Lidocaine Did Not Reduce The Incidence Of Transient Heart Rate Increasing With Propofol

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Citation

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Abstract

Study Objective: To determine whether lidocainecan reduce the incidence of transient heart rate increasing with propofol.

Design: Prospective, randomized study

Setting: Medical center operating room

Participants: 90 ASA physical status I and II adult patients undergoing minor surgery

Interventions: Patients were premeditated. Patients were randomly allocated to one of three groups. Group 1: 100 mg lidocaine was given immediately before the injection of propofol. Group 2: 100 mg lidocaine was mixed with propofol. Group 3: Only propofol was administered.

Measurements and Main Results: Heart rate, derived from the EKGs, was continuously recorded before and after completion of the injection of propofol. Heart rate increase more than or equal to 10% of the baseline was defined as positive heart rate increasing. The incidences of heart rate increasing were similar among the three groups.

Conclusions: Lidocaine injection did not reduce the incidence of transient heart rate increasing with propofol.

INTRODUCTION

Induction of anesthesia with propofol increased heart rate. The mechanism of propofol-induced transient heart rate increasing remains unclear. Seventy percent of patients complained that the injection of propofol was painful ($_1$). It was believed that the pain on injection may have affected the heart rate ($_2$). Therefore, it become popular practice that lidocaine is injected prior to propofol, or mixed with propofol to reduce the painful injection. The purpose of this study was to investigate whether lidocaine injection can reduce the incidence o transient heart rate increasing with propofol.

PATIENTS AND METHODS

Ninety patients aged between18-60 yr undergoing a variety of surgical procedures were studies. All patients had clinically normal cardiovascular systems. Patients had 20-gauge intravenous catheter in the dorsum of the hand. All patients received Versed 1-2 mg and Fentanyl 100 mcg 15-30 min before arrival in the operating room. The patients were randomized into three groups. Group 1: 100 mg lidocaine was given immediately before injection of propofol. Group 2: 100 mg lidocaine was mixed mixed with propofol. Group 3: Only propofol was administered. Approximately 2 mg/kg of propofol was injected at a rate of 0.5-1 ml/sec for induction of anesthesia. Heart rate, derived from the EKGs, was continuously recorded before and after completion of the injection of propofol. Heart rate increase more than or equal to 10% of the baseline was defined as positive heart rate increasing.

Statistical analysis was performed by paired two-tailed Student's t-test when comparing the demographic data, and by Fisher's exact test when comparing the incidence of heart rate increasing. All tests were considered significant if P values less than or equal to 0.05.

RESULTS

Mean ages, weights, and heights of the patients in the three groups are given in the table 1. No statistical differences were evident between the groups.

Figure 1

Table 1: demographic data (Mean SD)

	Ldocaine prior to propofol	Lidocaine mixed with propofol	Propofol only
Age (yr)	39 ± 15	38 ± 15	42 ± 16
Gender (M/F)	16/14	15/15	13/17
Height (CM)	163 ± 19	162 ± 19	166 ± 7
Weight (Kg)	79 ± 11	73 ± 16	76 ± 17

The incidences of transient heart rate increasing were similar among the three groups (Table 2). When comparing the incidence of transient heart rate increasing between propofol group and lidocaine prior to propofol group, no significant difference (P = 1.0) was found. There was no significant difference (P = 0.999) between propofol group and lidocaine mixed with propofol group.

Figure 2

Table 2: Incidence of transient heart rate increasing by propofol injection

	Lidocaine prior to propofol (n = 30)	Lidocaine mixed with propofol (n = 30)	Propofol only (n = 30)
Transient heart rate increasing	26	27	26

DISCUSSION

Induction of anesthesia with propofol increased heart rate. Early study showed the maximum increase was peaked around 1 min following completion of injection, and returned to baseline within 3 min after injection ([2]). There was 12-beat/min increase heart rate during propofol induction ([3]).

The increased heart rate is often interpreted as a baroreflex response to the decrease of arterial pressure, but this has not been supported by the finding of a marked decrease of braoreflex sensitivity ([4,5,6]). As plasma catecholamine concentrations have been consistently found to be reduced within a few minutes of induction of anesthesia ([7,8]), and animal studies have shown decreased cervical sympathetic nerve activity ([9]), the hypothesis of increased sympathetic nervous activity is difficult to sustain. One cannot define where the locus or loci of altered activity may be. Possible sites include baroreceptors, afferent pathways, integrating centers in the nervous system, efferent sympathetic or vagal pathways, or effectors organs ([10]).

Seventy percent of patients complained that the injection of propofol was painful ([1]). The best intervention to prevent pain on injection with propofol is unknown. Many different methods have been proposed to reduce pain on injection with propofol. There was no evidence of any relationship between catheter size and the incidence of pain on injection ([11]). There was no evidence of any impact of speed of injection on the incidence of pain ([11]).

Addition of lidocaine to the propofol is one of the most popular methods for reducing the incidence of pain on injection. The effects of mix lidocaine with propofol were studied in randomized, double-blind trials ([12, 13]). The incidence and severity of pain on injection of propofol were significantly reduced. Pretreatment with intravenous lidocaine decreased pain on injection with propofol ([14,15]). The patients received lidocaine immediately before the injection of propofol. The incidence of pain on injection was significantly reduced ([14,15]). Therefore, it become popular practice that lidocaine is injected prior to propofol, or mixed with propofol to reduce pain on injection.

It was believed that the pain on injection may have affected the heart rate ([2]). My hypothesis was that the incidence of increased heart rate by propofol should be reduced by lidocaine injection, if transient heart rate increasing was affected by painful injection. The result of this study did not support this hypothesis.

CONCLUSIONS

In summary, lidocaine injection did not reduce the incidence of transient heart rate increasing by propofol. Pain on injection did not contribute to the transient heart rate increasing with propofol. The theory of increased sympathetic nervous activity by painful injection is difficult to sustain. The mechanism of propofol-induced transient heart rate increasing remains unclear and should be investigated further.

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