ORIGINAL ARTICLE

Comparison of Efficacy between Intravenous Ondansetron and Intravenous Lidocaine on Propofol Induced Vascular Pain

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ABSTRACT

Aim: To compare the effects of intravenous ondansetron and intravenous lidocaine on reduction of Propofol induced vascular pain.

Methods: This randomized controlled trial was conducted at Department of Anaesthesia, Combined Military Hospital, Bahawalpur from November 2015 to May 2016. Total 700 patients undergoing elective surgeries, having age 18–55 years of both sexes and having ASA Grade I & II were selected for this study. Group A received Injection Lidocaine plain 2% (2ml) while group B received Ondansetron 4 mg (2 ml) at the time of induction of anesthesia.

Results: Age of the patients ranged between 18-55 years. Mean age of the patients was 33.1±9.1 years and 32.6±8.9 years in group-A and group-B, respectively. In group-A, 233 (66.6%) patients and in group-B 239 (68.3%) patients were males while 117 patients (33.4%) in group-A and 111 patients (31.7%) in group-B were females. Pain reduction was observed in 224 patients (64.0%) of group-A while in group-B pain reduction was reported by 266 patients (76.0%).

Conclusion: In conclusion, lidocaine pretreatment provides a simple and safe method of reducing the incidence of pain on injection of propofol and avoiding the administration of other drugs that may be undesirable in certain circumstances.

Key words: Lidocaine, Ondansetron, Pain, Propofol

INTRODUCTION

Propofol is used as a sedative hypnotic agent for induction of anaesthesia worldwide. It is used for short procedures; in Intensive Care Units for prolong sedation for patients on ventilatory support, and for day case surgeries. Since its introduction its popularity has increased over time. It has generally replaced thiopental as induction agent of choice for most anaesthetists world over. One of its persistent side effects that still remain of concern today is the vascular pain associated with its injection[1].

Pain on injection is less than or equal to that with etomidate, equal to that with methohexital, and greater than that after thiopental. Pain on injection is reduced by using a large vein, avoiding veins in the dorsum of the hand, and adding lidocaine to the propofol solution or changing the propofol formulation. Multiple other drugs and distraction techniques have been investigated to reduce the pain on injection of propofol. Pre-treatment with a small dose of propofol, opiates, nonsteroidal anti-inflammatory drugs, ketamine, esmolol/metoprolol, magnesium, a flash of light, clonidine/ephedrine combination, dexamethasone, and metoclopramide all have been tested with variable efficacy[2].

Lidocaine is a popular local anaesthetic which has been in use for over 50 years now. Till date lidocaine has proven to be one of the most effective treatments for reduction of Propofol induced vascular pain[1].

Ondansetron is a serotonin 5 $HT_{3,}$ receptor antagonist. It is a strong anti-emetic and commonly used to prevent nausea and vomiting caused by cancer chemotherapy, radiation therapy and post-surgical nausea and vomiting[3]. Ondansetron also has some local anaesthesia property for which it has been studied[4].

In a study ondansetron has been compared with lidocaine for reduction of propofol induced vascular pain. The study results showed 67.5% reduction of pain with use of lidocaine and 60% pain reduction with use of Ondansetron[5], while in another study pain reduction with Ondansetron was 76%[6].

In Pakistan no such study has been carried out till date for comparison of ondansetron and lidocaine for Propofol induced vascular pain. The Rationale for this study would be that lidocaine use can add to haemodynamic instability which follows after the Propofol injection, whereas ondansetron has a safe haemodynamic profile as well as reduces Propofol induced vascular pain. The novelty of this method needs to be further studied and more studies will be required to establish this as a preferred method for injecting Propofol in general anaesthesia.

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MATERIAL AND METHODS

This randomized controlled trial was conducted at Department of Anaesthesia, Combined Military Hospital, Bahawalpur from November 2015 to May 2016. Total 700 patients undergoing elective surgeries, having age 18–55 years of both sexes and having ASA Grade I & II were selected for this study. Patients having known allergy to Ondansetron, Lidocaine or Propofol, patients having infection on dorsum of hand, patients having history of Hypertension, IHD, Asthma, Cardiac or Renal Failure. patients with a history of or diagnosed cases of known cardiac conduction defect and patients requiring Rapid Sequence Induction were excluded from the study.

An approval was taken from institutional review committee and written informed consent was taken from every patient. All the patients were randomly divided into two equal groups A & B. Group A received Injection Lidocaine plain 2% (2 ml) while group B received Ondansetron 4 mg (2ml) at the time of induction of anesthesia. No premedication and analgesics was given before the administration of the study drugs. The study drugs were prepared by a junior anaesthetist, who did not involve in any other part of the study, and presented to blinded anaesthetist as identical 2 ml filled syringes. An 18 or 20 G cannula was placed on the dorsum of hand and the arm was lifted up for 30 sec, after that inflatable cuff would be applied above the elbow and inflated above the systolic blood pressure, the study drug injection was given and later the cuff was deflated after 20 seconds. Inj. Propofol 2.5mg/kg was injected and response in terms of pain was documented by the blinded anesthesiologist after 30 seconds of injecting Propofol.

Four point pain scale was used to asses pain after 30 seconds of injection of propofol. Score of 0 or one was considered as reduction of pain.

No Response: If none of the under mentioned was noted it was termed as no response to pain and categorized as no pain with a score of 0.

Facial Grimacing: A facial expression, often ugly or contorted, that indicates disapproval, pain, etc. It was categorized as mild pain with a score of 1.

Hand Withdrawal: Any movement of hand away from injection site or flexion at elbow joint was called hand withdrawal. It was categorized as moderate pain with a score of 2.

Vocalization: The act or process of producing sound or voice would be called vocalization. It was categorized as severe pain with a score of 3.Findings were recorded on pre-designed proforma. All the collected data was entered in SPSS version 18 and analyzed. Mean and SD was calculated for numerical data and frequencies and percentages were calculated for categorical data. Chi-square test was used to detect the difference between the efficacy of both drugs. P value ≤ 0.05 was considered as statistically significant.

RESULTS

A total of 700 patients (350 in each group) were included in the study. Mean age of the patients was 33.1±9.1 and 32.6±8.9 in group-A and group-B, respectively. Pain reduction observed in 224 patients (64%) of group-A while in group-B pain reduction was reported by 266 patients (76.0%) and the difference between the frequency of pain reduction between the both groups was statistically significant with p value 0.000 (Table 1).

According to distribution of age, there were 228 patients (65.0%) in group-A and 237 patients (67.7%) in group-B were between 18-35 years and pain reduction was noted in 201 patients (88.16%) and 183 patients (77.22%) of study group A & B respectively. The difference between the frequencies of pain reduction between the both groups was statistically significant with p value 0.001. Total 122 patients (21.7%) in group-A and 113 patients (32.3%) in group-B were 36-55 years of age and pain reduction was noted in 23 patients (18.85%) and 83 patients (73.45%) of study group A & B respectively. Difference between the frequency of pain reduction was statistically significant with p value 0.001 (Table 2).

In group-A, 233 (66.6%) patients and in group-B 239 (68.3%) patients were males, pain reduction was noted in 205 patients (87.98%) and 191 patients (79.92%) in Group A & B. Statistically significant (P=0.017) difference between the frequency of pain reduction was noted.

Total 117 patients (33.4%) in group-A and 111 patients (31.7%) in group-B were females, pain reduction was noted in 19 patients (16.24%) and 75 patients (67.57%) in Group A & B. Statistically significant (P=0.001) difference between the frequency of pain reduction was noted (Table-3).

Distribution of cases by ASA physical status showed, 308(88%) in group-A and 317 patients (90.6%) in group-B were ASA-I, reduction of pain was noted in 215 patients (69.81) and 243 patients (76.66%) and the difference was significant with p value 0.052. Total 42 patients (12%) in group-A and 33 patients (9.4%) in group-B were ASA-II status and pain reduction was noted in 9 patients (21.43%) and 23 patients (69.7%) of both groups and the difference was significant with p value 0.052 (Table-4).

Table-1: Comparison of pain reduction

Pain reduction	Group-A (Ondansetron Inj.)		Group-B (Lidocaine Inj.)	
	No.	%	No.	%
Yes	224	64.0	266	76.0
No	126	36.0	84	24.0
Total	**350**	**100.0**	**350**	**100.0**

P = 0.000

Table-2: Stratification with regard to age

Age	Group	Pain Reduction		Total
		Yes	No	
18-35 (P =0.002)	Group-A (Ondansetron)	201(88.16%)	27(11.84%)	228(65%)
	Group-B (Lidocaine)	183(77.22%)	54(22.78%)	237(67.7%)
36-55 (P =0.001)	Group-A (Ondansetron)	23(18.85%)	99(81.15%)	122(35%)
	Group-B (Lidocaine)	83(73.45%)	30(26.55%)	113(32.3%)

Table 3: Stratification with regard to gender

Gender	Group	Pain Reduction		Total
		Yes	No	
Male (P = 0.017)	Group-A (Ondansetron)	205(87.98%)	28(12.04%)	233(66.6%)
	Group-B (Lidocaine)	191(79.92%)	48(20.08%)	239(68.3%)
Female (P =0.001)	Group-A (Ondansetron)	19(16.24%)	98(83.76%)	117(33.4%)
	Group-B (Lidocaine)	75(67.57%)	36(32.43%)	111(31.7%)

Table-4: Stratification with regard to ASA Grade

ASA Group	Group	Pain Reduction		Total
		Yes	No	
ASA-I (P = 0.052)	Group-A (Ondansetron)	215(69.81%)	93(30.19%)	308(88%)
	Group-B (Lidocaine)	243(76.66%)	74(23.34%)	317(90.6%)
ASA-II (P = 0.001)	Group-A (Ondansetron)	9(21.43%)	33(78.57%)	42(12%)
	Group-B (Lidocaine)	23(69.7%)	10(30.3%)	33(9.4%)

DISCUSSION

Propofol is the drug of choice for induction of anaesthesia in millions of patients every year because of its rapid onset and short duration of action, easy titration, and favourable profile for side effects. Despite these positive attributes, about three out of five patients experience pain on injection of propofol, with one of these patients reporting severe or excruciating pain. Some patients recall the induction of anaesthesia as the most painful part of the perioperative period. As a result, several interventions have been investigated to alleviate the pain associated with propofol injection[7].

Though many methods of alleviating or reducing the intensity of pain on injection of propofol have been studied, the most commonly drug used for pretreatment was lidocaine[8]. In an attempt to find out optimal amount of lidocaine necessary to reduce pain. Tham et al[9] showed that a propofol emulsion containing 0.05% lignocaine is effective in reducing propofol injection pain. The dose of lidocaine used in our study was Lidocaine plain 2% (2ml) which was found to be effective.

Ondansetron (OND) is a widely used antiemetic drug. In animal experiments, OND administered intrathecally reduces nociceptive responses of dorsal horn neurons. In a experiment conducted in rats it is found that OND is approximately 15 times more potent as local anaesthetic than lignocaine[10]. OND is found to have μ opioid agonist action. So OND may be potentially used to decrease pain produced by propofol[11]. OND is routinely used in our hospital as a pre medication for prevention of PONV at a dose of 0.1mgkg- 1. In this study we compared the effect of lidocaine and ondansetron in reducing pain on propofol injection and found a good relief of pain.

Earlier studies were done in patients undergoing gynaecological procedures[12] orthopaedic surgeries and gastrointestinal surgeries[13]. We conducted study in 700 patients of ASA physical status I and II, age ranging between 18 to 55 years, undergoing elective surgeries under general anaesthesia that were randomly allocated into two groups of 350 each.

In present study, lidocaine found to be significantly effective as compared to ondansetron in reducing the propofol induced pain (p=0.0005). Picard et al also found that lidocaine was most effective method to decrease pain[14].

The best way to assess pain in clinical setting is by verbal response or its derivative, VAS and some of the previous studies were conducted using VAS

score [15] The VAS appears to be more sensitive to smaller changes in effect over time than are categorical measures [15]. In our study we chose Four point pain scale as advocated by Mccrirrick and Hunter [16] because it is simple and readily understood by patients and many previous studies reporting pain on injection of propofol have used either all or none or categorical scoring systems, thus allowing easier comparison with literature.

In our study, distribution of age ranged between 18-55 years with the mean age of Ondansetron group being 33.1±9.1 and for lidocaine group being 32.6±8.9 years. Majority of patients in both groups were males, 66.6% in ondansetron and 68.3% in lignocaine group. The sex difference between the groups is statistically insignificant. The distribution ASA between the groups was also statistically insignificant. Hence demographic characteristics are similar and comparable in both groups.

Gehan et al had previously shown that lidocaine at significantly reduced injection pain with 84% patients experienced no pain during the procedure[17]. Though in our study lidocaine significantly reduced pain (76%), but effect was not pronounced as the previous study (84%)[17]. Another double blind randomised placebo controlled study had shown that lidocaine groups had a 7% incidence of pain which was significantly less than a 33% incidence in the lidocaine 10mg group ($p< 0.05$) [18]. Pain of propofol injection was also found to be reduced when 10mg lignocaine was added to 19 ml of emulsified propofol[19].

CONCLUSION

In conclusion, lidocaine pretreatment provides a simple and safe method of reducing the incidence of pain on injection of propofol and avoiding the administration of other drugs that may be undesirable in certain circumstances.

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