



ORIGINAL ARTICLE

A Comparative Study of Conventional vs. Endoscopic Septoplasty

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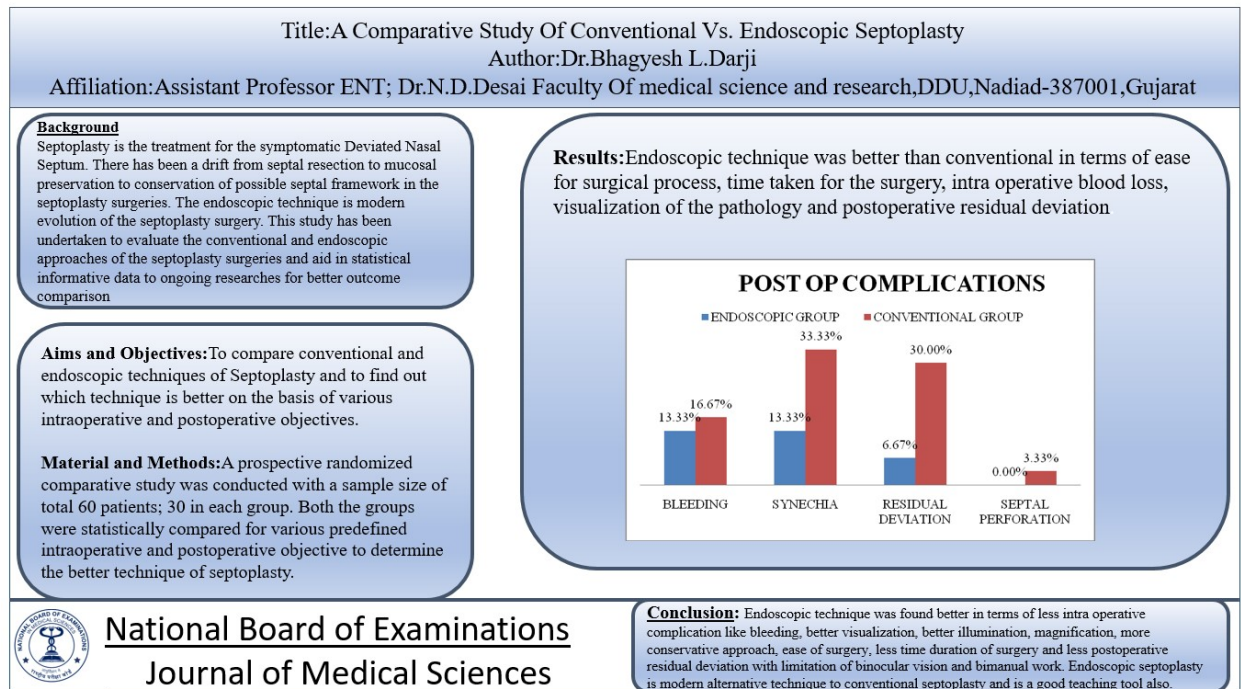
Abstract

Background: Septoplasty is the treatment for the symptomatic Deviated Nasal Septum. There has been a drift from septal resection to mucosal preservation to conservation of possible septal framework in the septoplasty surgeries. The endoscopic technique is modern evolution of the septoplasty surgery. This study has been undertaken to evaluate the conventional and endoscopic approaches of the septoplasty surgeries and aid in statistical informative data to ongoing researches for better outcome comparison. **Aims and Objectives:** To compare conventional and endoscopic techniques of Septoplasty and to find out which technique is better on the basis of various intraoperative and postoperative objectives. **Material and Methods:** A prospective randomized comparative study was conducted with a sample size of total 60 patients; 30 in each group. Both the groups were statistically compared for various predefined intraoperative and postoperative objective to determine the better technique of septoplasty. **Results:** Endoscopic technique was better than conventional in terms of ease for surgical process, time taken for the surgery, intra operative blood loss, visualization of the pathology and postoperative residual deviation. **Conclusions:** Endoscopic technique was found better in terms of less intra operative complication like bleeding, better visualization, better illumination, magnification, more conservative approach, ease of surgery, less time duration of surgery and less postoperative residual deviation with limitation of binocular vision and bimanual work. Endoscopic septoplasty is modern alternative technique to conventional septoplasty and is a good teaching tool also.

Keywords: Septoplasty, Endoscopic Septoplasty, Conventional Septoplasty, Comparative study

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Graphical Abstract



Abbreviations

ENT : Ear, Nose, Throat

OPD: Out Patients Department

DNS : Deviated Nasal Septum

BC : Before Christ

SMR : Submucosal Resection

DNE :Diagnostic Nasal Endoscopy

VAS :Visual Analogue Scale

Introduction

Treatment for the Deviated Nasal Septum is Septoplasty. It can be performed either conventionally using the headlight or with the visualization on a monitor using Nasal Endoscopes. In the current era of newer surgical instruments, technologies and emphasis on saving the normal anatomical structures and preservation of normal mucosa with the removal of most deviated parts and correcting the pathological part only is being exercised. There has been a drift from septal resection to mucosal preservation to conservation and preservation of possible septal framework in the septoplasty surgeries [1]. The endoscopic technique is modern evolution of the

septoplasty surgery. There are group of surgeons performing the septoplasty surgery conventionally using headlight and another using the endoscopes for the same. The debate and research regarding the better technique for the septoplasty is going on. This study has been undertaken to evaluate the conventional and endoscopic approaches of the septoplasty surgeries and aid in statistical informative data to ongoing researches for better outcome comparison.

Aims and Objectives

To compare conventional and endoscopic techniques of Septoplasty and to find out which technique is better on the basis of following parameters:

A) Intra operative

1. Ease of process (Easy/Difficult)
2. Time duration of Surgery(In minutes)
3. Intraoperative complications:-
 - a. Bleeding(Amount of suctioned blood in milliliters)
 - b. Mucosal Flap Tear (Present/Absent)
4. Visualization of Pathology/deviation (Satisfactory/Unsatisfactory)

B) Postoperative complication (Present/Absent)

1. Bleeding
2. Synechia
3. Residual deviation
4. Perforation

C) Postoperatively symptoms relieved (Visual Analogue Scale)

1. Nasal obstruction
2. Headache
3. Nasal discharge
4. Postnasal drip
5. Hyposmia
6. Epistaxis

Material and Methods

Study Population

Patients attending ENT OPD diagnosed to have symptomatic Deviated Nasal Septum on the basis of detailed clinical history and clinical and radiological examination which needs correction with given consent.

Sample size

Total 60 patients in this study divided in endoscopic and conventional groups, 30 in each group by simple

randomization method using table of random numbers.

Study Design

Prospective randomized cohort study.

Inclusion Criteria

I. All patients diagnosed to have symptoms due to deviated Nasal Septum on the basis of clinical evaluation above the age of 18 years and with patients consent for being included in the study group.

II. All patients of chronic Rhinosinusitis not responding to conservative management having associated Deviated Nasal Septum of magnitude interfering with endoscopic sinus surgery.

Exclusion Criteria

I. Patients under the age of 18 years.

II. Revision Septoplasty.

Methodology

Patients attending ENT OPD with symptomatic deviated nasal septum evaluated with detailed clinical history and examination. Those patients diagnosed to have deviated nasal septum requiring correction and willing to undergo septoplasty were included in the study.

Preoperative symptoms and clinical findings were recorded accordingly. DNE done with 0* rigid 4mm endoscopes and findings were recorded. Visual analogue scale used to record the presenting symptoms severity. Patients requiring surgery for the symptomatic deviated nasal septum identified according to inclusion and exclusion criteria and preoperative workup for the surgery done with required blood,

urine and radiological investigation and anaesthetic fitness obtained for general/local anaesthesia.

Patients undergoing surgery randomized into Group A (undergoing conventional septoplasty), and Group B (undergoing endoscopic septoplasty) using table of random numbers.

All the surgeries were performed under local anesthesia with sedation.

Ethical clearance was obtained from the institutional ethical committee.

Technique for Conventional Septoplasty

For the conventional Septoplasty, nasal cavities packed with 4% Lignocaine and Xylometazoline 0.1% soaked cotton packs for 10-15 minutes while patient lying supine. 1 ml Pentazocin and 1 ml Phenargan in 3 ml sterile water given intravenously. Painting followed by draping done. Head light used. Local 2% Lignocaine with 1 in 1 lakh Adrenaline solution infiltrated in columella, either side of septum, over spur (if any) and maxillary crest.

Surgery performed with Headlight. Killian's incision was given on left side of septum despite of side of deviation and mucoperichondrial and mucoperiosteal flaps elevated with the help of Freer's elevator and Killian's long bladed nasal speculum. Anterior, posterior, inferior and opposite side anterior tunnels made. Oseo-cartilagenous junction dislocated and opposite side posterior tunnel made. Small part of perpendicular plate of ethmoid was fractured and removed with Luc's forceps.

Then about 0.5 cm inferior strip cartilage was removed. Spur if any removed and maxillary crest spur if found was removed with the help of gouge and mallet.

Haemostasis achieved with suction and Neuropatties soaked in 4% lignocaine and adrenaline solution. Sutures taken at incision site with 4-0 vicryl. Any mucosal flap tear if present recorded. Amount of suction blood recorded from marked collector attached with it.

Both the Nasal Cavities were packed with soframycin soaked ribbon packs. Bolster dressing applied. Time duration of surgery was noted from local infiltration to bolster dressing. Ease of surgery (easy or difficult) and visualization of pathology (satisfactory or unsatisfactory) noted for every case.

Technique for Endoscopic Septoplasty:

Nasal cavities packed with 4% Lignocaine and Xylometazoline 0.1% soaked cotton packs for 10-15 minutes. 1ml Pentazocin and 1ml Phenargan in 3ml sterile water was given intravenously. Painting followed by draping done. Local 2% Lignocaine with 1 in 1 lakh Adrenaline solution infiltrated in columella, either side of septum, over spur (if any) and maxillary crest using 0*,4 mm endoscope connected to a monitor.

Vertical incision made just caudal to the deviated portion of the septum on convex side and extended both superior and inferiorly for the better exposure.

Mucoperichondrial flap raised using Freer's elevator with visualization with 0 degree rigid 4 mm nasal endoscope.

The incision was given on deviated part of cartilage parallel, but posterior to flap incision and caudal to deviation. Then Freer's elevator was inserted and mucoperichondrial flap was raised on opposite side.

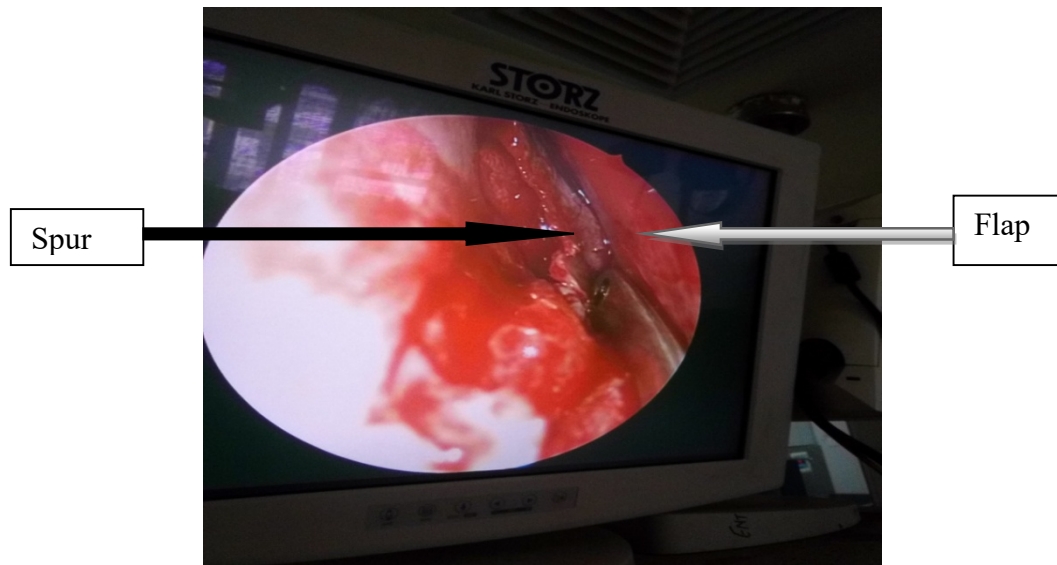


Figure 1. Endoscopic mucoperichondrial flap elevation and showing spur

Luc's forceps was used to excise the deviated part of septum.



Figure 2. Removal of spur with Luc's forceps in Endoscopic surgery

In Cases of maxillary crest deviation, elevation of flaps over crest done under endoscopic vision and deviated parts were removed with gouge and hammer.

In cases of isolated spur, incision was given directly over the spur under

endoscopic view, flaps elevated superior and inferiorly and spurs removed.

Haemostasis achieved with suction and neuropatties soaked in 4% lignocaine and adrenaline solution. Sutures were taken at incision site with 4-0 vicryl. Any mucosal flap tears if present, recorded. Amount of

suction blood recorded. Both the Nasal Cavities were packed with soframycin soaked ribbon packs. Bolster dressing applied.

Time duration of surgery was noted from local infiltration to bolster dressing. Ease of surgery (easy or difficult) and visualization of pathology (satisfactory or unsatisfactory) noted for every case.

Postoperative Care and Follow Up:

Patients were given same antibiotics, analgesics and antihistaminic in post op periods in both the groups.

Nasal packs were removed on 2nd post operative day and discharged with advice, oral medications and topical nasal sprays.

Patients were followed up on 7th, 14th, 30th and 60th post operative days. In each visit examination and suctioning done and improvement in presenting symptoms were noted on Visual Analogue Scale. In each visit DNE was performed and Postoperative complications like bleeding, abscess, haematoma, synechia, residual deviation and septal perforation if any noted. Thus the objective and subjective data of symptoms relieved and post operative complications were obtained.

Data Analysis

Data thus obtained was analysed using SPSS software.

Post operative symptomatic improvement in subjective criteria via VAS score were analyzed by Standard error of mean using Student's 't' test.

Subjective intra operative criteria like ease of surgery and visualization of pathology were analyzed by comparing standard error of proportion of two groups using Chi square test.

Objectives like time duration of surgery and bleeding during surgery were compared with 't' test.

Post operative complications in both groups were compared and analysed by standard error of proportions applying Chi square test.

All statistical analysis were carried out at 95% confidence level, $\alpha = 5\%$ and 80% power; to test the alternate and null hypothesis and to rule out occurrence of events by chance between Group A (underwent Conventional septoplasty) and Group B (underwent Endoscopic septoplasty).

Results

As per the study to evaluate the conventional and endoscopic techniques of the septoplasty surgery on the basis of intra and post operative subjective and objective criteria, which were evaluated statistically, got the following results:

Intra Operative Evaluation

Table 1. Intra operative objectives compared between conventional and endoscopic techniques

Objectives	Conventional	Endoscopic	P Value	Significance
Ease of process	43.33%(EASY)	70.00%(EASY)	0.037	Significant
Time duration(MEAN)	51.53 minutes	49.90 minutes	0.020	Significant
Blood Loss(MEAN ml)	20.97 ml	19.20 ml	0.007	Significant
Mucosal Flap Tear	36.66%	16.66%	0.08	Non Significant
Satisfactory Visualization of Pathology	53.33%	96.67%	0.000	Significant

Table 1 shows the intra operative objectives which were compared between conventional and endoscopic techniques. The endoscopic technique was found easy in 70% cases compared to 43.33% in conventional group with p value of 0.037, which is statistically significant.

The time duration for surgery was 49.90 minutes in endoscopic group compared to 51.53 minutes in conventional group with p value of 0.020, which is statistically significant.

The mean blood loss was 19.20 ml in endoscopic group as compared to 20.97 ml in conventional group with significant p value of 0.007.

The frequency of mucosal flap tear was 16.66% in endoscopic group compared to 36.66% in conventional group with p

value more than 0.05 which was statistically insignificant.

In endoscopic group 96.67% cases had adequate visualization of pathology while 53.33% in conventional group had satisfactory visualization of pathology during surgery with statistically significant p value of 0.000.

As per the statistical analysis the study showed that endoscopic technique was better than conventional in terms of ease for surgical process, time taken for the surgery, intra operative blood loss and visualization of the pathology.

There was no difference found in incidence of mucosal tear during surgery by either technique.

Post Operative Evaluation

Table 2. Frequency of post operative complications in both the groups.

Complication	Endoscopic Group	Conventional Group	P Value	Significance
Bleeding	13.33%	16.67%	0.718	Non Significant
Synechia	13.33%	33.33%	0.067	Non Significant
Residual Deviation	6.67%	30.00%	0.02	Significant
Septal Perforation	0.00%	3.33%	0.313	Non Significant

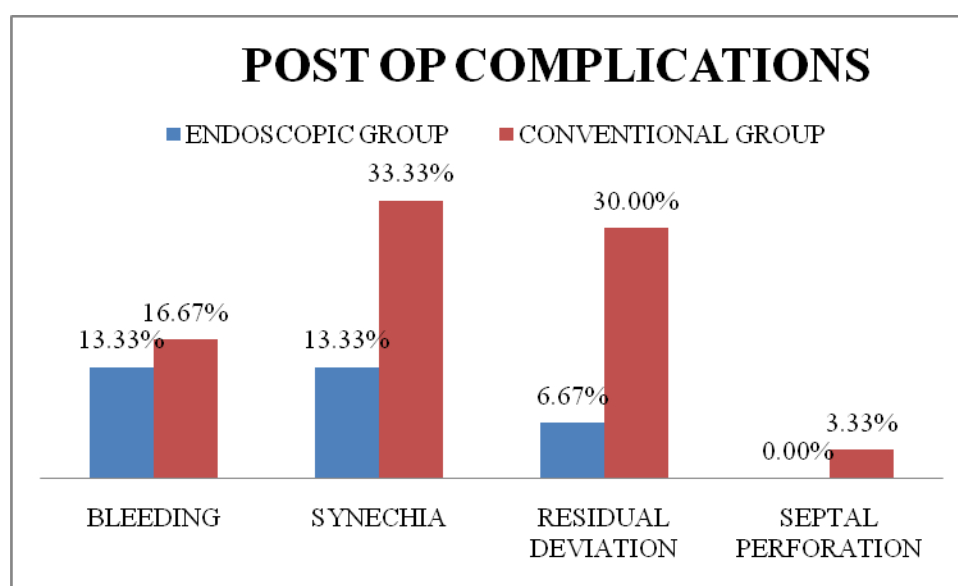


Figure 3. Frequency of post operative complications in both the groups.

Table 2 and Figure 3 describe the frequency of post operative complications in both the groups. Post operative bleeding was found in 13.33% cases in endoscopic group as compared to 16.67% in conventional group with p value of 0.718, which is statistically insignificant.

Synechia was found in 13.33% cases in endoscopic group, while in conventional group it was found in 33.33% cases with statistically insignificant p value of 0.067.

The residual deviation was found in 6.67% cases in endoscopic group as

compared to 30% in conventional group with statistically significant p value of 0.02. No septal perforation was found in endoscopic group, while 3.33% patients in conventional group had septal perforation with p value of 0.313, which is statistically insignificant.

This analysis depicts that neither technique was superior in terms of post operative bleeding, synechia formation and septal perforation. The endoscopic surgery was found better in terms of having less post operative residual septal deviation.

Post Operative Symptomatic Improvement

Table 3. Results of Postoperative Symptomatic Improvement

Symptoms	p Value	Significance
Nasal Obstruction	.825	Non Significant
Headache	.814	Non Significant
Epistaxis	.298	Non Significant
Nasal Discharge	.170	Non Significant
Post Nasal Drip	.533	Non Significant

Table 3 signifies that both techniques were equivalent in terms of relieving symptoms post operatively. In this study there was no statistically significant difference found in post operative subjective symptomatic improvement in nasal obstruction, headache, epistaxis, nasal discharge and post nasal drip.

Thus, study results showed that endoscopic technique was better than conventional technique in following aspects:

- a. Ease of process,
- b. Time duration of surgery,
- c. Intra operative blood loss,
- d. Visualization of pathology during surgery and
- e. Post operative residual deviation.

Both techniques were similar in following aspects:

- a. Intra operative mucosal flap tear,
- b. Post operative complications like bleeding, synechia, septal perforation and

c. Post operative symptomatic improvement.

Discussion

Septoplasty was first described by Cottle in 1947 as a treatment to correct nasal airway obstruction [2]. Lanza et al. described endoscopic techniques to correct septal deformities [3].

According to Brennan et al. the ideal objective in septal surgery is permanent correction of deviation with avoidance of any complication [4].

Endoscopic septoplasty is an attractive alternative to traditional headlight approach for surgery. Early reports of endoscopic septoplasty describe several advantages associated with the technique e.g. it makes easier for surgeons to see the tissue planes and it offers a better way to treat isolated septal spurs. Additionally, the endoscopic approach makes it possible for many people to simultaneously observe the procedure on a monitor, making the approach useful in a teaching hospital. The

main disadvantages of endoscopic septoplasty are contamination of the endoscope with blood, which obscures the endoscope view and repeated cleaning. Also, as one hand is occupied holding the nasal endoscope, other instruments must be manipulated with a single hand, which may be difficult at times [5].

Deviated nasal septum related to Sex

There was male preponderance in having DNS than females; ratio for conventional group was 4:1 (Male:Female) and for endoscopic group it was 2.75:1 as shown in Figure 4. This is in accordance to the literature saying Males have more preponderance to have DNS [6-11].

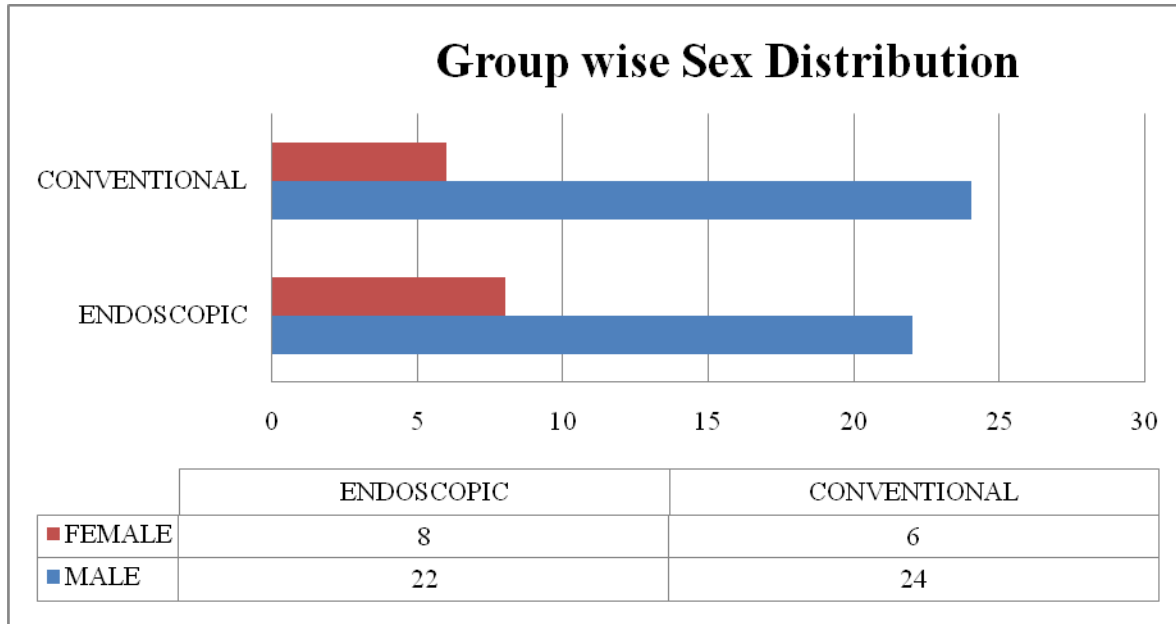


Figure 4. Group wise sex distribution

Deviated nasal septum related to Side

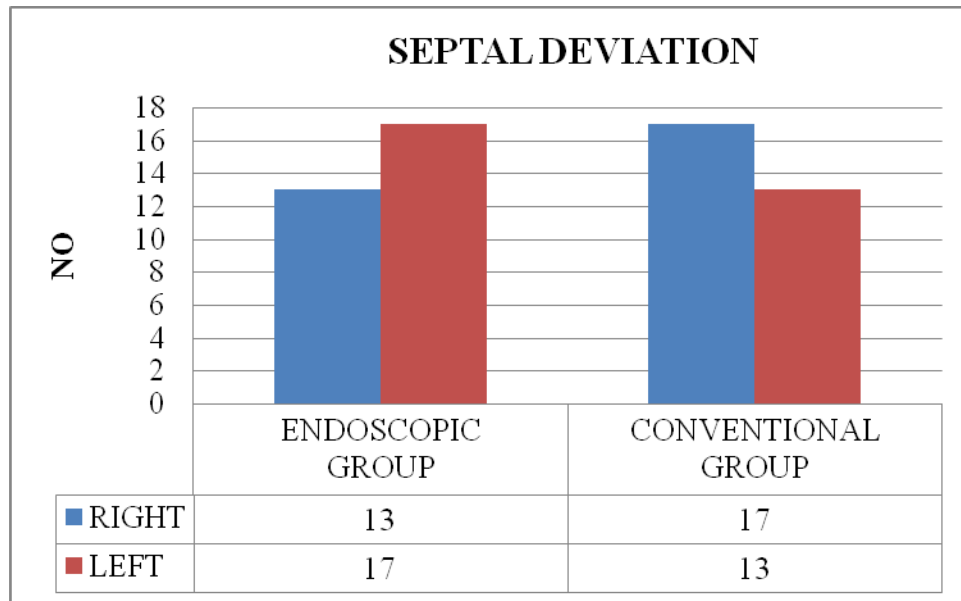


Figure 5. Deviated nasal septum related to Side:

In this study as shown in Figure 5, equal numbers of right and left deviated nasal septum were found which does not

conform to the literature which states that left is more common than right [12,13].

Deviated nasal septum related to Presenting Symptoms:

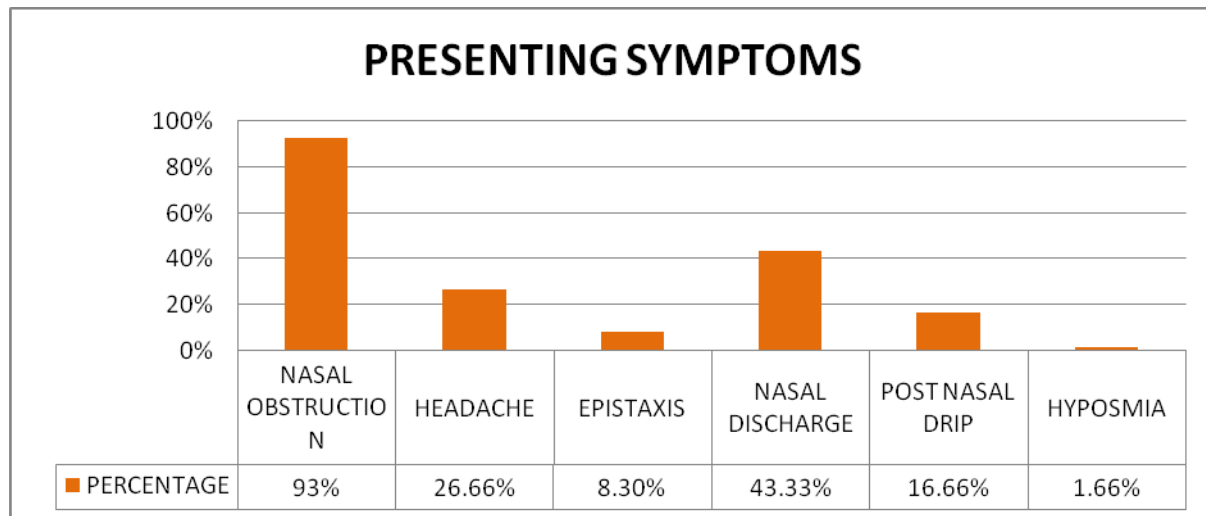


Figure 6. Deviated nasal septum related to Presenting Symptoms

Regarding presenting symptoms as shown in Figure 6, Nasal obstruction was the leading complaint (93%) which is found in the studies done by Khan et al.; Verma et al; Leen et al; Gupta and Motwani [8,12,13].

Other complaints were Headache (26.66%), Nasal discharge (43.33%), post nasal drip (16.66%) and Hyposmia (1.66%). These findings are in concordance to the study by Leena et al. and Gulati et al. [8,14].

Ease of Process

In our study, according to performing surgeons perception 70.00% endoscopic surgery were found easy and 43.33% conventional surgery found to be easy to perform. This may be related to the better visualization and illumination which can be achieved by the endoscopes and limited, obstructed vision while performing conventional septoplasty using headlight and nasal speculums.

Time Duration of Surgery

The average time taken to perform conventional surgery was 51.53 minutes and that of endoscopic was 49.90 minutes. The p value was 0.02 which is statistically significant and showed that endoscopic surgeries were faster to perform and saved time. This finding is in agreement with the authors Giles et al; Horry et al. and Shehata et al. where endoscopic surgery vary from 15 to 27 min. while conventional took 23 to 34 min [10,15,16].

Khan et al. found endoscopic surgeries took longer than conventional. Time for conventional septoplasty was 36.35 min. with a standard deviation of ± 5.33 min and for endoscopic septoplasty, the mean intra-operative time was marginally more

being 38.7 min. with a standard deviation of ± 4.77 min [13].

Intra Operative Blood Loss

Mean blood loss in conventional group was 20.97 ml and in endoscopic group was 19.20 ml. The p value was 0.007, which signified that endoscopic technique was better than conventional surgery in terms of intra operative blood loss.

Intra Operative Mucosal Tear

Mucosal flap tear was present in 36.66% patients in conventional group and 16.66% in endoscopic group. Though the frequency of mucosal flap tear during operation was less in endoscopic group than conventional, it was not statistically significant. This is in concordance to the study done by Sathyaki et al. and Yadav et al. and against the study done by Paradis et al. [9,11,17].

Visualization of Pathology

In this study, endoscopic surgery provided 96.67% satisfactory visualization of deviated septum as spur, posterior and anterior deviations and high and low deviations. In conventional group only 53.33% satisfactory visualization of pathology accessed. It was statistically highly significant ($p=0.000$). This can be attributed to better illumination, better access to the various portions of septum and ability to manipulate and observation on monitor as described in literature by Leena et al; Sathyaki et al; Verma et al; Khan et al; Gulati et al and Kapil et al. [8,9,12-14,18].

Subjective Improvement in VAS score

In this study, in the both groups, there was statistically significant improvement in presenting symptoms post operatively except for epistaxis, but neither technique was better in post operative symptomatic improvement based on VAS score, as the p value for the test of significance was $>.05$, as illustrated in Table 3. This disagrees with Leena et al. [8] Khan et al. [13]. This study is in concordance with

the study by Shehata A et al. which showed significant improvement in headache, epistaxis and facial pain but no significant improvement in nasal obstruction, post nasal discharge or hyposmia [10].

Postoperative Complications

Postoperative complications were evaluated objectively. DNE was performed and findings were noted for residual deviation, synechia and septal perforation.

Table 4. Comparison of post-operative complications of conventional septoplasty in present study with various previous studies

	Leenajain et al. ^[8]	Sathyaki et al. ^[9]	Shrestha et al. ^[19]	Suligavi et al. ^[20]	Kamran et al. ^[21]	Manjunath et al. ^[22]	Khan MN et al. ^[13]	Present study
Bleeding	-	24%	-	26%	3%	4%	6.67%	16.67%
Residual Deviation	36%	-	17.2%	14%	2%	-	36.67%	30%
Synechia	20%	16%	16.6%	20%	1%	4%	16.67%	33.33%
Septal Perforation	-	-	10%	-	2%	0%	6.67%	3.33%

Table 4 shows the comparison of the post operative complications of the

conventional septoplasty between this study and previous studies.

Table 5. Comparison of post-operative complications of endoscopic septoplasty in present study with various previous studies

	Leenajain et al. ^[8]	Shrestha et al. ^[19]	Suligavi et al. ^[20]	Manjunath et al. ^[22]	Chung et al. ^[23]	Khan MN et al. ^[13]	Present study
Bleeding	-	-	14%	4%	0.9%	0%	13.33%
Residual Deviation	13%	10%	16%	-	0.9%	6.67%	6.67%
Synechia	0%	6.7%	6%	4%	2.6%	6.67%	13.33%
Septal Perforation	-	0%	-	0%	3.4%	0%	0%

Table 5 shows the comparison of post operative complications of endoscopic septoplasty between the present and previous studies.

Endoscopic septoplasty can also be considered an effective teaching tool. In fact, when viewed over a monitor, the procedure provides an excellent opportunity for recording and studying anatomy, pathology and surgical techniques in the training of Assisting Surgeons, graduate Specialists and Medical students [8].

Conclusion

To conclude, both the techniques give satisfactory post operative results and can be performed to correct symptomatic deviated nasal septum. Endoscopic technique is found better in terms of less intra operative complication like bleeding, better visualization, better illumination, magnification, more conservative approach, ease of surgery, less time duration of surgery and less post operative residual deviation with limitation of binocular vision and bimanual work. Endoscopic septoplasty is modern alternative technique to conventional septoplasty and is a good teaching tool also.

Ethical Approval

The study got approval from Institutional Scientific Review (SRC) Committee and Institutional Ethic Committee (IEC)

Informed Consent

Informed written consent was obtained from the patient/participants

Conflicts of Interest

The authors declares that they do not have conflict of interest.

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