

Original Research Article

A comprehensive study on haematological and platelet related changes following septoplasty

Shivakumar Senniappan*, Naveen Giritharan

Department of ENT, Vinayaka Missions Kirupanandavariyar Medical College and Hospitals, Salem, Tamil Nadu, India

Received: 27 September 2020

Accepted: 12 October 2020

*Correspondence:

Dr. Shivakumar Senniappan,

E-mail: drshiva73@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Septoplasty is an elective surgical procedure indicated for the improvement of anatomic nasal airway obstruction. Platelets have an important role in endothelium damage repair and regulating hemostasis. Platelets produce pro-inflammatory mediators such as cytokines and chemokines during vascular inflammation. Aim of the study was to determine various types of changes that occur in Haematology and Platelet profile in patients after they undergo Septoplasty.

Methods: The study was conducted between January 2019 to June 2020 on 50 patients attending ENT OPD in Vinayaka Mission's KirupanandhaVariyar Medical College and Hospital, Salem. 50 patients fulfilling inclusion/exclusion criteria who give informed consent were included in the study.

Results: The parameters with no significant differences were found in red blood cells, white blood cells, platelet count, erythrocyte sedimentation rate, haemoglobin (Hb), hematocrit (Htc), mean corpuscular volume, mean corpuscular hemoglobin concentration (MCHC), and platelet distribution width values. mean platelet volume (MPV) value was decreased, platelet-to-lymphocyte ratio (PLR) and neutrophil to lymphocyte ratio (NLR) values were increased.

Conclusions: In our study, MPV value was decreased, PLR and NLR values were increased significantly after septoplasty. Also, the decrease in nasal obstruction symptom evaluation (NOSE) score after surgery is the confirmatory parameter proving that septoplasty not only improves the quality of life but also significantly corrects the altered blood and platelet related parameters in nasal septal deviation patients.

Keywords: Septoplasty, Platelet count, Nasal obstruction symptom evaluation score

INTRODUCTION

Septoplasty is an elective surgical procedure indicated for the improvement of anatomic nasal airway obstruction. It usually involves a judicious excision/realignment of a portion of the bone and/or cartilage in the nasal cavity.¹ It is one of the most commonly performed surgeries with an estimated 260,000 septoplasties performed per year. The nasal obstruction symptom evaluation (NOSE) scale is composed of five questions concerning the severity of nasal obstruction.² It is a reliable and valid tool to identify

restrictions of quality of life in patients with nasal problems. Nasal obstruction is a common presenting symptom in our day to day practice. Nasal deformity (septal deviation), turbinate hypertrophy, adenoid hypertrophy, nasal polyposis, are the few causes of nasal obstruction and nasal septal deviation (NSD) is the most common etiology.³ 80% of the general population is estimated to have some type of nasal deformity. Marked NSD causes chronic upper airway obstruction (UAO). UAO causes alveolar hypoventilation leading to chronic hypoxia and hypercarbia.⁴ Chronic hypoxia and

hypercarbia show a tendency for hypercoagulopathy. hypoxia leads to chronic inflammation, oxidative stress, and endothelial dysfunction.⁵ Platelets have an important role in endothelium damage repair and regulating hemostasis. Platelets produce pro-inflammatory mediators such as cytokines and chemokines during vascular inflammation.⁶ Platelet-to-lymphocyte ratio (PLR) and neutrophil-to-lymphocyte ratio (NLR) are new markers for inflammation. PLR, NLR, and platelet distribution width (PDW) values are inflammatory markers that can detect platelet activation and inflammation.⁷ Similarly hypoxia causes certain changes in the RBCs and WBCs by altering cellular metabolism leading to an increase in the production of erythrocytes and leucocytes. An acute decrease in plasma volume is observed in hypoxic situations causing a rapid increase in hemoglobin concentration.⁸

METHODS

The study was conducted between January 2019 – June 2020 on 50 patients attending ENT OPD in Vinayaka Mission's Kirupanandha Variyar Medical College and Hospital, Salem. 50 patients fulfilling inclusion/exclusion criteria who give Informed Consent were included in the study.

Inclusion criteria

Inclusion criteria were subjects who are symptomatic case of deviated nasal septum, subjects who are undergoing septoplasty and able to comply with study procedures.

Exclusion criteria

Exclusion criteria were subjects with a previous history of any blood and platelet related disorders, subjects with nasal polyposis, chronic rhinosinusitis, and adenoid hypertrophy.

An evaluation was performed to assess the septal deformity either anterior, posterior, or septal spur. Also, to detect if there is a contact point between the nasal septum and the lateral nasal wall as well as endoscopy

was done to exclude any other sinonasal pathology. CT scan paranasal sinuses was done for every patient preoperatively to confirm findings of clinical examinations and also to exclude any hidden sinonasal pathology. Requisite blood investigations were then done and patient was treated surgically with septoplasty. Patient was followed up regularly and requisite blood investigations done 60 days after surgery. Blood investigations were studied and compared. Patient was also assessed improvement with respect to NOSE scoring.

Statistical analysis

The data are reported as the mean±SD or the median, depending on their distribution. The differences in quantitative variables between groups were assessed using the unpaired T test. A comparison between groups was made by the nonparametric mann-whitney test. The chi-square test was used to assess differences in categorical variables between groups. A p value<0.05 using a two-tailed test was taken as being of significance for all statistical tests. All data were analyzed with a statistical software package. (SPSS, version 16.0 for windows).

RESULTS

In this study, 2 patients were among the age group 11-20 years, 22 patients were among the age group 21-30 years, 18 patients were among the age group 31-40 years and 8 patients were among the age group 41-50 years. In the present study, 28 patients were male and 22 patients were female (Table 1).

Table 1: Age distribution.

Age distribution (years)	No. of patients
0 - 10	0
11 - 20	2
21 - 30	22
31 - 40	18
41 - 50	8
51 - 60	0

Table 2: Investigations.

Parameters	Unit	Before surgery	After surgery
Total RBC count	millioncells/cu.mm	6.2	5.8
Total WBC count	cells/cu.mm	7.6	7.4
Differential leucocyte count (DLC)	%		
- Neutrophils	%	54	62
- Lymphocytes	%	34	29
- Monocytes	%	2	3
- Basophils	%	2	1
- Eosinophils	%	1	1
Platelet Count	lakhs/cells/cu.mm	2.3	2.5
ESR	mm/hr	12	11

Continued.

Parameters	Unit	Before surgery	After surgery
Haemoglobin (Hb)	gm/dl	14.8	14.5
Haematocrit (Htc)	%	47.3	46.4
Mean corpuscular volume (MCV)	fL	85.5	87
Mean corpuscular haemoglobin (MCH)	pg	31.9	29
Mean corpuscular haemoglobin volume (MCHC)	gm/dl	34.6	35
Mean platelet volume (MPV)	fL	9.75	8.45
Platelet distribution ratio (PDW)	%	28.2	27.8
Platelet-lymphocyte ratio (PLR)	%	124.38	131.07
Neutrophil-lymphocyte Ratio (NLR)	%	1.53	1.68

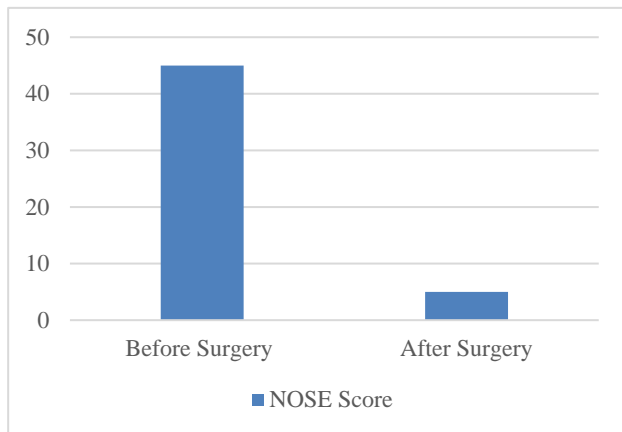


Figure 1: NOSE score.

Here, in (Table 2) neutrophil counts in DLC of patients before surgery was found to be 54% and 62% after surgery. MPV, before surgery, was found to be around 9.75 fL and around 8.45 fL after surgery. The average MCH values of patients before surgery was 31.9 pg and after surgery was 29 pg. Before surgery, average PLR values were 124.38 and 131.07 after the procedure. NLR was found to be around 1.53 before surgery and 1.68 after surgery. According to the analysis, MPV, PLR, and NLR parameters before and after surgery were found to be statistically significant. The parameters with no significant differences were found in RBC, WBC, Platelet count, ESR, Hb, Htc, MCV, MCHC, and PDW values.

There was a statistically significant improvement in nasal symptoms, 60 days after surgery according to NOSE scoring (Figure 1).

DISCUSSION

Nasal obstruction is one of the most common symptoms in nasal septal deviation. Due to nasal obstruction, patients are exposed to intermittent hypoxia leading to an alteration in platelet function. MPV is the marker for platelet reactivation potential. PDW, PLR, and NLR are the inflammatory markers that can show platelet activation and inflammation.⁹ Prolonged nasal obstruction period may also increase the risk of cardiopulmonary complications. In our present study, the

patients with deviated nasal septum causing upper airway obstruction (UAO) are subjected to blood investigations which shows significant changes before and 60 days after surgery.¹⁰ A resultant compromise in quality of life due to interfering with social and business activities can occur in Chronic nasal obstruction. It is well known that long-lasting hypoxia can affect coagulation and platelet function.¹¹ In this study, we investigated the hematological changes before and after septoplasty in patients with nasal septal deviation.¹² In a study conducted by Maran AG et al patients with NSD and healthy subjects were compared in terms of MPV and it was found to be statistically significantly higher compared with healthy subjects.¹³ Our present study before surgery, the average MPV value was 9.75 fL and after surgery it was 8.45 fL.¹⁴ In a study conducted by Nayak DR et al pre- and post-operative 3rd month mean Hb levels were analyzed and no statistically significant difference was found ($p=0.68$).¹⁵ Hb values in our study were 14.8 gm/dL and 14.5 gm/dL respectively. In a study conducted by Gupta N et al PLR and NLR parameters between the patients and control groups were found to be statistically significant ($p=0.039$, $p=0.017$). Average PLR values in our study were 124.38 before and 131.07 after surgery and average NLR values were 1.53 before and 1.68 after surgery respectively. This decrease in MPV increase in PLR and NLR values after surgically correcting the deviated nasal septum shows that these hematological parameters and the general condition of the patients are improved after septoplasty.¹⁶ Further, the NOSE scale is a valid and specific tool in the evaluation of the quality of life of patients with nasal obstruction before and after septal surgery.¹⁷ In this present study, there was a statistically significant improvement in symptoms of nasal obstruction 60 days after septoplasty.

CONCLUSION

Chronic nasal obstruction caused by NSD causes significant changes not only in the quality of life but also in several blood and platelet related profiles. MPV is an important marker and determinant of platelet function. Also, PLR and NLR are new markers for inflammation. Septoplasty is the treatment option of choice for symptomatic NSD patients. In our study, MPV value is decreased, and PLR and NLR values are increased significantly after septoplasty. Also, the decrease in

NOSE score after surgery is the confirmatory parameter proving that septoplasty not only improves the quality of life but also significantly corrects the altered blood and platelet related parameters in NSD patients.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Rahman A, Hashmi SF, Hasan SA, Arif SH. Role of septoplasty in reducing the incidence of comorbidities associated with elevated levels of mean platelet volume. *Egypt J Otolaryngol.* 2016;32(3):156.
2. Al-Shehri AM, Amin HM, Necklawy A. Retrospective study of endoscopic nasal septoplasty. *Biomed Resear Ind.* 2013;24(3):337-40.
3. Bhattacharyya N. Ambulatory sinus and nasal surgery in the United States: Demographics and perioperative outcomes. *Laryngosco.* 2010;120:635-8.
4. Both R, Mathur NN. Comparative evaluation of conventional versus endoscopic septoplasty for limited septal deviation and spur. *J Laryngol Otol.* 2009;123(7):737-41.
5. Drager LF, Polotsky VY, Lorenzi-Filho G. Obstructive sleep apnea: an emerging risk factor for atherosclerosis. *Ches.* 2011;140(2):534-42.
6. Geiser T, Buck F, Meyer BJ, Bassetti C, Haerberli A. In vivo platelet activation is increased during sleep in patients with obstructive sleep apnea syndrome. *Respirat.* 2002;69:229-34.
7. Getz AE, Hwang PH. Endoscopic septoplasty. *Curr Opin Otolaryngol Head Neck Surg.* 2008;16(1):26-31.
8. Jain M, Chouhan AN, Harshwardhan R. Conventional Septoplasty versus Endoscopic Septoplasty: A Comparative Study. *Peop J Scient Resear.* 2011;4(2):24.
9. Song J, Sundar KM, Hoidal J, Prchal JT. Hematological Changes in Chronic Sustained Hypoxia and Chronic Intermittent Hypoxia in a Mouse Model.
10. Mao-Chang Su, Jung-Liang Chiang, Rong-San Jiang: Endoscopic Septoplasty in Conjunction with Endoscopic Sinus Surgery. *Mid Taiwan J Med.* 2004;9:38-4.
11. Maran AGD, Lund VJ: Trauma to nose and sinuses. In: 1st Edn.; *Clinical Rhinology*, New York: Thieme 1990;110-139.
12. Meng X, Wang W, Wei G, Chang Q, He F, Ming L. A high or a reasonably-reactively elevated platelet-to-lymphocyte ratio, which plays the role?. *Platel.* 2016;27(5):491.
13. Murray JA, Maran AG, Mackenzie IJ, Raab G. Open v Closed Reduction of the Fractured Nose. *Arch Otolaryngol.* 1984;110(12):797-802.
14. Nawaiseh S, Al-Khartoum N. Endoscopic septoplasty: a retrospective analysis of 60 cases. *J Pak Med Assoc.* 2010;60(10):796-8.
15. Nayak DR, Balakrishnan R, Murty D, Hazarika P. Endoscopic septoturbinateplasty: our update series. *Ind J Otolaryngol Head Neck Surg.* 2002;54(1):20-4.
16. Nishi Gupta. Endoscopic Septoplasty. *Ind J Otolaryngol Head Neck Surg.* 2005;57(3):240-43.
17. Thejas SR, Mohan S. Effectiveness of isolated septal surgeries in nasal septal deviations: A prospective study with reference to the nasal obstruction symptom evaluation scale. *Annals of Ind Acad Otorhinolaryngol Head Neck Surg.* 2019;3(2):63-8.

Cite this article as: Senniappan S, Giritharan N. A comprehensive study on haematological and platelet related changes following septoplasty. *Int J Otorhinolaryngol Head Neck Surg* 2020;6:1975-8.