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ORIGINAL RESEARCH OPEN ACCESS

Pre-treatment with lignocaine and ondansetron for prevention of pain on propofol injection: A prospective, double blinded, randomised comparative study

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Abstract

Background: Propofol is widely used for induction and maintenance of anaesthesia as well as for intensive care unit (ICU) sedation. One of its persistent side effects that still remains of concern today is the vascular pain associated with its injection. It causes significant distress to the patient and interfere with smooth induction of anaesthesia. Various pharmacological and nonpharmacological interventions have been done to eliminate pain on propofol injection (POPI). In this study we compared lignocaine and ondansetron in decreasing POPI during intravenous induction of anaesthesia.

Material and methods: One hundred adult patients belonging to American society of Anaesthesiology (ASA) physical status I and II, scheduled for elective surgeries under general anaesthesia were selected and randomly allocated in to two groups. Group 1 received intravascular injection of lignocaine 0.1 mg/kg and Group 2 received injection ondansetron 0.1mg/kg as pre-treatment. A tourniquet was put before giving the pre-treatment followed by injection propofol for both the groups. Patients were assessed for pain during injection of propofol. Heart rate, blood pressure, and oxygen saturation were recorded at peri-induction and postoperatively.

Results: The results showed no pain following propofol injection in 54% (Group 1, lignocaine group) and 60% (Group 2, ondansetron group); moderate pain in 10% in both the groups; severe pain in 2% (Group 1) and 6% (Group 2), of the patients. No significant haemodynamic changes were observed in both the groups.

Conclusion: Pre-treatment with ondansetron is as effective as lignocaine in reducing POPI.

Keywords: propofol; pain on injection; lignocaine; ondansetron

Introduction

Although minor, pain on propofol injection is a consistent problem that all anesthetists face every day. While the exact mechanism of this pain is not known, the proposed mechanism of immediate pain on propofol injection (POPI) is attributed to direct irritant effect of the drug by stimulating venous nociceptive receptors or free nerve endings involving myelinated A delta fibers. The delayed pain of injection has a latency of 10-20 seconds and is mediated by activation of kallikrein - kinin system that releases bradykinin, causing venous dilatation and hyper permeability which increases the contact between the aqueous phase of propofol and free nerve endings causing delayed pain [1-3].

Various pharmacological and non-pharmacological interventions have been done to eliminate POPI. The

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suggested methods are injection in larger veins [4], cooling [5] or warming [6] the propofol solution, pretreatment of various drugs like lignocaine [7, 8], prilocaine [9], opioids like butorphanol [10], tramadol [11], magnesium sulphate [12], remifentanil [13], thiopentone sodium [14], metoclopramide [15], ketorolac [16] and clonidine [17].

Intravenous lignocaine has been well documented to reduce the incidence and severity of POPI. Ondansetron, serotonin 5HT3 receptor antagonist is a strong anti-emetic and has some local anesthetic property [18]. In this study, the efficacy of lignocaine and ondansetron have been compared in reducing POPI and their impact on hemodynamic.

Material and methods

After obtaining ethical committee's approval and written informed consent of 100 adult patients who were selected from either sex of ASA grade 1 and 2 and were scheduled for various elective surgeries under general anesthesia. The study was conducted between June 2018 and April 2019. Patients with emergency surgeries; patients requiring rapid sequence induction; history of drug abuse; known allergy to ondansetron, lignocaine or propofol; history of convulsions, head injury, cardiac conduction defects or on anti-arrhythmic drugs; patients with difficult airway; pregnant and lactating mothers were excluded from the study. This was a prospective, double blind, simple randomized comparative study. Patients were allocated into two groups of 50 each. Group 1 received lignocaine (0.1mg/kg) and Group 2 received ondansetron (0.1mg/kg) as pretreatment.

In the operating room after instituting standard monitor, an 18-gauge canula was inserted in the peripheral vein and the arm was lifted for 30 seconds. Post this, an inflatable cuff was applied proximal to the elbow and inflated above the systolic blood pressure (SBP), then calculated dose of study drug was given. One minute after the injection of pre-treatment drug the cuff pressure was released, followed by administration of propofol 2mg/kg by a second independent and blinded anaesthesiologist. The pain was assessed every 10 seconds till 30 seconds post 1/4th of the total calculated dose of propofol. After 30 seconds of the 1/4th dose, the remaining dose of propofol was administered. Pain was assessed by four-point verbal rating scale (VRS) (Table 1). Vitals like heart rate, blood pressure, oxygen saturation were recorded every five minutes for first 15 minutes and at the end of surgery. Episodes of perioperative hypotension (SBP < 80 millimeter of mercury), bradycardia (heart rate < 60 beats per minutes) and desaturation (SPO2 < 90%) were recorded.

Results and discussion

Demographically both the groups are comparable with respect to age, sex and weight (Table 2). The heart rate, SBP, DBP, and oxygen saturation were recorded during pre-induction, induction, intra operatively at 5-, 10-, 15-minutes intervals and at one-time post operatively. Changes in all these parameters showed similar pattern in both the groups and were statistically insignificant (Figure 1). It was noted that both lignocaine and ondansetron did not cause any significant hemodynamic disturbances in the study. The observed increase in heart rate was not significant enough to cause hemodynamic instability even in the patients who experienced POPI.

Pre-treatment to decrease POPI had been tried in many ways, 1. By giving as IV bolus before propofol or after applying a torniquet similar to Biers Block or 2. The pretreatment drug mixed with Propofol. In this study, a torniquet method had been used, which is modification of Biers block [19].

Assessment of pain

Assessment included standard questions asked to the patients about the comfort of the injection, verbal response and behavioural signs. Pain was graded using a four-point verbal rating scale [20] as advocated by Mc Crirrick and Hunter, after 60 secs of injection of propofol, with 0 being the lowest. A score 0 or 1 was considered as reduction of pain (Table 1).

Table 1: Four point verbal rating scale.

Score	*Pain scale*	*Pain scale explanation*
Score 0	No response	
Score 1	Facial grimacing (Mild pain)	A facial expression, often ugly or contorted, that indicated disapproval and pain
Score 2	Hand withdrawal (Moderate pain)	Any movement of hand away from injection site or flexion at elbow joint
Score 3	Vocalization (Severe pain)	The act or process of producing sound or voice would be called as vocalization

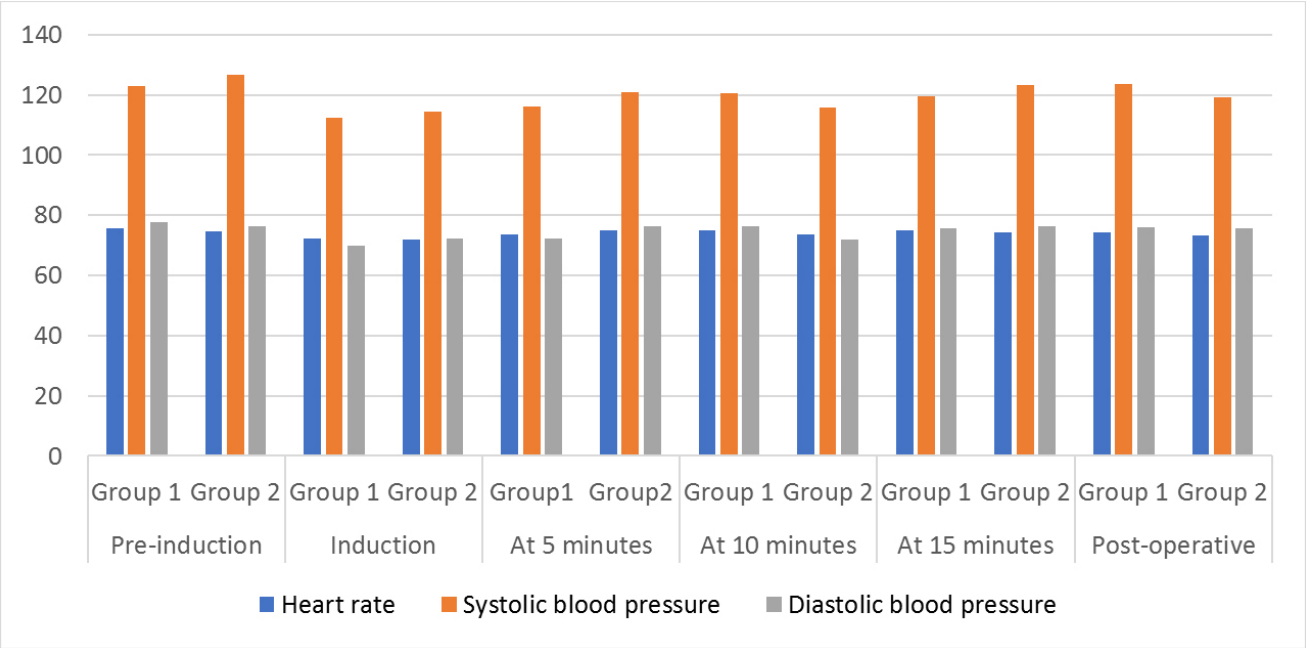

Figure 1: Haemodynamic changes.

Table 2: Demographic profile.

	Group 1 (Lignocaine) N# = 50	*Group 2 (Ondansetron) N# = 50*
Age 18 to 30 years	27 (54%)	14 (28%)
31 to 40 years	15 (30%)	20 (40%)
41 to 50 years	6 (12%)	9 (18%)
51 to 60 years	2 (4%)	7 (14%)
Sex (male: female)	19:31	20:30
Weight (kg)	54.40 ± (8.268) *	55.05 ± (7.466) *

*Mean (standard deviation) #N = number of patients.

Of the 50 patients in each group, 54% patients in lignocaine group and 60% in Ondansetron group did not have pain, 34% in lignocaine group and 24% in Ondansetron group had mild pain, 10% in both groups had moderate pain, 2% in lignocaine group and 6% in ondansetron group had severe pain. Though both ondansetron 0.1mg/kg and lignocaine 0.1mg/kg reduced pain from clinical perspectives, there was no statistical significance between the two groups (Figure 2). This is comparable with the study of Ambesh et al [21] who found that ondansetron decreased pain in almost 50% of patients. Our results also resemble study of Kang et al [22], who showed in their study that about 60% of patients did not have pain after pretreatment with ondansetron.

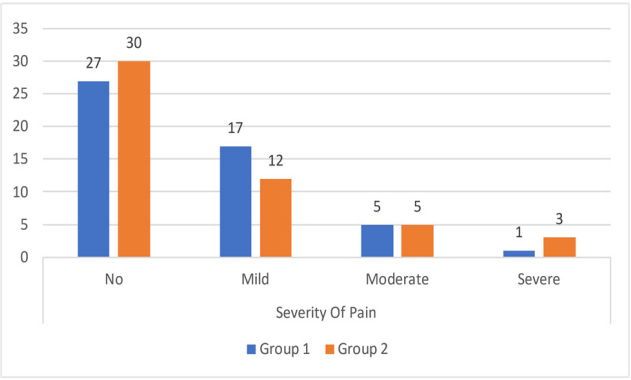

Figure 2: Pain on injection.

Conclusion

The current study showed that, ondansetron 0.1mg/kg decreased the POPI considerably and it was comparable to Lignocaine 0.1mg/kg in alleviating the pain due to POPI. No significant haemodynamic changes are caused by either Ondansetron or Lignocaine.

Conflict of interest

Authors declare no conflict of interest.

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