Research Article

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Evaluation of changes in mean platelets volume in children with adenotonsillar hypertrophy

Abstract

Objective: Adenotonsillar hypertophy is the most common cause of upper airway obstruction seen in children. Adenotonsillar hypertrophy is known to cause cardiac and pulmonary disfunctions. The most important reason for this is hypoventilation. Hypoventilation could lead to hypercoagulopathy. Mean platelet volume is the most important parameter that shows thrombocyte size. Larger thrombocytes contain more enzymatic granules and this is an indication that more prothrombotic activities will occur. In this study we researched on the changes in Mean platelet levels after adenotonsillectomy in patients with adenotonsillar hypertrophy.

Methods: The mean platelet volume of 45 patients of ages 3-9years were retrospectively evaluated before and after operation due to adenotonsillar hypertrophy between the years 2011-2015.

Results: There was no significant difference in Hemoglobin, White blood cells, and Mean Platelet Volume between the preoperative and postoperative values however there was a significant decrease in platelet count.

Conclusion: There was no signifant change in Mean Platelet Volume but a decrease in platelet volume was seen in almost 50% of the patients.

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Introduction

Adenoid tissue also termed as nasopharyngeal tonsils is located at the posterosuperior surface of the nasopharynx and made up of noncapsulated lymphoid tissues organised at the germinal centers.[1] Adenoid tissue that is present at birth is formed between the 4th and 7thmonths of embryogenesis.[2] The term adenoid hypertrophy means nonphysiologic growth of nasopharyngeal tonsils. As for palatine tonsils, they are lymphoid tissues located between the palatoglossal and palatopharyngeal arch in both sides of the oropharynx. Palatine tonsils develope from the 2nd pharyngeal pouch.

The most common cause of upper airway obstruction in children is adenotonsillar hypertrophy. Its main symptoms are sleeping with the mouth open and snoring, drooling, apnea, hypernasal speech, dental occlusion disorders, and retardation in midfacial growth. These symptoms just like in septum deviation develope as a result of upper airway obstruction and at the same time leads to alveolar hypoventilation, cor pulmonale and pulmonary hypertension.[3,4]

Mean Platelet Volume (MPV) is the most important parameter that shows thrombocyte size5. Increase in MPV is an indication that bone marrow has increased synthesis of new thrombocytes. As a result, larger, younger and more functional thrombocytes are produced. Larger thrombocytes contain more enzymatic granules and this shows that there will be more prothrombotic activities.[6] Increase in prothrombotic activities plays an important role in the developement of atherosclerosis.[7]

In this study we researched on the changes in MPV levels after adenotonsillectomy in patients with adenotonsillar hypertrophy.

Materials and methods

45 patients operated on due to adenotonsillar hypertrophy between the years 2011-2015 were retrospectively evaluated. This study was carried out in accordance with Helsinki Declaration and aproved by the Ethics Committee of Necmettin Erbakan University Meram Faculty of Medicine.

The diagnosis of adenoid hypertrophy was done by flexible endoscopy and lateral cephalometric radiography. Adenoid-nasopharyx ratio was determined using an obstruction scoring ratio. Those with adenoid-nasopharynx ratio of >0,7 were classified as large adenoid. Adenoid-nasopharynx ratio correlated with endoscopic findings.[8]

All the patients' hemoglobin, White Blood Cell (WBC), platelet count, and MPV levels were measured preoperatively and on 3rd month postoperatively. Blood samples were collected in Tripotassium EDTA tubes and analyzed.

Adenoidectomy operation in all the patients was done by surgical curretage with the help of an adenoid currete under general anesthesia. Patients who had tonsillectomy had it done at the same session with adenoidectomy using cold dissection method. The patients' preoperative blood levels were compared to the 3rd month postoperative blood levels. Patients with upper airway obstruction other than adenotonsillar hypertrophy and those with any other chronic disease were not included in the study.

Statistical analysis

Statistical analysis was done using SPSS 16.0 packet program. A frequency table was created for "Age" and "Sex" variables. Normal distribution of numerical variables was evaluated using visual and analytic methods. Histograms were used as the visual methods and single sampling Kolmogorov-Smirnov normality test as the analytic method. Mean±standard deviation, maximum and minimum values were given as descrpitive statistics. Preoperative and postoperative MPV values were compared using t-test. p value of less than 0.05 was accepted to be statistically significant.

Results

The 45 patient group in our study contained 35 males (77.8%) and 10 females (22.2%) with average age of 5.76 ± 1.55 (Table 1). When the groups were evaluated with regards to hemoglobin value there was no statistically significant difference between the preoperative group (12.32 ± 1.13) and postoperative group (*11.95 ± 1.57*) (p>0,05). When WBC values were analyzed there was no statistically significant difference between the preoperative group(8.65 ± 4.04) and postoperative group (*9.00 ± 3.83*) (p>0,05). Comparing the preoperative MPV values (5.80 ± 1.13) with the postoperative MPV values (*5.55 ± 0.99*) no statistically significant difference was obtained(p>0,05). In contrast to this when the platelet count was analyzed there was a statistically significant difference between the preoperative (348.42 ± 104.83) and postoperative (314.84 ± 122.97) values (p<0.05) (Figure 1).

Table 1 Descriptive statistics of variables (preop: preoperative, postop: postoperative)

	Preop	Postop	p
MPV Value, fl	5.80 ± 1.13	5.55 ± 0.99	0.069
WBC count x103/µL	8.65 ± 4.04	9.00 ± 3.83	0.638
Hb Level, g/dL	12.32 ± 1.13	11.95 ± 1.57	0.093
Plt Count, x103/µL	348.42 ± 104.83	314.84 ± 122.97	0.024*

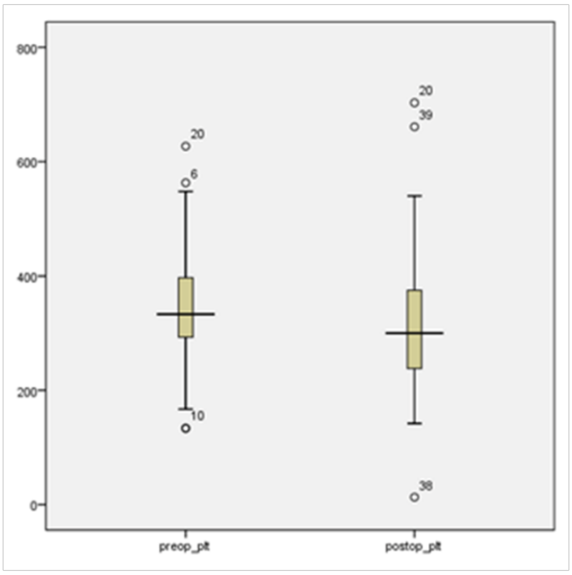

Figure 1 Platelet counts before and after adenotonsillectomy.

Discussion

Signs of adenotonsillar hypertrophy and upper airway obstruction are usually seen in children of ages 2-5.[9] Narrowing of the upper airway would be due to abnormal upper airway anatomy, abnormal function or both. Tonsil and adenoid hypertrophy are the most important causes of upper airway blockage in children. Cardiac complications that occur due to adenotonsillar hypertrophy are as a result of hypoventilation. Hypoventilation results in hypoxemia and/or hypercapnia. This condition causes pulmonary and cardiac vasoconstriction and as a result reversible or irreversible changes in the cardiac vascular bed occur.[10]

Obstructive sleep apnea syndrom (OSAS) developes as a result of chronic upper airway obstruction. OSAS is a condition that is frequently seen but not well known. There are various clinical signs and problems encountered in OSAS. It can cause cardiovascular problems, neurologic problems, psychiatric problems, endocrine problems, gastrointestinal problems and hematologic problems. Even though there is limited data, these patients have been reported to have a decreased survival rate.[11]

Mean platelet volume (MPV) is one of the most important parameters that show thrombocyte size.[5]

Increase in MPV indicates that bone marrow has increased synthesis of new thrombocytes. Larger thrombocytes contain more enzymatic granules and this shows that more prothrombotic activity will occur.[6] Increase in prothrombotic activity plays an important role in the developement of atherosclerosis.[7] In previous studies increase in MPV has been found to be related to cardiovascular and cerebrovascular diseases like hypertension, angina pectoris, myocardial infarction, and stroke.[12–15] In a different study it was concluded that increased MPV normalised with time in ischemic stroke patients and persistant increase was related to poor prognosis.[16] Similarly MPV that increased after myocardial infarction normalised with time. Values that were seen to be high are related to complications.[17] Varol et al.found that there is a relationship between increased MPV and severe obstructive sleep apnea.[18]

MPV values for nasal septum deviation have earlier on been researched on in the literature and it has been determined that MPV values are higher in individuals with nasal septum deviation compared to normal population. Furthermore there is a decrease in MPV values after septoplasty operation.[18] The number of studies on MPV values in patients with adenoid hypertrophy is limited in the literature. Onder et al.in their study did not find any significant difference between preoperative and postoperative MPV, hemoglobin and platelet count but found a significant difference in WBC between preoperative and postoperative values. In our results there were no statistically significant changes between preoperative MPV, hemoglobin, WBC values and postoperative MPV, hemoglobin, WBC values (p>0.05). However in 21 out of 45 patients MPV values were found to have decreased after adenotonsillectomy (Table 2). Even though this did not come out to be statistically significant, clinically a decrease in MPV value could be seen.

Even though there was a statistically significant decrease in preoperative and postoperative platelet count (p<0.05), this is thought to be due to changes in the patients' postoperative hydration and nutrition.

Conclusion

In conclusion even though decrease in MPV values were not statistically significant after adenotonsillectomy in adenotonsillar hypertrophy patients, there was a decrease in almost 50% of the patients. However for more definite results there is need for larger studies with more patients.

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Conflicts of interest

Author declares there are no conflicts of interest.

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