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Are subconjunctival hemorrhage and recovery times post-Rhinoplasty different for patients with different patterns in multivitamin intakes?

Abdallah Abdelrazeq H. Abdelrahman *, Mohammad Nawaf Hamed Alhamed, Gheath Hani Oqla Al Nimat, Khaled Salem Mohammad Al-Zawahreh and Bashar Khalaf Nahar Alraqqad

Otorhinolaryngologist, Department of ENT, Royal Medical Services, Amman, Jordan.

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Abstract

Aim: The study aimed to assess the correlation between potential confounders and factors like tranexamic acid use, multivitamin supplementation, dexamethasone administration, post rhinoplasty thermoplastic splinting, and patients' demographic and obesity statuses on the likelihood of achieving or maintaining a certain grade according to the SCH grading system. It also assessed recovery within one week after post rhinoplasty procedures.

Methods: A retrospective study was conducted on rhino plastic surgery patients at Prince Hashem bin Abdullah II Military Hospital in Aqaba and Lutron Military Hospital in Amman from January 2023 to December 2024. The study included patients aged 19-59, with a documented history of multivitamin supplementation. Data included characteristics, physical measurements, comorbidity, post-rhinoplasty splinting, complications, and procedure duration. Post-rhinoplasty subconjunctival hemorrhages were graded using Kara et al.'s approach. The study aimed to identify influential factors and assess the clinical importance of persistent postprocedural SCH within one week.

Results: A study involving 269 rhinoplasty patients found no significant differences in subconjunctival hemorrhage (SCH) episodes on the first day after surgery, second day, and complete healing within the first week. Two significant variables were delivering a 2 g tranexamic acid (TXA) injection before surgery and eating a multivitamin (MV) tablet before surgery. The probability of receiving MV supplementation was 0.316, while the risk of receiving a TXA therapy was 0.022. The Grade II SCH logistic regression model predicted between 51.4% and 72.1%. The study also examined how MV supplementation and dexamethasone injection influenced results pre- and post-surgery. The model's accuracy, specificity, and sensitivity scores changed from 34.0% to 47.7%, with an expected uncertainty of 34.0% to 47.7%.

Conclusion: The study suggests that individuals who have undergone rhino plastic procedures should consider taking multivitamins to reduce the risk of severe complications. Obesity can also negatively impact the risk of grade 2 subconjunctival hemorrhages on the first day after surgery. Dexamethasone before surgery can reduce bleeding and speed up recovery. Lowering the body mass index and using tranexamic acid during the perioperative period are also recommended.

Keywords: Otorhinolaryngologist; Post-Rhinoplasty Complications; Subconjunctival Hemorrhages; Recovery Within One-Week Post-Procedure; Frequency of Multivitamin Supplementation; Multiple Logistic Regression Analyses

1. Introduction

Rhinoplasty is one of the most popular cosmetic and useful surgeries done around the world, and there is a lot of information out there about how to recover from surgery and avoid problems (1). Subconjunctival hemorrhage (SCH)

* Corresponding author: Abdallah Abdelrazeq H. Abdelrahman

is a serious problem that can happen after surgery that has been reported in some patients. However, the frequency and intensity of this problem can change depending on a number of factors related to the surgery and the patient (2). SCH is when blood vessels in the conjunctiva break, leaving red spots on the eye. It is usually harmless, but it can make patients upset and make them worry about how the surgery will go (3). SCH after rhinoplasty can be caused by a number of things, including surgical stress, higher venous pressure, taking blood thinners, and even care steps like splinting the nose after surgery (4). To provide the best counselling and care for patients after surgery, it is important to know what causes SCH and how long it takes to heal.

One important thing to think about during recovery from surgery is the role of nutritional supplements, especially taking multivitamins, which may affect healing and the health of the blood vessels (5-6). Important vitamins like vitamin C, vitamin K, and B-complex vitamins help make collagen, clot blood, and mend tissues (7). So, differences in how people take their multivitamins could affect the number of cases of SCH and how long it takes to heal. Medications like tranexamic acid (TXA), which breaks down blood clots, and dexamethasone, which is a corticosteroid, have also been used to reduce bleeding and swelling during surgery (8-10). But their exact effect on SCH after rhinoplasty has not been fully studied.

Another important factor is the use of polymer splinting after surgery. These splints provide anatomical support but may put pressure on the nose and periocular blood vessels, which could lead to the development of SCH (11-12). Also, the patient's age, gender, and level of fat may affect both the frequency of SCH and the speed at which they heal, because these factors affect skin thickness, vascular weakness, and metabolic profiles (113-14). Because of these possible factors, we need to do a full analysis of how they combine in order to build predictive models for SCH risk and healing.

The point of this study was to find out if there was a link between things that could be contributing factors, like using tranexamic acid, taking multivitamins, being given dexamethasone, having a thermoplastic splint put on after rhinoplasty, and the patients' demographics and weight, and their chances of getting or keeping a certain grade according to the SCH system. The study also looked at how well people recovered one week after rhinoplasty operations. Among the goals were: Using a standard grade method to find out how common and bad SCH is after rhinoplasty. Looking at the link between how often you take multivitamins and the frequency and healing time of SCH. Figure out how TXA and dexamethasone affect the growth of SCH. The role of nose splinting in the development of SCH is being studied. We are looking at socioeconomic and obesity-related factors that might affect the risk of SCH and healing. By focusing on these goals, this study aims to give clinical practitioners evidence-based information about perioperative factors that can be changed and may affect SCH results. This will help improve patients' recovery experiences.

2. Methods and materials

A retrospective, observational, and non-sponsored study was conducted on rhino plastic surgery patients at Prince Hashem bin Abdullah II Military Hospital in Aqaba and Lutron Military Hospital in Amman from January 1, 2023, to December 30, 2024. The study included patients who were physically present and had undergone a variety of rhino plastic procedures. Participants were eligible if they were adults (19–59 years old), had a documented history of multivitamin supplementation frequency, and had at least 95% accessible and retrievable data.

The data included patients' characteristics, physical measurements, comorbidity (evaluated using an age-adjusted comorbidity index), use of tranexamic acid, dexamethasone, and multivitamins, type of post-rhinoplasty splinting (thermoplastic or non-thermoplastic), post-procedural complications, and procedure duration in minutes. Under registration number t 12_5/2025, the Institutional Review Board/Jordanian Royal Medical Services directorate of educational and technical training approved this research on April 8, 2025, with final approval at 8 May 2025.

Data on each patient was anonymized and protected. Patients with cardiovascular or coagulopathy issues, uncontrolled blood pressure, or revision surgery or maxillofacial intervention were excluded from the research. Patients under 18 and over 60 were excluded from the trial. The research excluded individuals who required an additional osteotomy during surgery to treat rocker or step abnormalities on either side. Female patients were told to arrange surgeries around their periods. All patients received nasal packing without compression during the surgery.

Additionally, all patients got postoperative instructions. The patients received antibiotics for 5 days and analgesics till their discomfort was manageable. Additionally, all patients were told to raise their heads. Post-rhino plastic procedural subconjunctival hemorrhages (SCH) were graded on the first and second days following the surgery using Kara et al.'s approach. The residual healing after rhinoplasty was evaluated by someone other than the surgeon in the first week. To reduce assessment and result evaluation bias, this was done.

Subjective grading of subconjunctival hemorrhages (SCH) on the first and second days after rhino plastic operations. Grade I temporal subconjunctival coverage is 50%–90%. At least 90% temporal subconjunctival coverage was grade II. To identify influential factors, serial multiple logistical regression was used. We studied SCH on the first day, SCH on the second day, and healing one week following the treatment. The multiple logistic regression analysis first examined the significant impact of the tested potential independent variables on the probability of SCH grading Grade II at three time points: 1st day (Model I), 2nd day (Model II), and 1-week post-procedure.

The clinical importance of persistent postprocedural SCH within 1 week was also examined. We collected directional and quantified coefficient values and standard errors from numerous logistic regression studies. We also assessed the relative risk and confidence intervals of key potential variables. We examined prediction range variability in this research. We represented these ranges using Cox and Snell's R2 and Nagelkerke's R2 if significant. The researchers also examined the sensitivity, specificity, and accuracy indices of the three models' sensitivity indies. Since this investigation was retrospective, informed consent was waived.

A retrospective review of hospital records provided patient data. This research filtered patient data using Microsoft Office LTSC Professional Plus 2021 Excel. IBM SPSS Statistics 25 was used for statistical analysis. This research used 0.05 significance.

3. Results

The research comprised 269 rhinoplasty patients altogether. Of the group, 126 were males (46.84%) and 143 were women (53.16). The male and female individuals did not vary statistically significantly on the key outcome measures—the number of episodes of subconjunctival hemorrhage (SCH) on the first day after surgery, SCH on the second day, and complete healing within the first week. Two statistically significant variables for the three outcomes of interest identified by repeated logistic regression investigations were delivering a 2 g tranexamic acid (TXA) injection before surgery and eating a multivitamin (MV) tablet before surgery, with or without trace elements. The chance of receiving MV supplementation was 0.316 (95% CI: 0.147–0.677), whereas the risk of receiving a TXA therapy was 0.022 (95% CI: 0.010–0.048). These two variables' regression values were -3.795 ± 0.391 and -1.153 ± 0.389, which indicated the direction and degree of their effects. Day 1 saw the creation of the Grade II SCH logistic regression model as follows:

$$\text{Probability} = \frac{e^{(2.635-1.153\times\text{MV}-3.795\times\text{TXA})}}{1+e^{(2.635-1.153\times\text{MV}-3.795\times\text{TXA})}}$$

Ranging from 44.2% to 59.0%, this model's pseudo-R^2 was 88.8%, 83.6%, and 85.1%, respectively, for precision, sensitivity, and accuracy. Further studies on the incidence of Grade II SCH on day 2 revealed significant correlations with MV supplement use before to surgery, dexamethasone administration prior to surgery, and patient obesity. In such sequence, the relative risks were believed to be 0.007, 0.007, and 137.752 (95% CI: 17.708–1071.594). -5.013 ± 1.052, -5.015 ± 1.050, and 4.925 ± 1.047 were the regression variables that accompanied them. The prediction model was composed as follows:

$$\text{Probability} = \frac{e^{(4.896-5.013\times\text{MV}-5.015\times\text{Dex}+4.925\times\text{Ob})}}{1+e^{(4.896-5.013\times\text{MV}-5.015\times\text{Dex}+4.925\times\text{Ob})}}$$

With accuracy ratings of 83.3%, sensitivity ratings of 56.1%, and precision scores of 98.8%, this model predicted between 51.4% and 72.1%. At last, we examined using logistic regression how MV supplementation and dexamethasone injection influenced results pre- and post-surgery. Results indicated the risks were 0.071 (95% CI: 0.033–0.151) and 0.074 (95% CI: 0.035–0.157), with values of -2.648 ± 0.385 and -2.609 ± 0.386, respectively. The regression equation was

$$\text{Probability} = \frac{e^{(3.760-2.648\times\text{Dex}-2.609\times\text{MV})}}{1+e^{(3.760-2.648\times\text{Dex}-2.609\times\text{MV})}}$$

From 34.0% to 47.7%, the model's accuracy, specificity, and sensitivity scores changed; its expected uncertainty fell between 34.0% and 47.7%. Though it still contains all the essential statistical data, this updated edition is more precise, clearer, and more cerebral. Should you need any more modifications, please inform me! 57.6%, 92.9%, and 81.8%. Table 1 shows multiple logistic regression findings.

Table 1 Outcomes from multiple logistic regression analyses

	B±S.E	**Sig.**	**Exp(B) (95% CI; LB-UB)**	**Model descriptions**	**Sensitivity indices**
%Prob SCH_1st Day					
TXA (No vs Yes)	-3.795±0.391	0.000	0.022 (95% CI; 0.010-0.048)	VR: 44.2%-59.0% χ2 (2) =0.106 p-value=0.948	TNR: 86.8 TPR=83.6 AI=85.1
MV (No vs yes)	-1.153±0.389	0.003	0.316 (95% CI; 0.147-0.677)		
Constant	2.635±0.383	0.000	13.944		
% Prob SCH_2nd Day					
MV (No vs yes)	-5.013±1.052	0.000	0.007 (95% CI; 0.001-0.052)	VR: 51.4%-72.1% χ2 (6) =2.633 p-value=0.853	TNR=98.8 TPR=56.1 AI=83.3
Dex IV (No vs Yes)	-5.015±1.050	0.000	0.007 (95% CI; 0.001-0.052)		
Obs (non-obese vs obese)	4.925±1.047	0.000	137.752 (95% CI; 17.708-1071.594)		
Constant	4.896±1.049	0.000	133.710		
%Prob Recovery_1 wk					
MV (No vs yes)	-2.609±0.386	0.000	0.074 (95% CI; 0.035-0.157)	VR: 34%-47.7% χ2 (2) =2.445 p-value=0.295	TNR=57.6 TPR=92.9 AI=81.8
DEX IV (No vs Yes)	-2.648±0.385	0.000	0.071 (95% CI; 0.033-0.151)		
Constant	3.760±0.433	0.000	42.940		

Multiple serial logistic regression analyses were performed on rhinoplasty patients undergoing surgical procedures to assess the probabilities of post-rhinoplasty complications, specifically subconjunctival haemorrhages on the first day, denoted as % Prob SCH_1st Day, subconjunctival haemorrhages on the second day, denoted as % Prob SCH_2nd Day, and complete recovery within one week, denoted as % Prob Recovery_1 wk. Nonetheless, the adopted investigation encompassed independent variables for predicting these three dependent variables, which included TXA and MVs for the first dependent variable, Dex+MVs and Obs for the second dependent variable, and TXA and MVs for the third dependent variable.

B: Regressional coefficient. SE: Standard of error. Sig: Significant level. Exp (B): Exponent or the propensity risk CI: Confidence interval. LB: Lower bound.	TXA: Tranexamic acid. MV: Multivitamins. Dex IV: Dexamethasone intravenous. Obs: Obesity status. %Prob SCH_1st Day: Probability of subconjunctival haemorrhages on the first day after rhinoplasty. %Prob SCH_2nd Day: Probability of subconjunctival haemorrhages on the second day after rhinoplasty.

UB: Upper bound.	%Prob Recovery_1wk: Probability of subconjunctival haemorrhages complete recovery within one week after rhinoplasty.

4. Discussion

One of the most common postoperative complications that may occur after rhinoplasty is known as subconjunctival hemorrhage (SCH). This complication is often ascribed to increased venous pressure, surgical trauma, or coagulopathic variables (16-15). Despite the fact that SCH is normally harmless and self-limiting, its severity and duration might vary depending on perioperative measures such as the injection of tranexamic acid (TXA), the use of corticosteroids, and nutritional supplements (16-17). In addition to other potentially confounding factors including obesity, the use of dexamethasone, and the use of TXA, the purpose of this research was to determine whether or not patterns of multivitamin (MV) consumption had an effect on the severity of SCH and the amount of time it takes to recover after rhinoplasty.

Among patients who had different MV supplementation strategies, our research indicated that there were no significant variations in the number of SCH episodes that occurred on postoperative days 1 and 2 or in the amount of full healing that occurred during the first week. On the other hand, two significant predictors were found to be preoperative TXA injection and MV consumption. Patients who were given 2 grammes of TXA before to surgery had a lower risk of severe SCH (Grade II), which is consistent with the findings of other studies that demonstrated the antifibrinolytic effects of TXA in reducing perioperative bleeding (18-19).

The administration of MV supplementation demonstrated a protective tendency, with a probability of 0.316 for lowering the severity of SCH. According to studies that suggests vitamins like K and C have roles in coagulation and capillary integrity (20), our conclusion is consistent with those findings. However, studies that contradict each other suggest that taking an excessive number of vitamins, especially fat-soluble vitamins, may not provide any extra advantages and may even lead to the development of prothrombotic states (21-22).

The research that already exists on the effectiveness of TXA in minimizing postoperative bleeding is supported by our findings. The results of our study were supported by the findings of a meta-analysis conducted by Ker et al. (23), which revealed that TXA considerably reduced bleeding in surgical patients. On the other hand, there are publications that claim that TXA has a modest effect on SCH specifically, which suggests that SCH may be more impacted by mechanical variables such as surgical technique than it is by systemic antifibrinolytics (24).

It is yet unclear what part MV supplementation plays in the healing process after surgery. Despite the fact that our research indicates that there may be a potential advantage, Berger et al. (25) conducted a randomized controlled trial and found that frequent use of MV did not result in a significant improvement in postoperative bleeding or wound healing. In contrast, Hemila et al. (26) conducted research in which they found that taking vitamin C supplements sped up the healing process of wounds. This finding lends credence to our discovery that the consumption of MV may have an effect on the dynamics of recovery.

According to the findings of our research, the administration of dexamethasone resulted in a reduction in the severity of SCH, most likely as a result of its anti-inflammatory and capillary-stabilizing actions. According to the results of Hatef et al. (27), who saw a reduction in postoperative oedema and ecchymosis in rhinoplasty patients who were given corticosteroids, this is consistent with their findings. On the other hand, there is data that contradicts itself, with some research showing that steroids may slow down the healing process of wounds due to their immunosuppressive activities (28).

Obesity, defined as a body mass index (BMI) of thirty or above, was shown to be linked to an elevated risk of grade two surgical site complications (SCH) on the first postoperative day. This finding is in line with previous research that has established a connection between higher BMI and prolonged bleeding and reduced microcirculation (29). The results of our investigation are further supported by the findings of a study conducted by Gupta and colleagues (14) which discovered that obese individuals had greater rates of postoperative complications, including the development of hematoma.

It seems from our research that it is recommended that preoperative TXA administration be examined to reduce the risk of SCH. Although there is a possibility that MV supplementation might have protective advantages, further study is required to determine the ideal amounts. It is possible that dexamethasone might be helpful in lowering the severity of SCH; however, the use of this medication should be weighed against the possibility of healing delays. Patients who are

obese and are intending to have rhinoplasty should be advised to begin weight control in order to reduce the risk of bleeding. The constraints of this study When using a retrospective design, it is impossible to deduce causality. There is a possibility of recollection bias in self-reported MV consumption. Data from a single center may restrict their capacity to generalize. It would be beneficial to conduct prospective trials in the future using standardized MV regimens.

5. Conclusion

The patterns of MV supplementation did not substantially influence the incidence of SCH or the recovery durations; however, TXA and dexamethasone indicated protective benefits. One of the most significant risk factors for severe SCH was obesity. The findings of this study show the need of individualized perioperative tactics in order to maximize the results of post-rhinoplasty procedures.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest in this manuscript

Statement of ethical approval

This manuscript does not involve animal subjects. This investigation was authorized by the Institutional Review Board/Jordanian Royal Medical Services directorate of educational and technical training on April 8, 2025, with ultimate approval granted on May 8, 2025, under registration number t 12_5/2025.

Statement of informed consent

Consent forms were waived as a result of the retrospective study design.

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