

Does Preoperative Vitamin K Injection Prevent the Bleeding Tendency in Adenoidectomy?

Preoperatif K Vitamini Enjeksiyonu Adenoidektomide Kanama Eğilimini Önler mi?

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ABSTRACT Objective: To investigate the effectiveness of preoperative vitamin K injection for hemostasis in adenoidectomy. **Material and Methods:** A total of 42 patients were included in the study. Vitamin K was injected to 21 of the patients preoperatively. The amount of intraoperative bleeding was classified as mild, moderate or severe. The duration of adenoidectomy operation was recorded. All patients were evaluated with complete blood count, activated partial thromboplastin time, prothrombin time, and bleeding time, both before the surgery and on the morning of the first postoperative day. The differences between preoperative and postoperative measurements were calculated. **Results:** The amount of intraoperative bleeding was severe in 2 (9.5%) patients in control group and 1 (4.8%) patient in vitamin K group. The mean duration of adenoidectomy operation time was 8.09±3.49 minutes in control group and 7.76±2.80 minutes in vitamin K group. The difference between preoperative and postoperative hemoglobin values was significantly lower in vitamin K group than control group ($p<0.05$). There was a statistically significant positive relationship between the operative time, the amount of intraoperative bleeding, and age in both groups ($p<0.05$). **Conclusion:** The present study has demonstrated that preoperative vitamin K injections helped prevent bleeding during adenoidectomy.

ÖZET Amaç: Adenoidektomide hemostaz için preoperatif K vitamini enjeksiyonunun etkinliğini araştırmaktır. **Gereç ve Yöntemler:** Çalışmaya, toplam 42 hasta dâhil edildi. Ameliyat öncesi 21 hastaya K vitamini enjekte edildi. İntraoperatif kanama miktarı hafif, orta veya şiddetli olarak sınıflandırıldı. Adenoidektomi operasyon süresi kaydedildi. Tüm hastalar hem ameliyattan önce hem de ameliyat sonrasındaki ilk sabah tam kan sayımı, aktive parsiyel tromboplastin zamanı, protrombin zamanı ve kanama zamanıyla değerlendirildi. Ameliyat öncesi ve sonrası ölçümler arasındaki farklar hesaplandı. **Bulgular:** İntraoperatif kanama miktarı kontrol grubunda 2 (%9,5) hastada ve K vitamini grubunda 1 (%4,8) hastada şiddetli idi. Ortalama adenoidektomi operasyonu süresi kontrol grubunda 8,09±3,49 dk ve K vitamini grubunda 7,76±2,80 dk idi. Preoperatif ve postoperatif hemoglobin değerleri arasındaki fark K vitamini grubunda kontrol grubuna göre anlamlı olarak düşüktü ($p<0,05$). Her 2 grupta ameliyat süresi, intraoperatif kanama miktarı ve yaş arasında istatistiksel olarak anlamlı bir ilişki vardı ($p<0,05$). **Sonuç:** Bu çalışma, preoperatif K vitamini enjeksiyonlarının adenoidektomi sırasında kanamayı önlemeye yardımcı olduğunu göstermiştir.

Keywords: Vitamin K; adenoidectomy; hemostasis; hemorrhage

Anahtar Kelimeler: Vitamin K; adenoidektomi; hemostazis; kanama

Adenoid hypertrophy can cause nasal obstruction with snoring, sinusitis, sleep apnea, effusion, otitis media, and adenoid facies in children. Adenoidectomy is the definitive surgical treatment of upper airway obstruction due to adenoid hypertrophy.¹ Various surgical methods such as curette and cautery, cautery alone, or microdebrider techniques can be used.² Adenoidectomy is a common operation in otorhinolaryngology practice. However, intraop-

erative blood loss can be a major problem with a mean amount of 43 to 54 mL in various studies.^{3,4}

Vitamin K (VK) is needed for the synthesis of the functional forms of factors 2, 7, 9 and 10 in the liver.^{5,6} VK deficiency results in an inability to synthesize functional molecules of factors 2, 7, 9 and 10 and therefore a hypocoagulable state.⁶ The traditional screening tests for VK deficiency are prothrombin time (PTT) and activated partial thromboplastin time

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(APTT). A prolonged PTT is not specific to VK deficiency and confirmation of the VK deficiency using two or more of the four VK-dependent procoagulants is required. PTT becomes prolonged only when the prothrombin concentration drops below about 50% of normal.^{6,7}

There are two hypotheses to explain VK deficiency associated with prolonged antibiotic use. These are suppression of intestinal flora by the use of broad spectrum antibiotics and a more direct inhibition of the VK-dependent step in clotting factor synthesis through antibiotic use. There are many studies showing hypoprothrombinemia in children who are treated with long-term antibiotic therapy.⁸ The aim of the present study was to investigate the effects of preoperative VK injections on hemostasis during adenoidectomy.

MATERIAL AND METHODS

ETHICAL CONSIDERATIONS

This retrospective study was conducted at the Department of Otorhinolaryngology of our hospital. The study was approved by the Ethics Committee of the same hospital with the number of 2011-KAEK-25 2018/07-07. Written informed consent was obtained from all participants, and data were collected in an anonymised database.

SUBJECTS

A total of 42 patients (20 boys and 22 girls) aged 3 to 12 years (mean age 6.6 ± 2.4 years in the VK group and 7.3 ± 2.7 years in the control group) who were admitted to our hospital for adenoidectomy underwent a preoperative anesthesia evaluation and otolaryngology examination. Patients with intermittent epistaxis, rhinosinusitis, and long-term history of antibiotic therapy were included in the VK group because of the intraoperative bleeding tendency risk. VK was injected to 21 of the patients preoperatively. Exclusion criteria were a history of suspicion of malignancy, a bleeding diathesis and usage of aspirin or anticoagulants.

SURGICAL PROCEDURE

All patients underwent curettage adenoidectomy and were operated on by the same surgeon under general anesthesia.

Adenoidectomy was then performed using a curette and the operative site was packed with a saline-soaked sponge gauze for 3 minutes. The intraoperative bleeding was collected in separate aspirator bags for each patient and amount measured in milliliters (mL) postoperatively. The operative time was recorded.

The amount of intraoperative bleeding was classified as mild (5-15 mL), moderate (16-30 mL) or severe (31 mL and over). Electrocauterization or similar procedures were not used for hemostasis.

Once absolute haemostasis was achieved, operation was ended. Paracetamol was recommended as required. Antibiotics were routinely prescribed to all patients.

OPERATIVE TIME

The operative time was defined as the period while the actual adenoidectomy was being performed. The time spent for complete hemostasis following adenoidectomy was also included.

HEMATOLOGICAL MEASUREMENTS

All patients were evaluated with complete blood count [hemoglobin level (HB), hematocrit level (HTCL), and platelet level (PLT)], bleeding time (BT), prothrombin time (PTT), and activated partial thromboplastin time (APTT) before surgery and on the morning of the first postoperative day. Differences between preoperative and postoperative measurements (HB, HTCL, PLT, APTT, PTT, BT) were calculated.

STATISTICAL ANALYSIS

The SPSS software (ver. 23.0) was used for statistical calculations. The Pearson correlation test, and Student's t-test were used.

A p value <0.05 was considered to indicate statistical significance.

RESULTS

The amount of intraoperative bleeding was mild in 11 (52.4%), moderate in 8 (38.1%), and severe in 2 (9.5%) patients in the control group while the respective numbers were 13 (61.9%), 7 (33.3%) and 1

(4.8%) in the VK group (Table 1). The operation time was 8.09 ± 3.49 minutes in control group and 7.76 ± 2.80 minutes in VK group. The volume of the adenoidectomy specimen was 2.32 ± 2.02 mL in control group and 2.59 ± 2.55 mL in VK group.

There was no statistically significant difference in the operative time or amount of intraoperative bleeding between the VK and control groups ($p > 0.05$).

There was no statistically significant difference between the HB, HTCL, PLT, APTT, PTT, and BT levels in the preoperative and postoperative periods between VK and control groups ($p > 0.05$). The difference between preoperative and postoperative HB was significantly lower in VK group compared to control group $p = 0.029$ ($p < 0.05$) (Table 2).

There was a statistically significant positive relationship between operative time, the amount of intraoperative bleeding, age and difference in HTCL between the preoperative and postoperative periods in VK and control groups ($p < 0.05$).

DISCUSSION

Adenotonsillectomy is a common procedure in otorhinolaryngology practice.⁴ Current techniques include curette and cautery, cautery alone, or microdebrider use.² In the present study, we used curettage adenoidectomy but did not use cautery to avoid modifying intraoperative hemostasis time. Hemostasis was ensured by packing the site for 3 minutes with

TABLE 1: The amount of intraoperative bleeding in both groups (%)

%	Mild	Moderate	Severe
Vitamin K	61.9	33.3	4.8
Control	52.4	38.1	9.5

saline-soaked gauze. Aspiration followed by gauze packing for 1 minute was repeated as necessary if the bleeding continued.

Adenoidectomy can cause significant bleeding. Bleeding during or after adenoidectomy can be challenging for the surgeon and it may be necessary to place a posterior nasopharyngeal pack followed by prolonged hospitalization.⁹⁻¹¹ Postoperative hemorrhage is the most common complication of adenoidectomy and it can be catastrophic. The incidence of postadenoidectomy hemorrhage is 0 to 0.49% in the literature.¹² The bleeding associated with adenoidectomy is usually not significant and the reported blood loss for curette adenoidectomy is approximately 50 mL.³ There was no postoperative hemorrhage in our study. The largest amount of intraoperative bleeding was 35 mL in VK group and 50 mL in control group. These findings are similar to those reported in the literature. The bleeding rate and the amount of bleeding were both lower in the VK group in this study.

The postoperative hemorrhage risk for adenotonsillar surgery in children with a congenital bleeding diathesis remains unclear and a wide range of

TABLE 2: Mean and standard deviation of operative time, amount of bleeding and the hemoglobin and hematocrit level differences in both groups.

	Group	Number of Patients	Mean	Std. Deviation	p*
Operative Time	VK	21	7.7619	2.80900	0.735
	Control	21	8.0952	3.49149	
Amount of Bleeding	VK	21	16.9048	10.18285	0.668
	Control	21	18.0952	7.49603	
HB Difference	VK	21	-5.952	.55360	0.029
	Control	21	-9.286	.38489	
HTCL Difference	VK	21	-2.1905	2.35094	0.531
	Control	21	-2.5905	1.70467	

HB: Hemoglobin level, HTCL: Hematocrit level, VK: Vitamin K

*p value shows the result of the independent samples test.

estimates have been reported.¹³ Dam et al. found that administration of antibiotics increased the risk of hemorrhage due to VK deficiency in humans in 1952.¹⁴ Conly et al. reported that patients who received antibiotic therapy with intravenous fluid therapy developed rapidly hypoprothrombinemia.¹⁵ This finding supported the role of antibiotics in causing VK deficiency.¹⁵ Studies have shown that children who receive long-term antibiotic therapy have a higher incidence of hypoprothrombinemia.⁸ Patients in both our groups had used antibiotics for at least 10 days for chronic rhinosinusitis before the adenoidectomy. Most of them also had a history of occasional epistaxis due to chronic infection.

Among the coagulation tests, APTT, PTT and PLT were evaluated routinely before surgery.¹⁶ Normal values of APTT are between 26-36 s. APTT becomes prolonged with the deficit of factors 5, 8, 9, 10, 11 and of VK, prothrombin and fibrinogen. PTT is prolonged with the deficit of factors 2, 5, 7, 10 and of fibrinogen. Normal values of PTT are 0.9 to 1.3.¹⁶ In our study, we measured APTT, PTT, PLT, BT, HB, HTCL preoperatively and postoperatively in both groups. We found no statistically significant difference between the preoperative and postoperative APTT, PTT, BT, PLT, HTCL levels in both the VK and control groups ($p > 0.05$). The difference between preoperative and postoperative HB was significantly lower in the VK group compared to the control group ($p < 0.05$). PT becomes prolonged only when the prothrombin concentration drops below 50% of normal and we believe this is the reason why there was no coagulation test difference between the preoperative and postoperative results. However, the postoperative decrease in HB was less prominent in VK group. HTCL is affected by intraoperative and postoperative saline infusion and the HTCL levels showed a similar change in both of our groups. We therefore believe HB levels are more useful when evaluating bleeding during adenoidectomy. The less prominent decrease of the HB level in the VK group in our study indicates that a single dose of VK can be effective on hemostasis.

CONCLUSION

A single preoperative injection of VK helped to prevent bleeding from adenoidectomy in this study. Surgeons should be aware of the issue and have their patients receive VK at the appropriate dose before surgery to prevent intraoperative bleeding caused by hypothrombinemia following antibiotic use. We believe a single preoperative injection of VK instead of long-term injections can be adequate for prevention.

Ethics

The study was approved by the Ethics Committee of Bursa Yüksek İhtisas Training and Research Hospital on 2011-KAEK-25 2018/07-07.

Informed Consent

This is a retrospective study and informed consent was taken from all patients.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Oğuzhan Dikici; **Design:** Oğuzhan Dikici; **Control/Supervision:** Oğuzhan Dikici, Fevzi Solmaz, Osman Durgut; **Data Collection and/or Processing:** Oğuzhan Dikici; **Analysis and/or Interpretation:** Oğuzhan Dikici, Fevzi Solmaz, Osman Durgut; **Literature Review:** Oğuzhan Dikici, Fevzi Solmaz, Osman Durgut; **Writing the Article:** Oğuzhan Dikici, Fevzi Solmaz, Osman Durgut; **Critical Review:** Oğuzhan Dikici, Fevzi Solmaz, Osman Durgut; **References and Fundings:** Oğuzhan Dikici, Fevzi Solmaz, Osman Durgut; **Materials:** Oğuzhan Dikici.

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