [13]. Within this context, the present study aims to assess the outcomes and complications associated with endoscopic septoplasty compared to conventional or open septoplasty, with specific reference to the variation in type and extent of DNS.

MATERIAL AND METHODS

This comparative analytical study was conducted over 18 months in the Department of Otorhinolaryngology at Hind Institute of Medical Sciences, Barabanki. A total of 75 patients aged 17 to 60 years presenting with nasal obstruction due to deviated nasal septum (DNS) were included. Participants were selected consecutively from the ENT outpatient department after applying defined inclusion and exclusion criteria. Ethical clearance was obtained from the Institutional Ethics Committee prior to the study, and written informed consent was obtained from all participants. Inclusion criteria involved patients of either sex, aged 17 to 60 years, with moderate to gross DNS and no nasal polyps or other nasal/nasopharyngeal pathology except inferior turbinate hypertrophy. Exclusion criteria included patients younger than 17 or older than 60 years, those with nasal polyps, tumors, or other pathology, individuals unfit for general anesthesia due to systemic illness (e.g., uncontrolled diabetes, hypertension, renal disease, or bleeding disorders), and those with previous septal surgeries. Participants were equally divided into three groups of 25 each: Group A (Endoscopic Septoplasty), Group B (Open Septoplasty), and Group C (Conventional Septoplasty), and a prospective observational approach was followed to compare surgical outcomes. All procedures were performed under local anesthesia using 1% lignocaine with adrenaline (1:100,000). Incision type varied based on deformity: Killian's incision for standard deviations, transfixion or hemitransfixion

(Freer's) for caudal dislocations, and septocolumellar incision when necessary. A mucoperichondrial or mucoperiosteal flap was elevated on one side, followed by the opposite side after separating the septal cartilage from the vomer and perpendicular plate of the ethmoid. The maxillary crest was excised, and bony irregularities were corrected. Cartilage deformities were managed using scoring, cross-hatching, morselizing, shaving, or wedge excision. Additional steps included nasal spine realignment, separation from upper lateral cartilages, and cartilage grafting if required. Mucoperichondrial flaps were approximated with trans-septal sutures, and nasal packing was placed postoperatively to support healing and reduce complications.

Statistical Analysis:

Statistical analysis was performed using SPSS version 26.0, with significance set at $p < 0.05$. Continuous variables were expressed as mean ± standard deviation and analyzed using Student's t-test and ANOVA, followed by post-hoc tests where applicable. Categorical variables were presented as frequencies and compared using the Chi-square test.

RESULTS

This prospective observational study included 75 patients at HIMS, Barabanki, divided equally into three groups undergoing endoscopic, open, or conventional septoplasty. [Figure-1] The mean age in the Endoscopic Group was 36.04 ± 15.51 years, 40.12 ± 12.12 years in the Open Group, and 42.60 ± 16.26 years in the Conventional Group. [Figure-2] Males formed the majority in all three groups, comprising 72.00% in the Endoscopic, 68.00% in the Open, and 68.00% in the Conventional group. There was no statistically significant difference in anthropometric measurements across the groups. [Table-1] Nasal obstruction was the most frequently reported symptom, seen in 88.00% of the Endoscopic group, 96.00% of the Open group, and 84.00% of the Conventional group. Other common symptoms included headache (52.00%, 48.00%, and 40.00% respectively), postnasal drip (44.00%, 56.00%, 52.00%), hyposmia (48.00%, 40.00%, 48.00%), and epistaxis (20.00%, 24.00%, 24.00%). None of these differences in symptom distribution were statistically significant ($p > 0.05$). [Table-2] The mean duration of surgery was shortest in the Endoscopic group (32.16 ± 7.13 minutes), followed by the Conventional (47.40 ± 8.38 minutes) and Open groups (55.84 ± 11.07 minutes), with a statistically significant difference ($t = 44.345$, $p < 0.001$). [Figure-3] Post-hoc analysis showed that the Endoscopic group had a significantly shorter operative time than both the Conventional (mean difference: -15.24, $p < 0.001$) and Open groups (mean difference: -23.68, $p < 0.001$), while the Conventional group was also significantly quicker than the Open group (mean difference: -8.44, $p = 0.004$). [Table-3] Post-operative symptom resolution was highest in the Endoscopic group. Nasal obstruction improved in 90.91% of its patients, compared to 70.83% in the Conventional and 66.67% in the Open group. Headache resolved in 92.31%, 70.00%, and 66.67%, respectively. Postnasal drip resolved completely (100.00%) in the Endoscopic group, and in 61.54% and 64.29% of the Open and Conventional groups. Hyposmia resolved in 91.67% (Endoscopic), 66.67% (Open), and 70.00% (Conventional), while epistaxis improved in 80.00%, 66.67%, and 66.67%, respectively. [Table-4] Postoperative complications were least common in the Endoscopic group. Bleeding occurred in 12.00%, compared to 24.00% and 20.00%. Synechiae formed in 4.00%, 8.00%, and 8.00%, while mucosal tears were reported in 4.00%, 16.00%, and 12.00%, respectively. No septal perforations were observed in any group. [Table-5] Endoscopic septoplasty is more efficient and safer than conventional and open methods for managing DNS, especially in moderate to severe cases. It results in shorter surgical times, fewer complications, and better symptom relief, making it the preferred approach in appropriate clinical studies, but in cases of severe septal

deformity, Open septoplasty remains treatment of choice which cannot be addressed by Endoscopic or Conventional Septoplasty.

DISCUSSION

In our study, the mean age was 36.04 ± 15.51 years in the Endoscopic Group, 40.12 ± 12.12 years in the Open Group, and 42.60 ± 16.26 years in the Conventional Group. The difference was not statistically significant ($F = 1.262$, $p = 0.289$), indicating minimal age-related bias. These findings align with Gopi M et al. [14], Mandal and Jana [15], and Darji [11] who reported similar age distributions across surgical groups. In our study, males predominated across all groups: 72.00% in the Endoscopic, and 68.00% each in the Open and Conventional groups. The Chi-square test ($\chi^2 = 0.13$, $p = 0.939$) showed no significant difference in gender distribution. Similar male predominance was reported by Gopi M et al. [14], Mandal and Jana [15], and Darji [11], with ratios of 2.75:1 and 4:1 in the latter. In our study, the mean weight was 58.64 ± 4.86 kg (Endoscopic), 61.52 ± 7.97 kg (Open), and 61.60 ± 7.96 kg (Conventional). The mean height was 164.16 cm, 164.24 cm, and 164.68 cm, respectively, while BMI values were 21.79 ± 1.96 kg/m^2, 22.82 ± 2.96 kg/m^2, and 22.68 ± 2.48 kg/m^2. ANOVA showed no significant differences in weight ($p = 0.289$), height ($p = 0.249$), or BMI ($p = 0.931$). Similar findings were reported by Gopi M et al. [14] and others [11,15]. In our study, nasal obstruction was the most common symptom—88.0% in the Endoscopic, 96.0% in the Open, and 84.0% in the Conventional group. Headache was reported by 52.0%, 48.0%, and 40.0%; postnasal drip by 44.0%, 56.0%, and 52.0%; hyposmia by 48.0%, 40.0%, and 48.0%; and epistaxis by 20.0%, 24.0%, and 24.0%, respectively. Chi-square analysis revealed no significant difference in symptom distribution ($p > 0.05$). Gopi M et al. [14] reported 100% nasal obstruction at baseline. Mandal and Jana [15] found nasal obstruction in 91.66%, headache in 55%, postnasal drip in 50%, and hyposmia in 48.33% of their patients. Darji [11] reported nasal obstruction in 93%, further supporting the commonality of these symptoms. In our study, the mean duration of surgery was significantly shorter in the Endoscopic group (32.16 ± 7.13 minutes) than in the Conventional (47.40 ± 8.38 minutes) and Open groups (55.84 ± 11.07 minutes) ($t=44.345$, $p<0.001$). Mandal and Jana [15] reported 24.9 ± 4.467 minutes for endoscopic and 32.03 ± 5.968 minutes for conventional septoplasty. Darji [11] observed 38.7 ± 4.77 minutes for endoscopic and 36.35 ± 5.33 minutes for conventional ($p=0.02$). Gopi M et al. [14], however, found longer times: 86.4 minutes for endoscopic and 80.4 minutes for conventional. Paradis and Rotenberg [16] reported 24 ± 7.8 minutes for endoscopic and 52 ± 12.5 minutes for conventional ($p<0.001$), supporting our findings. In our study, nasal obstruction resolved in 90.91% of the Endoscopic group, 70.83% of the Conventional group, and 66.67% of the Open group. Gopi M et al. [14] reported 92% resolution with endoscopic and 72% with conventional septoplasty. Mandal and Jana [15] found 92.3% resolution with endoscopic versus 62.1% with conventional techniques. Darji [11] also reported a 93% resolution rate with endoscopic surgery. These findings highlight the superior efficacy of endoscopic septoplasty. In our study, headache resolution was 92.31% in the Endoscopic group, 70% in the Conventional group, and 66.67% in the Open group. Mandal and Jana [15] reported 81.3% resolution with endoscopic and 52.9% with conventional septoplasty. Darji [11] and Tukaram K [4] also noted significant headache improvement post-endoscopic surgery due to precise anatomical correction [11,14,15]. Postnasal drip resolved completely (100%) in the Endoscopic group, compared to 64.29% in the Conventional and 61.54% in the Open group. Darji [11] reported similar high resolution with endoscopic techniques, while Gopi M et al. [14] highlighted their effectiveness in treating posterior nasal abnormalities. In our study, hyposmia resolved in 91.67% of the Endoscopic

group, 70% of the Conventional group, and 66.67% of the Open group. Mandal and Jana [15] similarly reported 87.5% resolution with endoscopic versus 61.5% with conventional techniques. Bothra and Mathur [7] linked improved airflow and reduced mucosal trauma to better olfactory recovery. In our study, epistaxis resolved in 80% of the Endoscopic group, compared to 66.67% in both the Conventional and Open groups. Gopi M et al. [14] reported lower postoperative epistaxis in the endoscopic group (4%) than in the conventional group (8%, p=0.04). Mandal and Jana [15] found higher resolution with endoscopic (75%) than conventional techniques (63.6%). In our study, postoperative bleeding occurred in 12% of the Endoscopic group, 24% of the Open group, and 20% of the Conventional group (p=0.541). Gopi M et al. [14] reported significantly lower bleeding in the endoscopic group (4%) than in the conventional group (8%). Paradis and Rotenberg [16] also observed reduced bleeding with endoscopic techniques due to improved visualization and precision. In our study, synechiae occurred in 4% of the Endoscopic group, and 8% in both Open and Conventional groups (p = 0.807). Mandal and Jana [15] reported synechiae in 10% of endoscopic versus 36.7% of conventional cases. Darji [11] also observed fewer synechiae with endoscopic methods due to better mucosal preservation. In our study, mucosal tears were seen in 4% of the Endoscopic group, 16% in the Open group, and 12% in the Conventional group (p = 0.376). Darji [11] also reported fewer mucosal tears with endoscopic techniques, while Paradis and Rotenberg [16] highlighted reduced mucosal injury due to better precision. In our study, no septal perforations occurred in any group. This aligns with Mandal and Jana [15] and Paradis and Rotenberg [16], who also reported no cases in endoscopic groups, citing better septal integrity. Gopi M et al. [14] found fewer perforations with endoscopic techniques, reinforcing their safety.

CONCLUSION

This prospective observational study found that endoscopic septoplasty offers clear advantages over open and conventional techniques, including shorter operative time, fewer complications, and higher rates of symptom resolution. While all methods were effective, the endoscopic approach provided superior surgical precision and recovery outcomes, making it a preferable choice for managing nasal obstruction. The study's limitations include a small sample size, single-center design, short follow-up period, and reliance on subjective symptom assessment without objective measurements. Surgeon expertise also influenced outcomes. Future multicenter studies with larger cohorts, longer follow-up, and objective tools like rhinomanometry are recommended to validate these findings and guide optimal surgical technique selection.

Conflict of Interest: The authors affirm that there are no conflicts of interest related to this study.

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Consent: Written informed consent was obtained from all participants in accordance with institutional and international ethical guidelines.

Ethical Approval: Ethical clearance was granted by the appropriate Institutional Ethics Committee, and documentation has been duly maintained by the authors.

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TABLES AND FIGURES

TABLE-1: Demographic profile of enrolled patients among the three groups.

Demographics		Endoscopic Group		Open Group		Conventional Group		p-Value
		n/ Mean	%/ SD	n/ Mean	%/ SD	n/ Mean	%/ SD	
Gender	Male	18	72.00	17	68.00	17	68.00	0.13; p=0.939
	Female	7	28.00	8	32.00	8	32.00	
Anthropometrics	Weight (kg)	58.64	4.86	61.52	7.97	61.60	7.96	F=1.262; p=0.289
	Height (cm)	164.16	5.24	164.24	4.17	164.68	6.06	F=1.417; p= 0.249
	BMI (kg/m^2)	21.79	1.96	22.82	2.96	22.68	2.48	F=0.072; p= 0.931

TABLE-2: Distribution of pre-operative symptoms among the three groups.

Symptoms	Endoscopic Group		Open Group		Conventional Group		Chi Sq.	p-Value
	n	%	n	%	n	%		
Nasal Obstruction	22	88.00	24	96.00	21	84.00	1.96	0.376
Headache	13	52.00	12	48.00	10	40.00	0.75	0.687
Postnasal Drip	11	44.00	14	56.00	13	52.00	0.75	0.688
Hyposmia	12	48.00	10	40.00	12	48.00	0.43	0.806
Epistaxis	5	20.00	6	24.00	6	24.00	0.15	0.927

TABLE-3: Post-hoc test for Duration of surgery (minute).

		Mean Difference	p-Value
Endoscopic Group	**Open Group**	-23.68	<0.001
	Conventional Group	-15.24	<0.001
Open Group	**Conventional Group**	8.44	0.004

TABLE-4: Comparison of pre-operative and post-operative symptom resolution across the groups.

Symptoms	Endoscopic Group			Open Group			Conventional Group		
	Pre-Operative (n)	Post-Operative (n)	Resolution (%)	Pre-Operative (n)	Post-Operative (n)	Resolution (%)	Pre-Operative (n)	Post-Operative (n)	Resolution (%)
Nasal Obstruction	22	20	90.91	21	14	66.67	24	17	70.83
Headache	13	12	92.31	10	7	70.00	12	8	66.67
Postnasal Drip	11	11	100.00	13	8	61.54	14	9	64.29
Hyposmia	12	11	91.67	12	8	66.67	10	7	70.00
Epistaxis	5	4	80.00	6	4	66.67	6	4	66.67

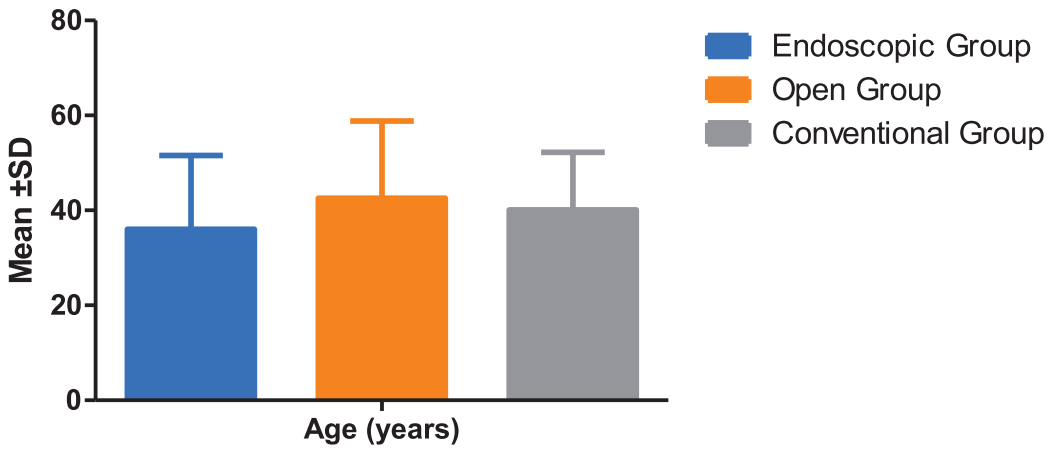


Figure-2: Comparison of participants' mean age across the Endoscopic, Open Septoplasty and Conventional group.

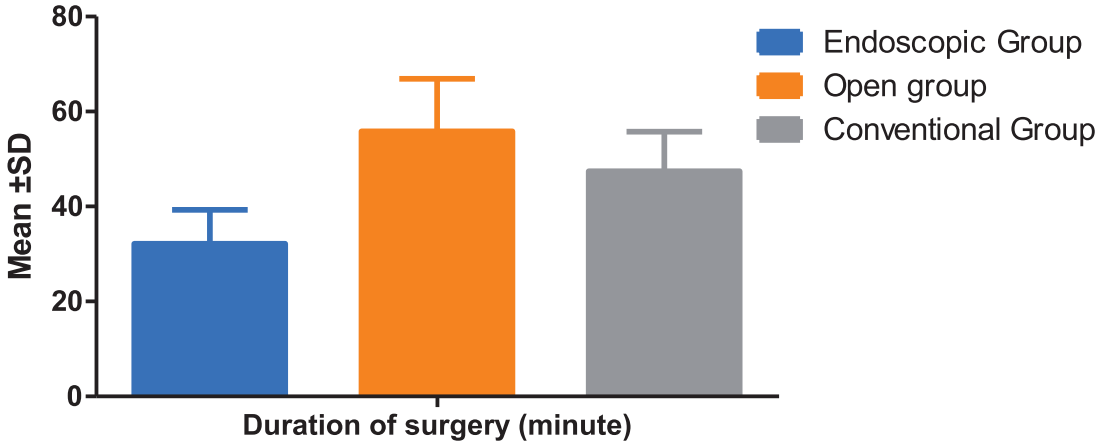


Figure-3: Comparison of the mean duration of surgery among Endoscopic, Open Septoplasty and Conventional group.

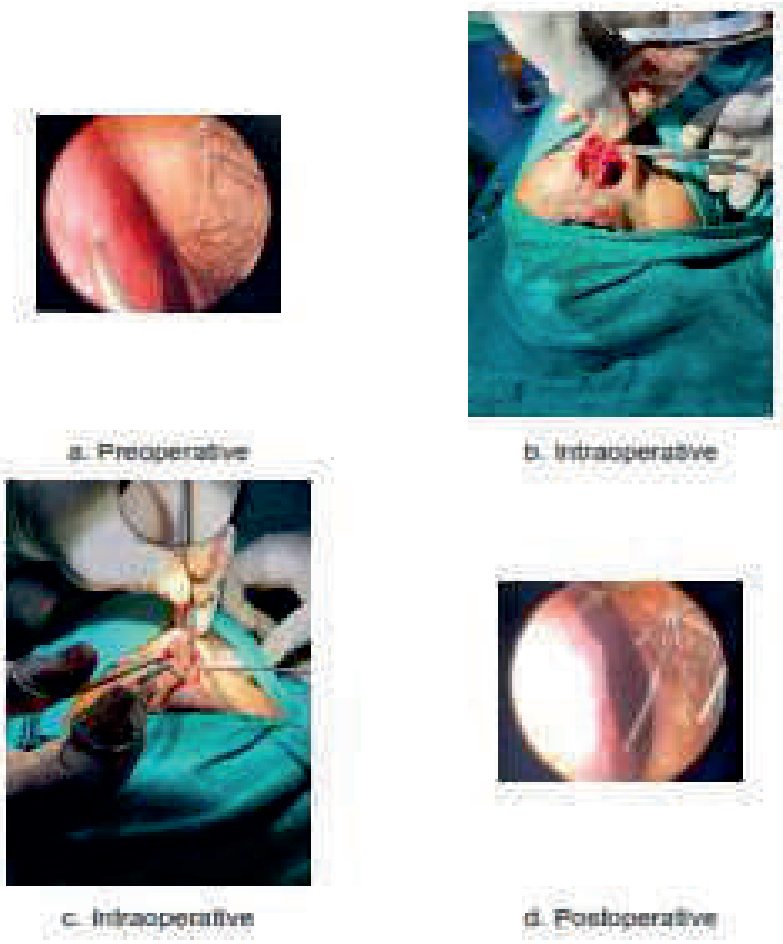


Figure of Procedure of Open Septoplasty

Figures of Procedure of Open Septoplasty with correction of External Deformity

TABLE-5: Comparison of post-operative complications across the groups.

Post-operative complications	Endoscopic Group		Open Group		Conventional Group		p-Value
	n	%	n	%	n	%	
Bleeding	3	12.00	6	24.00	5	20.00	0.541
Synechia	1	4.00	2	8.00	2	8.00	0.807
Mucosal tear	1	4.00	4	16.00	3	12.00	0.376
Septal perforation	0	0.00	0	0.00	0	0.00	-

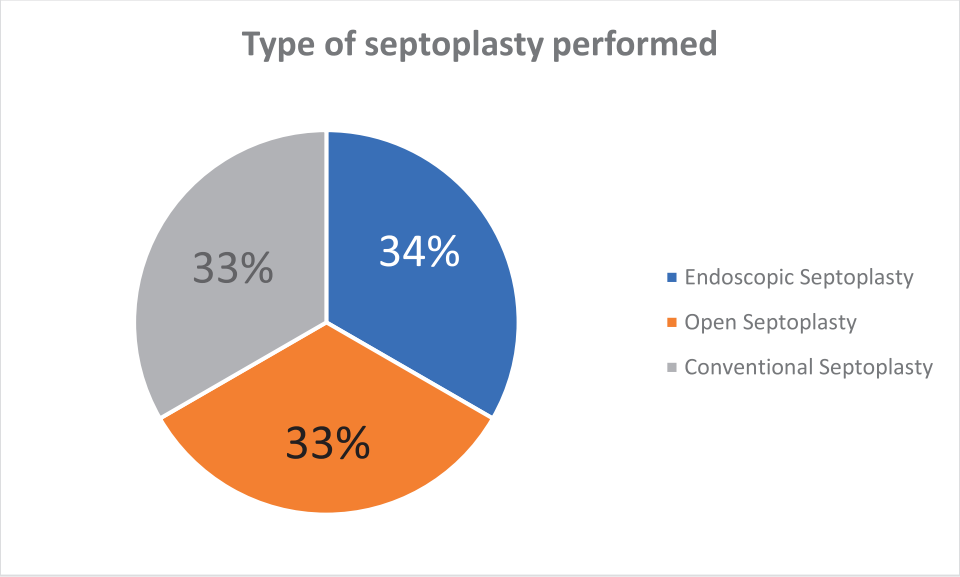
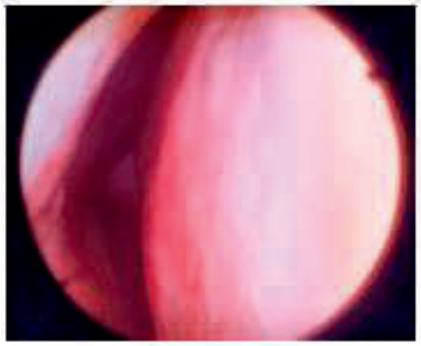
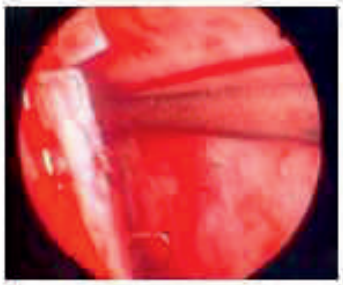


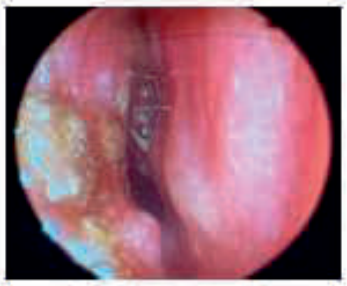
Figure-1: Distribution of participants based on the type of septoplasty performed.



a. Preoperative



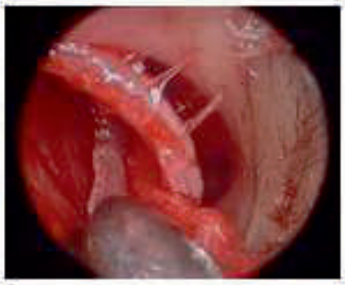
b. Intraoperative



c. Postoperative

Figures of Procedure of Endoscopic Septoplasty

a. Preoperative



b. Intraoperative

c. Intraoperative

d. Postoperative

Figures of Procedure of Conventional Septoplasty