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An Endoscopic Approach to the Deviated Nasal Septum: A Prospective Study

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Abstract: ***Background: Numerous medical descriptions are available regarding the pathology and the treatment of the deviated nasal septum. However, none of these descriptions have highlighted a complete surgical management of this condition to improve the nasal airway. Each surgical procedure has its limitations and cannot deal with all the variants of the deformities of the nasal septum, visualization and accessibility to the targeted deviated septum. Material & method: 50 cases selected in our study were admitted in the ward of E.N.T. Department of R.N.T. Medical College and M.B. Hospital, Udaipur, and divided into two groups, titled group A and B containing 25 cases each. Group A had undergone conventional septoplasty and group B had undergone endoscopic septoplasty. Aims and Objectives: We assessed endoscopic septoplasty as the better surgical procedure in correcting high deviations, familiarize with endoscopic anatomy of septum and mucoperichondrium, we assessed the efficacy and use of endoscopic septoplasty with other endoscopic surgeries for sinonasal pathology like chronic dacryocystitis, concha bullosa and sinusitis. Results: Postoperatively significant relief from the symptoms of headache (100%), nasal obstruction (90%), nasal discharge (84%), post nasal drip (67%) and hyposmia (50%) was observed more in endoscopic septoplasty group as compared to the conventional septoplasty group. Conclusion: Postoperatively significant relief from the symptoms of headache (100%), nasal obstruction (90%), nasal discharge (84%), post nasal drip (67%) and hyposmia (50%) was observed more in endoscopic septoplasty group as compared to the conventional septoplasty group.***

Keywords: Endoscopic Septoplasty, Conventional Septoplasty, Deviated Nasal Septum

1. Introduction

Surgery on deviated nasal septum has seen several modifications since its early days starting from radical resection to mucosal preservation and subsequent preservation of septal framework. The need for modification arose to minimise the complications inherent in radical dissections. It has been proved with passage of time that respect to the gentle and complex mucosa of the nose and correcting the area that impedes with the lamellar flow of air column should be the scientific basis of septal correction. These underlying principles gave birth to the concept of septoplasty.

In the recent times, with widespread use of endoscopes for various surgeries, many authors have highlighted their use in septal correction (Giles et al., 1994; Nayak et al., 1998 etc.) with advantage of better illumination, accessibility and magnification.

In addition to this indication of limited endoscopic septoplasty, it is also helpful in cases of endoscopic DCR, endoscopic sinus surgery in which the access to the target area is hampered because of the deviated nasal septum.

The traditional surgeries of the nasal septum improve the nasal airway but do not fulfill the above mentioned criteria in most instances. The reasons outlined for this are, poor visualization, relative inaccessibility, poor illumination, difficulty in evaluation of the exact pathology, need for nasal packing, unnecessary manipulation, resection and overexposure of the septal framework reducing the scope for a revision surgery if required later. On the other hand the nasal endoscope allows precise preoperative identification of the septal pathology and associated lateral nasal wall abnormalities and helps in better planning of endoscope-aided septal surgery.

2. Material and Methods

The present study was conducted in The Department of Otorhinolaryngology, R.N.T. Medical College and M.B. Hospital, Udaipur, entitled **"An Endoscopic approach to the deviated nasal septum: A Prospective study".** All the cases admitted in the ward of E.N.T Department were taken into consideration for study, during the period of May 2009 to May2010.

The subjects were selected by simple random sampling method and the patients were divided into two groups, titled group A and B containing 25 cases each. Group A had undergone conventional septoplasty and group B had undergone endoscopic septoplasty.

Patients with following signs and symptoms were included in the study:

- Nasal obstruction
- Sneezing
- Nasal discharge
- Hyposmia
- Postnasal drip
- Facial pain
- Headache

Patients with following signs and symptoms were excluded from the study:

- Allergic rhinitis
- Nasal polyposis
- Upper respiratory tract infection

Aims and Objectives

The present study was conducted with following aims and objectives:-

- To familiarise with endoscopic anatomy of septum and mucoperichondrium especially at cartilage-bony junction leading to spurs and other details of deviations.
- To compare the postoperative morbidity among conventional and endoscopic septoplasty patients.
- To assess endoscopic septoplasty as the better surgical procedure in correcting high deviations.
- To correlate efficacy of endoscopic septoplasty with traditional approach.
- To assess the efficacy and use of endoscopic septoplasty with other endoscopic surgeries for sinonasal pathology like chronic dacryocystitis, concha bullosa and sinusitis.
- To assess long term post-operative results.

3. Observation and Results

Table 1: Age sex ratio

Sex	10-20	21-30	31-40	41-50	TOTAL
Male	12	14	5	4	35
Female	7	4	3	1	15
TOTAL	19	18	8	5	50

The above table shows that male to female ratio for deviated nasal septum was 2.3:1 and the most of the patients fall in age group 10 to 30 years.

Table 2: Complaints of the patients with deviated nasal septum

Complaints	Total	Percentage
Nasal obstruction	40	80%
Headache	25	50%
Anterior nasal discharge	15	30%
Sneezing	4	8%
Epiphora	3	6%
Post nasal drip	5	10%
Hyposmia	4	8%
Bleeding	2	4%
Snoring	1	2%

Above table depicts that most prevalent complaint in the patients of deviated nasal septum who were taken for study was Nasal obstruction (80%), others being headache (50%), Anterior nasal discharge (30%), postnasal drip (10%), sneezing (8%), hyposmia (8%), epiphora (6%), bleeding (4%) and snoring (2%).

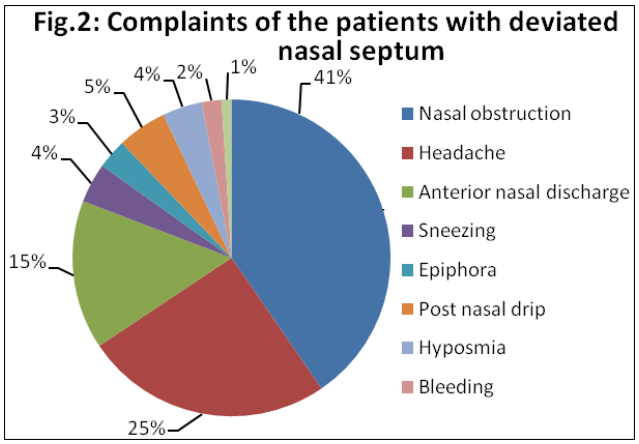


Table 3: Prevalence of type of nasal septal deformities

Septal deformity	No. of cases	Percentage
Type 1	1	2%
Type 2	5	10%
Type 3	4	8%
Type 4	5	10%
Type 5	23	46%
Type 6	8	16%
Type 7	4	8%

Most common type of septal deformity found in the study was Type 5(46%) i.e. horizontal spur on one side with or without posterior deviation on the other side followed by Type 6, Type 4 and Type 2, Type 3 and Type 7 (According to Mladina classification of deviated nasal septum).

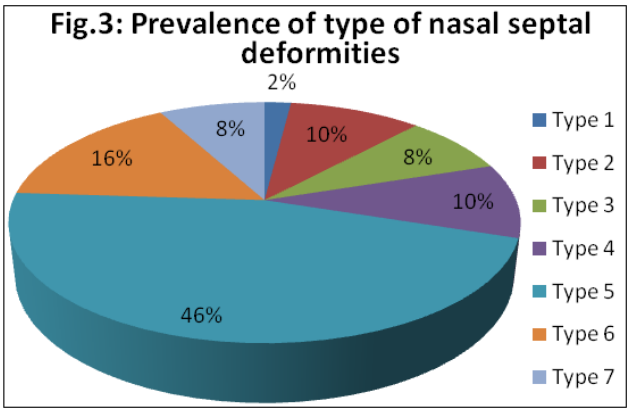


Table 4: Prevalance of lateral nasal wall pathology in association with deviated nasal septum

Lateral nasal wall pathology	No. of cases	Percentage
Inferior turbinate hypertrophy	40	80%
Concha bullosa	13	26%
Paradoxical middle turbinate	12	24%
Uncinate process abnormality	11	22%
Mucosal disease	11	22%
Polypoidal middle turbinate	10	20%
Over pneumatised bulla	6	12%

Associated with septal deformity several lateral nasal wall pathologies were found in the study. The commonest being Inferior turbinate hypertrophy(80%) followed by that were concha bullosa(26%), paradoxical middle turbinate(24%), uncinate process(22%), mucosal disease(22%), polypoidal middle turbinate (20%) and over pneumatised bulla(12%).

Table 5: Parameters to compare endoscopic septoplasty with conventional septoplasty

Parameters	Conventional septoplasty	Endoscopic septoplasty
Primary treatment for nasal obstruction	Yes	Yes
Addresses caudal septal deflections	Yes	No
Can alter dorsal nasal shape	No	No
Majority of septum addressed	Yes	No
Average time of procedure	Approx. 1hr	Approx. 45 mins

Above table shows that nasal obstruction as primary presenting symptom was addressed in both the groups. Caudal & complex septal deformities were not addressed in endoscopic septoplasty. Average time of procedure was found to be approx.45mins for endoscopic septoplasty group and approx.1hr for conventional group.

Table 6: Prevalance of type of DNS in the two groups intraoperatively

Intraoperative Type of DNS	Group A	Group B	Total
Cartilaginous	9(36%)	10(40%)	19
Bony	11(44%)	13(52%)	24
Both	2(8%)	2(8%)	4
Caudal deflection	3(12%)	0(0%)	3

Table is showing that intraoperatively overall prevalence of bony deviation was more common (48%) than the cartilaginous deviation (38%).

Table 7: Postoperative stay in two groups

Postoperative stay	Group A	Group B	Total
<48 hr	20(80%)	24(96%)	44
48-72 hr	4(32%)	1(4%)	3
>72 hr	1(4%)	0(0%)	3

Table shows that 80% cases were discharged within 48hrs of surgery in Group A and 96% in Group B, more than 72hrs stay was found to be 4% for Group A and 0% for Group B.

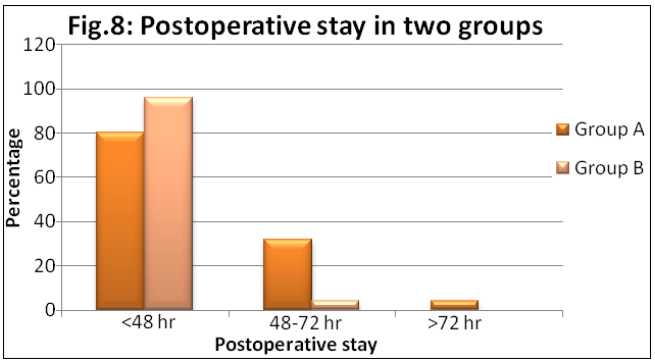


Table 8: Type of surgery performed

Type of surgery	Total No. of Cases	Percentage
Conventional septoplasty	25	50%
Endoscopic septoplasty	18	36%
Endoscopic septoplasty with FESS	4	8%
Endoscopic septoplasty with DCR	3	6%

In the study 50% cases underwent conventional septoplasty, 36% endoscopic septoplasty alone, 8% underwent endoscopic septoplasty in conjunction with FESS and 6% underwent endoscopic septoplasty with Endoscopic DCR.

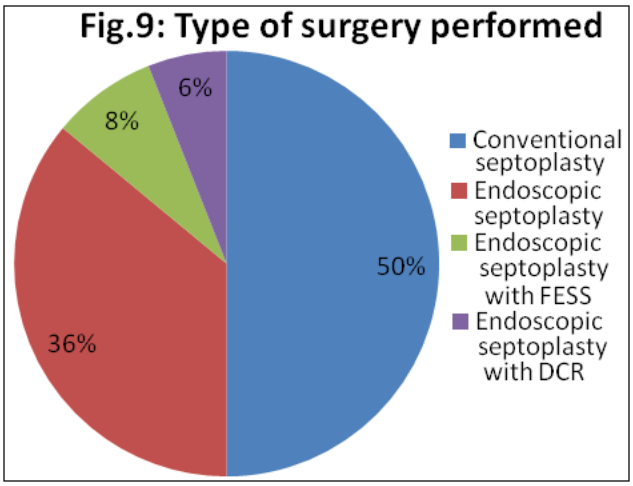


Table 9: Comparison of complaints with pack in post-operative period

Complaints	Group A	Group B
Headache	16(64%)	6(24%)
Watering of eyes	13(52%)	4(16%)
Bleeding	3(12%)	1(4%)

The study showed that 64% cases of Group A and 24% of Group B had complaints of headache with nasal packing, watering of eyes was the complaint in 52% of Group A and 16% of Group B patients. Complaint of bleeding was encountered in 12% of Group A cases and 4% of Group B cases.

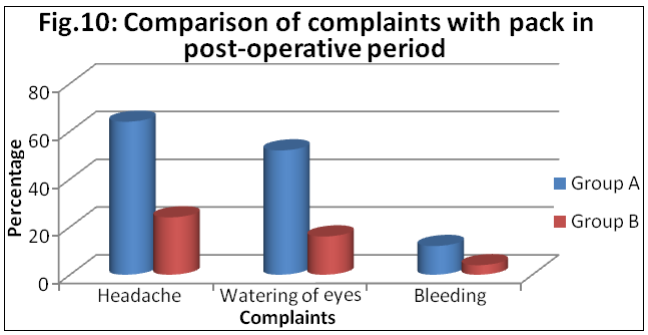


Table 10: Postoperative symptoms relieved

Symptoms relieved	Group A	Group B
Nasal obstruction	16(80%)	18(90%)
Headache	12(80%)	10(100%)
Nasal discharge	6(75%)	6(84%)
Hyposmia	0(0%)	1(50%)
Post nasal drip	1(50%)	2(67%)

Postoperative follow up of the patients showed that 80% cases of Group A and 90% of Group B cases were relieved of nasal obstruction , Headache was relieved in 100% of Group B and 80% of Group A, 75% of Group A and 84% of Group B patients were relieved of nasal discharge. There was no relief from hyposmia in Group A while it was relieved in 50% in of Group B patients. 50% of patients were relieved from post nasal drip in group A and 67% in group B.

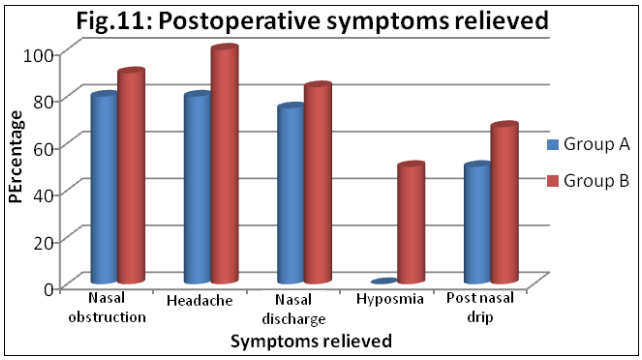


Table 11: Postoperative subjective improvement

Subjective improvement	*Group A*	*Group B*
Very good	20(80%)	24(96%)
Good	2(8%)	1(4%)
Satisfactory	1(4%)	0(0%)
No change	2(8%)	0(0%)

Subjective visual analogue scale of the study group showed that 80%of Group A and 96% of Group B patients had very good improvement, 8% of Group A and 4% of Group B had Good improvement, Satisfactory improvement was found in 4% of Group A cases while No change was found in 8% cases of Group A.

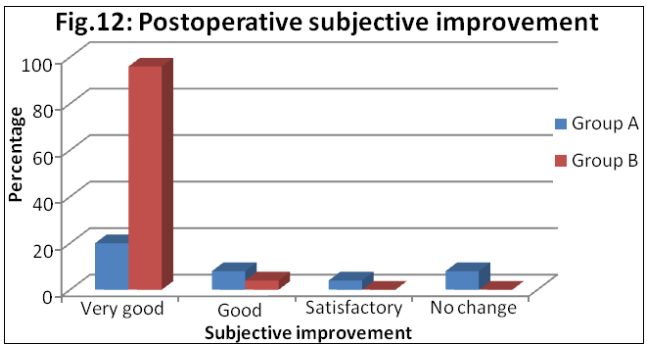
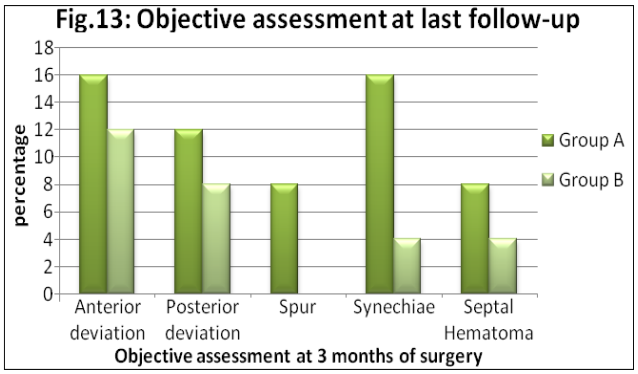


Table 12: Objective assessment at last follow-up

Objective assessment at 3 months of surgery	Group A	Group B
Anterior deviation	4(16%)	3(12%)
Posterior deviation	3(12%)	2(8%)
Spur	2(8%)	0(0%)
Synechiae	4(16%)	1(4%)
Septal Hematoma	2(8%)	1(4%)

Last follow up of the study cases showed that 16% of Group A and 12% of Group B cases had persistent anterior deviation, 12% of Group A and 8% of Group B had persistent posterior deviation. Spurs were found in 8% of cases in Group A only. As a complication synechiae was found in 16% cases of Group A and 4% in group B. Septal hematomaas a complication was found in 8% of Group A while only in 4% of Group B patients.



4. Discussion

In our study we observed male to female ratio of septal deviation was 2.3:1 and the most commonly affected group were of younger age from 2nd to 4th decades which is in concordance with the study conducted by J. Janardhan Rao et al. (1998), S.P. Gulati et al. (2009) etc.

Most common complaints of patients with septal deflections were found to be nasal obstruction (80%), headache (50%), anterior nasal discharge (30%), postnasal drip (10%), sneezing (8%) and epiphora (6%). Epiphora as a presenting symptom in our study was primarily in the cases of chronic dacryocystitis referred to us by ophthalmologists. These patients had concomitant septal deviation presenting difficulty in accessing the target area. These findings are similar to the study conducted by M. Gupta and G. Motwani (2000), S.P. Gulati et al. (2009).

Dipak Ranjan Nayak et al. (1998) showed that several lateral nasal wall pathologies are associated with deviated septum, commonest and consistent being the inferior turbinate hypertrophy (80%) followed by concha bullosa, paradoxical middle turbinate, uncinate process abnormality, mucosal disease, polypoidal middle turbinate and over- pneumatised bulla. In our study we also encountered inferior turbinate hypertrophy in 80% followed by concha bullosa in 26% along with paradoxical middle turbinate. These findings in a case of conventional septal deflections were possible only because endoscope as a tool to address these cases was used. This enabled us to carry out an endoscopic septoplasty along with these lateral wall pathologies amenable to an easy management because of better visualisation, understanding and precise instrumentation.

A detailed preoperative endoscopic nasal cavity examination in our cases revealed certain concomitant observations. It showed that type 5 type of DNS was most commonly associated with ostiomeatal disease in 16% cases, paradoxical middle turbinate 12% cases, concha bullosa 10% cases followed by type 4 and type 6 deviations. Similar observation was also made by Mladina et al (2003), Janardhana Rao et al (1998). This could be attributed to extreme crowding (less space) at these critical areas.

Endoscopic septoplasty is not only meant primarily for relieving nasal obstruction but also to gain access to surgical sites as in cases of FESS. It also has distinct advantages in paediatric cases, in revision surgeries and cases with previous septal perforation and also in cases with isolated

septal spurs. Complex deformities and the caudal deflections are however better dealt with by resorting to conventional septoplasty. In present study of the 25 cases selected for endoscopic correction, endoscopic septoplasty alone was performed in 18 cases, 4 cases in conjunction with FESS and 3 cases in conjunction with DCR. Similar views were expressed in the studies conducted by Harry Cantrell et al. (1997) and Hwang et al (1999).

In our study discretion was the sole criterion for selecting the cases for conventional/endoscopic septoplasties. Gross septal deformities in which the convexity was extreme, caudal deflection to either side in which the cartilage was jutting and could be seen just near the columella were subjected to conventional septoplasty. On the other hand subtle deflections, isolated bony spurs and bony posterior deflections were subjected to endoscopic septoplasty. Three cases of endonasal DCR and four cases of FESS were due to concomitant ostiomeatal disease which was a chance finding in detailed preoperative endoscopic examination were subjected to endoscopic septoplasty as septal deflection was hindering the access to the target area. These are in corroboration with various studies which have been carried out to address septal deflections by both conventional as well as endoscopic means such as Nayak et al. (1998), Nishi Gupta (2005), S.P. Gulati et al. (2009).Our finding of intraoperative deflections in which we found cartilaginous type of DNS in 36% in Group A and 40% in Group B, bony type of DNS in 44% in Group A and 52% in Group B and caudal deflection were in 12% of cases of Group A only are in accordance with the study by M. Gupta and G. Motwani (2005).It is prudent to mention that any surgeon engaged in septoplasty intraoperatively bases his skills on his reflexes for eg. at the level of maxillary crest he/she takes a knife, feels the bone and makes an incision at the mucoperichondrial-periosteal junction so as to make the inferior tunnel of Cottle (i.e. to raise the flap on both sides of the bony maxillary crest)because of poor illumination. On the other hand the use of an endoscope indeed enables one to really appreciate these subtle steps and to do it under proper vision confidently.

In a study by Sindhwani and Wright (2003), 54% patients with complaints of nasal obstruction and facial pain were cured and 38% showed improvement and 8% were not benefited. In a study by Harley et al. (2003) patients with nasal obstruction and headache were selected and significant improvement was observed in endoscopic group as compared to conventional group. In the present study more no. of patients were relieved from these symptoms in endoscopic septoplasty group as compared to conventional group (90% improvement in nasal obstruction, 100% relief from headache, 67% improvement in post nasal drip). Not enough literature is available in the world in which these two techniques have been compared. In our study even in our conventional group we had fairly good results. These could be explained on the basis of surgical excellence, good selection of cases and a meticulous post operative follow up.

Complication rate in the study by M. Gupta et al (2005) was found to be 2.08% and in a study by Hwang et al (1999), the complication rate was found to be 5% for endoscopic septoplasty. In the study by Park et al (1998), the synechiae were formed in significant lower number of patients in endoscopic septoplasty group as compared to conventional group. In our present study synechiae formation was only 4%. In our study the postoperative incidence of persistent deviation including both anterior and posterior in the conventional group were 7 cases i.e. 28% while in endoscopic group there were 5 cases of persistent deviation i.e. 20%. These findings were in concordance with observations made by Nayak et al (1998). We could observe only 2 residual spurs in the conventional group postoperatively while none in endoscopic group. All the surgeons familiar with septoplasty dread the complication of synaechiae. Synaechiae results because of crudity in surgical manipulation and with forced nasal packing resulting in the abrasion of nasal mucosa. However if the surgeon respects the tissue these can be avoided. In our study we found only 4 cases developing synaechiae in the conventional one while in only one case developed synaechiae in endoscopic septoplasty. This could be attributed to limited access, minimum handling and packing with soft material merocel.

Compared with the traditional method, the advantages of using endoscopic septoplasty are:

1) Enhanced illumination and wider field of vision
2) Better posterior septal spur correction which is difficult to reach/missed by conventional method.
3) More precise identification of the septal area to be repaired with subsequent limited extension of resection
4) Minimally invasive surgery; more limited incisions immediately anterior to the area of the septal deviation with less need to raise and retract the flaps
5) Useful in minor surgical revision after septoplasty or in septal perforations;
6) Better and more precise understanding of the disease of the sidewalls of the nasal fossa associated with septal malformations;
7) The ability to integrate the procedure with endoscopic procedures of the paranasal sinuses and lacrimal sac.
8) The ability to perform selective partial resection of the turbinates under endoscopy.
9) Minimal blood loss,
10) Endoscopic septoplasty is also indicated and performed in children, as it assists in avoiding resections that may cause aesthetic or functional anomalies during development, thus preserving delicate growth structures.
11) Minimal tissue handling with leading to less postoperative edema and pain.
12) Fewer complications like septal perforation and septal hematoma.

Lastly, 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, post graduates and Medical students and nursing staff.

It would not be improper to mention that a rigid stand as per the choice be made. The procedure can be started as a conventional one with a conventional hemi trans-fixation incision and later on be switched towards endoscopic septoplasty to view finer details and later on to address concomitant problems such as dealing with concha bullosa

etc. for better improvement of the airway. This would significantly improve our results in the best interest of the patients.

5. Summary and Conclusion

The present study was conducted in The Department of Otorhinolaryngology, R.N.T. Medical College and M.B. Hospital, Udaipur, entitled **"An Endoscopic approach to the deviated nasal septum: A Prospective study".** The Subjects were selected by Simple random sampling method and the patients were divided into two groups; Group A (conventional septoplasty) and Group B (endoscopic septoplasty) with 25 cases in each group.

- Our study consisted of 50 subjects with 35 males and 15 females and most of the patients were in age group 10-30 years.
- Most of the patients presented with the complaints of Nasal obstruction (80%), Headache (50%) and Anterior nasal discharge (30%).
- Most common type of deformity of nasal septum was found to be Type 5 deviation(46%) i.e, Horizontal spur on one side with or without posterior deviation to the other side (Mladina's classification).
- Deviated nasal septum was found associated with several lateral nasal wall pathologies, the most common and consistent finding was inferior turbinate hypertrophy (80%) followed by concha bullosa (26%) and paradoxical middle turbinate (24%).
- Type of DNS was assessed intraoperatively, bony deviation was found more common in endoscopic septoplasty group (52%) as compared to conventional septoplasty group (44%) .
- Endoscopic septoplasty alone was performed in 18 cases out of 25 cases of group B and in rest of the cases it was performed in conjunction with minimal FESS and DCR.
- Postoperative stay more than 48 hrs was more in conventional septoplasty group.
- Immediate post operative complication (just after pack removal) like septal haematoma, bleeding and synechiae were more in conventional septoplasty group.
- Postoperatively significant relief from the symptoms of headache (100%), nasal obstruction (90%), nasal discharge (84%), post nasal drip (67%) and hyposmia (50%) was observed more in endoscopic septoplasty group as compared to the conventional septoplasty group.
- Objective assessment of the patients was done at last follow up(3 months of surgery) by means of endoscopy and it revealed that prevalence of persistent deformity (Anterior deviation, posterior deviation, spur) of the septum was more for conventional septoplasty while it was less for endoscopic septoplasty group.
- Posterior deviations were best corrected by endoscopic septoplasty. Prevalence of persistent posterior deviation in conventional septoplasty group was found to be 12% while in endoscopic septoplasty group was 8%.
- Synechiae formation and persistent pathology of turbinates were also significantly less for endoscopic septoplasty.

In the end, we reach to the conclusion that the endoscopic approach to septoplasty facilitates accurate identification of the pathology due to its better illumination, improved accessibility to remote areas and magnification. It facilitates realignment by limited and precise resection of the pathological areas, by precise repair and strategically placed wedge resections. It effectively relieves contact areas and thus contact headache by allowing intraoperative assessment.

Endoscopic septoplasty is associated with significant reduction in patients morbidity in both pre-operative and post-operative period due to its limited extent of flap dissection, not using Killian nasal speculum which by pressure can cause per-operative discomfort, limited manipulation and resection of septal framework, thus obviating the need for a tight pack and requiring packing for a lesser duration. However, the endoscope has its own limitations which include loss of binocular vision, need for frequent cleaning of the tip of endoscope especially when there is more bleeding and lastly by endoscopic approach to septoplasty complex deformities with caudal deflections could not be corrected.

On the other hand still we cannot ignore the Conventional method of septoplasty for correcting the deviated nasal septum because this method has its own importance.

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