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PERIOPERATIVE DEXAMETHASONE IV WITH KETAMINE IV TO DECREASEPAIN FOR SEPTORHINOPLASTY: A PROSPECTIVE, RANDOMIZED, DOUBLE-BLIND STUDY

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ABSTRACT

Objectives: Studies investigating the effects of intravenous (IV) ketamine with dexamethasone (IV) in pain management after septorhinoplasty. This studyaims to evaluate the efficacy of IV ketamine with IV dexamethasone on pain scores. **Methods**: This randomized, prospective, double-blind study was conducted with 90 patients who underwent septorhinoplasty. IV dexamethasone 2 ml (2 ml/ 8 mg) with Intravenous ketamine bolus (0.5 mg/kg) was administered to the ketamine group (group K, n = 45), Perioperative. In the control group (group C, n = 45), the same protocol was administered using saline instead of ketamine and dexamethasone. Pain scores were evaluated with the visual analogue scale. Consumptions intraoperative of opioid and sevoflurane, rescue opioidrequirement, patient satisfaction, and side effects were recorded. **Results**: Pain scores were significantly lower in group K at all postoperative periods ($P < 0.05$). There was no significant difference between the groups in terms of intraoperative sevoflurane and remifentanil consumptions ($P > .05$). Rescue opioid analgesic requirements were significantly lower in group K than group C (0/45 vs 6/45, respectively; ($P = 0.022$). Side effects were similar between the groups ($P > 0.05$). **Conclusion:** We recommend the administration of ketamine with dexamethasone during septorhinoplasty surgery because it reduces the requirement for rescue opioid analgesia and postoperative pain scores.

KEYWORDS: septorhinoplasty, pain, anesthesia, intravenous ketamine, dexamethasone, postoperative analgesia.

INTRODUCTION

Inadequate pain management directly affects the success of the surgical procedure and also negatively affects health care costs by increasing opioid use and recovery time.

To the best of our knowledge, this prospective, double-blind, randomized study is the first to evaluate the analgesic effectiveness of perioperative IVketamine with dexamethasone IV in septorhinoplasty surgery.

The primary aim of this study was to investigate the effect of IV ketaminewith dexamethasone on pain scores in septorhinoplasty surgery, and thesecondary aims were to evaluate its effect on rescue analgesia, patient satisfaction, and intraoperative anesthetic consumption.

MATERIALS AND METHODS

Ethical approval for this prospective, randomized, double-blind study was obtained from the local ethics committee of Tal-afar hospital Total of 90 patients aged 18 and 45 years were American Anesthesiologists Association (ASA I-II) and for whom septorhinoplasty surgery was planned were included in the study.

All patients were informed in detail about the anesthesia and pain assessment procedures, and their written consent was obtained forparticipation in the study.

Using a computer program, patients were randomly assigned into 2 groups at a ratio of 1:1. These groups were group control (group C, n = 45) and ketamine(IV) with dexamethasone (IV) group (group K, n = 45).

Postoperative pain assessors, patients, and practitioners were blinded by the study groups and the drug content. Saline preparations used for group Cwere prepared with the same volumes of preoperative and intraoperative infusion solutions as those prepared for the group K to guarantee double- blind.

The standard monitoring procedure, including electrocardiography, oxygen saturation, and noninvasive blood pressure, was administered. Crystalloid infusion solution (8 mL/kg/h) was maintained throughout the operation. All surgeries were performed using the same surgical technique by the same surgical team.

Study Protocol

Anesthesia induction was performed with midazolam (1 mg), propofol (2-3 mg/kg), and rocuronium (0.6 mg) in all patients. Remifentanil 0.5 to 1 µg/kgwas administered over 60 to 90 seconds. Remifentanil infusion was maintained during the surgery with systolic blood pressure not exceeding 100 mm Hg. The maintenance of anesthesia was conducted with 2% sevoflurane. In the last 30 minutes of the surgery Remifentanil infusion was terminated at the end of the surgery.

The determination of the ketamine dosage protocol in this study is based on previously published relevant studies. To induce anesthesia, ketamine 0.5 mg/kg bolus with dexamethasone was given. In group C, the same protocol was implemented using normal saline. The infusions were terminated in group C postoperatively.

Postoperative Analgesia Management and Outcomes

In both groups Pain score evaluation and the other examinations of the patients was performed by an anesthesiologist blinded to the analgesic drugs and grouping. Visual analog scale was used to evaluate the state of postoperative analgesia (visual analogue scale [VAS] 10 = most severe pain, 0 = no pain). Tramadol 1 mg/kg described as a rescue analgesic in patients with a VAS score of ≥4. Central nervous system side effects (hallucinations and nightmares), double vision, nausea, vomiting, hyper salivation, and nystagmus were recorded during a 24-hour follow-up.

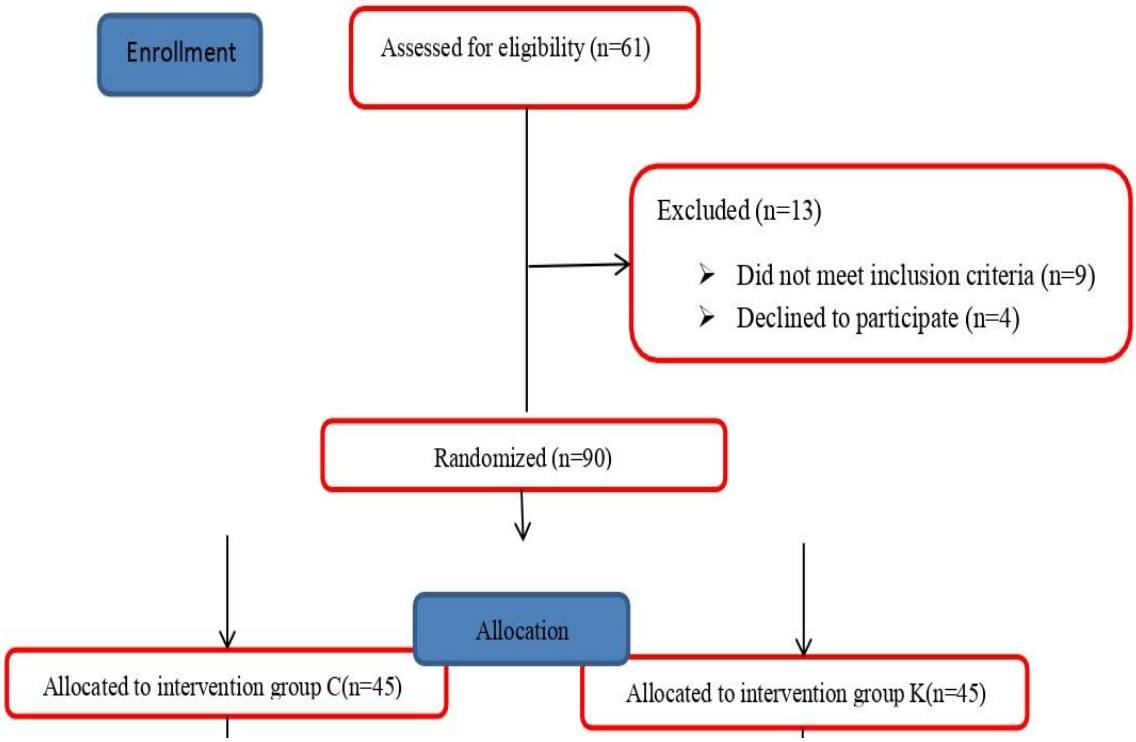
Intraoperative consumptions of Remifentanil and sevoflurane were recorded. Patient satisfaction was classified from 1 to 4 (1 = poor, 2 =moderate, 3 = good, and 4 = excellent).

Statistical Analysis

Statistical analysis was performed on SPSS software version 22.0 (IBM Corp). Descriptive statistics were presented as means ± SD. The histogram and Kolmogorov-Smirnov tests were used to determine the distribution of values, and $\chi 2$ or Fisher exact test was used to compare the categorical values between groups. The student t test was used to analyze normally distributed data containing continuous variables. Mann-Whitney U test was used for non-normally distributed values. For the statistical significance, P <0.05 was considered.

RESULTS

Eligible patients for this study were analyzed and are presented in aConsolidated Standards of Reporting Trials flow diagram (Figure 1).



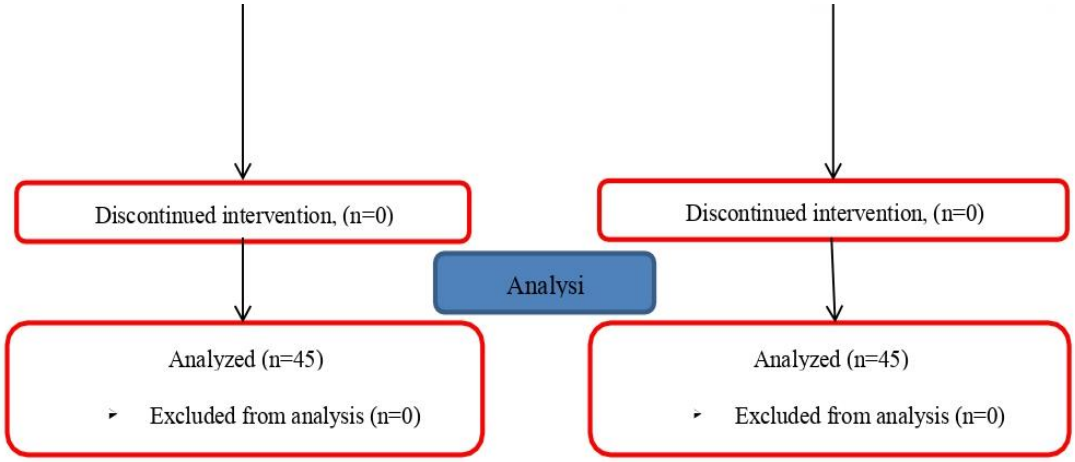


Figure 1: CONSORT diagram. CONSORT indicates Consolidated Standards of Reporting Trials.

no statistical difference was observed between groups in terms of demographic data (age, weight, gender, ASA classification, duration of anesthesia, and operation time). Details are presented in Table 1. Likewise, vital parameters were similar between groups (P > 0.05).

Table 1: Demographic and Clinical Data of Study.

	Group C (n=45)	Group K (n=45)	P
Age (year)	24.75 ± 6.26	24.33 ± 6.87	0. 686[b]
Weıght	65.71 ± 10.08	60.50 ± 9.36	0. 070[c]
Gender(F/M)	22/23	35/10	0. 136[d]
ASA(I/II)	35/10	40/5	0. 751[d]
BMI	42.8 ± 2.65	42.17 ± 2.71	0. 239[b]
Surgery tıme(min)	93.29 ± 38.48	105.83 ± 29.40	0. 103[b]
Anesthesia time(min)	117.21 ± 43.48	129.88 ± 31.16	0. 323[c]
Operative Procedures Osteotomy (yes/no) Turbinate reduction(yes/no)	35/10 40/5	41/4 30/15	0. 724[c] 0. 759[d]
Intraoperative Remifentanil consumption(µg)	1420.83 ± 1150.80	1020.83 ±480.02	0. 235[b]
Intraoperative sevoflurane consumption(ml)	27.79 ± 10.47	29.08 ±12.02	0. 893[b]
Rescue analgesia (yes/no)	10/35	0/45	0. 022[e]

Abbreviations: ASA American Anesthesiologist Association BMI, body mass index
C: control; K: Ketamine.

a. values are presented as mean ± SD or number.
b. independent simples t test**.**
c. *Mann. Whitney U test.*
d. continuty coorrection.
e. Fisher exact test**.**

Table 1. Demographic and Clinical Data of Study.

Visual analogue scale scores were significantly higher in group C than ingroup K at postoperative 30 minutes, 1, 2, 4, 8, 12, and 24 hours (P <.05; Table 2). The need for additional opioid analgesics was significantly higher in group C than in group K (6/45 vs 0/45, respectively, P =.022).

Table 2: Pain Scores.

	Group C (n=45)	Group K (n=45)	*P*[b]
VAS PACU	3.37 ± 0.97	0.29 ± 0.69	<. 0001
VAS 1 hour	2.92 ± 1.02	0.21 ± 0.51	<. 0001
VAS 2 hours	2.42 ± 1.06	0.21 ± 0.66	<. 0001
VAS 4 hours	2.04 ± 095	0.25 ± 0.53	<. 0001
VAS 8 hours	1.92 ± 1.06	0.33 ± 0.76	<. 0001
VAS 12 hours	1.29 ± 081	0.42 ± 1.65	<. 0001
VAS 24 hours	1 ± 1.02	0.25 ± 0.53	. 0001

Abbreviations: C: control; K: ketamine; VAS: visual analogue scale.
[a]values are presented as mean ± SD or number.
P[b] < 0. 05 mann − Whitney U test t test.

No difference was observed in terms of the intraoperative Remifentanil consumption between group C and group K (1420.83 ± 1150.80 µg vs 1020.83 ± 480.02 µg, P =.235). Additionally, no difference was observed in terms of the intraoperative sevoflurane consumption between group C and group K (27.79 ± 10.47 mL vs 29.08 ± 12.02 mL, P = 0.893(Patient satisfaction was higher in group K (P = 0.003). Nausea was observed in 4 patients in group C and 1 patient in group K, but there was no statistically significant effect (P = 0.348). Furthermore, there were no other side effects (vomiting, hallucination, and arrhythmia) observed in the 2 groups (P > 0.05; Table 3.).

Table 3: Side Effects and Patient Satisfaction[a]

		Group C (n=45)	Group K (n=45)	P
Nausea		4	1	0.348[b]
Vomiting		2	1	1.000[b]
Hallucination		0	0	*NA*[b]
Arrhythmia		0	1	1.000[b]
Patient satisfaction	Poor Moderate Good Excellent	1 5 37 2	1 1 8 35	0.003[b]

Abbreviations: C: control; K: ketamine; NA: not applicable.
[a]values are presented as number.
[b]Fisher exact test.
[k]X^2test.
Table 3. Side Effects and Patient Satisfaction.

DISCUSSION

We investigated the postoperative analgesic effect ketamine with dexamethasone during septorhinoplasty. We showed that IV ketamine significantly reduced postoperative pain during the first 24 hours compared to group C. Additionally, IV ketamine significantly reduced the use of postoperative rescue opioid analgesia.

The American Pain Society recommends IV ketamine as a component of multimodal analgesia in adults undergoing extensive surgery, especially those with opioid tolerance. Although ketamine has a clinical history of >50 years in anesthesiology practice, it is still not used to its full extent due to itspsychotomimetic side effects. This drug is an NMDA-receptor antagonist and provides both analgesic and antihyperalgesic effects by binding to phencyclidine receptors in NMDA channels and non-competitively inhibitingglutamate activation.

In different studies, low-dose ketamine was used to provide postoperative analgesia. Low-dose ketamine is used for postoperative analgesia at 0.1 to 0.5 mg/kg bolus and 0.1 to 0.25 mg/kg/h doses for cholecystectomy, spinal fusion surgery, and breast surgery. Consistent with the literature, IV 0.5 mg/kg bolus dose followed by 0.25 mg/kg/h infusion during the surgery waspreferred in the present study.

Low-dose ketamine reduces pain and opioid consumption as well as the risk of opioid-induced hyperalgesia. In systematic reviews, low-dose ketamine has been shown to reduce opioid consumption by 32%.22 Studies show that low-dose ketamine reduces postoperative pain scores by 87%, 59%, and 54.5%.Furthermore, ketamine-related side effects are less in these subanesthetic doses. Although very rare under general anesthesia, benzodiazepine premedication reduces the psychotomimetic side effects.

Therefore, in the present study, we performed midazolam premedication during anesthesia induction to avoid ketamine-related psychotomimetic side effects. Other reasons for the absence of psychotomimetic side effects might be the administration of ketamine under general anesthesia or low- dose administration.

Studies report that ketamine provides a significant reduction in the minimum alveolar concentration (MAC) of sevoflurane. Although, animal studies showa decrease in the MAC of sevoflurane with ketamine administration, there was no difference in intraoperative opioid and sevoflurane consumption in our study.

The prevailing view for postoperative pain management is that multimodal analgesia techniques are superior to conservative approaches. There are systematic reviews about the safe use of ketamine as a component of multimodal analgesia in acute postoperative pain. We implemented multimodal analgesia by administering nonsteroidal anti-inflammatory drugs during the postoperative period in addition to IV ketamine administration at the first hour and postoperative IV administration following the preoperative bolus dose. Patient satisfaction was also better in the ketamine-treated group. This result can be attributed to better pain scores.

In conclusion, we believe that perioperative IV ketamine with dexamethasone administration is an effective and

safe alternative component of multimodal analgesia for septorhinoplasty surgeries.

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