Evaluating the relationship between deviated nasal septum and mean platelet volume

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Source(s) of support: Nil
Presentation at a meeting : Nil
Conflicting Interest (If present, give more details): Nil
Acknowledgement: Nil

Author contributions:

All authors contributed to the study's conception and design. Material preparation, data collection and analysis were performed by the first author.

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Abstract

Background

One of the most common causes of nasal airway obstruction in ent practice is deviated nasal septum and nasal airway obstruction is a common cause of upper airway obstruction which leads to obstructive and hypoxia conditions. The mean platelet volume(MPV) reflects the platelet production rate which increases in hypoxia conditions.

Method

We performed a prospective study carried out in the Department of Otorhinolaryngology in Saveetha Medical College and Hospital from April to August 2022 with 47 patients with the clinical evidence of DNS and 47 healthy age matched subjects as control group, aimed to evaluate the relationship between MPV levels and nasal obstruction due to DNS.

Results

From the data obtained in this study it was analysed that mean platelet volume was higher in patients with deviated nasal septum. And females had a higher range of mean platelet volume compared to the males in both the case and control group.

Conclusion

MPV values were found to be increased in patients with deviated nasal septum. This increase was found to be related to the severity of obstruction.

Key words: deviated nasal septum, mean platelet volume, nasal obstruction

INTRODUCTION

The nose not only acts as a passage for air , it also cleans, conditions and humidifies the inspired air and performs other physiological functions of olfaction and phonation.[1] The nasal septum ideally lies in the midline of the nasal cavity dividing them into right and left cavities and it comprises both cartilaginous and bony parts. Apart from its aesthetic role, it has the function of preserving the nasal form and control nasal airflow and respiration. [2] Nasal septum deviation (NSD) is a common problem and a common cause of upper airway obstruction .[3] Deviation of the nasal septum may result in a deviation of either the bony or cartilaginous septum or both, leading to a disruption of the nose's physiological function and a distortion of its shape.

Nasal airway obstruction is a common cause of upper airway obstruction and upper respiratory tract resistance further leading to obstructive and hypoxic manifestations and alveolar hypoventilation.[4] prolonged hypoxia can cause changes in the hematological parameters like change in platelet function and coagulation functions.

Mean platelet volume(MPV) increases in the presence of hypoxia and hypercarbia.it is related to activation of platelets and also suggested that large thrombocytes show a greater content of cell granules, display higher expression of adhesion molecules, and undergo faster activation, which results in platelet hyperactivity and increased risk of clot formation resulting in increased platelet turnover.[5,6]

The most accepted reason for the platelet activation in patients with alveolar hypoxia is said to be augmented sympathetic activity and increase in epinephrine and norepinephrine due to the hypoxemia due to which the elevated catecholamines causes platelet activation.[4,5,7] another mechanism is that the due to chronic hypoxia in deviated nasal septum there can be endothelial dysfunction causing platelet activation.[4,7,8]

Mean platelet volume indicates the platelet function indices which in turn reflect the platelet production rate, platelet size, activation and aggregation and a potential marker for platelet reactivation and metabolism.[9,10,11] Whatever is the cause, restoration of hypoxia can improve platelet function.

This study is a prospective study done to compare the patients with symptoms suggestive of chronic nasal obstruction due to deviated nasal septum with the values of mean platelet volume and it's significance.

AIM AND OBJECTIVE

To evaluate if Deviated Nasal septum leads to an increase in the Mean Platelet Volume.

METHODOLOGY

This prospective study was carried out in the Department of Otorhinolaryngology in Saveetha Medical College and Hospital from April to August 2022 with 47 patients with the clinical evidence of DNS and 47 healthy age matched subjects as control group.

The cases and control were selected from ENT OPD after proper history and examination, aimed to evaluate the relationship between mean platelet value and nasal obstruction due to deviated nasal septum (DNS) by convenient sampling method. Informed consent was obtained from all the participants. All the procedures were performed in accordance with ethical standards. To diagnose and evaluate deviated nasal septum patent underwent anterior rhinoscopic examination, diagnostic nasal endoscopy and CT of the paranasla sinuses. The DNS was classified as type 1 to 7 based on mladina classification for DNS.

The blood sample to measure the mean platelet value were collected in sterile manner and sent in EDTA vial and the sample was processed within 2 hours after obtaining the sample to avoid bias due to platelet swelling and platelet degeneration. The mean platelet volume values ranges between 7.2 to 11.7 fl.

Inclusion criteria

Age above 18 years

Patients presenting with complaints of nasal obstruction which on further examination showed diagnosis of deviated nasal septum for cases and asymptomatic DNS patients for controls.

Exclusion crirteria

Patients with other causes of nasal obstruction- nasal polyposis, chronic rhinosinusits, adenoiditis

Patients with hypertension, CAD, autoimmune diseases, bleeding diathesis, other conditions leading to increase in blood pressure like COPD, relevant drug intake, hypercholesterolemia.

RESULTS

This study includes 94 patients, group A consisted of 47 patients who were the cases with symptomatic DNS and group B where 47 patients who were controls with DNS without any symptoms and were an incidental finding during general examination. Group A has 28 males (59.6%) and 19 females (40.4%) . Male to female ratio being 1.47:1. In group B of the 47 patients 29 (61.7%) were male and 18 patients (38.3%) were female and the male to female ratio being 1.61:1.

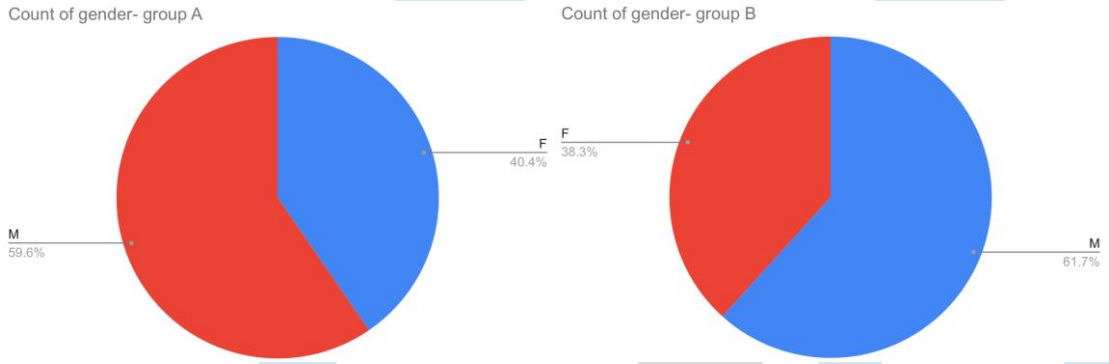

Fig1:gender distribution among group A and B

According to the age distribution the maximum age was 44 years and the minimum was 18 years. The average age was 31 years. 24 patients (50%) came under the age group of 18 to 30 years. 18 patients (39.1%) came under the age group of 31 to 40 years and 5 patients (10.9%) were under the age group of 41 to 50 years. Among group B According to age distribution 28 patients came under the age group of 18 to 30 years. 14 patients (29.8%) were in the age group of 31-40 years and 5 patients (8.5%) were in the age group of 41-50 years.

Maximum number of 24 patients were under the age group of 18 to 30 years and 14 patients (58.3%) were male and 10 patients (41.7%) were females. Of the 18 patients belonging to the age group of 31 to 40 years 12 patients (66.7%) were male and 6 patients (33.3%) were female. In the age group of 41 to 50 years 3 patients (60%) were male and 2 patients (40%) were female.

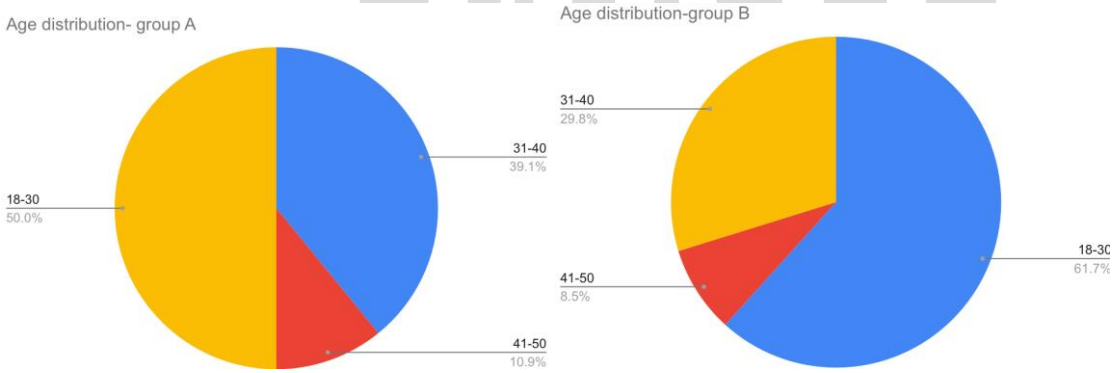

Fig 2:age distribution among group And B

The mean platelet volume of the group A patients ranged from, maximum values of 12.3 and minimum value of Mean platelet volume of 7.7 and the average was 10.3. Among group A individuals, MPV was found to be higher in female than the male (10.43+/-0.55 fl vs 10.33+/-0.42 fl). Among the group B individuals who are the controls the MPV was found to be higher in females than the males (7.93+/-0.31 fl vs 7.74+/- 0.36 fl). The overall mean platelet values among both the groups was found to be 10.

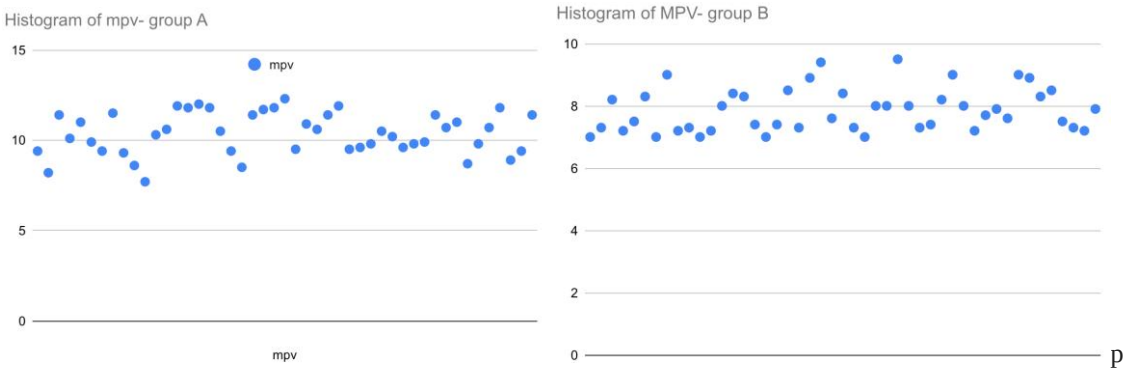

Fig3: representation on MPV values in the case and control

The type of deviated nasal septum was classified based on mladina classification. Among the cases 13 patients (27.7%) had type 4, that is S shaped, posterior to one side and anterior to other. 11 patients (23.4%) had type 5, that is horizontal septal crest touching or or not touching the lateral wall . 10 patients (21.3%) had type 3, that is posterior vertical deviation at level of OM and middle turbinate. 8 patients (17%) had type 2, that is moderate anterior vertical deviation of cartilaginous septum in full length. 3 patients (6.4%) showed type 6, that is prominent maxillary crest contralateral to the deviation with a septal crest on the deviated side. 2 patients (4.3%) showed type 1 that is mild deviation in the vertical plane.

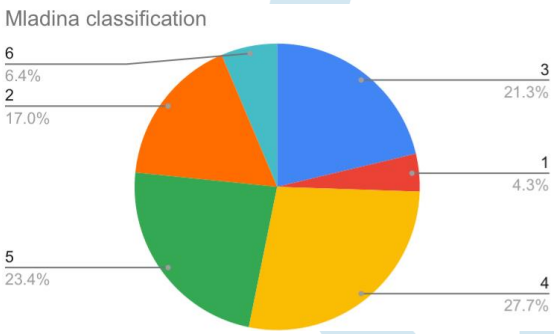

Fig 4:mladina classification of nasal septal deviation in the cases

In this study deviated nasal septum was found to be more common in males more than the females in both the case and the control group. The mean platelet volume was found to be higher in females than male in both the case and the control groups. The mean platelet volume was found to be higher in the case with DNS than the control group (10.35 +/- 0.33 fl vs 7.85+/- 0.20 fl).

DISCUSSION

Deviated nasal septum is a common cause of upper airway resistance presenting with nasal obstruction and the chronic hypoxia resulting from this leads to change in certain platelet functions which can be detected by the mean platelet volume which is a measure of size and the function of platelets, larger platelets have higher thrombotic property and it is said that larger platelets are more adhesive and can aggregate the small platelets.[10] The inflammation and endothelial dysfunction caused by chronic intermittent hypoxia can cause direct platelet activation leading to a n increase in the mean platelet volume in these patients.[4,8]

In this study the majority of the cases(27.7%) had type 4 DNS according to mladina classification followed by type 5(23.4%) and type 3 (21.3%). In a study by Abdul et al in patients planned for septoplasty procedure pre operative and postoperative MPV were compared and concluded that septoplasty has an important role in reducing the MPV which inturn implies reduction in the hypoxia status.[12]

Similar to this study by Sagit et al, regarding the relation between chronic nasal obstruction leading to hypoxia there was found to be an increase in value of mean platelet volume in relation to the severity of the nasal obstruction.[4,8]V.K. Poorly et al in their study used cottle's classification of DNS and concluded that more the severity of deviated nasal septum higher the value of mean platelet volume in those patients. And they also concluded that values of mean platelet value was more in females in both cases and controls.[13]

In this study the male to female ratio was observed to be 1.47:1 among the population of cases. And similarly higher male preponderance has been observed in various other studies also as the most common and known etiology for a deviated nasal septum is trauma.[14]

In this study the age predilection showed that majority of the cases belonged to the age group of 18-30 years (50%) among the cases followed by 31-40 years (39.4%) and the mean age being 31.08 years. In other studies by Guyuron Bet al and Jang JY et al the mean age was 33.5 years and 31.5 years respectively.[15,16]

In this study the mean platelet volume levels were found to be higher in patients with deviated nasal septum similar to various studies by Min et al and Kadikoylu et al.[17,18] but kadikoyul et al also observed increase in mean platelet volume in women with iron deficiency anemia.

The study could have been made better by planning septoplasty for these symptomatic patients and pre operative and post operative mean platelet volume could have been compared and look for any significant change in mean platelet volume.

CONCLUSION

In our study we demonstrated that the mean platelet volume was found to be higher in the patients with deviated nasal septum with symptoms of chronic nasal obstruction and the mean platelet volume was found to be higher among the cases compared to the control group in female gender even though male gender had higher incidence of deviated nasal septum.

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