Original Article

Evaluation of Local Tranexamic Acid on Septoplastic Surgery Quality

Dr. Abdullah Musleh[1*]

[1]College of Medicine, King Khalid University, Abha, Saudi Arabia.

***Corresponding Author:** Dr. Abdullah Musleh

[*]College of Medicine, King Khalid University, Abha, Saudi Arabia.
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Abstract

Objective: Septoplasty is a surgical procedure that is used to correct abnormalities of the nose that are either genetic or the consequence of traumatic injury. Tranexamic acid (TXA) is a synthetic derivative of the amino acid lysine, and its antifibrinolytic properties are attributed to its irreversible binding to the lysine binding sites on plasminogen molecules. The objective of this study was to evaluate the local TXA in septoplastic surgery quality.

Methods and Materials: It was the goal of this prospective, randomized, double-blind study, which was approved by the Research and Ethics Committees of the AJA University of Medical Sciences and the Iranian Registry of Clinical Trials, and which received written informed consent from all participants, to evaluate the effects of local TXA on the septoplastic surgery field. The study was conducted among 60 patients (thirty patients in each group) at the Imam Reza Hospital in Tehran, Iran.

Results: The (demographic characteristics) gender, age, and weight did not vary statistically significantly between the two groups, and neither did their height and weight. The researchers found that there were no statistically significant variations in mean arterial pressure or heart rate fluctuations between the two groups.

Conclusion: TXA has been shown to have hemostatic properties, and there is no doubt about it. According to the researchers, TXA has been demonstrated in multiple clinical studies and meta-analyses to reduce blood loss while not increasing the risk of DVT and PE complications. Other medication delivery strategies, such as intramuscular injection, oral administration, and intra-articular injection, are available in addition to the ones mentioned above. In multiple experiments, it has been shown that the quantity of intravenous TXA solution that reaches the target region is very little. Due to the heightened coagulation status of the whole body, as well as the potentially life-threatening consequences of thrombosis difficulties, local application is the preferred method of administration.

Keywords: Quality of surgery, Tranexamic acid, septoplastic surgery

INTRODUCTION

Septoplasty is a surgical procedure that is used to correct abnormalities of the nose that are either genetic or the consequence of traumatic injury. On the other hand, Tranexamic acid (TXA) is a synthetic derivative of the amino acid lysine, and its antifibrinolytic properties are attributed to its irreversible binding to the lysine binding sites on plasminogen molecules [1]. If there is any bleeding during septoplasty, it is crucial since even a little amount of bleeding may impair the surgeon's vision, increasing the risk of surgical problems and lengthening the bleeding time. This can result in incomplete surgical surgery among other consequences.

Furthermore, an improved field of vision may be achieved by the use of several procedures such as controlled hypotension, cauterization, packing, and the use of topical vasoconstrictors. Contrary to this, cauterization may cause tissue damage as well as delayed bleeding, while topical vasoconstrictors might induce hemodynamic instability in patients, particularly those who have a history of high blood pressure or ischemic heart disease [2]. Patients who were deliberately hypotensive received greater dosages of aesthetic medicines as well as more sildenafil. According to the most general consensus, none of the techniques indicated above can provide the requisite surgical field.

The administration of TXA as an intravenous infusion has previously been shown in the area of endoscopic sinus surgery. An extensive body of research has shown that TXA may significantly minimize bleeding in patients undergoing heart surgery, major orthopedic surgery, liver transplantation, and prostate surgery [3]. Over the last many years, TXA has been used as a mouthwash prior to tooth extraction in the field of dentistry. While there has been evidence to demonstrate that TXA intravenous infusion may reduce postoperative blood loss by a significant amount, the risk of deep vein thrombosis (DVT) and pulmonary embolism (PE) associated with this therapy makes its use controversial [4]. TXA injection given intravenously is thought to be responsible for the development of CNS depression, hypersensitivity reactions, color vision loss, seizures, thromboembolic events, and ureteral obstruction problems [5].

LITERATURE REVIEW

An even little quantity of bleeding during nose surgery may impair the surgeon's eyesight, cause the operation to take longer, and degrade its overall quality; as a result, many techniques have been offered to reduce bleeding during nose surgery and therefore enhance the overall quality of surgery [11]. The scientists undertook this trial in order to evaluate the effectiveness of local TXA administration in the dry field of surgery to that of systemic treatment.

It has previously been shown that TXA is effective when administered intravenously during endoscopic sinus surgery procedures. Patients having heart surgery, major orthopedic surgery, liver transplantation, and prostate surgery, among other operations, have shown that TXA is beneficial in minimizing bleeding [14]. TXA mouthwash has traditionally been recommended by dental practitioners prior to tooth extraction in order to avoid gum disease and other oral health concerns. Even while there is evidence to suggest that TXA intravenous infusion may significantly minimize postoperative blood loss, the danger of deep vein thrombosis (DVT) and pulmonary embolism (PE) associated with this medication renders its usage debatable. According to the manufacturer, it is likely that intravenous administration of TXA will result in central nervous system depression, hypersensitivity responses, color vision loss, seizures, as well as thromboembolic events, and ureteral obstruction, among other undesirable effects [15].

As a result of their study, Koster and colleagues discovered that when TXA was administered to patients having cardiac bypass surgery, the incidence of seizures increased by double, as did the likelihood of embolic and hypoglycemic events occurring. On the basis of efficacy, it has not yet been shown that TXA is the most effective route and manner of administration [16]. It was decided to conduct double-blind, placebo-controlled research in order to investigate if topical application of this medicine may reduce the amount of blood lost during surgical procedures. The prior study revealed that there were complications associated with intravenous injection; thus, this procedure was implemented in order to reduce the likelihood of similar issues arising in the future.

Thrombocytopenia, hemophilia, cardiac and orthopedic therapies, as well as nose surgery, have all profited from the use of blood transfusions to maintain their systems operating at peak performance (rhinoplasty, septoplasty, turbinectomy, and FESS) [17]. If TXA is supplied systemically to the patient, it may also induce adverse symptoms such as dizziness, nausea, vomiting, blurred vision, and a headache. The efficacy of transdermal x-ray ablation in the treatment of post-nose surgery problems such as hemorrhage, edema, ecchymosis, and other issues has been examined in a recent study. At this point, however, the findings have been uneven, and the effectiveness of TXA in nose surgery has not been shown decisively. We want to do so by conducting a comprehensive examination of the current data on the function of TXA in patients having nose surgery as part of our research. One of the objectives of this meta-analysis is to determine if perioperative TXA has an impact on surgical field quality, operating time, and particular operational problems, among other things (estimated blood loss, eyelid edema, and periorbital ecchymosis) [18].

Individuals who have had rhinoplasty are more susceptible to the development of postoperative edema and ecchymosis around the periorbital regions, which may be difficult to hide because of their location. A total of two randomized controlled trials were identified and analyzed in the present meta-analysis for perioperative TXA therapy-induced postoperative edema and ecchymosis following perioperative TXA treatment, according to the authors [19]. In each of the four findings (edema of the upper and lower eyelids, ecchymosis of the upper and lower eyelids, ecchymosis of the upper and lower eyelids, and ecchymosis of the upper and lower eyelids), the findings revealed a statistically significant difference between the two groups, with edema of the upper and lower eyelids being the most common.

Following the outcomes of this research, it is possible that the use of TXA in nasal surgery will lower the incidence of postoperative edema and ecchymosis by a substantial amount. Wang hypothesized that systemic injection of TXA would be beneficial during minimally invasive total knee arthroplasty with rivaroxaban for thromboprophylaxis and that this would help to reduce wound hematoma during the operation. Wang's results were in line with his predictions [20]. It has also been shown that TXA may reduce the occurrence of extremities ecchymosis after total knee replacement surgery, according to Dr. Chen's study findings. In light of these data, we came to the conclusion that perioperative TXA was beneficial in reducing the development of edema and ecchymosis after nasal surgery [21].

Numerous studies have shown that a range of therapies may be effective in minimizing the appearance of edema and ecchymosis on the eyelids after rhinoplasties have been done [22]. Some examples of such therapies are corticosteroid medication, intraoperative hypotension (low blood pressure), head elevation, and intraoperative cooling [23]. Further research has shown that the use of preoperative metoprolol, lidocaine injection in conjunction with epinephrine, intravenous remifentanil with controlled hypotension, and intravenous desmopressin may all aid to reduce intraoperative bleeding and postoperative discomfort. TXA has been shown to minimize intraoperative bleeding as well as postoperative eyelid edema and ecchymosis in certain cases following rhinoplasty, but further study is required to determine if this is the case.

The fact that rhinoplasty is a relatively safe surgical procedure does not negate the possibility that direct damage to the vasculature during the osteotomy may result in significant bleeding, persistent eyelid edema, ecchymosis, and asymmetry, all of which can result in cosmetic deformity and excessive narrowing of the nasal passage [24]. A number of strategies have been developed in an attempt to reduce the morbidity associated with surgical procedures. An investigation of the effects of TXA administration during rhinoplasty in the instances of intraoperative hemorrhage, postoperative eyelid edema, periorbital ecchymosis, and other complications was carried out in this meta-analysis. According to our data, TXA was associated with a 42.28 mL decrease in bleeding when compared to the placebo group. A protective benefit of TXA used during rhinoplasty was shown in this research in terms of minimizing intraoperative bleeding, which may be beneficial in terms of reducing operation length and the risk of complications [25].

In addition, we found a decrease in eyelid edema and periorbital ecchymosis within the first postoperative week and no reports of thromboembolic events. The main purpose of TXA is the reduction of intraoperative bleeding and transfusion requirements in both cardiac and non-cardiac surgery. TXA is an ant fibrinolytic agent derivative of the amino acid lysine that competitively inhibits activation of plasminogen to plasmin, an enzyme that degrades fibrin clots, fibrinogen, and other plasma proteins, including the procoagulant factors V and VIII.31 Studies have suggested an anti-inflammatory response to TXA by reducing the levels of interleukin-6, fibrin degradation products (D-dimer), creatine kinase, plasminogen activator inhibitor, and C-reactive protein. Interleukin-6 plays a major role in the inflammatory response to surgeries, reaching significant plasma levels after 2 to 4 hours and maximum concentration on POD [26].

In the acute-phase response, interleukin-6 stimulates the production in the liver of c-reactive protein, fibrinogen, and other ant proteinases, which is influenced by operation length and volume of blood loss during surgery. Therefore, the use of TXA in patients undergoing rhinoplasty may lead to a reduction of interleukin-6 and acute-phase proteins decreasing the eyelid edema within the first postoperative week. Furthermore, the suppression of D-dimer, a marker of ongoing fibrin formation and degradation, suggests that patients receiving TXA experienced less secondary fibrinolysis, which may lead to reduced intraoperative bleeding and post-rhinoplasty ecchymosis [27].

There are few studies to date comparing outcomes after the use of oral and intravenous TXA, and most of them were conducted in orthopedic surgeries. In the present met analysis, oral TXA, 1 g, 2 hours before rhinoplasty was associated with a greater reduction in intraoperative bleeding compared with intravenous TXA, 10 mg/kg, and is as safe as intravenous administration regarding short-term surgical outcomes and thromboembolic complications [28]. These findings may be related to differences in plasma concentration of oral and intravenous TXA during the first few hours after administration. Studies have shown that peak concentrations of oral TXA are noted within 2 to 4 hours after administration in contrast with monoexponential decays observed for intravenous TXA. Within 6 hours after administration, the levels of intravenous TXA seem to be subtherapeutic, but the levels of oral TXA are still above the minimum required concentration to maintain a hemostatic reaction (10mg/L) [29].

Moreover, oral TXA provides greater cost savings to patients and can be recommended to reduce bleeding in rhinoplasty. In standard rhinoplasty procedures, the trauma of fracturing nasal bones and the injuries to angular vessels that cross the osteotomy sites lead to prolonged postoperative periorbital edema and ecchymosis and can affect the cosmetic results and the patient's social life. Recent studies have demonstrated that clinical outcomes in patients who undergo otolaryngology–head and neck surgery may be improved using different surgical approaches, such as piezoelectric surgery [30]. In addition, non-pharmacologic and pharmacologic interventions have been widely used to reduce periorbital edema and ecchymosis after facial plastic surgeries, but evidence for efficacy is conflicting. A recent systematic review evaluated the use of postoperative interventions in rhinoplasty and found that cold compression and arnica administration could reduce eyelid edema and ecchymosis in the short-term

ROLE OF TRANEXAMIC ACID IN NASAL SURGERY

Each and every one of the invasive nose operations listed above is done on a regular basis, either as a standalone therapy or in combination with other procedures. Invasive nose operations such as rhinoplasty, septoplasty, and functional endoscopic sinus surgery (FESS) are examples of procedures that are done on a regular basis in the UK [6]. However, despite the fact that these therapies were first presented more than a century ago, they have experienced considerable breakthroughs in recent years, despite the fact that they were first introduced more than a century ago. Similar to other surgical treatments, these cosmetic procedures are not without their own set of dangers and concerns, particularly when it comes to their capacity to improve the physical appearance of patients while also assuring their happiness and faith in the process itself. It is critical to take preventive actions today in order to avert the emergence of these challenges in the near future.

After eyelid surgery, the most often seen complications are intraoperative hemorrhage, eyelid edema, and periorbital ecchymosis, amongst other things. In addition, since the maxillofacial region is a blood-rich area, bleeding is expected in the majority of nose procedures, which has a negative impact on the overall quality of the procedure [7]. It is probable that intraoperative bleeding could raise surgical risk, and that the accompanying loss in intraoperative visibility will make it more difficult to complete the surgery on time. Due to the diminished intraoperative visibility, it is also likely that a surgeon will not be able to perform the treatment in its entirety.

The possibility of it arising during the postoperative period, after the packing has been removed, must be considered. In certain cases, the doctor may be forced to apply more packing to the nose or to repack the nose, which will result in the patient experiencing further difficulties. Depending on the severity of the edema, the healing process of the damaged tissues may be prolonged, and ecchymosis may result in skin coloring that is permanent [8]. The vast majority of rhinoplasty and septoplasty cases need the use of various forms of osteotomies, which is the most prevalent cause of periorbital and paranasal edema and ecchymosis, as well as other problems, during the procedure.

TXA is an amino acid that is a synthetic derivative of the amino acid lysine. It has an antifibrinolytic action by inhibiting the lysine-binding sites on plasminogen molecules, which are found on fibrinogen molecules [9]. Chemical compounds have been used to prevent or minimize bleeding in the digestive and urinary systems, in thrombocytopenia, hemophilia, cardiac and orthopedic surgeries, and in various types of nose surgery, among other applications (rhinoplasty, septoplasty, turbinectomy, and FESS).

TXA may also cause side effects such as dizziness, nausea, vomiting, blurred vision, and a headache if administered systemically to the patient [10]. Many studies have been undertaken in recent years to establish the usefulness of TXA in reducing bleeding, edema, ecchymosis, and other complications related to nose surgery, and the results have been

encouraging. There has been a wide range of outcomes reported, and the usefulness of TXA in nose surgery has not been conclusively shown.

METHODS

Study Design

It was the goal of this prospective, randomized, double-blind study, which was approved by the Research and Ethics Committees of the AJA University of Medical Sciences and the Iranian Registry of Clinical Trials, and which received written informed consent from all participants, to evaluate the effects of local TXA on the septoplastic surgery field. The study was conducted among 80 patients (40 patients in each group) at the Imam Reza Hospital in Tehran, Iran. The selected sample underwent surgery by different surgeons but under the same hospital i.e. Imam Reza Hospital in Tehran. It was estimated that the sample size for each group should be 40 patients based on data from similar research and taking into account the power (probability) test of 80 percent and confidence interval of 95 percent (=0.05 = percent 01) that was used in the study. For each group, a total of 30 patients were selected as a representative sample.

Blinding

The usage of double-blinded technique was used to achieve blindness in this experiment. The results were kept a secret from everyone involved, including the researcher, the management, the anesthesiologists, the surgeons, the nurses, and the data analyzer, among others. All of the drugs were produced by other nurses who were fully unaware of the nature of the study being carried out at the time they were prepared. We agreed that the coding would be done at random by the project manager, the patient, and the analyzer of the code outputs, all of whom had no previous understanding of coding or how it worked. The surgeon, surgical and anesthesia technicians, and the anesthesiologist had no means of knowing who belonged to which group after they were randomly allocated to one of two groups (intervention or control groups) based on a random black-and-white card drawing. Furthermore, the employee who delivered the drugs was fully unaware of the contents of the syringe. In order to increase the accuracy of the data collection, two well-trained persons collected all of the data on their own.

Subjects and setting

Before surgery, each patient was examined by an anesthesiologist the day before to ensure that they were in good health prior to the operation. Candidates for elective septoplastic surgery with ages ranging from 40 to 60 years, as well as physical status classes I and II of the American Society of Anesthesiologists (ASA), had to be in excellent health in order to be eligible to participate in the study. Patients who refuse to participate, those who are classified as class III, class II, or class IV by the American Society of Anesthesiologists (ASA), those who have a history of the bleeding condition, those who have a history of thromboembolism, those who have low platelets, and those who have poor coagulation tests are all excluded from the study.

The patient's safety was ensured by a number of safety equipment connected in the operating room, including standard pulse oximetry monitoring, capnographic monitoring, a non-invasive blood pressure measuring device (which measured both SBP and DBP), and an electrocardiogram. In addition, while computing the findings, the baseline values for heart rate, respiratory rate, SPO2, and ECG were taken into consideration. All patients were put in the supine position for additional monitoring immediately after the placement of an 18-cm venous catheter into their arm. All patients were given oxygen at a rate of 5 L/min while in this posture for further monitoring.

Outcomes and measurements

According to the researchers, the key outcomes studied in this study were the quality of the surgical site, as judged by the Boezaart grading scale, and blood loss, as determined by the Visual Guide for measuring blood loss. All of the secondary outcomes of interest in this research, including the duration of the operation, the timing of Karpol injections, and hemodynamic variations were deemed secondary outcomes of interest. When the volume of irrigation fluid used for washing was subtracted from the weight of the nasopharyngeal pack measured in the suction chamber in both groups, the amount of blood accumulated in the suction chamber was carefully calculated by converting the blood weight into milliliters (1 gr = 1cc) and converting the milliliters into grams.

The Visual Guide for measuring blood loss also gathered and measured all blood gauze absorbers 4 x 4 inches that were used over the course of the surgery in each patient, with a full wet gauze regarded to be 12 milliliters in total and are represented in Figure 1.

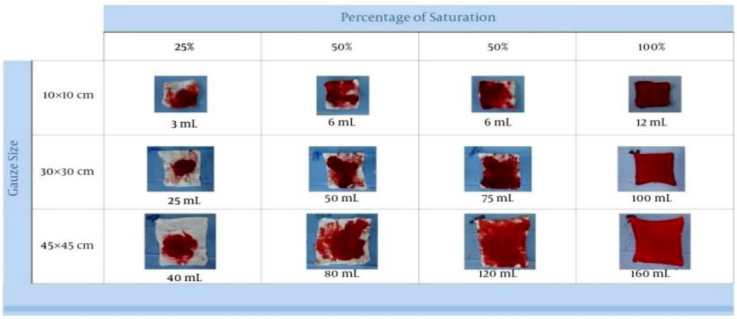

Figure 1: Visual guide for blood loss

In this study, satisfaction with the surgeon was measured on a 5-point Likert scale with 1 indicating low satisfaction and 5 indicating excellent satisfaction. According to the Boezaart grading method, the surgeon was requested to grade the adequacy of the operation field, represented in table 1.

Score	Assessment
0	No bleeding
1	Slight bleeding: no suctioning required
2	Slight bleeding: occasional suctioning required
3	Slight bleeding: frequent suctioning required. Bleeding threatens surgical field a few seconds after suction is removed
4	Moderate bleeding: frequent suctioning required. Bleeding threatens surgical field directly after suction is removed
5	Severe bleeding: constant suctioning required, bleeding appears faster than can be removed by suction, surgical field severely threatened, and surgery usually not possible

Table 1: Grading scale for the scoring of surgical field bleeding.

Statistical analysis

This study used the Chi-square test to analyze qualitative characteristics such as gender, an independent t-test to investigate quantitative variables in two groups for normal data, and a Mann-Whitney test for non-normal data to investigate quantitative variables. To evaluate whether or not the data was normal, the Kolmogorov-Smirnov test was performed on the data. Results that were statistically significant were those with a p-value less than 0.05. It was necessary to use the SPSS program in order to do the statistical analysis.

RESULTS

The (demographic characteristics) gender, age, and weight did not vary statistically significantly between the two groups, and neither did their height and weight. This shows that the variables under consideration are regularly distributed in the target population, which is consistent with the hypothesis. ($p>0.05$), and it is represented in table 2.

Variables	Group A	Group B	P-value
Gender (M/F)	12/18	12/18	1.000*
Age (year)	57.99 ± .5667	58 ± .5643	0.752**
Weight (kg)	58 ± 6.8	57. 5 ± 5.7	1.000**

* Chi-square test ** independent Student's t test
Group A: adrenaline-infused lidocaine
Group B: adrenaline-infused lidocaine and tranexamic acid

Table 2: Demographic characteristics of participants

Following the fifth minute of testing, the researchers found that there were no statistically significant variations in mean arterial pressure or heart rate fluctuations between the two groups ($p>0.05$), as shown in figure 2. They believe this is due to delays in drug systemic absorption. Over the course of the study, this difference was statistically significant ($p<0.05$) on a number of additional times as shown in figure 3.

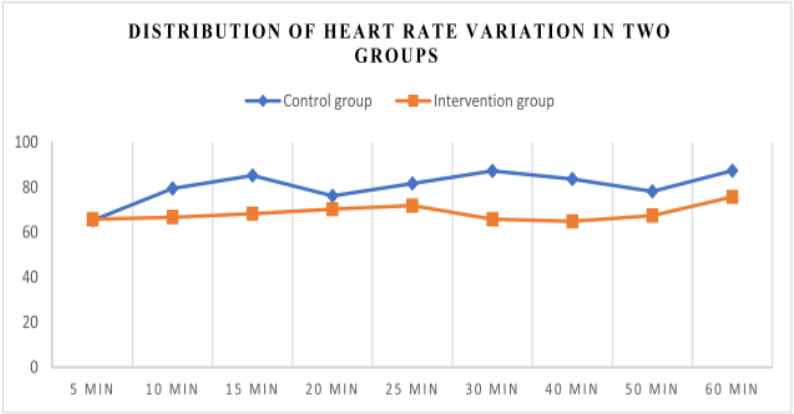

Figure 2: Distribution of heart rate variations

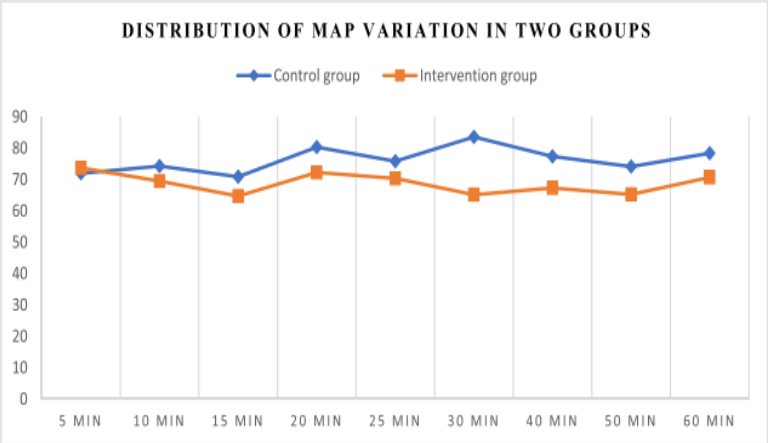

Figure 3: Distribution of Map Variations

There was a statistically significant difference between the two groups in terms of surgeon satisfaction and the appropriateness of surgical field features when comparing the two groups. In terms of overall satisfaction, the intervention group had a higher rating from the surgeons [4.1 against 3.16 in the control group (P=0.001)]. The mean Boezaart score (suitability of operation field) in the intervention group was 1.8 (range: 1-3), while the mean Boezaart score in the control group was 2.53 (range: 2-4), and this difference was statistically significant (P=0.001).
When compared to the control group (syringe A contained adrenaline-infused lidocaine 1 in 100,000 and 100 mg TXA), the intervention group (syringe B contained adrenaline-infused lidocaine 1 in 100,000 and 100 mg TXA) required less adrenaline lidocaine injection (known as Karpol) for hemostasis control, and this difference was statistically significant (p = 0.011) when compared to the control group. The intervention group demonstrated a statistically significant difference in mean bleeding volume (P=0.001) when compared to the control group, with 187.23 ± 54.61 mL in the intervention group and 341.22 ± 49.17 mL in the control group, shown in table 3. Consequently, both the intervention and control groups had shorter surgical times than the intervention group.

Variables		Group A (control group)	Group B (intervention group)	P-value
Duration of surgery (minute)		56.17 ± 2.82	44.21 ± 4.61	0.002
Mean Blood Loss (ml)		341.22 ± 49.17	187.23 ± 54.61	0.001
intraoperative	once	2 (patients)	2 (patients)	0.001
injections of	twice	7 (patients)	0 (patients)	
Karpol	3 times	4 (patients)	2 (patients)	
	4 times	2 (patients)	0 (patients)	

Group A: adrenaline-infused lidocaine
Group B: adrenaline-infused lidocaine and tranexamic acid
The times of needing Karpol in the intervention group was fewer than the control group and this difference was significant (p = 0.011). The mean bleeding volume in the intervention was lesser than in the control group (P = 0.001). The duration of surgery in the intervention group was lesser than that in the control group (P = 0.002).

Table 3: Duration of surgery and intraoperative injections of Karpol

DISCUSSION

TXA has been shown to have hemostatic properties, and there is no doubt about it. According to the researchers, TXA has been demonstrated in multiple clinical studies and meta-analyses to reduce blood loss while not increasing the risk of DVT and PE complications [31]. Other medication delivery strategies, such as intramuscular injection, oral administration, and intra-articular injection, are available in addition to the ones mentioned above.
In multiple experiments, it has been shown that the quantity of intravenous TXA solution that reaches the target region is very little. Because of the heightened coagulation status of the whole body, as well as the potentially life-threatening consequences of thrombosis difficulties, local application is the preferred method of administration [32]. While the systemic TXA plasma concentration after topical therapy is 70% lower than that following intravenous injection, the hemostasis effect of topical treatment is equivalent to that of intravenous treatment. On balance, local implementations of solutions are preferable to systemic implementations in terms of overall impact, given that the effect is the same in both cases.
Specifically, the goal of this study was to evaluate two distinct drug combinations in order to enhance the overall quality of the septoplasty surgical field, which served as the topic of the study [34]. According to the researchers, the patients who had had septoplastic surgery were the intended participants in this study. Lidocaine was coupled with adrenaline in one group, whereas in another, lidocaine was combined with adrenaline plus TXA (group B), and so on. For the purpose of evaluating the effectiveness of different combinations, the heart rate (HR) and mean arterial pressure (MAP), as well as the suitability of the operation field and surgeon satisfaction, were all assessed.

According to our results, hemodynamic indicators such as heart rate and mean arterial pressure were less variable in the group that received local TXA than in the other group, indicating that the TXA group saw a considerable decrease in bleeding volume. Interestingly, Dr. Lee's research found that topical use of TXA in knee surgery resulted in less bleeding than the intravenous application of the molecule [35]. As a result of only using the prepared syringes (known as Karpol in both groups) for hemostasis management, the HR and MAP in the intervention group were lower than those in the control group, which could be explained by the intervention group injecting Karpol for shorter periods of time than the control group, which was the case in the control group.

Evidently, any type of adrenaline + lidocaine injection (also known as Karpol) will cause an increase in heart rate and mean arterial pressure, and when the intake of this medication combination is reduced, the heart rate and mean arterial pressure will return to normal, rather than increasing further [36]. Because both groups got this drug combination as a local injection in the area of operation, it will take a few minutes for the medication to be absorbed and for pharmacodynamic effects such as tachycardia and high MAP to manifest themselves in both groups. Therefore, the intervention group demonstrated greater hemodynamic stability (HR and MAP) after 5 minutes compared to the control group, and the intervention group demonstrated superior hemodynamic stability in general compared to the control group (HR and MAP). The reason for this, we feel, is that our study has shown that the combination of TXA and Karpol minimizes the number of times it is necessary for septoplasty surgery for hemostasis [37].

Our research has shown that by reducing the amount of bleeding during surgery, the surgical field becomes drier. As a result, the surgeon's vision improves and he or she becomes more satisfied with their job. (See related article on tranexamine) To the researcher's surprise, this outcome is consistent with the Hankerson MJ study, which found that patients who received topical TXA for nasal hemorrhage reported greater levels of satisfaction with the medical staff [38]. The intervention group had fewer occurrences of requiring intra-operative injections of Karpol, had less blood loss, and had a shorter total operation longer than the control group [39]. In accordance with the Rafael A Couto study, which discovered that local infiltration of TXA with the local anesthetic prior to a facelift appears to reduce bleeding, operative time, and postoperative facelift drainage output after facelift surgery, these findings were corroborated by the current study [40]. In support of this, the fact that the TXA has a direct influence on microvasculature and clot stability, resulting in a decrease in local bleeding, is mentioned above [41].

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