Original Article

Low dose of remifentanil in facilitation of Insertion of Laryngeal mask airway

H.Hoseinzade, M.Eidy, M. Ansari, D. Aghamohammadi, N.Ghorbabian A.Mahmoudpour

From Department of Anesthesiology and intensive care, Emam Khomeini hospital, Tabriz, Iran

Correspondence: H.Hosseinzade. Emam Khomeini hospital Tabriz from IRAN
Email: Hosseinz@tbzmed.ac.ir

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Abstract

Objective: To evaluate the effect of injection of remifentanil with propofol in decreasing the undesirable anesthetic airway responses such as coughing and gagging.

Methods: We performed a randomized double-blind study from October 2003 to May 2004, in Emam Hospital in Tabriz, Iran, to compare the condition during insertion of LMA in 90 patients with ASA classes I and II, in 3 groups. Group R_1 received 0.25 µg/kg remifentaniel and 2.5 mg/kg propofol, Group R_2 0.5 µg/kg remifentanil and 2.5 mg/kg propofol, and Group P normal saline and 2.5 mg/kg propofol. Hemodynamic changes, apneic time, condition of insertion and airway patency were compared in these groups.

Results: Remifentanil significantly improved the condition of insertion in-group R_1: 80.33% and group R_2: 90.6% in comparison with group P 40%. Hemodynamic changes in-group R_1 was less than R_2. Patients in-group R_1 were apneic for a mean time of 1.75 ± 0.9 min as compared with 2.35± 1.3 min in-group R_2.

Conclusion: Administration of 0.25-µg/kg remifentanil with 2.5 mg/kg propofol caused less hemodynamic changes and provided excellent condition for insertion of the LMA.(Rawal Med J 2007;32:8-10)

Key Words: Airway, remifentanil, propofol, intubation.

INTRODUCTION

The Laryngeal Mask Airway (LMA) is an ingenious supraglottic device that is designed to provide and maintain a seal for controlled ventilation at modest levels (up to 15 cmH_2O). Propofol is commonly used for the induction of anesthesia and insertion of LMA,[1] but this alone may be associated with undesirable airway responses such as coughing and gagging. The addition of a potent and short acting opioid facilitates LMA insertion after induction with propofol.[1] Remifentanil is a short acting, selective ji receptor agonist and it's ester linkage renders it susceptible to hydrolysis by blood and tissue esterases with a short terminal half life less than 10 min, and return of spontaneous respiration may be faster, making this opioid more suitable for providing ideal LMA insertion condition when administered with propofol. This study was conducted to asses the use of remifentanil with propofol in preventing anesthesia associated coughing and gagging.

METHODS

Ninety adult unpremedicated patients with ASA physical status I-II and mallampati class I-II, aged 18-63 years old who were scheduled for elective surgery in the period during October 2003 to May 2004, were included in this double-blinded randomized study. Procedures of these patients were inguinal herniorrhaphy, varicocellectomy, lumpectomy and prostatectomy. Patients with history of hypertension, asthma, cardiac disease gastric reflux and Mallampati class III, IV were excluded from the study. All patients were monitored for blood pressure, heart rate, pulse oximetry ECG and capnography during surgery. Patients received about 6 ml/kg 0.9% saline. There were 30 patients in each group and they were randomized to one of the following groups: Group R_1: received remifentanil 0.25 μg/kg followed by 2.5 mg/kg propofol; Group R_2: received 0.5 μg/kg remifentanil followed by 2.5 mg/kg propofol and group P received 5ml of 0.9% saline followed by 2.5 mg/kg propofol.

The remifentanil in Groups R_1 and R_2 was diluted with 0.9% saline to 5ml. Each induction dose of propofol was given over 10 seconds and mixed with 1ml of 2% lidocain to reduce the pain of injection. Thirty seconds after induction, patient's vital signs were checked and after 60 seconds an experienced anesthesiologist inserted the classic LMA in all patients. He was also blinded to the drugs used for induction. After successful LMA insertion, anesthesia was maintained with 1%

halothane and 50% nitrous oxide in oxygen. The correct position of the LMA was checked by observing chest movement and capnography. Apneic patients were manually ventilated to maintain a pulse Oximetry reading of more than 95%. Another dose of propofol 0.5 mg/kg bolus was injected if one the following conditions were seen: airway reflexes preventing LMA insertion (Coughing, gagging), limb and head movement, inability to ventilate after insertion of LMA. After establishment of patent airway, vital signs, pulse oximetry and capnography were checked in 1st, 2^{nd} and 3^{rd} minutes. The airway patency at the first attempt, number of attempts for LMA insertion, its easiness and duration of apnea between three groups were noted. The study was conducted after obtaining of informed consent and approval of the ethical committee of Emam Hospital in Tabriz, Iran, Data were processed with SPSS 11.0 statistical Package. Categorical variables were analyzed by Chi-square test: $P<0.05$ was considered statistically significant.

RESULTS

All groups had no statistical difference in demographic data (table 1). There was statistical difference between three groups in the ease of LMA insertion (P value <0.001), airway patency (P value: 0.009), Duration of apnea (P value: 0.041), number of attempts (P value: 0.041) and additional dose of propofol (P value <0.001) (table 2). There was no statistical significant difference between groups R_1 and R_2 in ease of LMA insertion (P value: 0.064), additional dose of propofol (P value: 1.00), airway patency (P value: 0.368), number of attempts (P value: 0.173).

Table 1: Demographic data of patients in two groups

	Group R_1	Group R_2	Group P	P value
Age	30*±14	28±13	32±10	0.430
Weight(kg)	68*±13	65±19	68±9	0.655
Sex TM/F	26/4	25/5	27/3	0.576
ASA,2	24/6	27/3	25/5	0.508
* Mean ± SD				

Duration of apnea between two groups had statistical significant difference (P value: 0.044). Systolic pressure changes in the group P were more than groups R_1 and R_2 but without statistically significant difference (P value 0.272). Diastolic-blood pressure changes in-group P were more than groups R_1 and R_2 (P value: 0.001) Hemodynamic changes between group R_1 and R_2 had no statistical difference.

DISCUSSION

Several studies have shown the possibility of LMA insertion by hypnotics such as thiopental sodium and propofol with opioids such as fentanyl and alfentanil. [2,3,4] Alexander et al found 2mg/kg propofol after 4 μg/kg remifentanil provided good intubating condition.[5] Grant et al showed that injection of 2 μg/kg remifentanil before 2 mg/kg propofal provided good condition for intubation.[6] Our data confirms these findings. The success of the combination of the two drugs is probably because of the apneic, analgesic and antitussive effects of the opioid.[4] Our success rate was lower in group P than other groups probably because the patient were unpremedicated and we didn't use muscle-relaxant. Use of muscle relaxants for LMA insertion facilitates it's insertion[7] but is controversial because of long duration of apnea with nondepolarizing muscle relaxants.

Table 2. Response to LMA insertion in ease of insertion, airway patency, number of attempts, duration of apnea and additional dose of propofol.

	Group R_1	Group R_2	Group P	P value
Ease of insertion * 1/2/3	25/5/0	29/0/1	12/18/0	<0.001
Airway patency °g/f/p	29/1/0	29/1/0	23/7/0	0.009
Nurnber of attempts 1/2/3	23/7/0	23/6/1	4/15/1	0.041
Duration of apnea (mm)	1.75 ± 0.9	2.35 ± 1.3	1.2 ± 0.7	0.041
Additional propofol*1	8	7	25	<0.001

* 1: excellent, no response to LMA insertion
2: acceptable. Gagging or swallowing with LMA insertion
3: Poor, unable to open mouth or bitting upon insertion of LMA
° g: good F: Fair P: Poor

Our success rate in remifentanil group is slightly less than reported by Ho advocating the use of muscle relaxants to facilitate LMA insertion.[4] Chui showed no clinically significant problem was seen when small doses of mivacuriumn were used to facilitate LMA insertion.[8] Myalgia is a concern with succynylcholine and long term paralysis in patients with hereditary plasma cholinesterase deficiency.

Because of short onset and duration time of remifentanil and rapid metabolism and return of spontaneous breathing it is a suitable opioid for LMA insertion with propofol. This is an important consideration in spontaneously breathing patients to avoid hypoventilation and development of hypercarbia. Remifentanil attenuates the hemodynamic response to tracheal intubation.[5,6] Bradycardia (<50 bpm) is a complication associated with remifentanil, but we didn't have any case of this in our study, probably because of lower dose of remifentanial that we used. In conclusion, we have demonstrated that addition of remifentanil before propofol reliably provided excellent condition for LMA and it is associated with a short duration of apnea and fewer hemodynamic disturbances.

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