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KEY WORDS: Injections, Pain, Propofol, dexamethasone, lignocaine, Temperature

STUDY TO COMPARE THE EFFICACY OF LIGNOCAINE ,DEXAMETHASONE AND COLD PROPOFOL TO DECREASE PROPOFOL INDUCED PAIN.

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ABSTRACT

BACKGROUND: Propofol is a common intravenous (IV) anesthetic drug used for induction during general anesthesia. The aim of this study was to compare the efficacy of Lignocaine ,dexamethasone and cold propofol(4°C) to decrease due to propofol injection.

METHOD: This randomized comparative study was conducted Total 30 patient ASA grade I and II patients were randomly assigned into three groups (10 in each). Group A received 0.5 mg/kg lignocaine, Group B received 0.1mg/kg dexamethasone and Group C received 2 mg/kg propofol 1% at 4°C. We manually occlude venous drainage at mid arm with the help of an assistant. One minute later, the occlusion of venous drainage will be released. This will followed by injection of 1% propofol. 1/4th of the calculated dose will be injected over 5 s and 15 s later the patient will be assessed for pain during injection of propofol.

RESULT: The overall incidence and intensity of pain were significantly less in all groups. The incidence of mild-moderate pain in Group A, B, and C were 30%, 50% and 70% respectively. The incidence score 0(no pain) was significantly higher in Group A (70%) and Group B (50%).

CONCLUSION: Injection with iv lignocaine and dexamethasone in preventing pain from propofol injection were better than cold propofol .Highest satisfactory result achieved with iv lignocaine.

INTRODUCTION:

Propofol is a widely used induction agent in general anaesthesia with fast onset and a short period of action. [1] If a vein on the dorsum of the hand is cannulated, pain on propofol injection varies between 28%- 90% in adult populations. Propofol, an alkyl phenol compound, is virtually hydrophobic. Its vial contains 1% propofol, 10% soya bean oil, 2.25% glycerol & 1.2% purified egg phosphatide. The mechanism of pain from vascular tissues is complex in origin. Propofol stimulates nitric oxide gas (NO) release in vitro.[2]Nociceptive nerve endings have been found in the vascular endothelium in humans, suggesting the role of Nitric oxide for the production of pain.[3,4] Additionally, Nitric oxide which releases from the vascular endothelium binds to the guanylcyclase enzyme which catalyses the guanosine triphosphate to guanosine monophosphate. Guanosine monophosphate causes PGE2-induced hyperalgesia.[5] It's been found that pain following I.V. injection of bradykinin and hyperosmolar solutions are blocked by pre-treatment with Nitric oxide synthase inhibitor.[6] The pain was sharp, aching, or burning. To decreases the incidence of pain on injection include, adding lignocaine to propofol, cooling propofol [7[, diluting the propofol solution, injecting propofol in large veins, pre-treatment with IV injection of lidocaine, ondansetron, metoclopramide [8], opioid, magnesium, steroid-like dexamethasone [9]; All are tried with very different results. Injection of lignocaine to decrease propofol injection pain is the most widely used method in clinical practice. The effects of dexamethasone on Nitric oxide production have been previously studied. Additionally, the efficacy of dexamethasone to alter nitric oxide release has been demonstrated in several diseases. Therefore, the choice of dexamethasone to minimize pain due to propofol injection was based on its wide clinical utilization and its biological basis. The manufacturer notes that the pH of propofol is 6-8.5 and it will effectively be used between 4-37°C.

AIMS AND OBJECTIVES:

Randomized control blind Study was conducted to compare the efficacy of lignocaine, dexamethasone, and cold propofol to decrease pain while injecting propofol for induction.

MATERIALS AND METHODS:

After obtaining approval from institutional ethical committee and written informed patient consent.

30 ASA grade 1 and 2 patients were randomly assigned into three groups (10 in each).

Group A received 0.5mg/kg lignocaine

Group B received 0.1mg/kg dexamethasone

Group C received propofol 1% at 4°C 2mg/kg

Mid forearm was occluded manually before injection and released after 1 min and then propofol was injected over 5 sec. Patients were observed and questioned 15 sec later if they had pain and pain was scored on a four point scale.

0 = no pain
1 = mild pain
2 = moderate pain
3 = severe pain.

Inclusion Criteria:-

- **Age -** 18 to 60 Years.
- **Sex -** Male or Female.
- **ASA Grade** 1 & 2.

Exclusion Criteria:-

- Patient's Refusal.
- Patients belonging to ASA 3 and 4
- Patients with known major systemic disorders
- Those who are allergic to propofol and lignocaine

PREANESTHETIC PREPARATION

- Patient will be kept NBM for 6-8 hours.
- Explain the procedure to the patient and take informed consent.
- Secure wide bore I.V. line.

PREMEDICATION:

- Inj. Glycopyrrolate 0.2 mg IV.

Technique Of Anaesthesia:

In the operation theatre, intravenous (IV) access established with large bore 18 G cannula in wide suitable a vein on non-dominant hand and infused with Ringer's lactate solution. Vital signs will be measured by placing an ECG, NIBP, and SPO_2 on the patients, followed by a 5 min stabilization period.

Patients will be given either lignocaine 0.5 mg/kg (Group A),

or 0.1 mg/kg dexamethasone (Group B) or use cold propofol for induction (Group C). Following pre-treatment, we manually occlude venous drainage at mid-arm with the help of an assistant. One minute later, the occlusion of venous drainage will be released. This will follow by injection of 1% propofol which will be drawn immediately before use. ¼ th of the calculated dose will be injected over 5 s and 15 s later the patient will be assessed for pain during the injection of propofol.

MONITORING:

The intensity of pain graded by using a four-point scale
0-No pain(negative response to questioning)
1-Mild pain (pain only in response to questioning without any behavioral signs)
2-Moderate pain (pain in response to questioning and associated with a behavioral sign or the pain reported spontaneously without questioning)
3-Severe pain (strong vocal response or response by facial grimacing, arm withdrawal or tears)

RESULTS

Table 1: Demographic Data.

Patient characteristics	Group A N = 10	Group B N = 10	Group C N = 10
Age(years)	32.6±15.8	34.6±15.2	33.9±15.7
Sex (M/F)	3/7	2/8	5/5
Weight (kg)	54.1±6.15	57.3±6.57	56.4±14.5
ASA ½	6/4	3/7	8/2

Values are expressed as mean ± standard deviation (SD) or number of patients.

There were no significant differences among groups.

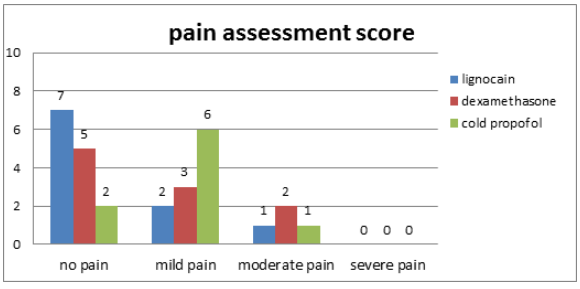

Chart 1: Assesment Of Pain Score

The overall incidence and intensity of pain were significantly less in all groups.The incidence of mild to moderate pain in Group A, B and C were 30%, 50% and 70% respectively. The incidence of score 0 (no pain) was significantly higher in Group A (70%) and Group B (50%) then Group C (30%)

DISCUSSION

IV injection of propofol causes pain at the injection site and it's usually reported as severe or may be intolerable. propofol chemically belongs to sterically hindered phenols group. It is no surprise that like propofol any phenol group drug will be irritating the skin, mucosa and vein intima.[10] The precise mechanism of pain on injection is not exactly known. The immediate vascular pain during propofol injection is due to a direct irritant effect of the drug by stimulation of vein nociceptive receptors or because of free nerve endings with myelinated A fibres. The delayed pain is due to activation of the kallikrein-kinin system. [11]

Local anaesthetics contain hydrophilic and lipophilic structures which were separated by an intermediate amide or ester linkage. The hydrophilic group is a secondary or tertiary amine, and the hydrophobic (lipophilic) group an aromatic moiety. Two of the most commonly accepted techniques are the administration of Lignocaine immediately prior to the injection of propofol or mixing Lignocaine with Propofol. The previous first study found that mixing lignocaine with propofol was more effective than administering it before propofol injection. But this study was cofounded by the pre-induction administration of opioid analgesic following premedication with 100 mg of lignocaine diminished the intensity of pain but failed to alter the incidence of pain [12].

Cold application has the anaesthetic effect of its own; it had been even reportable that cold saline injection as well as tourniquet application just before propofol administration will decrease pain. However, ever-changing the temperature of administered propofol still created conflicting results. Some studies have been suggested that decrease in pain on using cold propofol, maybe due to the stabilization of local pain mediators at low temperatures. One different study has demonstrated a lower incidence of pain when warm propofol 37°C uses; the authors prove that warmed injection may reduce pain either by changes in pain receptor stimulation or changes partition between the aqueous and lipid phases of propofol. However, we tend to found that cold application of propofol has some positive impact for the decrease of pain.

The other study on dexamethasone conducted. This found that the reduction of moderate or severe pain in the number of subjects following propofol administration when they are pre-treated with dexamethasone compared to saline. Systemic use of dexamethasone has been commonly done perioperatively to decrease postoperative nausea and vomiting and also to enhance the quality of recovery. Additionally, dexamethasone has been shown to decrease nitric oxide production so it ultimately reduces propofol-induced vascular pain. This study suggests that the preoperative use of dexamethasone also diminishes pain on propofol injection.

CONCLUSION:

Pre-treatment with IV lignocaine 0.5mg/kg, dexamethasone 0.1 mg/kg in preventing pain from propofol injection were better than cold propofol. Highest satisfactory result achieved with IV lignocaine.

REFERENCES

1. White Paul F and Eng R. Mathew. Intravenous Anesthetics. In; (Eds.) Barash Paul G, Cullen Bruce F etc. Clinical Anesthesia, 6th edition. New Delhi, Philadelphia. Lippincott, Williams & Wilkins. 2009; pg 451-3.
2. Petros AJ, Bogle RG, Pearson JD. Propofol stimulates nitric oxide release from cultured porcine aortic endothelial cells. British Journal of Pharmacology. 1993;109(1):6–7.4.
3. Gragasin FS, Bourque SL, Davidge ST. Propofol increases vascular relaxation in aging rats chronically treated with the angiotensin-converting enzyme inhibitor captopril. Anesthesia & Analgesia. 2013;116:775–83.
4. Romero TRL, Galdino GS, Silva GC, et al. Ketamine activates the l-arginine/nitric oxide/cyclic guanosine monophosphate pathway to induce peripheral antinociception in rats. Anesthesia and Analgesia. 2011; 113(5): 1254–259.
5. Kindgen-Milles D, Arndt JO. Nitric oxide as a chemical link in the generation of pain from veins in humans. Pain. 1996; 64(1): 139–42.
6. Nakane M, Iwama H. A potential mechanism of propofol-induced pain on injection based on studies using nafamostatmesilate. British Journal of Anaesthesia. 1999; 83(3):397–404.
7. Mc.Crirrick A, Hunter S.Pain on injection of propofol: the effect of injectate temperature. Anaesthesia 2005;45:1090-1.
8. Movafegh A. A comparison of metoclopramide and lidocaine for preventing pain on injection of propofol. Tehran Univ Med J 2003;61:274-80.
9. Yadav M, Durga P, Gopinath R. Role of hydrocortisone in prevention of pain on propofol injection. J AnaesthClinPharmacol. 2011;27:460-4
10. Hellier C, Newell S, Barry J. A 5-microm filter does not reduce propofol induced pain. Anaesthesia. 2003;58:802-3.
11. Nishiyama T. How to decrease pain at rapid injection of propofol: effectiveness of flurbiprofen. J Anesth. 2005;19:273-6.
12. Mangar D, Holak EJ.Tourniquet at 50 mm Hg followed by intravenous lidocaine diminishes hand pain associated with propofol injection.Anesth Analg 1992 ;74(2):250-2.
13. Zahoor I, Mir AH, Qazi MS, etal.A prospective, randomized, double blind study to evaluate and compare the efficacy of lidocaine, ramosetron and tramadol pre-medication, in attenuating the pain caused due to propofol injection. Int J Res Med Sci. 2017;5:2644-51.
14. Honarmand A, Safavi M. Magnesium sulphate pretreatment to alleviate pain on propofol injection: A comparison with ketamine or lidocaine. Acute Pain. 2008;10:23-9.
15. Ahmad S, Oliveira G S, Fitzgerald P C, et al. The Effect of Intravenous Dexamethasone and Lidocaine on Propofol-Induced Vascular Pain: A Randomized Double-Blinded Placebo-Controlled Trial. Pain Research and Treatment.2013;3:734-53. DOI: 10.1155/2013/734531