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# PREVENTION OF PROPOFOL INJECTION PAIN – COMPARISON BETWEEN DEXMEDETOMIDINE VS KETAMINE INFUSION

Anaesthesiology

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## ABSTRACT

Intravenous injection of propofol causes pain at the site of injection, the incidence varying from less than 10 % in the antecubital fossa to 90 % on the back of the hand. Pain is often reported as severe or even intolerable.108 patients divided into 2 groups , Group D received Inj.Dexmedetomidine 0.5mcg/kg iv and Group K received Inj.Ketamine 0.5mg/kg IV in 10 ml Normal saline as premedication.Immediately after infusion, inj. Propofol 2.5mg/kg iv injected over 25 seconds.Patients will be assessed for pain every 5 seconds till patient become unconscious by Propofol.We concluded that intravenous infusion of Ketamine 0.5 mg /kg before Propofol injection more effective in alleviating the incidence of Propofol Injection Pain(PIP) and severity (mild pain only) when compared to Dexmedetomidine 0.5 µg/kg without any statistically significant side effects.

## KEYWORDS

PIP , Dexmedetomidine , Ketamine

### INTRODUCTION

Propofol is most widely used intravenous induction agent owning to its smooth induction and rapid recovery, but has major disadvantage being Propofol Injection Pain(PIP). Propofol injection pain is immediate as well as delayed after 10 to 20 seconds.The immediate vascular pain on propofol injection is attributed to a direct irritant effect of the drug by stimulation of venous nociceptive receptors or free nerve endings with central transmission of nerve impulse by thin, myelinated A-delta fibres.The delayed pain is by indirect action on the endothelium, propofol is believed to release bradykinin by activation of the kallikrein-kinin system, which induces venous dilation and hyperpermeability, thereby probably promoting contact between free propofol and free nerve endings within the vascular wall, resulting in pain.Several strategies have been suggested to prevent or reduce pain at the site of propofol administration. Most previous and recent work in this area has been done on adjuvant use of hypnotic, analgesic, anti-inflammatory or local anaesthetic drugs.The routine use and lack of comparison of dexmedetomidine and ketamine prompted us to compare their effect on PIP and hemodynamic changes

### AIMS & OBJECTIVES

Primary aim of our study was To compare the effect of iv Dexmedetomidine & Ketamine Infusion on Propofol injection pain (PIP).Secondary aim was To study the hemodynamic changes Intraoperatively in both groups.

### MATERIALS AND METHODS

After the Ethical committee approval, written informed consent has to be obtained for this study. According to inclusion criteria 108 patients will be randomly assigned into groups.Patients undergoing elective surgery under general anaesthesia are assigned into two groups, group D and group K.Patients will be kept nil per orally before surgery. On the day of surgery patients will be reassessed in the preoperative room. In the operating room, standard monitored including ECG, NIBP, SPO2 will be attached and an intravenous line will be secured.No premedication other than study drugs will be administer to the patients.Group D: Inj.Dexmedetomidine 0.5mcg/kg iv in 10 ml Normal saline.Group K: Inj.Ketamine 0.5 mg/kg IV in 10 ml Normal saline.Immediately after infusion, inj. Propofol 2.5mg/kg iv injected over 25seconds.Patients will be assessed for pain every 5 seconds till patient become unconscious by Propofol.

- Pain Severity Scale Mc Cririck and Hunter Pain Scale[1]

| DEGREE OF PAIN | RESPONSE |
|---|---|
| None | No response |
| Mild | Pain reported in response to questioning alone without any behavioural sign |
| Moderate | Pain reported in response to questioning accompanied by behavioural sign or Pain reported without any questioning |
| Severe | Strong vocal response or Response accompanied by facial grimacing arm withdrawal, tears |

After pre-oxygenation with 100% O2 for 3-5 minutes patient were induced with inj propofol 2-3mg/kg and Inj Succinylcholine 2mg/kg IV to facilitate intubation with appropriate sized endotracheal tube.Anaesthesia was maintained with 100% O2 mixture and sevoflurane traces 1.5-2% and Inj Atracurium as per dose.

The sample size was calculated based on previous studies.[11] Size of 54 patients in each group was arrived at with 90% power at an alpha value of 0.05 to detect a 25% difference in severity of pain between the two groups.

#### Statistical Analysis

Statistically Chi square test will be applied to compare the data. Statistical significance will be defined as $p < 0.05$.

All demographic data were summarized as mean ± standard deviation (SD) for continuous variables and percentages in case of frequency/ categorical variables.

### OBSERVATION & RESULTS

After studying 108 cases, the observation and results were summarized in tabulated form and described below. All patients were divided into two groups with 54 patients in each group to compare propofol injection pain (PIP) by giving Dexmedetomidine vs Ketamine infusion.

### DEMOGRAPHIC DATA

We have studied demographic data like age,sex and hemodynamic changes between two groups for incidence and severity of Propofol injection pain (PIP).

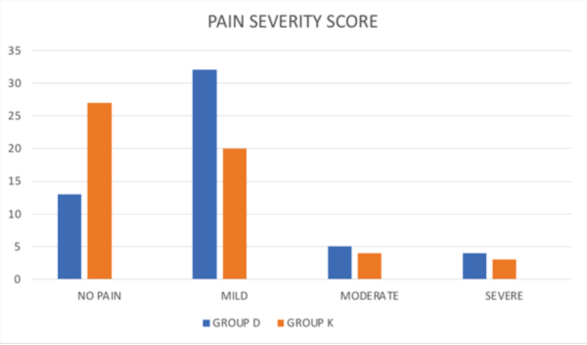
| Variable | Group D (n=54) | Group K (n=54) | P Value |
|---|---|---|---|
| Age(years) (Mean+SD) | 36.98+11.29 | 36.31+.42 | 0.73 |
| Male:Female | 28:26 | 28:26 | |
| Pulse Rate | 77.98+8.16 | 79.91+8.26 | 0.224 |
| SBP | 118.94+11.32 | 125.94±17.37 | 0.01 |
| DBP | 80.56±7.12 | 81.27±6.27 | 0.58) |

#### Mccririck And Hunter Scale

The incidence and severity of Propofol injection pain (PIP) following administration of drugs like Dexmedetomidine and Ketamine among patients in two groups and the pain score and severity are compared

with each other.

| Pain Score | Group D No (%) | Group K No (%) | P Value |
|---|---|---|---|
| 0 | 13(24.07%) | 27(50%) | 0.0096 |
| 1 | 32(59.25%) | 20(37.3%) | 0.0345 |
| 2 | 5(9.25%) | 4(7.4%) | 0.7277 |
| 3 | 4(7.4%) | 3(5.5%) | 0.695 |

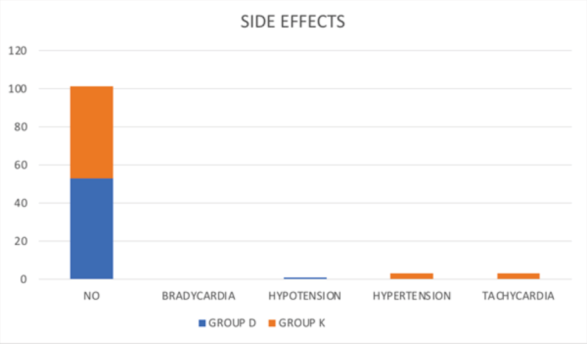



Incidence of no pain with group D and K is 24% and 50% following drug administration. Severity of mild pain is 59% with group D and 20% with group K. Incidence of moderate to severe pain is 16% with group D and 7% with group K. The incidence and severity of Propofol injection pain also decreases with Ketamine administration and was found to be clinically significant, p value (<0.0341)

### Side Effects

We have studied the intraop side effects in patients following administration of drugs like Dexmedetomidine and Ketamine for Propofol injection pain and are compared.

| Intaoperative Side effects | Group D No(%) | Group K No(%) | p value |
|---|---|---|---|
| No | 53(98.14%) | 48(88.88%) | 0.1180 |
| BRADYCARDIA | 0 | 0 | 0 |
| HYPOTENSION | 1(1.85%) | 0 | 0.3151 |
| HYPERTENSION | 0 | 3(5.55%) | 0.2416 |
| TACHYCARDIA | 0 | 3(5.55%) | 0.2416 |




There was no significant difference in side effects between two drugs administration for PIP

## DISCUSSION

Propofol injection pain (PIP), a well-known clinical phenomenon has an incidence ranging from 28%-90% in adults.[6]Mechanism of pain [12]is attributed to the activation of kinin-kallikrein system that releases bradykinin causes vasodilatation and hypermetabolility, thereby increasing contact between aqueous phase propofol and free nerve endings. Pain on injection on propofol could be due to other factors like the osmolality of the solvent used for the solution, pH of the solution and concentration of propofol in aqueous phase of solution.

The anti-nociceptive action of dexmedetomidine is mediated by the analgesic modulation of the level of the dorsal horn by α and β receptor activation and inhibition substance P release. Dose 0.5%µg/kg dexmedetomidine was found effective by sarkilar et al.[2] Ketamine produces analgesia through NMDA and µ opioid receptors at the neuraxial level.The dose of 0.5 mg/kg ketamine was selected on the basis of Barbi et al[3] who found this dose to be effective in reducing PIP Ketamine is found to be effective in controlling PIP when compare to dexmedetomidine.

In our study,Group D patients were given injection of dexmedetomidine 0.5µg/kg while in Group K patients were given an injection of ketamine 0.5mg/kg. The degree of pain score is advocated by McCririck and Hunter scale [1]. The incidence of moderate to severe pain during propofol injection was 16.6% and 13% in group D and K respectively suggesting that both of them are effective in reducing moderate to severe PIP.

Our results are in accordance to that of sarkilar et al. [2]who found an incidence of 17.6%of moderate to severe pain with Dexmedetomidine 0.5µg/kg pre-treatment following propofol injection in the ipsilateral hand.

Barba et al. [3]who found the dose of 0.5mg/kg Ketamine was to be effective in reducing PIP.Tan and Kua et al studied the effect of ketamine pre-treatment on propofol injection pain and found that incidence of pain was reduced from 87% to 26%, they concluded pre-treatment with ketamine reduces PIP.

We observed higher overall incidence of PIP compared to other authors with Dexmedetomidine. This might be due to the pertinent difference in our study design consisting of slow administration of Dexmedetomidine without venous occlusion. Venous occlusion delays release of drug. A number of studies have combined drugs during pre-treatment including Ketamine and Dexmedetomidine with venous occlusion. However, this has failed to become a standard technique and lack of convincing study, need of additional equipments. We did not include venous occlusion in our study. In order to avoid sampling error, we took 108 patients in each group as 54 patients.

59% of patients in group D in our study has mild pain, whereas group K has (37.3%) of patients with mild pain, in which group K is effective in controlling (PIP) which is mild, and is found to statistically significant P value (<0.0345). Incidence of no pain following drug administration was found to be 24.04% and 50% in Group D and Group K respectively. There were no significant intraoperative side effects other than one patient in group D had hypotension which was statistically insignificant. Group K has 3 patients intraoperative hypertension and tachycardia which had incidence rate of 5 % and it was found to be statistically insignificant.

## CONCLUSION

The study concluded that intravenous infusion of Ketamine 0.5 mg /kg before Propofol injection more effective in alleviating the incidence of PIP and severity (mild pain only) when compared to Dexmedetomidine 0.5 µg/kg without any statistically significant side effects.

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