ORIGINAL PAPER

DOI: 10.5935/0946-5448.20200013

International Tinnitus Journal. 2020;24(2):60-64.

Comparison of the Effect of Dexmedetomidine and Remifentanil on Controlled Hypotension During Rhinoplasty: A Clinical Trial Study

Farzad Zamani[1]
Narges Naseri[1]
Farzaneh Farmani[2]
Alireza Kamali[2]*

ABSTRACT

Introduction: One of the most important problems during cosmetic nose surgery is excessive bleeding. Controlled hypotension is an appropriate technique for reducing intraoperative bleeding as well as satisfactory and non-bloody surgical field. Different drugs, such as dexmedetomidine and remifentanil, are used to control hypotension. The aim of this study was to compare the effect of dexmedetomidine and remifentanil on the creation of control hypotension during rhinoplasty.

Material and Method: This study is a randomized, double-blind clinical trial which was performed on 60 patients randomly divided into two groups D (Dexmedetomidine) and R (Remifentanil). In group D (0.5 mg / kg / h) Dexmedetomidine infusion and in group R (50-100 μg / kg / h) Remifentanil infusion. The study groups were compared in terms of hemodynamics and intraoperative bleeding. The data obtained from completed questionnaires were analyzed using SPSS software, T-test and ANOVA statistical tests and were presented in tables and statistical charts.

Results: The results of this study showed that the mean MAP (Mean Arterial Pressure) was significantly lower in remifentanil group patients than in dexmedetomidine group, while the intraoperative bradycardia rate was different at various time.

Conclusion: During rhinoplasty surgery, both dexmedetomidine and remifentanil were effective in controlling hypotension and reducing intraoperative bleeding, but the effect of remifentanil was more pronounced than dexmedetomidine.

Keywords: Rhinoplasty, Controlled Hypotension, Dexmedetomidine, Remifentanil

[1]Department of Rhinology and Ear Surgery, Arak University of Medical Sciences, Arak, Iran
[2]Department of Anesthesiology and Critical Care, Arak University of Medical Sciences, Arak, Iran

*Send correspondence to: Alireza Kamali
Department of Anesthesiology and Critical Care, Arak University of Medical Sciences, Arak, Iran, E-mail: alikamaliir@yahoo.com, Phone: +00989181622810
Paper submitted on September 07, 2020; and Accepted on October 30, 2020

INTRODUCTION

Rhinoplasty is a facial plastic surgery to improve nasal aesthetics and airway function[1,2]. In fact, rhinoplasty is done to reduce the size of the nose, deform the nasal bridge or tip, and narrow the nostril or all of these[3]. One of the most important problems with aesthetic surgery is excessive bleeding during surgery. Excessive bleeding, in addition to reducing the surgeon's view of the surgical field, will cause more trauma to the surrounding tissues and prolong the postoperative recovery period. Controlled hypotension reduces bleeding at the surgical site, thereby providing greater technical freedom and visibility for the surgeon to perform more accurately. With less bleeding, suitable conditions are provided for plastic surgeons[4]. Controlled hypotension, anesthesia with induction hypotension, is said to be a widely used technique in reducing intraoperative bleeding and reducing the need for postoperative blood transfusion in general surgeries. The main purpose of the hypotension anesthesia technique is to reduce mean arterial pressure (MAP). Hypotension anesthesia is adjusted according to blood pressure, prior to the patient's surgery to reduce at least 30% of the patient's MAP base line with at least 50 to 65 mm Hg[5]. Nowadays, controlled hypotension anesthesia is commonly used in surgical interventions using different techniques[6,7]. Various medications such as magnesium sulfate, sodium nitroprusside, nicardipine, nitroglycerin, remifentanil, dexmedetomidine, labetalol, and high doses of inhalation Anaesthetics such isofluran are used to control hypotension. Remifentanil, a selective opioid agonist that suppresses the vasomotor system by releasing histamine as well as centrally, reduces blood pressure. Compared to other opioid drugs such as fentanyl, remifentanil can improve hemodynamic stability in surgical Stressful events and minimize changes in cerebral blood flow[8]. Remifentanil is also prescribed to control harmful stimulus changes during surgery as well as rapid recovery of patients after general anesthesia[9]. Dexmedetomidine is an active isomer of Medetomidine and a potent and highly selective α2-adrenoceptor agonist with sympatholytic, sedative, amnistic and analgesic properties that has been used as a safe and useful adjuvant in many clinical trials. dexmedetomidine is a short-acting drug with no residual effects, sedation and analgesia without reduced respiration and mean arterial pressure (MAP). As a result, it reduces bleeding during surgery, further enhancing patient safety and satisfaction with surgery[10]. Dexmedetomidine also reduces postoperative opioid use, severity of pain, and postoperative nausea and vomiting[11]. The aim of this study was to determine the effect of dexmedetomidine and Remifentanil on the development of control hypotension during rhinoplasty.

MATERIALS AND METHODS

This study was a double-blind randomized clinical trial (RCT) performed on patients undergoing rhinoplasty in Amir Kabir Hospital, Arak, Iran. Patients with rhinoplasty candidates with studied criteria were selected and then randomly divided into two groups of remifentanil and Dexmedetomidine according to random number table. The questionnaire included demographic information as well as data on MAP, PR, mean bleeding score, mean pack cell intake, control hypotension, and morbidity and mortality rate for all patients in both groups. They were completed and met the inclusion criteria.

Inclusion criteria:

1- All rhinoplasty patients referred to the hospital

2-Patients in the age range of 18 to 50 years

3- Patients with ASA Class I and II

4- Surgery of all patients by one surgeon

5- Operating time between 90 to 180 minutes

Exclusion criteria:

1- Surgery that lasts more than 180 minutes

2- Patients who have had a specific cardiac complication or even cardiopulmonary arrest during surgery

All patients underwent complete monitoring of HR, RR, BP, SPO2 (oxygen saturation), temperature, capnography and ECG upon entry into the operating room. The patients were then treated with CVE of 3-5 cc / kg of crystalloid fluid. All patients were then given 1 mg midazolam plus 1-2cc fentanyl as premed and then a nonlinear hand radial artery of patients was inserted as an arterline to accurately record blood pressure. (For invasive BP registration). Then the patients were anesthetized and all of the patients in the two study groups were treated with anesthesia induction with 3-5 μg / kg fentanyl, 0.2 mg / kg midazolam, 0.5 μg / kg atherocurium and 2-3 mg / kg propofol. Patients were randomly divided into R (Remifentanil) and D (Dexmedetomidine) groups using random number table. After induction of anesthesia, the patients were intubated and placed under the ventilator, and then prepped and prepped (Drep) and prepared for rhinoplasty. Then the patients in the first group received 0.5 μg / kg / h dexmedetomidine and 50-100 μg / kg Remifentanil infusion.To observe blindness, the volume of infusion was equal to 50 cc in both groups, and the volume and volume were similar in both groups. Therefore, all patients were blind. The drugs needed for the infusion were also prepared by the anesthesiologist and provided to the resident resident to design the infusion for the patients. Therefore, the co-resident resident as well as the intern responsible for the project responsible for completing the questionnaire were not aware of the type of study group.

Sample Size

$$n = \frac{\left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2 \times (\delta_1 + \delta_2)^2}{(\mu_1 - \mu_2)^2}$$

$z_{1-\frac{\alpha}{2}} = 1.96 \quad z_{1-\beta} = 1.28 \quad \mu_1 = 109 \quad \mu_2 = 68 \quad \delta_1 = 52$

$\delta_2 = 15$

Considering the loss and possible loss of patients, the sample size was 30 individuals per group.

Data Analysis

The data obtained from the completed questionnaires were analyzed using SPSS software, t-test and ANOVA statistical tests. They are expressed as tables and statistical charts.

Ethical considerations

In this study, the names and characteristics of the study subjects were kept confidential, no cost was imposed on the patient's family and the hospital. At all stages of research, including proposal writing, sample collection, and data analysis, researchers were required to adhere to the ethics of research approved by the Ministry of Health and the Helsinki Declaration. This research plan was approved by the 631th meeting of the Research Council, with the code of ethics IR.ARAKMU.REC.1395.256, in the 237th meeting of the Research Council's Ethics Committee.

RESULTS

The results of age comparisons of patients with rhinoplasty were 23.9±2.8 and 23.2±3.4, respectively. Also, in terms of sex comparisons between dexmedetomidine and remifentanil groups, male sex was 22.6% and 21.7% and sex, respectively. Females were 77.4% and 78.2%, respectively, which showed no significant difference between the two groups in terms of mean age (P-value = 0.4) and sex (P-value = 0.6), with a mean age of 23.5 years. Comparison of mean blood pressure in patients undergoing rhinoplasty in two groups' dexmedetomidine and remifentanil was evaluated in. The mean blood pressure in patients in the Remifentanil group was significantly lower than in the dexmedetomidine group (P-value=0.02, P-value =0.03). Figure 1 compares the mean heart rate of patients in the two groups of dexmedetomidine and remifentanil. According to the results, the mean heart rate in the two groups at 30, 45, 60 and 75 minutes after surgery, and recovery, were compared. No significant difference was seen (P-value≥0.05), But only at 15, 90 and 120 minutes after the operation, a significant difference was observed, so that patients in the dexmedetomidine group were significantly more bradycardia than the Remifentanil group at 90 and 120 minutes after the operation (P -value = 0.03). However, bradycardia was more effective than dexmedetomidine at 15 minutes after the start of the Remifentanil group, and appears to be normal because the effect of dexmedetomidine bradycardia usually occurs 10-15 minutes after injection (Table 1).

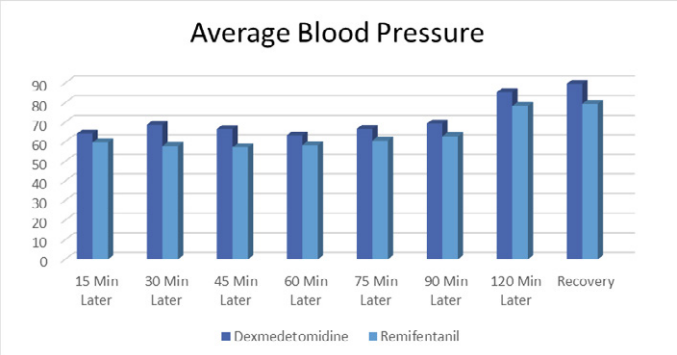

Figure 1: Comparison of mean blood pressure.

Comparison of mean bleeding (according to CC) in patients in the two groups of dexmedetomidine and Remifentanil was evaluated in Figure 2 and according to the results, the mean of bleeding in the remifentanil group was significantly lower than that of the dexmedetomidine group. There was less and subsequently better visualization of the surgeon in the remifentanil group. (P-value = 0.02, P-value = 0.01) There was no significant difference only in the recovery between the two groups (P-value = 0.4), which is somewhat normal and usually does not show any specific bleeding in the rhinoplasty patients, except for the complication. Something special has happened. Table 2 compares the recovery time (in minutes) in the dexmedetomidine and remifentanil groups and according to the results, there was a significant difference between the two groups in terms of mean recovery time and the

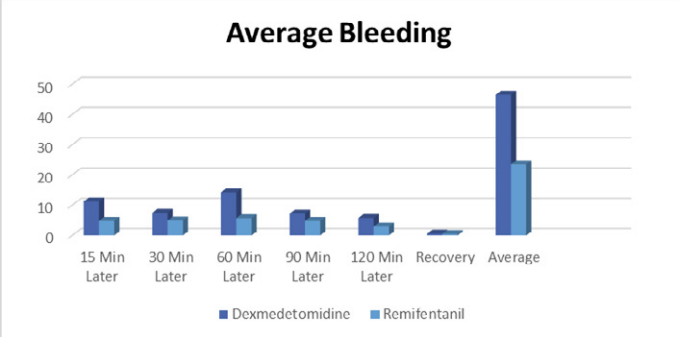

Figure 2: Comparison of Average Bleeding (in Cc).

Table 1: Comparison of mean heart rate.

P-Value	Remifentanil group	Dexmedetomidine group	Group / Average heart rate
P=0.03	70.9±4.6	79.2±3.9	Heart rate 15 minutes after surgery
P=0.4	67.7±3.8	68.7±4.2	Heart rate 30 minutes after surgery
P=0.6	65.5±3.9	66.5±3.7	Heart rate 45 minutes after surgery
P=0.08	65.1±2.7	61.3±2.9	Heart rate 60 minutes after surgery
P=0.1	67.5±3.6	62.6±3.6	Heart rate 75 minutes after surgery
P=0.03	72.1±5.3	66.6±4.3	Heart rate 90 minutes after surgery
P=0.03	73.4±2.8	67.3±4.9	Heart rate 120 minutes after surgery
P=0.6	81.3±4.9	80.3±3.9	Recovery heart rate

Table 2: Comparison of recovery time (in minutes).

P-Value	Group Remifentanil	Group Dexmedetomidine	Group / Recovery Time
P=0.01	30.4±5.3	49.6±4.7	Average recovery time (in minutes)

mean recovery time in the two groups. Remifentanil was less frequently reported (P-value = 0.01).

DISCUSSION

In limited field surgeries, such as rhinoplasty, the reduction of bleeding in the field of operation reduces the duration of surgery and thus improves the outcome of the operation[12]. Common methods used by the surgeon and anesthesiologist to reduce bleeding in this type of surgery include raising the head to the body surface, injecting epinephrine at the site of operation, and inducing controlled hypotension[13]. Achieving a suitable combination for the prevention and control of intraoperative hemorrhage in patients undergoing rhinoplasty through the creation of controlled hypotension is one of the most important goals of ENT specialists. In this study, two drugs, dexmedetomidine and remifentanil, were used as a suitable combination in controlling hypotension to reduce bleeding in patients with rhinoplasty and their effects were compared. The results of this study indicate that the mean MAP was significantly lower in the remifentanil group patients at different times than in the dexmedetomidine group. There was a significant difference in the number of intraoperative bleeding patients in the remifentanil group compared to dexmedetomidine, in a study by Kosucu et al[13]. In a study of 52 patients undergoing rhinoplasty in year 2014 to investigate the effects of Remifentanil on hypotension and reduced intraoperative hemorrhage MAP and intraoperative bleeding were reduced in the Remifentanil group[14]. The results are consistent with our study because our study clearly reduced blood pressure and intraoperative hemorrhage.

In another study by P. Gupta in India in 40 patients undergoing sinus endoscopy in 2016, they investigated the effect of dexmedetomidine on controlling hypotension and decreasing intraoperative bleeding. It was reported[10]. The results are consistent with our study because dexmedetomidine also reduced MAP and decreased intraoperative bleeding in our study, but this effect was less well documented than that of remifentanil. In another study conducted by Amman Mohammad Kamal Abu Seyf and his colleague in 120 patients on rhinoplasty in year 2015, they compared the effects of the two remifentanil and sodium nitroprusside drugs, which showed that Remifentanil produced better hypotension than nitroprusside. Is. But this difference was not statistically significant[15]. The results of this study are also consistent with our study because in our study, Remifentanil caused MAP and intraoperative bleeding. Also in another study conducted by Ho Seok Lee in China in a meta-analysis in 2017, the effect of dexmedetomidine on recovery time in patients undergoing rhinoseptoplasty was found to be meaningful. The rate of intraoperative bleeding, need for gause, and postoperative pain was lower in the dexmedetomidine group compared to the placebo group[16]. Intraoperative bleeding was reported to be better and more appropriate than dexmedetomidine.

CONCLUSION

The results showed that both remifentanil and dexmedetomidine were effective in controlling hypotension and reducing intraoperative bleeding, but this effect was more pronounced in the remifentanil group. Therefore, at the end, it is recommended that similar studies be performed on patients with rhinoplasty or sinus endoscopy with larger sample size or using other blood pressure lowering drugs.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest on publishing this paper.

REFERENCES

1. Vahabi S, Rafieian Y, Abbas Zadeh A. The effects of intraoperative esmolol infusion on the postoperative pain and hemodynamic stability after rhinoplasty. Journal of Investigative Surgery. 2018;31:82-8.
2. Vasconcellos SJ, do Nascimento-Júnior EM, de Aguiar Menezes MV, Mendes ML, de Souza Dantas R, Martins-Filho PR. Preoperative Tranexamic Acid for Treatment of Bleeding, Edema, and Ecchymosis in Patients Undergoing Rhinoplasty: A Systematic Review and Meta-analysis. JAMA Otolaryngology–Head & Neck Surgery. 2018;144:816-23.
3. Ragab A, El Shamaa H, Ibrahim M. Dexmedetomidine, morphine, propofol vs midazolam, morphine, propofol for conscious sedation in rhinoplasty under local anesthesia. A prospective, randomized study. Egyptian Journal of Anaesthesia. 2013;29:181-7.
4. Banssillon V. Remifentanil and controlled hypotension; comparison with nitroprusside or esmolol during tympanoplasty. CAN J Anaest. 2001;48:20-7.
5. Jeong J, Portnof JE, Kalayeh M, Hardigan P. Hypotensive anesthesia: comparing the effects of different drug combinations on mean arterial pressure, estimated blood loss, and surgery time in orthognathic surgery. Journal of Cranio-Maxillofacial Surgery. 2016;44:854-8.
6. Papalia R, Simone G, Ferriero M, Costantini M, Guaglianone S, Forastiere E, et al. Laparoscopic and robotic partial nephrectomy with controlled hypotensive anesthesia to avoid hilar clamping: feasibility, safety and perioperative functional outcomes. Journal of urology. 2012;187:1190-4.
7. Ozcan AA, Ozyurt Y, Saraçoglu A, Erkal H, Suslu H, Arslan G, et al. Dexmedetomidine versus remifentanil for controlled hypotensive anesthesia in functional endoscopic sinus surgery. Turkish Journal of Anaesthesiology and Reanimation. 2012;40:257-61.
8. Kaur H, Tiwari RL, Bhargava J, Kasliwal N. Effect of dexmedetomidine on consumption of anesthetic agents, duration of surgery, time to extubation and post-operative emergence during endoscopic nasal surgeries: a pilot study. Sch J App Med Sci. 2016;6:2180-6.
9. Komatsu R, Turan AM, Orhan-Sungur M, McGuire J, Radke OC, Apfel CC. Remifentanil for general anaesthesia: a systematic review. Anaesthesia. 2007; 62:1266-80.
10. Gupta P, Choudhary R, Ojha T, Jethava D. Dexmedetomidine

as an adjuvant for hypotensive anaesthesia during functional endoscopic sinus surgery (FESS). IOSR-JDMS. 2016;1:143-6.

11. Zargar S, Rafie AN, Sosanabadi A, Kamali A. Addition of dexmedetomidine and neostigmine to 1.5 % lidocaine and triamcinolone for epidural block to reduce the duration of analgesia in patients suffering from chronic low back pain. J Med Life. 2019;12:260-5.
12. Marzban S, Haddadi S, Mahmoodi H, Heidarzadeh A, Nemati S, Nabi BN. Comparison of surgical conditions during propofol or isoflurane anesthesia for endoscopic sinus surgery. Anesthesiology and pain medicine. 2013;3:234-8.
13. Homaee M, Ghodrati M, Farazmehr K, Soleimani M, Pournajafian A. Blood loss and quality of controlled hypotension induced by Magnesium Sulfate versus Remifentanil in PSF surgery. Anesthes Pain Med. 2012;2:52-62. 27
14. Kosucu M, Omur S, Besir A, Uraloglu M, Topbas M, Livaoglu M. Effects of perioperative remifentanil with controlled hypotension on intraoperative bleeding and postoperative edema and ecchymosis in open rhinoplasty. Journal of Craniofacial Surgery. 2014;25:471-5.
15. Aboseif EM, Osman SM. Use of remifentanil in comparison with sodium nitroprusside for controlled hypotension during rhinoplasty: Randomized controlled trail. Egyptian Journal of Anaesthesia. 2015;31:303-8.
16. Lee HS, Yoon HY, Jin HJ, Hwang SH. Can Dexmedetomidine Influence Recovery Profiles from General Anesthesia in Nasal Surgery?. Otolaryngology–Head and Neck Surgery. 2018;5:2341-9.