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EFFECT OF ORAL CLONIDINE PREMEDICATION ON HEMODYNAMIC RESPONSE DURING SEDATED NASAL FIBEROPTIC INTUBATION

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ABSTRACT

Although oral clonidine premedication is known to reduce the hemodynamic response under general anesthesia, effects on the hemodynamic response during sedated fiberoptic nasal intubation have not yet been examined. Our aim was to compare the effects of clonidine premedication on hemodynamic responses with those of atropine and hydroxyzine premedication during sedated fiberoptic nasal intubation. Thirty adult patients were randomly assigned to one of two groups: Group 1 patients (n=15) were premedicated with atropine sulfate (0.01 mg/kg) and hydroxyzine hydrochloride (1 mg/kg) intramuscularly, and Group 2 patients (n=15) were premedicated with clonidine (5 μg/kg) orally. We compared the hemodynamic response and sedation level in fiberoptic nasal intubation between the two groups. There were no significant differences in sedation levels and postoperative complaints between the two groups. But the oral clonidine premedication (Group 2) blunted hemodynamic changes during fiberoptic intubation. No profound hypotension or marked bradycardia was noted in Group 2. We concluded that the oral clonidine premedication might contribute to hemodynamic stability during sedated fiberoptic nasal intubation.

Key Words: clonidine, fiberoptic intubation, hemodynamic response

INTRODUCTION

The hemodynamic changes associated with sedated fiberoptic nasal intubation are well documented. Several maneuvers have been used to protect patients from these hemodynamic insults, including heavy premedication with opioids, local anesthesia and use of potent vasodilators.[1–3] Our standard procedure has employed pentazocine and droperidol in combination. However, we often encountered an adverse hemodynamic response during sedated fiberoptic nasal intubation, especially in patients with hypertension and/or ischemic heart diseases.

Clonidine, an α2-adrenoreceptor agonist which decreases the release of norepinephrine at the peripheral nerve terminals, has recently been widely used as an oral premedicant[4]. It acts on the central nervous system and decreases blood pressure and the heart rate, and has been reported to reduce the requirement for inhalation anesthetics.[1,2] It has also been shown to have sedative and analgesic properties.[5] Clonidine premedication may attenuate the adverse hemodynamic response to sedated fiberoptic nasal intubation.

The aim of this study was to compare the effects on hemodynamic changes of oral clonidine premedication with those of our standard premedication (using intramuscular atropine sulfate

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and hydroxyzine hydrochloride) during sedated fiberoptic nasal intubation.

MATERIALS AND METHODS

After obtaining informed consent, we examined thirty patients scheduled for orthopedic or oral surgery who needed fiberoptic nasal intubation because of advanced rheumatoid arthritis or difficulty in opening the mouth. Patients with cardiorespiratory diseases and/or who were taking any drugs likely to affect blood pressure were excluded. Sedated patients were randomly assigned to one of the two groups. Group 1 patients (n=15) were premedicated with 0.01 mg/kg of atropine sulfate and 1 mg/kg of hydroxyzine hydrochloride intramuscularly 60 minutes before induction of anesthesia. Group 2 patients (n=15) were premedicated with 5 μg/kg of clonidine orally 90 minutes before induction.

On arrival in the operating room, routine monitoring of oscillometric blood pressure, electrocardiograph, and pulse oximetry was commenced using the Hewlett Packard model 66S and the patients were given 0.15 mg/kg of droperidol and 1 mg/kg of pentazocine intravenously. Fifteen minutes after the administration of these drugs, 3 ml of 2% lidocaine containing 1:200,000 diluted epinephrine and 4% lidocaine jelly were injected into the nasal cavity for topical anesthesia, and we inserted an endotracheal tube (Endotroll Malinkrott U.K.) into the nasal cavity. A fiberoptic bronchoscope (OLYMPUS 3C20) was inserted through the endotracheal tube. After advancing the tip of the scope beyond the epiglottis, we identified the glottis and the scope was inserted between the vocal cords into the trachea and by holding the fiberscope steady, the endotracheal tube was advanced into the trachea. Just after the intubation, patients received 150 mg of thiamylal and 8 mg of vecuronium bromide, after which mechanical ventilation commenced. They were maintained with 1% sevoflurane and 66% nitrous oxide in oxygen until the start of the operation. All intubations were carried out by the first author.

Systolic and diastolic blood pressure, heart rate, changes of ST segment and arrhythmia were measured at the following times: prior to the administration of the premedication (T0), just before departure from the ward (T1), on arrival in the operating room (T2), 15 minutes after the administration of pentazocine and droperidol (T3), at the maximum response following intubation (T4), 5 minutes after intubation (T5), at the start of the operation (T6), and on arrival in the ward after the operation (T7). All blood pressure measurements were performed at 1 min intervals by automated oscillometric BP cuff and the values of the blood pressure readings used in this study were calculated as an average of 3 times measurements. Lead II of the electrocardiogram was continuously monitored throughout the periods of study, and the overall heart rate was calculated as an average over a 4s cycle from the ECG monitor. The percentage changes in the blood pressures and heart rate at each period were calculated from the values before premedication. We considered that any ST segment change over 1 mm above or under the baseline was positive. When systolic blood pressure was less than 70 mmHg, 5 mg of ephedrine was administered intravenously. When systolic pressure was greater than 200 mmHg, 1 mg of nicardipine was administered intravenously.

The sedated level was scored using a scale graded as follows; 1 = wide awake; 2 = drowsy, but easily aroused by verbal command to an alert state; 3 = dozing intermittently, but arousable by verbal command; 4 = mostly sleeping, but arousable to a drowsy state by light tactile stimulation.[6] The sedated level was measured at T0, T1, T2, T3, and T7.

Data were analyzed using two-way analysis of variance (ANOVA), the Bonferroni test and the chi-square test. A value of $p < 0.05$ was required to statistical significance.

Table 1. Demographic data and hemodynamic variables before premedication

	Group 1 (n=15)	Group 2 (n=15)
Age (years)	36 ± 16	47 ± 18
Weight (kg)	51.7 ± 11.4	51.8 ± 12.8
Height (cm)	158.9 ± 6.1	161.9 ± 9.5
Sex Male/Female	7/8	8/7
The time required for intubation (min)	2.3 ± 1.0	2.1 ± 1.1
Anesthesia time (min)	353 ± 32	365 ± 46
Heart rate (b.p.m)	73.3 ± 6.4	72.5 ± 7.0
Systolic blood pressure (mmHg)	112.8 ± 9.7	121.3 ± 10.3
Diastolic blood pressure (mmHg)	63.4 ± 6.2	68.6 ± 6.9

All values are mean ± SD. There were no significant differences between the groups.

RESULTS

The two groups were similar with respect to ASA physical status. There were no statistically significant differences in the demographic data and the time required for intubation in the two groups. Heart rates and blood pressures before premedication were not statistically different between groups (Table 1).

Figure 1 shows the percentage changes in the systolic and diastolic blood pressures and heart rates at each measuring point respectively. The changes in the systolic and diastolic blood pressures in Group 2 were similar except in T4. Intubation (T4) produced increases in the systolic and diastolic blood pressures in Group 1, but not in Group 2. The changes in heart rates in both groups were similar before intubation. But the percentage change values of T4 through T6 in Group 1 were significantly elevated compared to T0, and greater than those in Group 2. No patients experienced bradycardia (heart rate < 50 bpm), positive ST changes or serious arrhythmias in either group.

Figure 2 shows the sedation scores at T0, T1, T2, T3, and T7 respectively. There was no significant difference between the group.

DISCUSSION

When patients are subjected to sedated fiberoptic nasal intubation, severe hypertension and tachycardia are frequently observed. In particular, marked and harmful changes in hemodynamics can be induced in patients with hypertension and/or elderly patients, with a corresponding risk of myocardial ischemia. In this study, marked increases in blood pressure and heart rate were observed during intubation in the control group that had no preoperative cardiac risk. But in the clonidine group, heart rate and blood pressure showed little change and remained stable at all the measuring points. We have therefore confirmed that oral clonidine premedication blunts hemodynamic changes during sedated fiberoptic nasal intubation.

It was reported that the main purpose of the administration of clonidine in anesthesia was to reduce anxiety, stabilize perioperative circulation and decrease anesthetic requirements.[7] But the side effects of clonidine premedication are hypotension and bradycardia when used with general anesthesia, and these effects were reported to limit the use of this drug for premedication.[5] In this study, neither a case of hypotension which required any vasopressor drugs nor a

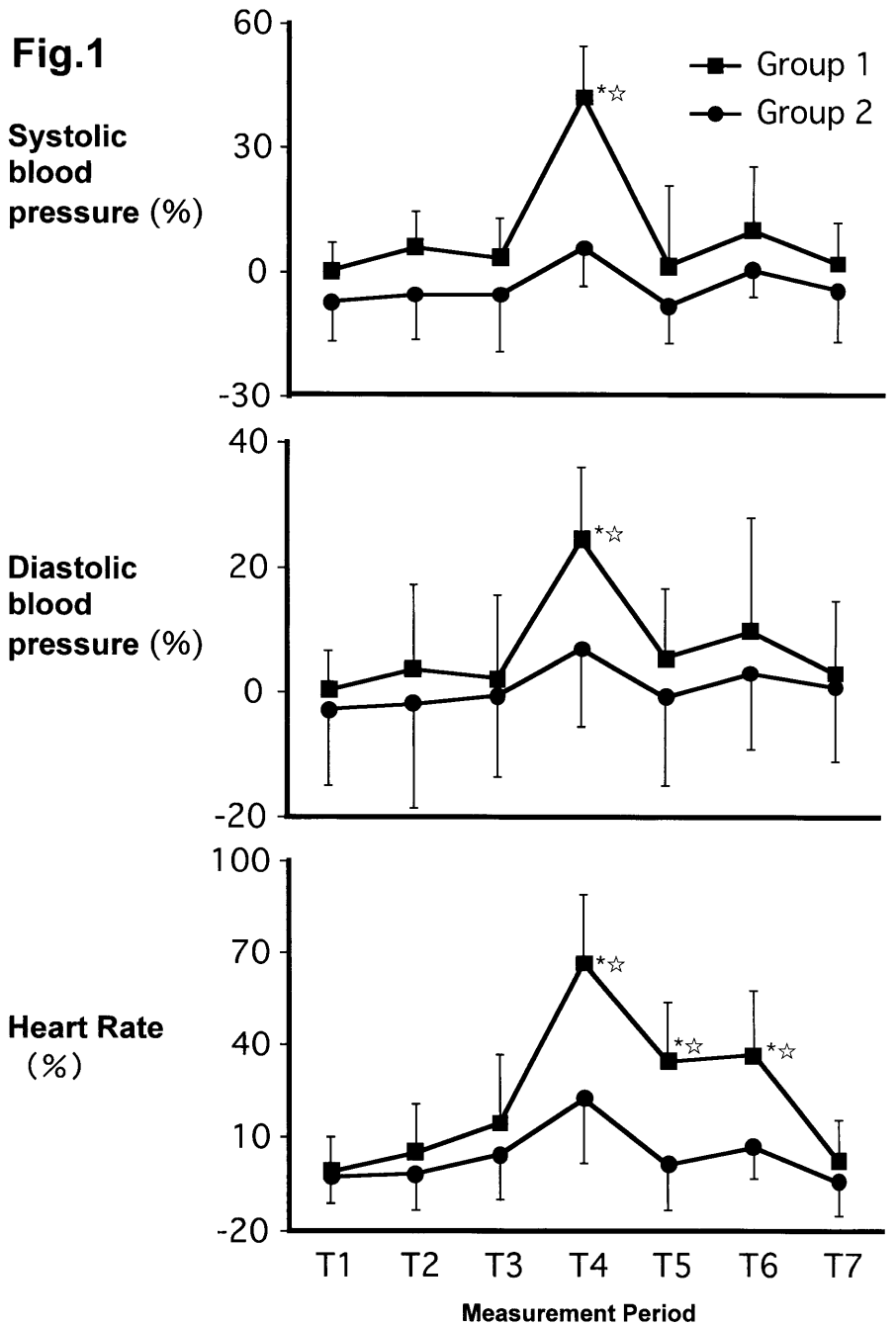

Figure 1. Percent changes of blood pressures and heart rates during the study period (see text for measurement times). Changes in blood pressures and heart rates are shown as a percent change from T0. Solid squares show Group 1 (atropine and hydroxyzine premedication), and solid circles show Group 2 (clonidine premedication).
☆$p < 0.05$ when compared with T0; *$p < 0.05$ between groups at a given measurement time. Values are mean ± SD.

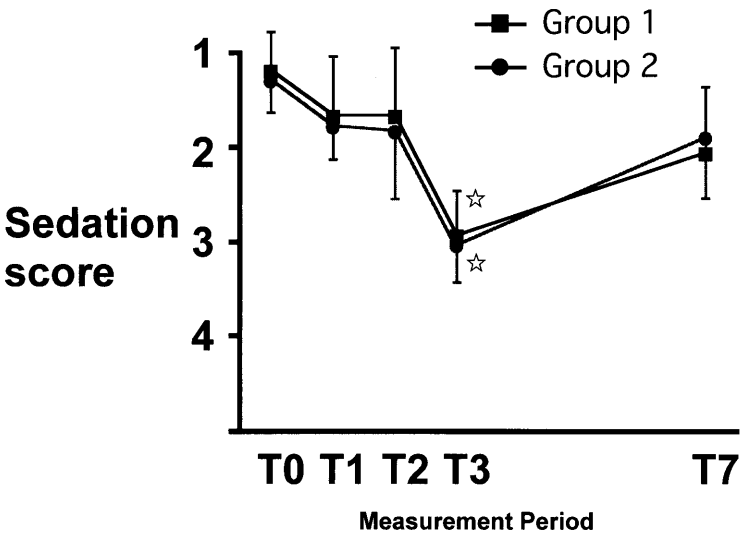

Figure 2. Sedation scores during the study period (see text for measurement times). Solid squares show Group 1 and solid circles show Group 2.
☆$p < 0.05$ when compared with T0. There was no significant difference between the groups at a given measurement time. Values are mean ± SD.

case of bradycardia was observed in the perioperative periods.

It was reported that clonidine could reduce blood pressure by inhibiting lower brainstem stimulation of sympathetic preganglionic neurons,[8–10] which inhibits spinal preganglionic neurons[11] or inhibits peripheral norepinephrine release.[12] In this study, the serum catecholamine level was not measured. But we suggest that the serum catecholamine level is decreased when 5 μg/kg of oral clonidine is administered.

There have been reported that clonidine has a sedative effect and an analgesic effect at the spinal level, when administered to the epidural space.[13,14] In oral administration, the sedation and postoperative analgesic effects of clonidine were also reported.[15] In this study, no significant differences in the sedation scores was observed. The use of pentazocine and droperidol may have obscured the difference in the sedation level between the two groups. But in the clonidine group, there were no cases of a sleeping state nor the need for respiratory management after administration of pentazocine and droperidol, or a delay in recovering awareness after the operation. We suggest that oral 5 μg/kg dose of clonidine does not affect the sedation level. If we use a high dose of oral clonidine, we may detect differences in the sedation level.

Oral clonidine premedication has been reported to reduce intraoperative anesthetic requirements for opioids[16,17] and volatile anesthetics.[1,18] Ghignone, et al. reported that oral clonidine 5 μg/kg decreased the isoflurane requirement by 30% and the fentanyl requirement by 60–75%.[16] Flacke, et al. reported that oral clonidine 200–300 μg decreased the sufentanyl requirement by 40% and maintained hemodynamic stability.[17] But these reports were the results of a study under general anesthesia without consciousness. Flacke, et al. reported that the hypotensive action of α2-agonists was dependent on the level of pre-existing sympathetic tone. Clonidine's hypotensive action was largely affected by anesthesia, and this effect was more pronounced under anesthesia than during consciousness.[17] The effect of oral clonidine premedication on hemodynamic response in fiberoptic awake intubation has not yet been examined. In

this study, although the examinations were performed under small doses of pentazocine and droperidol but during consciousness, oral clonidine premedication showed the same effects as general anesthesia.

We concluded that oral 5 μg/kg clonidine premedication blunts the hemodynamic changes during fiberoptic intubation in contrast to premedication with atropine sulfate and hydroxyzine hydrochloride in the perioperative period. Oral clonidine premedication is one of the most effective premedications with fiberoptic intubation.

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