10. Bjørnland T, Rørvik M, Haanæs HR, et al. Degenerative changes in the temporomandibular joint after diagnostic arthroscopy. An experimental study in goats. *Int J Oral Maxillofac Surg* 1994;23:41–45
11. Kaminishi RM, Davis CL. Temporomandibular joint arthroscopic observations of superior space adhesions. *Oral Maxillofac Surg Clin N Am* 1989;1:103–109
12. Nitzan DW, Dolwick MF, Martinez GA. Temporomandibular joint arthrocentesis: a simplified treatment for severe, limited mouth opening. *J Oral Maxillofac Surg* 1991;49:1163–1170
13. Nishimura M, Segami N, Kaneyama K, et al. Prognostic factors in arthrocentesis of the temporomandibular joint: evaluation of 100 patients with internal derangement. *J Oral Maxillofac Surg* 2001;59:874–878
14. Nitzan DW, Samson B, Better H. Long-term outcome of arthrocentesis for sudden-onset, persistent, severe closed lock of the temporomandibular joint. *J Oral Maxillofac Surg* 1997;55:151–158
15. Frost DE, Kendell BD. Part II: the use of arthrocentesis for treatment of temporomandibular joint disorders. *J Oral Maxillofac Surg* 1999;57:583–587
16. Al-Belasy FA, Dolwick MF. Arthrocentesis for the treatment of temporomandibular joint closed lock: a review article. *Int J Oral Maxillofac Surg* 2007;36:773–782
17. Dimitroulis G, Dolwick MF, Martinez A. Temporomandibular joint arthrocentesis and lavage for the treatment of closed lock: a follow-up study. *Br J Oral Maxillofac Surg* 1995;33:23–26
18. Matsumoto K, Bjørnland T, Kai Y, et al. An image-guided technique for puncture of the superior temporomandibular joint cavity: clinical comparison with the conventional puncture technique. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011;111:641–648
19. Parra DA, Chan M, Krishnamurthy G, et al. Use and accuracy of US guidance for image-guided injections of the temporomandibular joints in children with arthritis. *Pediatr Radiol* 2010;40:1498–1504
20. Honda K, Bjørnland T. Image-guided puncture technique for the superior temporomandibular joint space: value of cone beam computed tomography (CBCT). *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2006;102:281–286

Mean Platelet Volume Levels in Children With Adenoid Hypertrophy

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Abstract: Adenoid hypertrophy (AH) is a common disorder in children, resulting in chronic nasal congestion. This chronic congestion should be evaluated carefully because it can lead to chronic upper airway obstruction. Many authors have suggested that increased nasal resistance to respiration may cause disturbances in the pulmonary ventilation and carry the risk of cardiopulmonary diseases. Mean platelet volume (MPV) is a marker of platelet function and is positively associated with indicators of platelet activity. Mean platelet volume is an indicator of larger and more reactive platelets and has been shown to be increased in patients with vascular disease, including peripheral, pulmonary, and coronary artery disease. Recently, MPV levels have also been shown to be increased in patients with severe obstructive sleep apnea, and marked nasal septal deviation. Moreover, increased MPV has also been shown to have a prognostic role in cardiovascular disease. We investigated whether MPV is higher in patients with AH and whether higher MPV levels can be reduced by adenoidectomy. To the best of our knowledge, this is the first study to investigate MPV in patients with AH. Our results suggest that MPV, a determinant of platelet activation, is elevated in patients with AH and adenoidectomy is an effective therapeutic measure in such patients. Increased platelet activation may be related to an increase of cardiopulmonary risk in patients with AH.

Key Words: Adenoid hypertrophy, adenoidectomy, mean platelet volume, platelet activation

Nasal congestion is a common symptom in children. The main causes are adenoid hypertrophy (AH), infectious rhinitis, and allergic rhinitis. Adenoid hypertrophy is the most common cause of pediatric upper airway obstruction, and it induces permanent obstruction among other conditions.[1] Significant congestion may interfere with sleep, may cause snoring, and can be associated with sleep apnea. In children, nasal congestion from enlarged adenoids may cause chronic sleep apnea with insufficient oxygen levels and hypoxia, as well as pulmonary hypertension and right-sided heart failure.[2] The problem usually resolves after adenoidectomy.[3]

Chronic nasal obstruction in children is a common symptom that requires careful and thoughtful evaluation to arrive at a correct diagnosis and treatment plan. Both the diagnostic evaluation and treatment must take into account not only the nature and severity of the primary disease but also the possible adverse effects on cardiac and pulmonary systems.[2,4]

Mean platelet volume (MPV) is considered to be a marker and determinant of platelet function because larger platelets are hemostatically more reactive than platelets of normal size, increasing the propensity to thrombosis.[5] Thus, platelet volume has been proposed as an indirect marker of increased platelet reactivity. Increased MPV is associated with the presence and prognosis of vascular disease, including peripheral, cerebrovascular, and coronary artery disease.[6,7] Recently, MPV levels have been shown to be elevated in patients with severe obstructive sleep apnea[8] and marked nasal septal deviation.[9]

To the best of our knowledge, this is the first study to evaluate the relationship between MPV and AH. We investigated MPV levels in patients with AH and the effect of adenoidectomy on MPV levels.

MATERIALS AND METHODS

This prospective study consisted of 105 patients who presented to the otolaryngology outpatient clinic of our hospital with AH (56 females, 49 males; mean age, 4.2 ± 1.1 years). An age- and sex-matched control group was composed of 100 healthy children (52 females, 48 males; mean age 4.4 ± 1.3 years). The study protocol was performed according to the Helsinki Committee requirements and was approved by the ethics committee and institutional review board of Afyon Kocatepe University. All parents gave informed consent before inclusion in the study.

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Received April 10, 2013.
Accepted for publication June 25, 2013.
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The authors report no conflicts of interest.

ISSN: 1049-2275
DOI: 10.1097/SCS.0b013e3182a2eddd

The airway of the patients was evaluated via the transnasal or transoral route by flexible endoscopy. The adenoid grade volume referred to the upright endoscopic view from the superior choanal limit to the nasal floor: 1, 25% of choanal space or less; 2, 25% to 50% of choanal space; 3, 50% to 75% of choanal space; and 4, 75% to 100% of choanal space. The patients included in the study group had grade 3 or 4 AH. All patients underwent transoral cold curettage adenoidectomy while under general anesthesia. Children with nasal septal deviation, sinonasal infection, hematological disease, chronic diseases, and history of previous adenoidectomy were excluded from the study. All children were clinically free of infection at the time of surgery.

Routine preoperative blood samples were drawn from the antecubital vein by careful vein puncture. Blood samples were collected in EDTA, and laboratory data were screened via a computerized database in the hospital. The reference values for MPV ranged between 7.0 and 11.0 fL. In the postoperative third month, blood samples were drawn again, and the results were compared with preoperative measurements.

Statistical analysis was conducted using SPSS version 11.5 (SPSS, Chicago, IL). Normality was assessed using a Shapiro-Wilk test. For normally distributed values, descriptive results are expressed as mean ± SD. The independent-samples *t*-test and Kruskal-Wallis test were used to examine the differences between groups. Statistical significance was defined as $P < 0.05$.

The primary outcome of this study was the difference in MPV levels between patients with AH and healthy controls. The secondary outcome measure was the change in MPV levels after adenoidectomy.

RESULTS

The AH group consisted of 105 patients (56 females and 49 males) with a mean age of 4.2 years, and the control group had 100 patients (52 females and 48 males) with a mean age of 4.4 years. There were no significant differences between the study and control groups in terms of age and sex. All characteristics of the AH and control groups, including MPV, hemoglobin, and platelet distribution width, are listed in Table 1.

The mean MPV levels were 8.25 ± 1.1 fL in patients with AH and 7.5 ± 0.9 fL in the control group. The MPV levels in patients with AH were significantly higher than those in the control group ($P < 0.001$) (Fig. 1). As seen in Table 1, white blood cells, hemoglobin, and platelet levels were not significantly different between the 2 groups ($P > 0.05$).

When the preoperative and postoperative MPV levels in the study group were compared, it was found that there was a significant decrease in MPV levels in the postoperative group (preoperative MPV levels, 8.25 ± 1.1 fL; postoperative MPV levels, 7.75 ± 1.2 fL; $P < 0.001$) (Fig. 2).

TABLE 1. Study Group Characteristics

	Children With AH	Children Without AH	*P*
Age, y	4.2 ± 1.1	4.4 ± 1.3	NS
Sex, male/female, n	49/56	48/52	NS
Hemoglobin level, g/dL	13.8 ± 1.2	13.4 ± 1.3	NS
Platelet, per unit	260.790 ± 97.210	246.560 ± 95720	NS
PDW, fL	13.8 ± 1.8	13.9 ± 2.0	NS
MPV, fL	8.25 ± 1.1	7.5 ± 0.9	<0.001

All parameters were expressed as mean ± SD unless specified otherwise.
$P < 0.05$ was accepted as significant.
NS indicates not significant.

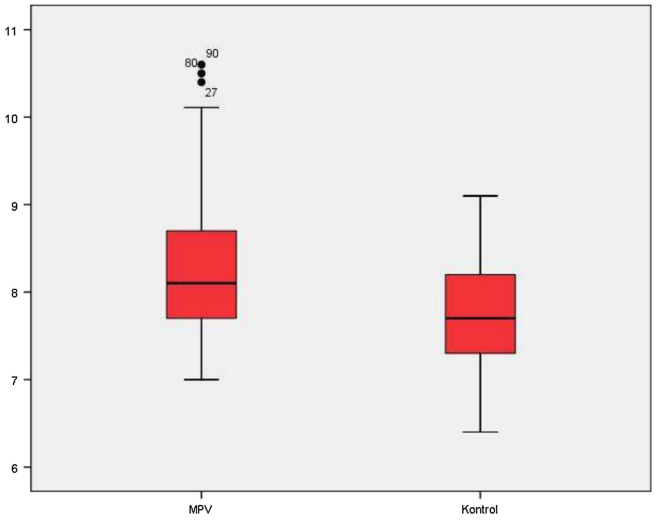

FIGURE 1. The MPV values of the children with AH and the control group.

DISCUSSION

Mean platelet volume levels were significantly higher in patients with AH than in healthy controls and were significantly lower in patients with AH after adenoidectomy. To the best of our knowledge, this is the first study to evaluate platelet function by measuring MPV levels in children with AH.

In children, AH is believed to lead to increased pulmonary hypertension and cor pulmonale, causing chronic upper airway obstruction.[10] Because the usual route of airflow is via the nasal passage, obstructed nasal airflow can lead to labored breathing and increased upper airway resistance, resulting in upper airway resistance syndrome.[11] If sufficient airflow cannot be established by the nasal route, mouth breathing becomes obligatory. During mouth breathing, which causes turbulent airflow, the intraluminal air pressure cannot reach the appropriate level to keep the nasopharyngeal and oropharyngeal structures open in the

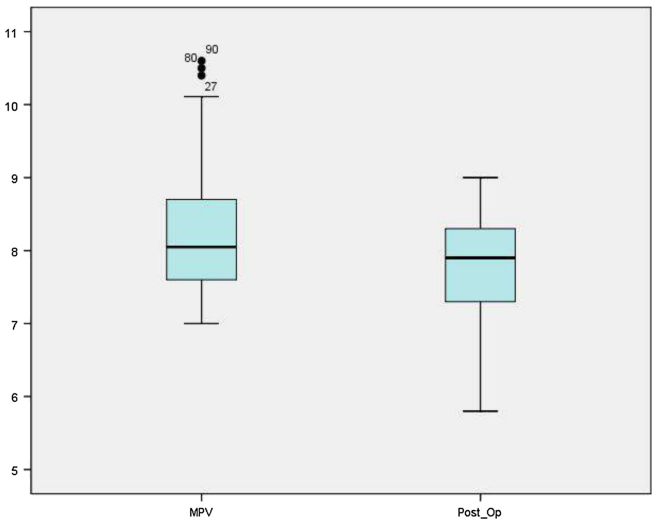

FIGURE 2. The MPV values of the children with AH and the postoperative group.

supine position; moreover, the bulk of the tongue is displaced backwards by the influence of gravity, obstructing the airway. Therefore, this chain of events results in alveolar hypoventilation, hypoxia, and hypercarbia during sleep.[11,12]

Cardiovascular complications of AH are attributed to chronic upper airway obstruction. Chronic alveolar hypoxia may lead to hypoxemic pulmonary vasoconstriction, which may result in hypertension and right ventricular heart failure.[13,14] Mean platelet volume level has been reported to be higher in patients with pulmonary hypertension.[15]

Platelets play a central role in the formation of atherosclerotic plaques and therefore in the pathogenesis of atherothrombosis. Elevated MPV levels, as an indicator of larger, more reactive platelets resulting from increased platelet turnover, may therefore represent a risk factor for overall vascular mortality, including cardiovascular diseases.[16] Furthermore, elevated MPV also has a prognostic role in coronary artery diseases; for example, it is associated with higher mortality after myocardial infarction.[17]

As far as we are aware, MPV values in AH have not been assessed previously. Mean platelet volume values in our patients with AH were significantly higher than in the control group, and we saw a significant reduction in MPV levels after adenoidectomy.

In most patients with AH, we see mild symptoms or no symptoms at all related to the cardiopulmonary system, but symptomless chronic changes may slowly occur in these children.[18,19] Therefore, it is wise to monitor these patients by an easy, noninvasive, and cost-effective method. We demonstrated that MPV could be a candidate to monitor the risk of cardiopulmonary diseases in patients with AH. However, prospective and multicenter studies should be designed to investigate the association between MPV levels and the risk of pulmonary and cardiovascular diseases in patients with AH.

In conclusion, this study shows that AH causes higher MPV values in children and that adenoidectomy is an effective therapeutic measure in such patients. In our opinion, measurement of MPV may be considered a quick, safe, and reliable guide for the assessment of AH.

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REFERENCES

1. Gorur K, Doven O, Unal M, et al. Preoperative and postoperative cardiac and clinical findings of patients with adenotonsillar hypertrophy. *Int J Pediatr Otorhinolaryngol* 2001;59:41–46
2. Abdel-Aziz M. Asymptomatic cardiopulmonary changes caused by adenoid hypertrophy. *J Craniofac Surg* 2011;22:1401–1403
3. Yılmaz MD, Onrat E, Altuntaş A, et al. The effects of tonsillectomy and adenoidectomy on pulmonary arterial pressure in children. *Am J Otolaryngol* 2005;26:18–21
4. Boos CJ, Balakrishnan B, Lip GY. The effects of coronary artery disease severity on time-dependent changes in platelet activation indices in stored whole blood. *J Thromb Thrombolysis* 2008;25:135–140
5. Park Y, Schoene N, Harris W. Mean platelet volume as an indicator of platelet activation: methodological issues. *Platelets* 2002;13:301–306
6. Greisenegger S, Endler G, Hsieh K, et al. Is elevated mean platelet volume associated with a worse outcome in patients with acute ischemic cerebrovascular events? *Stroke* 2004;35:1688–1691
7. Vizioli L, Muscari S, Muscari A. The relationship between mean platelet volume with the risk and prognosis of cardiovascular disease. *Int J Clin Pract* 2009;63:1509–1515
8. Varol E, Ozturk O, Gonca T, et al. Mean platelet volume is increased in patients with severe obstructive sleep apnea. *Scand J Clin Lab Invest* 2010;70:497–502
9. Sagit M, Korkmaz F, Kavugudurmaz M, et al. Impact of septoplasty on mean platelet volume levels in patients with marked nasal septal deviation. *J Craniofac Surg* 2012;23:974–976
10. Redding GJ. Pulmonary hypertension and cor pulmonale in children. In: Hilman BC, ed. *Pediatric Respiratory Diseases: Diagnosis and Treatment*. Philadelphia: Saunders, 1993:335–353
11. Potsic WP, Pasquariello PS, Baranak CC, et al. Relief of upper airway obstruction by adenotonsillectomy. *Otolaryngol Head Neck Surg* 1986;94:476–480
12. Sie KC, Perkins JA, Clarke WR. Acute right heart failure due to adenotonsillar hypertrophy. *Int J Pediatr Otorhinolaryngol* 1997;41:53–58
13. Duman D, Naiboğlu B, Esen HS, et al. Impaired right ventricular function in adenotonsillar hypertrophy. *Int J Cardiovasc Imaging* 2008;24:261–267
14. Abd El-Moneim ES, Badawy BS, Atya M. The effect of adenoidectomy on right ventricular performance in children. *Int J Pediatr Otorhinolaryngol* 2009;73:1584–1588
15. Varol E, Uysal BA, Ozaydin M. Platelet indices in patients with pulmonary arterial hypertension. *Clin Appl Thromb Hemost* 2011;17:171–174
16. Vizioli L, Muscari S, Muscari A. The relationship between mean platelet volume with the risk and prognosis of cardiovascular diseases. *Int J Clin Pract* 2009;63:1509–1515
17. Boos CJ, Lip GY. Assessment of mean platelet volume in coronary artery disease—what does it mean? *Thromb Res* 2007;120:11–13
18. Paca A, Karadagb A, Kurtaranc H, et al. Comparison of cardiac function and valvular damage in children with and without adenotonsillar hypertrophy. *Int J Pediatr Otorhinolaryngol* 2005;69:527–532
19. Widlitz A, Barst RJ. Pulmonary arterial hypertension in children. *Eur Respir J* 2003;21:155–176

Reconstruction of Extensive Through-and-Through Cheek Defects With Free Anterolateral Thigh Flap

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Objective: The purpose of this study was to assess the clinical features and therapeutic efficacy of extensive through-and-through cheek defects reconstruction with free anterolateral thigh flap.
Methods: A total of 11 patients underwent simultaneous tumor radical resection and through-and-through cheek defects reconstruction with free anterolateral thigh flap.

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Received April 12, 2013.
Accepted for publication June 25, 2013.
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The authors report no conflicts of interest.
Funding Support: This work was supported by the Nanjing Medical Science and Technique Development Foundation and the Nature Science Foundation of Jiangsu Province (grant nos. BK2011102 and BL2012017).

ISSN: 1049-2275
DOI: 10.1097/SCS.0b013e3182a2edf5