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ORIGINAL ARTICLE

Comparing the Pre-treatment with Lignocaine 40 mg and Fentanyl 100 ug as an Adjuvant for Preclusion of Pain Associated with Intravenous Propofol Injection

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ABSTRACT

Background: One of the most used medications for inducing anaesthesia is propofol (2,6-di-isopropylphenol). Injection pain is a typical issue. Many approaches have been attempted, but the outcomes have been inconsistent.

Objective: The purpose of this study is to evaluate the relative efficacy of lignocaine and fentanyl in patients receiving propofol for general anaesthesia in the Pakistani population that visits the Pakistan Institute of Medical Sciences, (PIMS) hospital in Islamabad.

Methodology: Two equal groups of sixty individuals each, consisting of 120 people of either sex, between the ages of 18 and 40, with ASA physical status I and II, were randomly assigned to have elective surgery under general anaesthesia. Before receiving an injection of propofol, they were given an intravenous pre-treatment of either 2 ml of lignocaine (20 mg/ml) or 2 ml of fentanyl (50 mcg/mL).

Results: When compared to fentanyl (85.0%), lignocaine (96.7%) was a more effective pre-treatment drug injection. 2.3% of participants in the lignocaine group and 15% in the fentanyl group reported experiencing pain, respectively (P<0.05).

Conclusion: In summary, lignocaine pre-treatment proved to be more successful in reducing discomfort during propofol injection than fentanyl. diagnosed and treated.

Key Words: Comparison, Fentanyl, Lignocaine, Propofol, Pain

Authors' Contribution:
[1,2]Conception; Literature research; manuscript design and drafting; [2,3] Critical analysis and manuscript review; [1,4,5] Data analysis; Manuscript Editing.

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Article info:
Received: June 12, 2023
Accepted: September 26, 2023

Cite this article. Alam SA, Khan RU, Bilal M, Liaqat K, Rahna A, Iqbal J. Comparing the Pre-treatment with Lignocaine 40 mg and Fentanyl 100 ug as an Adjuvant for Preclusion of Pain Associated with Intravenous Propofol Injection. J Islamabad Med Dental Coll. 2023; 12(3): 204-209. DOI: https://doi.org/10.35787/jimdc.v12i3.1048

Funding Source: Nil
Conflict of interest: Nil

Introduction

The intravenous (IV) anaesthetic medication propofol is used for its speedy postoperative recovery profile and low incidence of nausea and vomiting.[1] However, one of the most unpleasant aspects of this medication is painful injection, which some anaesthetists rank as the ninth worst consequence of anaesthesia among 33 events. According to certain research, 28 to 90% of individuals who receive a propofol injection in the

dorsal vein of the hand experience varying degrees of pain intensity.[2]

The endothelium of veins may be irritated by propofol (an alkylphenol), which is thought to produce discomfort because all phenols affect skin and mucous membranes. The release of mediators from the kinin cascade, such as kininogen, may be the reason for the delayed pain that starts 10–20 seconds later. The brand name of the propofol utilised in this study is Propofol-Lipuro (B Braun), which is a mixture of medium chain triglyceride (MCT) and long chain triglyceride (LCT). Since MCT/LCT propofol has a lower free propofol content than propofol that is only available in LCT formulations, it is thought to be less irritating. The free propofol content is less than 30%–45%.[3]

According to certain studies, MCT/LCT formulations are less painful than LCT and nonlipid formulations. Various physical and pharmaceutical techniques have been employed, including using larger veins, lowering the temperature or volume of the propofol solution, and pre-injecting medications such ketamine, lidocaine, fentanyl, benzodiazepines, ondansetrone, magnesium, opioids, and flurbiprofen with or without the use of a tourniquet. The pain associated with propofol injections hasn't totally disappeared, though, despite the use of a variety of methods.[4]

An opioid analgesic with a quick onset and brief duration of action, fentanyl is a strong synthetic opioid.[5] The -opioid receptors are strongly agonistic by it. It is utilised intraoperatively as an analgesic and also has some peripherally mediated analgesic action; as a result, it has been injected into veins to lessen the pain associated with propofol injections.[6] Lignocaine, a local anaesthetic, is used to treat pain associated with propofol injections and is known for having a quick onset of action.[7] When used with propofol, lidocaine and fentanyl can both lessen the discomfort felt during the injection. Given how painful a propofol injection may be, this is a common worry in the practise of anaesthesia.[8] Fentanyl and lidocaine may affect the preservation of hemodynamic stability during tracheal intubation.[9] This is essential to avoiding unfavourable outcomes from variations in heart rate and blood pressure that can happen during intubation procedures.[10] Fentanyl may not be as efficient as lidocaine in relieving propofol discomfort. This could have an impact on the medication that anesthesiologists choose to employ.[11] For reducing the pain associated with propofol injections, fentanyl might not be as useful as lidocaine.[12]

Prior to administering a propofol injection, lidocaine is utilised as a pretreatment; however, it has been noted that lidocaine by itself is ineffective at reducing pain. Some research employed injections of fentanyl and butorphanol to treat pain; other studies used midazolam, which has sedative, anticonvulsant, antianxiety, and muscle relaxant properties, to treat pain. It is vital to look into the usage of various substances in conjunction with propofol because of the inconsistent outcomes from various research and the significance of employing propofol in invasive operations.

The Physical Status categorization (ASA PS) of the American Society of Anesthesiologists is referenced. When assessing patients prior to surgery, it is the most often utilised tool by practising anesthesiologists. Its seniority and simplicity are the reasons for its widespread use. A correlation between ASA classes and the perioperative mortality rate has been demonstrated by numerous retrospective investigations conducted after the ASA was updated into five classes in 1961. In 1996, a large number of patients participated in the first prospective study aimed at establishing a correlation between perioperative risks, postoperative outcome, and ASA classification. All surgical procedures were assigned to patients, and consideration was given to the nature of the procedure, the patient's lab results, perioperative risk factors, the time of the procedure, and the kind

of anaesthesia.[13] The goal of this research is to compare the relative effectiveness of lignocaine and fentanyl in treating patients who are getting propofol for general anaesthesia among Pakistanis who visit the Pakistan Institute of Medical Sciences (PIMS) hospital in Islamabad.

Methodology

From July 1, 2018, to June 30, 2019, a randomised control trial was carried out in the Department of Anaesthesia, Pakistan Institute of Medical Sciences, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, Pakistan. The Advance Studies and Research Board (AS&RB) and the Hospital Ethiopia Committee approved the study protocol.

The sample size was calculated using the Openepi online tool.It is estimated that with a significance level of 5%, test power of 93.6%, and population proportion 1 of 85.7%.9. Expected population percentage 2: 57.1%9.60 in A group, 60 in B group, and 120 in total.[14]

By means of a lottery, the patients were randomised to either of the two groups. This method of simple random sampling involves the researcher selecting a sample in an impartial manner by writing the names on paper, folding it, and thoroughly mixing it before selecting one.

Patients undergoing elective surgery under general anaesthesia, regardless of gender, and aged between 18 and 40 years old were the inclusion criteria. The following cases met the exclusion criteria because they could potentially induce bias in the study by acting as confounders and interfering with the results. Drug hypersensitivity or incapacity to use lignocaine, fentanyl, or propofolneurological conditions, such as peripheral neuropathies identified through pertinent examination and history, individuals who have taken an analgesic within the 24 hours before their procedure, individuals with urgent surgical appointments as well as ASA III and IV patients.

Individuals undergoing general anaesthesia for elective surgery, aged 18 to 40, were included. Formal informed consent obtained from patients prior to their infusion. None of the patients received premedication and they were all kept awake until 2300 hours before operation.

In the operating room, an 18-G intravenous catheter was placed in each patient's dorsal vein off-hand (a dorsal vein off-hand was used in all patients), and monitoring for heart rate, blood pressure, ECG, end-tidal CO2, and SpO2 was started. All of the medications were injected just into the cannula port.

A cuff that was inflated to 40 mm Hg close to the cannula site was used to obstruct the vein. Two groups were given pre-treatments: group A received 40 mg of 2% lignocaine (IV stat) and group B received 100µg of fentanyl (IV stat). A 30-second lignocaine/fentanyl pre-treatment was administered. Following the conclusion of the pre-treatment, the venous occlusion was relaxed after one minute, and anaesthesia was quickly produced with an intravenous injection of propofol (2 mg/kg). An additional anaesthetist (a single observer) evaluated the patient's pain based on their facial expressions following a propofol injection. A recorded positive facial expression indicated possible suffering.

The variables of efficacy, ASA grade, age group, and sex were expressed as a count and percentage for the sample. The efficacy of the two groups was evaluated using the McNemar chi-square test, which was performed using an online statistical calculator.[15]

Results

Group A received a stat IV dosage of 40 mg of 2% lignocaine (lignocaine group), and group B received a stat IV dose of 100g of fentanyl as pre-treatment. Each treatment group consisted of 60 patients (n = 60). Group A consisted of 37 males (61.7%) and 23

females (38.3%), while group B consisted of 34 males (56.7%) and 26 females (43.3%) (Table 1).

Table 1: Demographics of Study Participants

Variable	Lignocaine Group (A)	Fentanyl Group (B)	Total
Male	37	34	60
Female	23	26	60
Total	60	60	120
Age Group 18-30	47	34	60
Age Group 30-40	13	26	60
Total	60	60	120
ASA Group1	54	50	60
ASA Group 2	6	10	60

Table 2: Descriptive Statistics and Estimation of Parameters

Presence of Efficacy			95% CI For Proportion	
Group	Yes	No	Lower	Upper
Lignocaine N1=60	58 96.7%	2 3.3%	88.64	99.08
Fentanyl N2=60	51 85.0%	9 15.0%	73.89	91.9

Group A had 47 individuals in the age group of 18 to 34, whereas group B had 34 in this age group. In group A, thirteen individuals and in group B, twenty-six were in the thirty to forty age range. The ASA grade 2 patients in groups A and B were 6 and 10, respectively, whereas the ASA 1 patients were 54 and 50. 9 (Table 2). About 86.0% of fentanyl and 96.7% of lignocaine were effective.

The confidence interval (CI) for lignocaine was from 88.64 to 99.08, while for fentanyl it ranged from 73.89 to 91.9 percent. The confidence level is 95%. Using an online calculator known as Statistical Kingdom, the confidence interval was computed.

Because the $p < 0.05$, the effectiveness difference between lignocaine and fentanyl is significant. Thus, the null hypothesis is disproved and it is demonstrated that lignocaine has more efficacy than fentanyl (Table 3).

Discussion

The arm veins are cut off from the rest of the circulation by the tourniquet. Like a modified Bier block, it provides a suitable model for examining a drug's peripheral actions when there is no central effect.[16]According to this study, lignocaine is more effective at preventing propofol injection discomfort than it is in the fentanyl group, where it was 85.0% ($P<0.05$). The superiority of lignocaine is demonstrated and supports the results of related investigations, albeit conducted on a different population. In reality, my study's lignocaine efficacy was higher than the other study's, with efficaciousness percentages of 96.7% and 90.5%, respectively, in eliminating pain.[17]

A study conducted by Boujan et al., had the normal saline group had an incidence of 86.5% of ache after injecting propofol, which was higher than the ketamine group's 0% and the lidocaine group's 20% (p=0.0002). 8.1% of the patients in the normal

Groups		Lignocaine N1 =60		Row Total	X2 Value	P Value
		Presence of efficacy	Absence of efficacy		Alpha 0.05 D.F.1	
Fentanyl N2=60	Presence of efficacy	50	8	58	4.00	0.0455
	Absence of efficacy	1	1	2	H0 Rejected	
	Column Total	51	9	60 Pairs		
Nemamcr Chi-Square Test				Yates Continuity Correction Applied		

saline pretreatment group and 0% in the lidocaine and ketamine groups, respectively, suffered severe discomfort. They concluded that intravenous lidocaine and ketamine prevented ache during propofol infusion just as well.[18]

Even so, the lignocaine group in this study had a larger population than in the previous trial. In the lignocaine group, there were 60 participants in the study, compared to 21 participants in the other study.[19] The fact that the propofol employed in this study was LCT/MCT based, as opposed to LCT based in the previous study, may be one factor contributing to the increased efficacy. Although carried out in a manner comparable to mine, the study by Mohamed et al., demonstrated that the duration and quality of anaesthesia are improved, tourniquet pain is decreased, and the need for intraoperative and postoperative analgesics is decreased when either paracetamol, ketamine, or nitroglycerine is added to lidocaine during a Bier block. These effects are achieved without causing any discernible side effects.

Higher doses were employed, but the drugs' combined pain efficacy did not outperform the study's findings for any given medicine. The usage of a narrower gauge cannula—size 22—could be the cause.[20] The study employed an 18 G canula. Smaller gauge cannulas have been shown to be associated with a higher incidence of propofol injection pain than larger cannulas. Furthermore, the kind of propofol formulation that was employed in this investigation was not specified.[21]

This study was limited in a number of ways. Numerous variables, such as the injection site, vein size, injection speed, blood buffering effect, propofol temperature, and concurrent administration of opioids and local anesthetics—both of which are irreversible—can influence the frequency of discomfort. There was no placebo group either. The results reflect a limited population because more ASA III and IV patients were excluded, and the paediatric and over-40 age groups were not included either.

Conclusion

In comparison to preparation with an intravenous stat dosage of 100µg fentanyl in patients undergoing elective procedures, pretreatment with an intravenous stat dose of 40mg 2% lignocaine resulted in reduced discomfort due to propofol injection for induction of general anaesthesia in a larger number of patients. We advise against using 100µg of fentanyl as a pre-treatment and instead suggest using 40 mg of 2% lignocaine in light of this study.

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