International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 13, No. 12, December 2024 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_13.12.2024.84

ORIGINAL RESEARCH

Study of pediatric septoplasty and its outcomes

Dr. Narla Surekha[1], Dr. H.T.Latha Devi[2], Dr.R.N.Karadi[3], Dr. Shashi Kumar[4]

[1]Final year post graduate, [2]Professor, [3]Professor and Head of the Department, [4]Assistant Professor, Department of ENT, Shri B.M.Patil Medical College, Hospital and Research Centre, B.L.D.E Deemed university, Vijayapura, Karnataka, India

Corresponding Author
Dr. Narla Surekha
Final year post graduate, Department of ENT, Shri B.M.Patil Medical College, Hospital and Research Centre, B.L.D.E Deemed university, Vijayapura, Karnataka, India.
Email:surekhareddysure@gmail.com

Received Date: 23 October, 2024 Accepted Date: 27 November, 2024

ABSTRACT

Introduction: A deviated nasal septum is an abnormal configuration of septal cartilage which may cause problems with breathing or nasal discharge. A septal deviation can be present at the time of birth or can be caused by an injury. Incidence of DNS in pediatric patients is 59%. Exact timing for septoplasty among children remains unclear at present, because nasal growth completion occurs up to the age of 16 years in males and 14 years in females. However, few centres have recently opted for an earlier age septoplasty when indicated only if it is considered that benefits are outweighing the risks. It is reported that Septoplasty surgery is successful in children. But this surgery must be conservative and must be restricted to pathologic area. Henceforth, this study is undertaken to compare the efficacy of septoplasty in pediatric age group who has nasal obstruction and poor quality of life. **Aims:** Study of Outcomes in children who underwent pediatric septoplasty in terms of nasal obstruction and Quality of life assessment through Nose scale score. **Methodology:** The data will be collected in the form of a questionnaire in terms of complete clinical history, clinical examination and necessary investigations of the patients. Detailed examination of the patient with an emphasis on anterior rhinoscopy findings will be done with the help of thudicum nasal speculum or tip test and headlight to see the status of turbinate. A preoperative diagnostic Nasal Endoscopy has been performed with 0 degrees and 30-degree scopes for cooperative patients. Computed Tomography of Paranasal sinuses (coronal) Plain has been added 0.6 or 0.7mmPlain. NOSE scale is used to assess postoperatively. A postoperative diagnostic nasal endoscopy has been performed with 0-degree and 30- degree scopes. Post operatively patients are followed at 6 weeks and 6 months interval to assess the symptoms. Randomization of the patients will be done by lottery methods. Chits will be given to the patients, and the patient is asked to select one chit to avoid bias for surgery. **Results:** Out of 30 patients, males were76.7% and females were 23.3%. The current study reveals significant differences in post operative NOSE score and VAS score when compared to pre operative scores. This comparison was done using Wilcoxon test which showed considerable improvement in NOSE score and VAS score with signifance<0.001. In the study synechia, infection following crust formation and residual deviation were the common complications. **Conclusion:** It is justified that septoplasty in the pediatric age group shows significant improvement in quality of life and the low complication rate, even if considerable cartilage work was done.

Key words: NOSE, DEVIATED NASAL SEPTUM, PEDIATRIC SEPTOPLASTY, NOSE SCALE SCORE, VAS SCORE.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

The most common complaint among patients visiting otorhinologists is prolonged nasal blockage. Nasal septal abnormalities and mucosal disease associated with turbinate hypertrophy can lead to nasal obstruction. The septum, made of cartilage, divides the nose into two separate nasal cavities. A deviated nasal septum (DNS) is an abnormal configuration of the septal cartilage that divide these cavities. It is a condition in which the septum separates from the centre of the nose. Still, it is typical to deviate slightly to one side. Until roughly the age of seven, the septum often remains in the midline; beyond that, it frequently veers to one side. DNS can be congenital, can result from injury, or arise from damage due to previous medical treatments. Trauma, a frequent cause of DNS, may occur during childbirth, especially with forceps placement or in patients with a narrow pelvic passage, where excessive pressure is exerted on the nose or midfacial area of the head.

The symptoms of DNS, which include nasal obstruction, mouth breathing, increased airflow

©2024Int. J. LifeSci.Biotechnol.Pharma.Res.

DOI: 10.69605/ijlbpr_13.12.2024.84

resistance, the unsightly look of the nose, and occasionally snoring, are significant in a child's life. In addition to nasal blockage, DNS in children can result in mechanical obstruction to the paranasal sinus's drainage, which can lead to postnasal drip, crusting, epistaxis, and recurrent sinusitis. A paediatric patient's long-term alleviation from this morbidity will be aided by early DNS diagnosis and care [1]. Septoplasty is the term for the procedure used to correct the deviated nasal septum. Since nose development completion occurs at age 16 for males and 14 for females, the current state of septoplasty in children is unknown. The normal growth of the nose and face may be negatively impacted by surgical intervention on a developing structure, whichis a cause for concern. Still, the majority of recent research has shown that a delay in surgically realigning the septum can lead to misaligned dentition, aberrant facial development, and deterioration of their breathing issues. Septoplasty refers to a surgery in which only deviated part of the septum is removed leaving the remaining normal septum behind. There was a recent tendency toward cartilage removal and inserting back after remodelling which some papers refer to as external septoplasty.

Pediatric septoplasty doesn't appear to impact growth in the midface[2]. When necessary, septoplasty is performed at an earlier age if the advantages outweigh the dangers. This study's objectives are to assess the health associated quality of life in pediatric patients (<14 years). Patients following septoplasty and to evaluate both the early and the long-term effects following surgery[3].

When necessary, septoplasty is performed at an earlier age if the advantages outweigh the dangers. Children can have nasal septal surgery without having their midfacial and nasal development disrupted.

MATERIALS AND METHODS

Study design

Cross-sectional Prospective study

Source of data

All children between 8 to 14 years who underwent septoplasty surgery in the Department of Otorhinolaryngology, B.L.D.E. (Deemed to be University Shri B. M. Medical College and research center, Vijayapura, between july 2022 to december 2023.

Method of collection of data

1. A questionnaire was used to gather information on the patients' whole clinical history, clinical examination, and required investigations.
2. A thorough examination of the patient was conducted, focusing on the results of the anterior rhinoscopy. The turbinate's condition was assessed using a spotlight and a thudicum nasal speculum.
3. Both 0 degree and 30 degree scopes had been used for a preoperative diagnostic nasal endoscopy as shown in figure 3.
4. 0.6 or 0.7mm plain CT scan of the paranasal sinuses (coronal) had been added.
5. The NOSE scale was used to evaluate nasal blockage both before and after surgery.
6. septoplasty is performed on the patient as shown in figure 4.
7. A postoperative diagnostic nasal endoscopy using 30 and 0 degree scopes had been carried out.
8. Post operatively patients were followed at 6 weeks and 6 months interval to assess the symptoms.

Sample size

Using G*Power ver. 3.1.9.4 software for sample size calculation, The proportion of children of 13 years is 24%, and this study requires a sample size of 28. So to achieve a power of 80% for detecting a difference in Proportion (Exact – Proportion: Difference from constant (binomial test, one sample case) with 5% level of significance.

Statistical Analysis

The data obtained will be entered in a Microsoft Excel sheet, and statistical analysis will be performed using statistical package for social sciences (Version 20). Results will be presented as Mean±SD, counts and percentages and diagrams. For normally distributed continuos variables between the two groups will be compared using independent t-test. For not normally distributed variables, Mann Whitney U test will be used. Pre and post operative data will be compared using Paired t-test/Wilcoxon signed-rank test. Categorical variables between the two groups will be compared using a Chi-square test/Fisher\s Exact test. Pre and Postoperative categorical data will be compared using Mac Nemer’s chi-square test. $P < 0.05$ will hence be considered statistically significant. All statistical tests will perform two-tailed.

Inclusion Criteria

1. symptomatic nasal obstruction due to moderate to severe degree of septal deviation.
2. severe nasal septal deformity following trauma

Exclusion Criteria

1. Septal Perforation
2. Moderate to severe adenoid hypertrophy
3. Allergic rhinitis

Subjective evaluation tools, such as the Nasal Obstruction Symptom Evaluation Scale (NOSE) and a 10-cm Visual Analogue Scale (VAS), were used in this study to gauge the intensity of symptoms. Each of the five elements on the NOSE scale (Table 1) has a score between 0 and 4, with 0 denoting no problem, where 1 denotes very mild problem, 2 denotes moderate problem, 3 denotes fairly bad problem, and 4 denotes severe problem. The raw score spans from 0

©2024Int. J. LifeSci.Biotechnol.Pharma.Res.

DOI: 10.69605/ijlbpr_13.12.2024.84

to 20, and after multiplying the raw score by 5, the total scale score spans from 0-100. A score of 5-25 is mild, 30–50 is deemed moderate; a score of 55–75 is considered severe; a score of 80–100 is regarded as extreme nasal obstruction shown in (TABLE 1).

TABLE1: NASAL OBSTRUCTION SYMPTOM EVALUATION (NOSE) SCALE[4]

Over the past month, how much of a problem were the following conditions for you?					
	No problem	**Very mild problem**	**Moderately problem**	**Fairly bad problem**	**Severe Problem**
1.Nasal congestion	0	1	2	3	4
2.Nasal blockage	0	1	2	3	4
3.Trouble breathing throughmy nose	0	1	2	3	4
4.Trouble sleeping	0	1	2	3	4
5.Unable to get enough hair through my nose during exercise or exertion	0	1	2	3	4
Circle the correct response					

VISUAL ANALOGUE SCALE

The VAS score was used to visualise the overall and global satisfaction of the patients with surgical outcomes. It runs from 0 (worst possible) to 10 (best possible) satisfaction on a 10 cm line (Figure 1). All patients were assessed using the NOSE and VAS scale both pre operatively and post operatively[5].

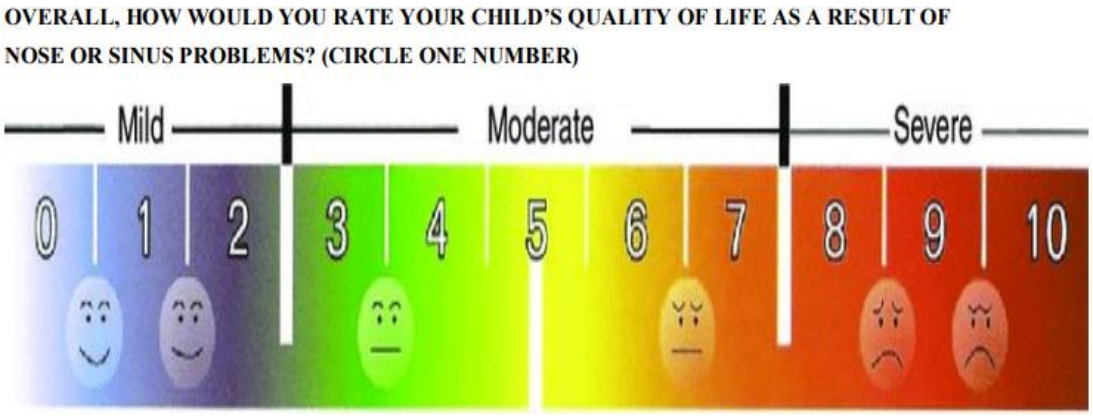
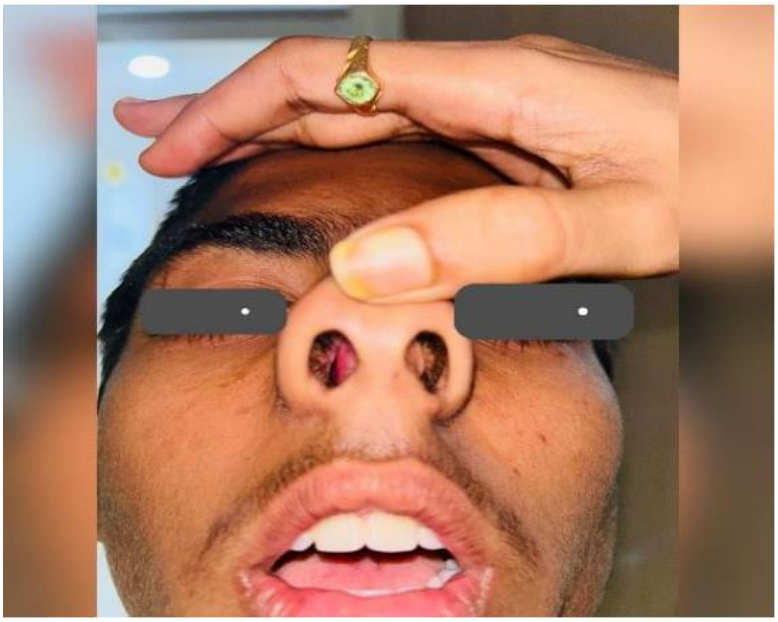


Figure (1): Visual Analogue Scale of Quality of Life[5].

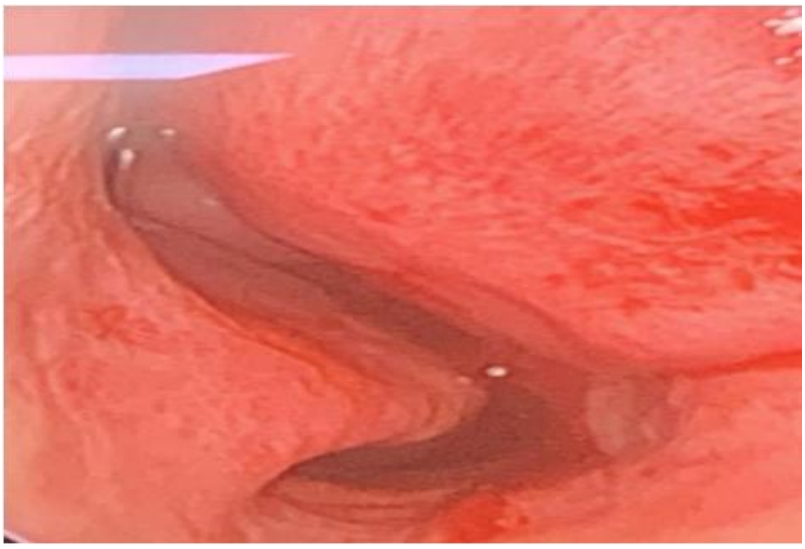
Prior to performing the surgery, with the parents' consent, photographic evidence was taken as shown in (FIGURE 2).



Figure(2) : 13 year old patient with right septal deviation.
source of the image: Department of ENT, Shri B.M. patil hospital.

©2024Int. J. LifeSci.Biotechnol.Pharma.Res.

DOI: 10.69605/ijlbpr_13.12.2024.84



Figure(3) : DNE showing left sided spur
source of the image: Department of ENT, Shri B.M. patil hospital, Pre operative diagnostic nasal endoscopy is done for all co operative pediatric patients as shown in (FIGURE 3)

Figure (4): Intra operative image of pediatric septoplasty
source of the image: Department of ENT, Shri B.M. patil hospital.

Pediatric septoplasty procedure with deviated septum removal as shown in (FIGURE 4)

RESULTS

In the current study, the parameters were taken from (30) patients who underwent septoplasty, and results were calculated.

1. AGE DISTRIBUTION

TABLE 2: DISTRIBUTION OF PATIENTS BASED ON AGE

AGE	FREQUENCY	PERCENTAGE
<=11	4	13.3
12-13	13	43.3
14	13	43.3
TOTAL	30	100

In our study out of 30 patients enrolled and operated for pediatric septoplasty 4(13.3%) patients were of <11age, 13(43.3%) were between 12-13, 13(43.3%) were under 14 years. (TABLE 2)

©2024Int. J. LifeSci.Biotechnol.Pharma.Res.

DOI: 10.69605/ijlbpr_13.12.2024.84

2. SEX DISTRIBUTION

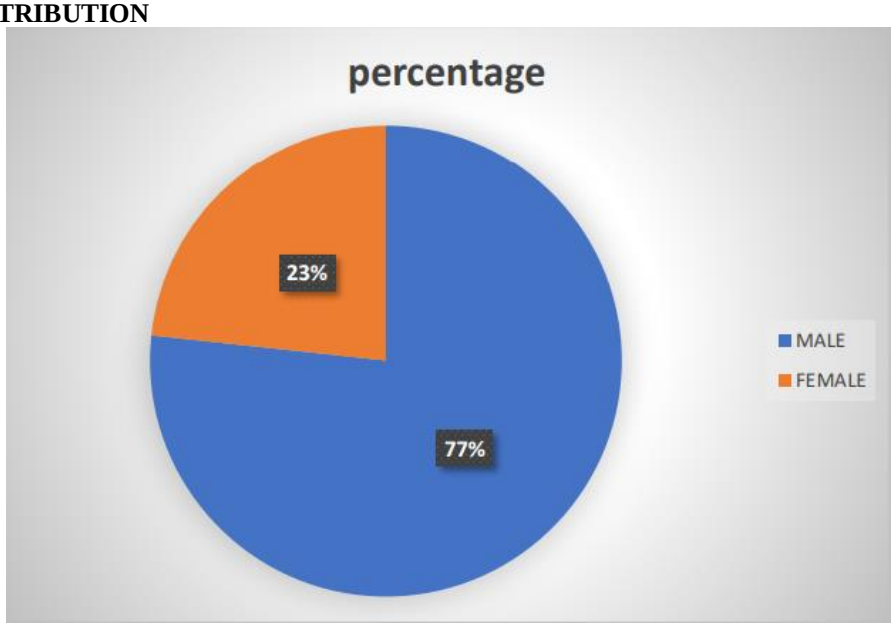
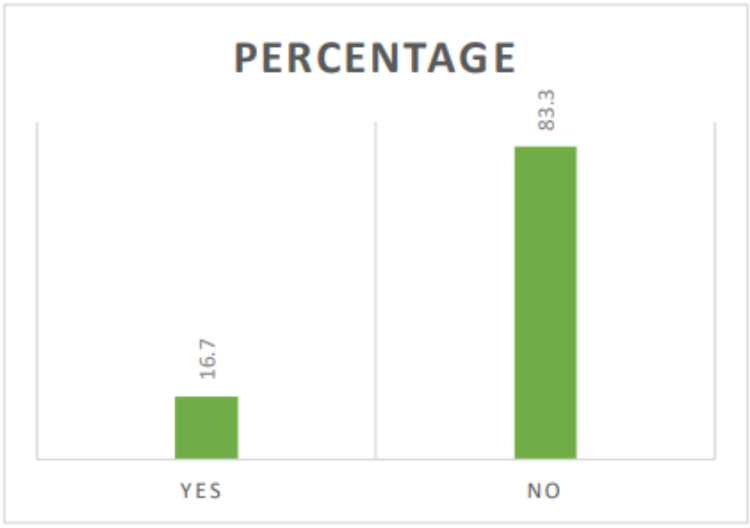


FIGURE 5: DISTRIBUTION OF PATIENTS ACCORDING TO SEX.

In our study out of 30 patients enrolled and operated for septoplasty, 23.3 % of the patients are females and 77% were males (FIGURE 5).

3. H/O TRAUMA



(FIGURE 6)

Out of 30 patients enrolled and operated for septoplasty 16.7% of the patients had h/o trauma and 83.3 % had no h/o trauma as in (FIGURE 6).

4. NOSE SCALE PREOPERATIVE, 6 WEEKS AND 6 MONTHS POST OPERATIVELY (TABLE 3)

Pre-operative NOSE scale		Frequency (percentage)	6weekspostoperativeNOSE scale		Frequency (percentage)	6 months post operative NOSE scale		Frequency (percentage)
Severe	75	2(6.7)	Moderate	50	8(26.7)		15	7(23.3)
	80	7(23.3)		55	10 (33.3)			
	85	11 (36.7)		60	9(30)		25	9(30)
	90	8(26.7)		65	2(6.7)	Mild	5	8(26.7)
Extreme	95	2(6.7)	SEVERE	70	1(3.3)	Moderate	30	2 (6.7)

Out of 30 patients, pre operative nose score of 75 in 2 patients, 80 in 7, 85 in 11, 90 in 8, 95 in 2 patients respectively followed by 6 weeks post operative nose score of 50 in 8, 55 in 10, 60 in 9 70 in 1 and post

©2024Int. J. LifeSci.Biotechnol.Pharma.Res.

DOI: 10.69605/ijlbpr_13.12.2024.84

operative 6 months nose score was 15 in 7, 25 in 9, 5 in 8, 30 in 2. Thus there is significant improvement in nose score when pre operative and post operative 6 months scores are compared as shown in (TABLE 3).

5. VAS SCALE PRE-OPERATIVELY AND 6 MONTHS POST OPERATIVELY (TABLE 4)

Pre-operative VAS		Frequency (percentage)	6 months post operative VAS		Frequency (percentage)
Moderate	7	4(13.3)	MILD	0	3(10)
Severe	8	15(50)		1	10(33.3)
				2	7(23.3)
				3	3(10)
				4	1(3.3)
	9	11 (36.7)	MODERATE	5	3(10)
				6	3(10)

Out of 30 patients, pre operative vas score was 7 in 4, 8 in 9, 9 in 11 patients where as post operative 6 months vas score was 0 in 3, 1 in 10, 2 in 7, 3 in 3, 4 in 1, 5 in 3 patients respectively. Thus there was a significant improvement in vas score in when pre operative and post operative scores were compared as explained in (TABLE 4)

6. NOSE SCORE (TABLE 5)

NOSE SCALE	MEAN	STANDARD DEVIATION	MEDIAN (25^{th}-75^{th})	WILCOXON SIGNED RANKTEST	SIGNIFICANCE
PREOP	85.7	5.167	85(80-90)	-4.826	0.0001
POD 6 WEEKS	5.83	3.957	5(5-6.25)		

The mean pre op nose scale score was 85.7 and standard deviation is 5.167 and mean post op 6 months nose score was 5.83, standard deviation was3.957. Nose scores of both the groups were compared using Wilcoxon signed ranks test (-4.826), and found to be Significant (p value<0.001).(TABLE 5)

7. VAS SCORE (TABLE 6)

VAS SCALE	MEAN	STANDARD DEVAITION	MEDIAN (25^{th}-75^{th})	WILCOXONSIGNED RANKSTEST	SIGNIFICANCE
PREOP	8.233	6.7891	8(8-9)	-4.798	0.0001
POD6 WEEKS	2.33	1.86313	2(1-3.25)		

The mean preop vas score was 8.233 and the standard deviation was 6.7891where as the post op 6 months vas score was 2.33, standard deviation was 1.86313. Vas scores ofboth the groups were compared using Wilcoxon signed rank test (-4.798) and found to be significant (p value <0.001). (TABLE 6)

DISTRIBUTION OF PATIENTS ACCORDING TO COMPLICATIONS POST SURGERY (TABLE7)

COMPLICATIONS		FREQUENCY	PERCENTAGE	NOTES
EARLY	EPISTAXIS	PRESENT-0	0	NOTREPORTED
		ABSENT-30	100	
	SEPTAL HEMATOMA	PRESENT-0	0	NOTREPORTED
		ABSENT-30	100	
INTERMEDIATE	CRUSTING	PRESENT-8	26.7	DNE WITH DECRUSTATIONAND SUCTIONCLEARANCE
		ABSENT-22	73.3	
	VESTIBULITIS	PRESENT-3	10	MOSTLYDUE TO CRUSTATION
		ABSENT-27	90	
LATE	SYNECHIA	PRESENT-8	26.7	SYNECHIARELEASE
		ABSENT-22	73.3	
LATE	SEPTAL PERFORATION	PRESENT-0	0	NOTREPORTED
		ABSENT-30	100	
	RESIDUAL	PRESENT-4	13.3	DUETOLIMITED

©2024Int. J. LifeSci.Biotechnol.Pharma.Res.

DOI: 10.69605/ijlbpr_13.12.2024.84

	DEVIATION	ABSENT-26	86.7	CARTILAGE REMOVAL

Out of 30 patients enrolled and operated in our study, no patients had epistaxis, septal hematoma and septal perforation. 8 (26.7 %) patients had post op crusting and synechia, 3(10%) had vestibulitis, 4(13.3%) had residual deviation. (Table 7)

DISCUSSION

Paediatric septoplasty, in contrast to adult septoplasty, is still debatable and up for debate since it is thought that performing the procedure in underdeveloped nations may have negative consequences on the development of the nose and face.[6] The most important aspect of surgery is to preserve the principal nasal and midface growth centres while performing a cautious excision of the cartilage. Excision should be kept to a minimum, and an excised segment must be reinserted after remodelling. Certain precautions in pediatric septoplasty should be considered to reduce the possible effect on nasal growth and shape. Minimal excision is recommended, and following remodelling, an excised segment needs to be reinserted. When performing paediatric septoplasty, there are a few measures that should be taken to lessen the potential impact on nasal growth and morphology.[7]

These include avoiding the elevation of the nasal mucosa of the floor to avoid damage to the incisive nerves, avoidance of incision and excision through the growing and supporting zones, especially at the sphenoethmoid dorsal zone, avoiding the separation of the septal cartilage from the perpendicular plate, avoidance of transecting the septospinal ligament, avoidance of unilateral orbilateral separation of the upper lateral cartilages from the septum, and to avoid implanting alloplastic or biomaterials in the growing septum. The incisive nerves should not be injured by elevating the nasal mucosa of the floor, cutting or excising through the growing and supporting zones, particularly at the sphenoethmoid dorsal zone, separating the septal cartilage from the perpendicular plate, cutting through the septospinal ligament, separating the upper lateral cartilages from the septum unilaterally or bilaterally, or implanting biomaterials or alloplastic materials in the growing septum. We attempt to draw attention to a few issues pertaining to long-term outcomes following surgery and health-related quality of life in the current study. The danger of septoplasty on the long-term growth of the face is low in certain paediatric children[7]. Parents and young patients should be educated about long-term follow-up and the necessity of revision surgery after puberty, regardless of the type of nose surgery performed on their child.

The total number of male and female patients in this study varied from a population of 30 patients with deviated nasal septum leading to symptomatic severe nasal obstruction who attended the ENT OPD during the study period who fulfilled the inclusion criteria. The present study, included patients ranging from 10 TO 14 years of age. Out of 30 patients, 4 children were <=11 years, 13 children were ranging between 12-13 years. 13 children were of 14 years age group. Mean age in this study is 12.73. On a contrary, in a study by Basil et al., mean age was 8.5 and it was 15.7 in a study by Manteghi et al., Out of 30 patients, 23% were females, 76.7 % were males which shows that majority are males. This correlates with a study by Basil et al., in which males were 96.3% and a study by Sabry et al in which it was 70%. All patients (100%) presented with nasal obstruction. Out of them 34% had right sided nasal obstruction, 38% had left sided nasal obstruction and 28% had b/l nasal obstruction. Out of 30 patients enrolled and operated for septoplasty 16.7% of the patients had h/o trauma and 83.3 % had no h/o trauma. Out of 30 patients inour study who are operated for septoplasty, 10% of the patients had symptoms of allergy ie., recurrent sneezing, watering of eyes. Out of 30 patients enrolled in our study, operated for septoplasty, 18 (60%) had left dns, 11(36.7%) had right dns and 1(3.3%) had left dns with spur. 26.7% of the patients had crusting which correlates with study by Basil et al., in which it is 32%., which was cleared by meticulous suction clearance and instructing patient to do saline nasal douching [8]. Synechia was seen in 26.7 % of the patients. In contrary it was 7% in study by Muhammad et al., 48% in a study by Basil et al., It is seen only in 10% of the patients, where as it is 24% in a study by Basil et al.,

In our study 30 patients had undergone septoplasty. Pre op scores were ranging between 75 to 95 and out of 30, only 2 patients were under severe nose scale (75) and rest all were under extreme scale (80-95). During follow up on 28th post operative day, there is an improvement in nasal obstruction and nose score and scores were ranging between 50 and 70, ie., 23 were under severe scale, and 7 were under moderate scale. During further follow up after post op 6 months, there is significant improvement in nasal obstruction and nose score and scores were ranging between 0 to 30. Out of 30 patients, 26 were under mild and rest 4 were under moderate scale. Pre op and pod 6 months scores were compared using Wilcoxon signed rank test Mean of total pre op scores of 30 patients was 85.17 and that of post operative after 6 months scores was5.83. Z value is -4.826 and the results were statistically significant ($p<0.001$). Pre op VAS scores were ranging between 7 and 9 and out of 30 patients 4 were under score 7(moderate), 15 were underscore 8(severe), 11 were under score 9(severe) which correlates with a study by Basil etal., in which 6 patients were under moderate pre op VAS score and 24 were under severe pre op VAS score [8]. During further follow up after post op 6 months, there is

©2024Int. J. LifeSci.Biotechnol.Pharma.Res.

DOI: 10.69605/ijlbpr_13.12.2024.84

significant improvement in nasal obstruction and VAS score and scores were ranging between 0 to 6. Out of 30 patients, 4 were 0 score (mild), 7 were under score 5, 9 were under 15, 8 were under score 25, Only 2 were with score 30. Pre op and pod 6 months VAS scores were compared using Wilcoxon signed rank test. Mean of total pre op scores of 30 patients was 8.233 and that of pod 6 months scores was 2.33. z value is -4.798 and the results were statistically significant, $p < 0.0001$, These results correlate with a study by Basil et al., in which the pre op vas score mean was 8.1+/-0.85 in which the comparison of pre op and post op vas scores were statistically significant ($p<0.001$). So from this discussion, septoplasty in pediatric age group had benefited patients which correlated with other studies in terms of NOSE and VAS scores[9].

LIMITATIONS

1. Lack of long term follow up of the patients is one of the limitations in this study. In the current study patients were followed post op 6 weeks, 6 months.
2. VAS score was given by parents, since the patients were of pediatric age group. So, there might be a bias with regards to VAS score.

CONCLUSION

Septoplasty in pediatric age group (<14years) has led to significant improvement with regards to nasal obstruction and quality of life in children. There can be very few complications like crusting, synechiae post surgery which can be easily addressed[10].

REFERENCES

1. Sooknundun M, Kacker SK, Bhatia R, Deka RC. Nasal septal deviation: effective intervention and long term follow-up. Int J Pediatr Otorhinolaryngol. 1986 Nov;12(1):65-72. doi: 10.1016/s0165-5876(86)80059-3.
2. Calvo-Henríquez C, Neves JC, Arancibia-Tagle D, Chiesa-Estomba C, Lechien JR, Mayo-Yáñez M, Martinez-Capoccioni G, Martin-Martin C. Does pediatric septoplasty compromise midfacial growth? A systematic review. Eur Arch Otorhinolaryngol. 2020 Jun;277(6):1565-1574. doi: 10.1007/s00405-020-05919- 7.
3. Valsamidis K, Titelis K, Rachovitsas D, Konstantinidis I, Markou K, Triaridis S. Long-Term Evaluation of Nasal Septoplasty Followed by Inferior Turbinate Cauterization for the Treatment of Nasal Obstruction using Objective and Subjective Methods. Int Arch Otorhinolaryngol. 2018 Jul;22(3):284-290. doi: 10.1055/s-0037-1613688.
4. Stewart MG, Witsell DL, Smith TL, Weaver EM, Yueh B, Hannley MT. Development and validation of the Nasal Obstruction Symptom Evaluation (NOSE) scale. Otolaryngol Head Neck Surg. 2004 Feb;130(2):157-63. doi: 10.1016/j.otohns.2003.09.016.
5. Shukla RH, Nemade SV, Shinde KJ. Comparison of visual analogue scale (VAS) and the Nasal Obstruction Symptom Evaluation (NOSE) score in evaluation of post septoplasty patients. World J Otorhinolaryngol Head Neck Surg. 2020 Apr 6;6(1):53-58. doi: 10.1016/j.wjorl.2019.06.002.
6. Bishop R, Sethia R, Allen D, Elmaraghy CA. Pediatric nasal septoplasty outcomes. Transl Pediatr. 2021 Nov;10(11):2883-2887. doi: 10.21037/tp-21- 359.
7. Rabie, A.N., Begermy, M.M.E., Shalma, A.A.A.E. et al. Pediatric septoplasty impact on nasal breathing and when to consider a revision surgery-A metaanalysis study. Egypt J Otolaryngol 40, 133 (2024). https://doi.org/10.1186/s43163-024-00666-6.
8. Basil M.N.Saeed., Mohammed Saeed Sheet., Emanuel et al. Pediatric Septoplasty: A Case Series Study. June 2023. Annals of the College of Medicine Mosul 45(1):70-79. DOI:10.33899/mmed.2023.137591.1182
9. Acharya, S., Dash, A., & Satpute, S. (2022). Septoplasty in peadiatric population: A systematic review of quality of life outcome. International Journal of Health Sciences, 6(S8), 6361–6366. https://doi.org/10.53730/ijhs.v6nS8.13785
10. Saniasiaya J, Abdullah B. Quality of life in children following nasal septal surgery: A review of its outcome. Pediatr Investig. 2019 Sep 26;3(3):180-184. doi: 10.1002/ped4.12145.

©2024Int. J. LifeSci.Biotechnol.Pharma.Res.