

COMPARISON OF ANALGESIC EFFECTS OF TRAMADOL AND LIDOCAINE IN REDUCTION OF PROPOFOL INDUCED PAINS

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ABSTRACT

Introduction: Propofol is frequently associated with pain on injection. Numerous methods were introduced to alleviate the pain. This study was designed to assess the effectiveness of Lidocaine compared with tramadol in reducing pain on propofol injection.

Material & Methods: In a randomized, double blind study, 60 patients were selected for this study and divided into two equal groups of A and B based on receiving tramadol and lidocaine respectively. Following venous occlusion by a pneumatic tourniquet placed on the arm and inflated to 50 mmHg above the baseline systolic pressure, a dose of 50mg (10cc) of tramadol was injected in group A (n=30) and 50 mg (10cc) of lidocaine in group-B (n=30) and the tourniquet pressure was released after one minute. A dose of 2.5 mg/kg of propofol (20°-25°C) was then administered as a bolus dose over 30 seconds. Pain assessment was made 30 seconds after the start of the injection.

Results: There was a significant reduction in the incidence of propofol-induced pain when administered in both groups. The incidence of pain was 13.34% in group-A as compared to 16.66% in group-B without any significant difference.

Conclusion: Pretreatment with tramadol is as effective as lidocaine in reducing pain on propofol injection.

KEYWORDS: Propofol, Tramadol, Lidocaine, Pain

INTRODUCTION

It is well-known that intravenous injection of propofol is associated with pain. The incidence

ranges from 28% to 90%¹ and is recognized as an unpleasant experience by the patient. Numerous methods have been advocated to alleviate this pain.² Different studies have evaluated the administration of cold propofol,^{3,4,5} propofol premixed with lignocaine and also the role of several pretreatment modalities such as tramadol^{6,7,8} lidocaine,^{7,9} metoclopramide⁷ and ondansetron⁶ in minimizing the pain induced by Propofol infection. Tramadol is a centrally acting weak mu-receptor agonist and inhibits noradrenaline re-uptake as well as promotes serotonin release.¹⁰ Stein et al¹¹ showed that tramadol might also have a peripheral action on the free nerve endings of blood

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vessels, which in conjunction with temporary venous occlusion could reduce pain induced by injection of propofol. This study was undertaken to assess the effectiveness of tramadol compared with lidocaine in reducing the propofol-induced pain.

MATERIALS AND METHODS

A randomized, double-blind study involving 60 patients of ASA class I and II who aged between 18 and 50 years old was conducted receiving the ethical committee approval and the patients' informed consent. Patients were selected from hospitals of Shiraz University of Medical Sciences who were admitted for elective surgery under general anesthesia. They were divided into two equal groups of A and B in relation to receiving tramadol and lidocaine respectively. Patients with a past history of adverse effect to propofol, tramadol and lidocaine; pregnant/lactating mothers, patients with history of epilepsy or cardiac conducting defects, patients on antiarrhythmic drugs or analgesics, and patients with disorders of lipid metabolism were all excluded from the study. First, a 20 G Venflon cannula was inserted into the largest vein of the dorsum of the non-dominant hand and was flushed with 2 ml of normal saline. The patient's arm was elevated for 30 seconds before the tourniquet was applied on the forearm and inflated to 50 mmHg above the baseline systolic pressure. Then, 50 mg (10cc) of Tramadol and 50 mg (10cc) of Lidocaine were administered in groups A and B respectively and the pressure was removed after one minute. A bolus of 2.5 mg/kg of Propofol (20-25°C) was administered for induction of general anesthesia over 30 seconds. Another skilled anesthetist blind to the drug, recorded the presence of pain and/or excitatory side effects 30 seconds after the start of the injection. Scoring of pain was performed according to the criteria shown in Table 1.

Table 1: Pain score and severity of pain.

Pain score	Severity of pain
0	No pain when asked 30 seconds after injection
1	Complaint of pain when asked 30 seconds after start of injection
2	Spontaneous complaint of pain by patients
3	Spontaneous complaint of pain associated with grimacing or withdrawal of hand during injection

Chi-square test was used for statistical analysis and a p-value of <0.05 was considered significant.

RESULTS

The demographic information of both groups is recorded in Table 2.

Table 2: Demographic data of groups A and B

Demographic data	Group A (n=30)	Group B (n=30)
Age (year)	38.3 (± 10.1)	45.8 (± 11)
Sex (Male : Female)	1	1
Weight (Kg)	55.4 (± 9.4)	63.16 (± 12.4)
Type of operation		
Orthopedic	42%	47%
Gynecology	36%	31%
ENT	22%	22%

Values are expressed as mean (SD).

The incidence and grade of pain when propofol was injected in both groups are shown in Table 3.

Table 3: Incidence and grading of pain during propofol injection

Pain Score	Drug	
	Tramadol (n=30)	Lidocaine (n=30)
0	26 (%86/660)	25 (%83/33)
1	3 (%10)	4 (%13/33)
2	0 (0)	1 (%3/33)
3	1 (%3/34)	0 (0)

The incidence of pain was 13.34% in group-A compared to 16.66% in group-B. There was no significant difference in the incidence of pain between groups A and B who received tramadol and lidocaine respectively ($p=0.717$). Severe pain and excitatory side-effects were noticed in one patient in group-A, but this was not statistically significant.

DISCUSSION

Propofol was first introduced in the field of anesthesiology in 1977 as a 1% solution in cremophore EL. This formula was associated with a high incidence of pain (30 - 80 %) when injected.¹²⁻¹⁴ The pain on injection was postulated to be due to either a direct irritant effects of the drug giving rise to an immediate sensation of pain or indirect effects of it via the release of mediators leading to a delayed onset involving the release of kininogens. When propofol comes into contact with the vascular endothelium,¹⁵ these changes were noticed. Klement and Arndt¹⁶ believed that the afferent free endings between the media and intima are the sensors of this pathway and explains why injection into large forearm veins significantly reduces injection pain by reducing the contact between the drug and the endothelium as it tends to stay in the midstream of the lumen of the vein.¹⁵ Other factors reported to account for Propofol injection-induced pains including its physiological PH and osmolarity differences. It was suggested that venous pain may be induced due to irritant agents formed when propofol was drawn up in disposable plastic syringes.¹⁷ Several authors have used different pharmacological agents and various methodologies to decrease the incidence and severity of pain including the use of lidocaine and tourniquet,¹⁷ opioids,^{9,18} metoclopramide and ondansetron.¹⁶ This study was undertaken to assess the effectiveness of lidocaine compared with tramadol in reducing the pain induced by propofol injection.

Lidocaine was shown to be successful especially when used with a tourniquet. Mangar and

Holak found that Lidocaine when given after application and inflation of a tourniquet to 50 mmHg would virtually abolish the pain. However, trials with opioids such as fentanyl, alfentanil and pethidine showed different results. Fletcher et al,¹⁹ found that intravenous administration of alfentanil (1 mg given 15 seconds before administration of propofol) was effective in reducing the incidence and severity of pain. Similarly, Nathanson et al.⁹ demonstrated that the incidence of pain was reduced with alfentanil (24%) compared to placebo (67%). In similar study, Roehem et al²⁰ showed that remifentanil provided effective pain relief, comparable with lidocaine and is an alternative as part of an intravenous anesthesia regimen to using another concomitant drug. Also, Agarwal et al.²¹ suggest intravenous pretreatment with butorphanol 2 mg for attenuation of pain associated with propofol injection. Pretreatment with thiopental (100 mg) was also shown to be more effective than lidocaine (20 mg) in reducing the incidence of propofol-induced pain.²² Yew et al.²³ in a research done in 2005 concluded that propofol-medium and long-chain triglyceride lidocaine mixtures significantly reduce propofol induced pain. However, Wrench et al¹⁸ failed to show any peripheral action by alfentanil to reduce the pain and concluded that there was no difference between placebo and the drug. These authors used a tourniquet with a cuff pressure of 50 mmHg above the arterial pressure for 30 seconds together with intravenous administration of alfentanil. The amount of propofol administered was similar to our study. The differences with our study may be due to the differences in the type of drug administered (tramadol versus alfentanil) and the time of pressure induced by tourniquet application (1minute versus 30 seconds). We observed that if a longer time was provided for tramadol to act locally on the peripheral opioid receptors, inhibition of pain signal transmission from the free nerve endings in the vascular endothelium would be more prominent.

In another study by Memis et al,⁴ the efficacy of tramadol and ondansetron was compared in relation to minimizing of pain due to injection of propofol. They showed that both of these drugs were equally effective in prevention of pain induced by propofol. Mok et al.⁷ in a study similar to ours evaluated the analgesic effects of tramadol, metoclopramide, meperidine and lidocaine pretreatments in reducing the pain induced by propofol. They demonstrated that lidocaine (60 mg), tramadol (50 mg), metoclopramide (10 mg) and meperidine (40 mg) retained in a tourniquet-occluded veins for 1 min could effectively reduce the pain induced by propofol injection. They also showed that there was no significant difference in the incidence of pain between these drug, but due to high incidence of local reactions caused by meperidine, they suggested that tramadol and metoclopramide to be reasonable alternatives for lidocaine in reducing propofol induced injection pains which was identical to our study.

CONCLUSION

In conclusion, it seems that intravenous tramadol is equally effective in relieving pains induced by propofol injection when compared with lidocaine.

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