A COMPARATIVE STUDY OF THE ANALGESIC EFFECT OF LIGNOCAINE AND TRAMADOL IN AMELIORATING PROPOFOL INJECTION PAIN

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ABSTRACT

BACKGROUND

Propofol is an ideal intravenous anaesthetic agent which provides smooth induction and recovery, but its adverse effect is considerable pain on injection of unknown cause. Various drugs like lignocaine, tramadol, ketorolac, opioids, metoclopramide can be co-administered to alleviate pain. The purpose of this study is to compare the analgesic effect of lignocaine and tramadol in ameliorating propofol injection pain.

MATERIALS AND METHODS

In this prospective placebo controlled double blinded study, one hundred and fifty patients under general anaesthesia with propofol as inducing agent of ASA grade 1 and grade 2, were randomly allocated into three groups (A, B, C). In all cases, the drugs were administered slowly one minute prior to the injection of propofol and pain scores were measured immediately. Verbal responses for pain were also recorded.

RESULTS

Results were analysed by Z-test. p value <0.05 was considered to be significant. Incidence of pain was 16% in Group A, 26% in Group B and 86% in Group C. The difference in the incidence of pain in Group A (lignocaine group) and in Group B (Tramadol Group) was not statistically significant (p Value >0.05). However, both the drugs effectively reduced the incidence of pain on propofol injection when compared to placebo group. (p value <0.05), by Z test (Z>1.96).

CONCLUSION

There is no statistically significant difference between lignocaine and tramadol with regard to their efficacy in reducing propofol injection pain. Both the drugs (Lignocaine 60 mg and Tramadol 50 mg), can be given one minute prior to the propofol injection and they could prevent the pain of propofol injection in patients undergoing general anaesthesia, as compared to the placebo group.

KEYWORDS

Propofol, Injection Pain, Lignocaine, Tramadol.

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BACKGROUND

Intravenous administration of propofol is associated with a high incidence (3-100%) of pain and discomfort. Pain of propofol may be due to release of a kininogen from the vein wall with triggering of a local kinin Cascade.[1] Morishima et al., reported a myocardial ischemia attack due to profound pain during propofol injections.[2] Various treatments have been tried to alleviate this pain.

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One well accepted therapy is I.V. Lignocaine using tourniquet venous occlusion for one-minute follower by propofol injection. Mangar et al., showed that lignocaine given after inflation of the tourniquet 50 mmHg virtually abolishes the transient pain associated with propofol injection.[3]

Opioids inhibit the release of excitatory and pro-inflammatory compounds from sensory nerve endings. Tramadol is a centrally acting weak μ receptor agonist inhibiting nor-adrenaline re-uptake and promotes serotonin release. Opioids activate the receptors increasing the potassium currents and decrease calcium currents in sensory neuron cell bodies leading to inhibition of signal transmission.[4]

Pain on injection of propofol is reduced by using a large vein, avoiding veins in dorsum of the hand and adding lignocaine to the propofol injection.

In this study we designed to compare the peripheral analgesic efficacy of Lignocaine and Tramadol in reducing propofol injection pain.

MATERIALS AND METHODS

The study is a prospective randomized double blinded control study conducted at King George Hospital, Visakhapatnam between March 2017- March 2018, after getting permission from institutional ethical committee.

One hundred and fifty patients with ASA Grade 1and Grade 2, undergoing elective surgeries under General anaesthesia, age groups ranging from 15-40 years Patients undergoing elective general surgeries, between age groups 15-40 years, of either sex, belonging to ASA 1 and 2 groups are included in the study after obtaining consent from patient.

Patients with any major systemic illness or those taking medications for pain, patients with difficulty in communication, history of epilepsy, cardiac conduction defects, bronchial asthma, allergic to egg, presence of neurological and psychiatric disease, pregnancy, lactating mothers and patients with disorders of lipid metabolism were excluded in the study.

Pre anaesthetic check-up and preoperative investigations were done.

At the pre anaesthetic interview, the patients were familiarised with visual analogue scale (VAS). From 0-10 with 0 being no pain to 10 having excruciating pain. Patients were kept on overnight fasting of 8-10 hours. Oral Diazepam 0.2 mg/kg was given the night before surgery.

Preoperative questionnaire was completed, and demographic data were noted.

On arrival into the preoperative room, 18G IV cannula was placed in to the antecubital vein and ringer lactate infusion was started. No pre-medication was given. Patients were then shifted to the operating table.

In the operation theatre before induction, the patients are reminded about the possibility of pain on injection of anaesthetic agents. The patient was kept in supine position, pre-oxygenated with 100% oxygen for 3 min. Thereafter IV infusion was stopped and arm with IV line was elevated for 15 seconds for drainage of venous blood. A pneumatic tourniquet was placed on the arm with pressure inflated to 50 mmHg to produce venous occlusion.

As it is a double blinded technique, both the anaesthetist recording the pain and the patient are blinded about the pre-treatment drug. An investigator is present to prefill the syringe with drug and handed it over to the observer.

For administering the Patients were randomly allocated into three groups of 50 each:

Group A (n=50): Received injection lignocaine 60 mg at the rate of 0.5 ml /second, one minute before the injection of propofol 2.5 mg/kg at the rate of 0.5 ml/second.

Groups B (n=50): Received injection Tramadol 50 mg at the rate of 0.5 ml/sec which is prepared in 3 ml volume with the addition of normal saline, one minute before the injection of propofol 2.5 mg / kg at the rate of 0.5 ml/sec.

Group C (n=50): Received injection normal saline (placebo) 3 ml at the rate of 0.5 ml / sec, before the injection of propofol 2.5 mg / kg at the rate of 0.5 ml / sec.

The study drugs were prepared in 3 ml volume with the addition of normal saline for tramadol and given at room temperature. All the injections were given at the port immediately proximal to IV canula at the rate of 0.5 ml / sec.

One minute after the injection of the drug under study, tourniquet was deflated, followed immediately by IV injection of propofol (2.5 mg /kg) at the rate of 0.5 ml / sec for induction of anaesthesia.

VAS was assessed before the patient lost consciousness. Absence or presence of erythema or wheal in the arm was observed and recorded. Intra - operative monitoring. The following parameters were monitored intra - operatively. Pulse – rate, Blood pressure, Continuous O2 monitoring, VAS on propofol injection. Monitoring of any allergic reactions to the study drug.

The above parameters were assessed and recorded. The pulse rate and blood pressure were recorded before and after injection of propofol and study drugs. The intensity of pain on injection of propofol was assessed by the patients using a verbal 10-point scale.

Scale 0 =No pain at all.

Scale 10 =Worst pain

RESULTS

Sl. No.	Demographic	Group A	Group B	Group C
	Feature	Lignocaine	Tramadol	Normal saline
		n=50	n=50	n=50
1.	Age in years	28.84+2.22	28.28+2.29	26.82+2.66
2.	Sex (M:F)	20: 30	28: 22	26: 24
3.	ASA (1:2)	42: 8	44: 6	44: 6
4.	Weight in kgs	50.52+2.92	51.16+2.71	52.88+4.35

Table 1. Demographic Characters in Different Groups (MEAN + S.D.)

There was no significant difference in the demographic profile of the three groups. The three groups were comparable with regard to age, weight, male to female ratio and ASA Grade 1 and 2.

Parameter	Group A	Group B	Group C
VAS	Lignocaine n=50	Tramadol n=50	Normal saline n = 50
	0.42±0.99	0.96±1.71	5.54±2.50

Table 2. Vas Score After Propofol Injection in Different Groups (Mean + S.D.)

Pain intensity was assessed using a visual analogue scale (0=No pain, to 10=more severe pain).Pain intensity in lignocaine group never exceeded a VAS SCORE of more than 3. Pain intensity in tramadol group never exceeded VAS SCORE of more than 5. Pain intensity in placebo group reached even up to a VAS SCORE of 8.

Sl. No.	Groups Compared for VAS Score After Propofol Injection	p-Value	Remarks
1.	Groups A vs. Group B	>0.05	NS
2.	Group A vs. Group C	< 0.05	Highly Significant
3.	Group B vs. Group C	<0.05	Highly Significant

Table 3. Comparison of Vas Scores in Three Groups

When compared to placebo group decrease in the incidence of pain was more and statistically significant in both lignocaine and tramadol groups. 16% of the patients in Lignocaine group (n=8) and 26% of the patients in tramadol group (n=13) complained of pain on injection of propofol. The statistically significant difference between Lignocaine and Tramadol in reducing Propofol injection pain. Both the drugs could prevent the pain on injection of propofol significantly as compared to the placebo group.

Parameter	Group A	Group B	Group C
	Lignocaine n (%)	Tramadol n (%)	Normal Saline n (%)
VAS 0	42 (84%)	37 (74%)	7 (14%)
VAS >0	8 (16%)	13 (26%)	43 (86%)

Table 4. Vas Score 0 and More Than 0 in Different Groups N (%)

The overall incidence of pain in Lignocaine group was 16% (8 patients) and in tramadol group was 26% (13 patients) when compared to placebo group with an incidence of 86% (43 patients)

The administration of lignocaine or tramadol could significantly reduce the incidence of pain on injection of propofol 86% in placebo group to 16% in Lignocaine group and 26% in tramadol group which is statistically significant. P value <0.05 by applying standard error of difference between two means (Z >1.96, Z test). Both the drugs lignocaine and tramadol are effective in reducing the incidence of pain on injection of propofol.

Sl. No.	Effect	Group A		Group B		Group C
		Lignocaine n (%)		Tramadol n (%)		Normal Saline n (%)
1.	Pain on Injection of The Study Drug	7	(14%)	7	(14%)	0 (0%)
2.	Redness on Injection of The Study Drug	0	(0%)	4	(8%)	0 (0%)

Table 5. Adverse Effects

The incidence of pain on injection of lignocaine and tramadol is almost the same in both group A and group B, 14%. Redness is observed in only 4 patients in group B(8%) on tramadol injection which is nil significant.

DISCUSSION

Intravenous administration of Propofol is associated with a high incidence (10-100%) of pain and discomfort.[5] One of the most common side effects of propofol is pain during intravenous injection which is usually distressing to the patients. Minimising pain on injection of propofol enhances the patient's perception of quality and acceptability of anaesthesia.[6]

Various treatments have been tried to alleviate this pain. It is reasonable to assume that pain on injection of propofol involves only the terminal nerve endings. This may explain why some drugs, although possessing only weak local anaesthetic activity, can produce a pain reducing effect on propofol injection when they are retained in the vein for a period of time as in the present study, where we used a tourniquet for venous retention of the pre-treatment drug for one minute.[7] The inflated tourniquet isolated the arm veins from central analgesic effect of study drugs in our study, thus presenting a useful model for studying the local action of the drug, similar to modified Bier's block.[7]

Lignocaine, a local anaesthetic, reversibly blocks peripheral pathways through action on excitable membrane and it's effectiveness reducing propofol injection pain has been reported in various studies[1] with a minimum optimal dose of 30 mg to attenuate pain.[8] In our study, the incidence of pain on propofol injection after lignocaine (60 mg) was 16% with VAS of 0.42+0.99, which is comparable to Madan et al,[9] where the incidence of pain with lignocaine pre-

treatment is 24% with a mean VAS score of 0.72+.62. The incidence of pain after lignocaine injection is shown by Ganta et al[10] as 21% and Wong et al[4] 27%.

A comparable incidence of pain on injection of propofol is 26% with mean VAS OF. 0.96+1.71 on a ten-point rating scale, after pre - treatment with tramadol 50 mg, was found in our study, as compared to Madan et al[9] was 28% with mean VAS of 0.96+1.65. The results are also comparable with Wei-Wu Pang et al[11] were 23%, WH Wong et al was 30%,[10] Goel et al was 25%.[12] Incidence of pain in with injection of normal saline along with propofol is found to be 86%, with VAS score of 7+1.8.

While the incidence of side effects due to injection of lignocaine was 14% in the current study, the incidence of pain with lignocaine is 12% and 20% with tramadol and 1 patient showed local redness in Madan et al[9] study. The incidence of side-effects of tramadol injection in our study was 22% out of which 14% patients complained of pain and 8% showed local redness. The incidence of side effects with lignocaine pre-treatment is 14% in Wu-Pang et al[11] and 14% in Martin et al.[13] The incidence of side effects of tramadol injections in Goel et al[12] is 15%, Martin et al[13] is 22%, Singh et al 23.2%.

Statistically significant reduction in both the incidence and intensity of pain following i.v injection of propofol was evident in group A and group B when compared to group C. However, absence of statistically significant difference among group A and group B in reducing the incidence of pain on injection of suggests comparable efficacy of both the drugs used.

In this study it is observed that 60 mg intravenous lignocaine or 50 mg intravenous tramadol one minute prior to propofol injection with venous retention of pre-treatment drug significantly reduced the pain on propofol injection without any significant adverse effects. Thus, both the drugs Lignocaine and Tramadol were effective in reducing Propofol injection pain.

CONCLUSION

Both the drugs, lignocaine 60 mg and tramadol 50 mg, given one minute prior to the propofol injection could prevent the pain on propofol injection in patients undergoing general anaesthesia. Routine administration of either Lignocaine or tramadol is effective in reducing the propofol injection pain, as compared to the placebo group.

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