



The Hemostatic Effect of Desmopressin on Bleeding as a Nasal Spray in Open Septorhinoplasty

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Received: 8 April 2019 / Accepted: 10 August 2019 / Published online: 26 August 2019
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Abstract

Background Rhinoplasty is associated with intraoperative bleeding which affects the quality of the operation and may increase the time of surgery. The aim of this study was to assess the role of nasal spray of desmopressin on reduction in intraoperative bleeding during elective open rhinoplasty. **Methods** Conducting an interventional study in our hospital, all patient data including demographic information, medical history and laboratory tests before surgery were collected. Patients who were randomly divided into two study groups, received nasal desmopressin spray or placebo spray, 60 min before starting open septorhinoplasty. The measured variables included: bleeding volume, the operative field quality in regard to bleeding (Boezaart score), the surgeons' satisfaction in regard to bleeding during surgery (Likert scale), postoperative bruising, postoperative bleeding and menstruation. **Results** Thirty cases were studied; 13 (46.3%) people received placebo and 17 (56.7%) received desmopressin. The Boezaart score, satisfaction scores, bleeding volume, upper eyelid ecchymosis in the group receiving

desmopressin were significantly better than the control group. Postoperative bleeding was also less in the desmopressin group, but not significant as other variables. In women of each group, menstruation had no effect on the amount of bleeding, surgical field quality and surgeon satisfaction compared with non-menstruation women. **Conclusion** Nasal desmopressin use is an effective method for reducing intraoperative and postoperative bleeding and diminished postoperative ecchymosis which improves surgeons' satisfaction. So using the nasal form of desmopressin could be considered as method of controlling bleeding and ecchymosis in open rhinoplasty. **Level of Evidence IV** This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Introduction

As a common aesthetic surgery worldwide, septorhinoplasty requires a safe procedure. Every surgeon should be familiar with ways to manage bleeding during this surgery. Many anti-hemostatic agents have been introduced in this regard.

As an anti-hemostatic agent, desmopressin increases the plasma concentration of coagulation factor VIII (an anti-hemophilic factor) and tissue plasminogen, plus the activity of Von Willebrand factor and clotting activity. It shortens the bleeding and partial thromboplastin times. It is an analogue of vasopressin, but its half-life is much longer. The minimum effective dosage of desmopressin is 0.1 µg/kg for intravenous administration [1]. Desmopressin can reduce blood loss during orthogenetic surgery [2].

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To our knowledge, all previous studies have used the intravenous forms of this drug and we did not find any previous study about the nasal form of the drug. Nowadays, desmopressin is available as a nasal spray for easier use. Its effects start from one hour after inhalation and reaches the peak level after five hours. It disappears after eight to 20 h [3]. This motivated us to evaluate the effect of desmopressin as a nasal spray to decrease bleeding during an open septorhinoplasty.

Materials and Methods

This was a double-blinded interventional prospective study. Thirty people who were supposed to undergo open septorhinoplasty were selected to participate in the study. The exclusion criteria were having a history of: (1) coagulating disorders (2) conditions associated with clotting (such as stroke, coronary artery disease, deep vein thrombosis, pulmonary embolism and peripheral vascular disease) (3) allergy to desmopressin, tranexamic acid and similar products (4) hypertension, and (5) taking drugs that affect coagulation.

Their information was gathered before the surgery, and all patients were randomly divided into two groups according to random 4-block model. Sixty minutes before inducing anesthesia, one group received nasal desmopressin spray. The other group received placebo NaCl spray in a similar container. Two puffs of sprays were used in each nostril (Minirin with an approximate bioavailability of 8 µg or placebo). One board-certified surgeon did all the surgeries.

The following information was recorded for each patient: bleeding volume, surgery field quality in terms of bleeding (Boezaart score), the surgeons' satisfaction in terms of bleeding during surgery (Likert scale), post-surgery bruising, bleeding and menstruation [4–6]. Participants with pre-medical problems were excluded from the study. The data were analyzed with the statistical package for social sciences (SPSS) software version 25 and presented in charts. Frequency was considered for qualitative variables, and mean ± standard deviation for quantitative variables. Parametric tests were used for normal distributions, and nonparametric tests were applied for non-normal distributions. A *p* value less than 0.05 was considered significant.

Results

Among 30 participants, 13 (43.3%) of them were in the placebo group and 17 (56.7%) of them were in desmopressin group (according to their completed files for

randomized classification). The two groups were not significantly different in terms of age ($p = 0.69$) and sex ($p = 0.60$). Among women, menstruation status was not significantly different between the two groups ($p = 0.54$).

The suctioned volume was measured without using irrigation or gauze to assess the bleeding volume. Nasal bleeding volume was significantly lower in the desmopressin group compared to the control group (21 cc vs. 32 cc). There was a significant difference between the two groups ($p = 0.04$).

The Boezaart score was used to evaluate the surgery field in terms of bleeding and the need for suction. The effect of each drug changes gradually during surgery. So, this score was assessed every 30 min to give a better viewpoint of desmopressin's effect. The Boezaart scores were significantly better in both the 30th and 60th min of the surgery ($p < 0.001$; Fig. 1).

In the 30th min of the surgery, the surgeon's satisfaction scores were 3.92 ± 0.49 and 4.18 ± 0.39 in the placebo and desmopressin groups. In the 60th min of the procedure, the surgeon's satisfaction scores were 4.08 ± 0.76 and 4.59 ± 0.62 in the placebo and desmopressin groups. There was a significant difference between the two groups in 30 and 60 min after the beginning of the surgery ($p = 0.02$). In other words, desmopressin improved the quality of the surgery field during septorhinoplasty compared to placebo.

The Likert score was used to evaluate the surgeon's satisfaction of the surgery field. The mean satisfaction score significantly improved in the desmopressin group compared to the placebo group ($p = 0.05$) (Fig. 2).

The duration of open septorhinoplasty was 79.2 ± 15.7 min in the placebo group and

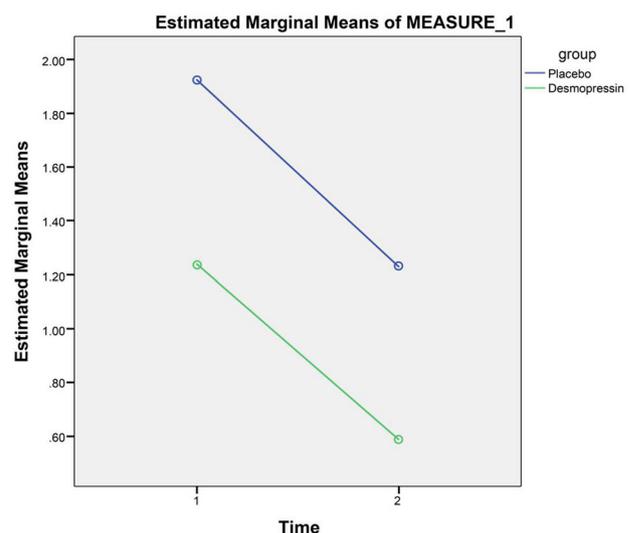


Fig. 1 Boezaart score in time frames. Time 1: 30 min after beginning of surgery, time 2: 60 min after beginning of surgery

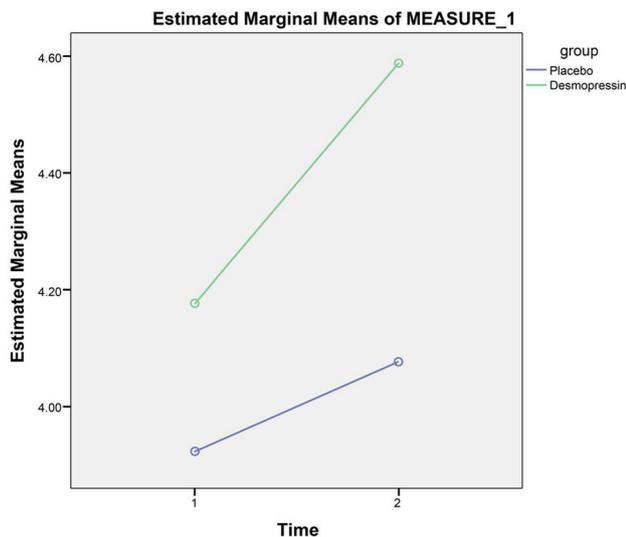


Fig. 2 Likert score in time frames. Time 1: 30 min after beginning of surgery, time 2: 60 min after beginning of surgery

70.6 ± 19.5 min in the desmopressin group which was not significantly different ($p = 0.20$). There was a significantly smaller ecchymosis in both upper ($p = 0.04$) and lower eyelids ($p = 0.009$) in the desmopressin group compared to the placebo group. Postoperative epistaxis was observed in only two patients in the placebo group, which was managed conservatively. There was none in the desmopressin group. Still, the difference was not significant. Women with menstruation had no significant difference in terms of bleeding volume ($p = 0.43$), surgery field quality ($p = 0.41$; Boezaart score) or surgeon's satisfaction ($p = 0.78$) compared to women without menstruation in both groups.

Discussion

When we do incisions at the beginning of the surgery, relatively fresh vascular injuries cause more bleeding. In time the coagulation system activates and amplifies during the surgery. The improvement of scores in the desmopressin group shows that the nasal desmopressin which was administered one hour before the surgery remained effective up to the last moments of the surgery. It means that simply nasal spray can control hemostatic events during septorhinoplasty. In other words, easily available spray not only can make the operation field better, but also patients may sense its benefits on ecchymosis and edema.

Ecchymosis was assessed one day after surgery according to the bruising in the farthest points from the nose in both upper and lower eyelids, which was scored relative to canthi and pupil position, and this is one of the rarest ways to assess ecchymosis, quantitatively. Farahvash

et al. [5] evaluated this assessment, and their results seemed to be as close as to real conditions. Moreover, we assessed blood volume during surgery by measuring the suctioned volume—without irrigation or gauze usage—to have a concise estimation, and confirm nasal spray efficacy.

In a well-established meta-analysis in 2016, Coroneos et al. [7] confirmed the effects of perioperative corticosteroid intravenous administration on postoperative edema and ecchymosis from eight trials and recommended it. Considering their results, we suggest nasal desmopressin spray as an easily administration with comparable outcomes.

Herbal supplements such as *Arnica montana* are among recommendations to decrease ecchymosis and edema after rhinoplasty as introduced by Chaiet et al. [8] as an easy way, but it seems 9 cases are not enough to be confirmed. As, Ho et al. [9] did not reach such conclusion in their systematic review article and stated insufficient data did not support use of arnica and bromelain to control postoperative ecchymosis and edema. Our topical administration can help surgeons' operation field and patients' ecchymosis without significant side effects.

Guyuron et al. [2] introduced intravenous desmopressin to reduce bleeding during orthogenetic operations without complications and unremitting epistaxis control without the need for alternative maneuvers [10]. We think a nasal spray can be safe and easily administered especially in office-based procedures.

Nasal desmopressin is easily accessible in many countries. Water retention and hyponatremia, dizziness, nausea and vomiting, nasal congestion, and rarely nasal bleeding are among its side effects that are considered during treatment [3]. It can be used to have a cleaner surgery field. If it is used, people feel more comfortable during the post-surgery recovery. It can be administered an hour before the surgery. Two puff in each nostril seems to be sufficient to have less bleeding.

Acknowledgements The authors thank Muhammed Hussein Mousavinasab for editing this text.

Funding None.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interests.

Ethical Approval This article was based on fellowship thesis accepted by ethic committee with number: 9311256006 and all human rights were respected accordingly.

Informed Consent All patients signed informed consents (in Persian forms) while enrolling the study.

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