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Study of Intravenous Injection of Lignocaine Hydrochloride and Palonosetron Hydrochloride

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Abstract: Propofol is one of the anesthetics that supply quick action initiation, fast recovery and simple titration with minimal side effects. Patient satisfaction with propofol is diminished due to its side effect of causing discomfort when being injected. Study objective is to compare Lignocaine and Palonosetron to alleviate pain caused by propofol injection during anaesthesia intravenous induction. The present prospective randomized study was conducted during the period from December, 2013 to July, 2015 at the Krishna Institute of Medical Sciences, Hospital and Research Center, Karad. Palonosetron pre-treatment is as effective as lignocaine in reducing the pain caused by propofol injection with the added benefit of reducing PONV incidence.

INTRODUCTION

The WHO defines pain as "an unpleasant sensory or emotional experience associated with actual or potential tissue damage or described in terms of such damage". With postoperative morbidity declining, patient satisfaction levels have begun with increasing interest in the perioperative period. Anaesthetic-induced pain is one of the key reasons for lack of patient satisfaction. Propofol is one of the best anesthetics that induces minimal anxiety and it has the advantages of ensuring prompt induction, rapid anesthesia development, a titrable level of anaesthesia, lack of cumulation and minimal side effects (McLeod and Boheimer, 1985; Gehan *et al*., 1991). The various methods suggested to reduce the pain are injection in larger size veins, cooling (Scott *et al*., 1988) or warming (McCrirrick and Hunter, 1990; Fletcher *et al*., 1996) the propofol solution, pre-treatment/ pre-injection of various drugs like lignocaine (Gehan *et al*., 1991; Eriksson *et al*., 1997; King *et al*., 1992) prilocaine, opioids like butorphanol, tramadol, alfentanil, remifentanil, thiopentone sodium, metoclopramide, ketorolac, magnesium sulphate, acetaminophen, clonidine and ketamine (Eriksson, 1995; Agarwal *et al*., 2004; Memis *et al*., 2002a, b; Nathanson *et al*., 1996; Kwak *et al*., 2007; Haugen *et al*., 1995; Ganta and Fee, 1992; Yull *et al*., 2000; Canbay *et al*., 2008; Yoshikawa *et al*., 2001; Barbi *et al*., 2003). Intravenous lignocaine, a local anaesthetic, has been well reported to decrease the incidence and severity of pain on propofol injection. It is considered superior to other drugs but cannot decrease the incidence and severity of pain on propofol injection in all situations.

Aim and objectives

Aim: To compare the efficacy of intravenous injection of lignocaine hydrochloride and palonosetron hydrochloride as pre-treatment to reduce pain on propofol intravenous injection.

Objectives: Following administration of intravenous (IV) injection of propofol after pre- treatment with IV injection of lignocaine hydrochloride or IV injection of palonosetron hydrochloride. Assessment of the pain level according to McCrirrick and Hunter (1990) scale. Assessment of haemodynamic changes.

Literature review: Induction of general anaesthesia is a state of syncope with the absence of pain sensation over the entire body with suppression of reflexes through the administration of anaesthetic and adjuvant drugs. Intravenous induction is most commonly used method for providing anaesthesia. Kay (1977) first used the drug 2, 6, diisopropylphenol for a clinical trial and confirmed its potential as an IV induction agent. Since, then, it is a popular drug for brief procedures, day care surgeries, LMA insertion and ICU sedation. Propofol was initially formulated as a 2% solution in 16% cremaphor EL and 8% ethanol. The pre-treatment with magnesium sulfate 2.48 mmol can be used as an alternative for reduction of pain on propofol injection as it is a calcium channel blocker and antagonist of NMDA receptor ion channel (Yull *et al*., 2000). However, they noticed minimal pain on injection of magnesium sulphate. Two recent studies with IV paracetamol pre-treatment showed that it is effective in reducing pain but not as good as 40 mg lignocaine (Memis *et al*., 2002a, b; El-Radaideh, 2007).

Propofol was initially prepared as 1% solution with Cremophor EL (16%) and was found to be associated with anaphylactoid reactions and severe pain on injection, so the drug was reformulated in an emulsion. Propofol itself results in a concentration dependent inhibition of cytochrome P-450 and thus may alter the metabolism of drugs dependent of this enzyme system (Chen *et al*., 1995). Propofol is extensively protein bound (98%). The pharmacokinetics of propofol are described by 2 and 3 compartmental model. When the concentration in the central compartment eventually becomes lower than that of highly lipophilic tissue compartments (e.g., Fat), propofol will begin to move back into the central compartment. However, this transfer occur very slowly and propofol concentrations in the central compartment remain sub-therapeutic. Thus, complete elimination of propofol from the body may take many hours to days but has minimal effect on clinical recovery. As propofol produces fall in arterial blood pressure it cannot be used in patients of shock and hypotension. Propofol should not be used in patients having history of hypersensitivity to egg lecithin or propofol.

MATERIALS AND METHODS

The present randomized study was performed during the period from December, 2013 to July, 2015 at the Krishna Institute of Medical Sciences, Hospital and Research Center, Karad, with the approval of the Ethical Committee to obtain written consent from all patients.

To detect a difference of 30% reduction in incidence of pain between both groups (Group lignocaine and Group palonosetron) for a error of 0.05 and power of 80%, we included sample size of 50 patients based on previous studies (Barbi *et al*., 2003). Thus, 25 patients will be randomly allocated into each group. The 50 patients posted for various elective surgical procedures were studied in a randomized prospective manner.

RESULTS AND DISCUSSION

Data was collected and statistical analysis was conducted. The results and interpretations are as explained below:

As shown in Table 1, after applying student unpaired‘t’ test, mean age in group 1 was 34.2±11.84 and 34.92±10.44 in Group 2. After applying student unpaired‘t’ test, mean weight in group 1 was 54±4.90 and 57.96±5.11 in Group 2 (Table 2).

Table 3 indicates that the males and females were equally distributed in both groups (Chi-square test). As shown in Table 4, 32 and 44% of patients belong to ASA I physical status in lignocaine group and in palonosetron group, respectively. The 68 and 56% of patients belong to ASA II physical status in lignocaine group and in palonosetron group, respectively. The difference between two groups is statically insignificant.

There is no such drug called ‘ideal induction agent’ for induction of anaesthesia. Every drug has its own pros and cons. Researchers from around the

Table 1: Age distribution in both groups

	Types of drug used		
Age (years)	Lignocaine (1) (n = 25)	Palonosetron (2) (n = 25)	p-value
Mean±SD	34.2±11.84	34.92±10.44	0.82

No statistically significant difference (p>0.05)

Table 2: Weight wise distribution in both groups

	Type of drug used		
Weight (kg)	Lignocaine (1) (n = 25)	Palonosetron (2) (n = 25)	p-value
Mean±SD	54±4.90	57.96±5.11	0.17

No statistically significant difference (p>0.05)

Table 3: Sex wise distribution in both groups

	Type of drug used	
Gender	Lignocaine (1) (n = 25)	Palonosetron (2) (n = 25)
Male	15 (60%)	15 (60%)
Female	10 (40%)	10 (40%)

Table 4: Comparison of ASA physical status in both study groups

	Types of drug used		
ASA	Lignocaine (1) (n = 25)	Palonosetron (2) (n = 25)	Total
I	8 (32%)	11 (44%)	19
II	17 (68%)	14 (56%)	31
Total	25	25	50

$X^2 = 0.76$; p-value = 0.38

globe make continuous efforts to develop an induction agent which will fulfill all qualities of an ideal induction agent.

In 1970, during the research on the derivatives of phenol, Kay (1997) first used the drug 2,6-di-isopropyl phenol which was reported to have many qualities of an ideal agent for induction. Later, they confirmed its potential as an anaesthetic agent. It is being used for clinical purpose since 1986.

Propofol provides rapid onset of action and rapid recovery making it useful for day care procedures (McLeod and Boheimer, 1985). It provides excellent amnesia, sedation, anxiolysis with state of general well being at sub hypnotic doses. It is found to have antiemetic action as an additional advantage. It provides muscle relaxation and suppresses the upper airway reflexes making it the drug of choice in hypertensive patients, patients with epilepsy or hyperactive airway where attenuation of stress response to laryngoscopy and intubation is desirable. Propofol has become very popular in ICU sedation, daycare surgeries, cardiac anaesthesia, pediatrics anaesthesia and neuroanaesthesia because of its attractive clinical profile. But propofol is also associated with side effects like hypotension, myoclonus, apnoea and pain on injection.

Pain that is produced at the injection site during injection of propofol is the most extensively studied side effect. The incidence of propofol injection pain varies from 30-85% of patients (Gehan *et al*., 1991).

In our study, study drugs were prepared in plastic syringe in an aseptic manner to prevent contamination due to other agents. It was injected into vein through 20G IV cannula. Many of the previous studies had used either 18G (Gehan *et al*., 1991; Agarwal *et al*., 2004; Adam *et al*., 2004; Tan and Hwang, 2003; Sommer, 2006) 20G (Canbay *et al*., 2008; King *et al*., 1992; Krobbuaban *et al*., 2005; McLeod and Boheimer, 1985) or 22G (Sun *et al*., 2005) IV cannula. However, further comparative studies with lignocaine which is a gold standard agent for alleviating propofol pain, needs to be undertaken.

CONCLUSION

We conclude that palonosetron 0.075 mg decreases the pain on propofol injection significantly. Palonosetron and lignocaine are equally effective in reducing pain on propofol injection. No significant haemodynamic changes are caused by either drugs. Palonosetron when used for prevention of PONV provides the additional benefit of reducing propofol injection induced pain.

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