DEXMEDETOMIDINE PREMEDICATION WITH KETAMINE AND PROPOFOL DURING BURNS DEBRIDEMENT AND DRESSINGS

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ABSTRACT

Background: Burn patients undergo frequent extensive burn debridement and painful dressing changes. Ketamine and Propofol are the most common anesthetic used along with Opioids and Benzodiazepines in burns dressings. Studies have shown that concomitant use of Dexmedetomidine with Propofol and Ketamine. **Objectives:** To study the effects of Dexmedetomidine as premedication with Ketamine and Propofol as sole anesthetic agents during burns debridement and dressing. **Materials and methods:** Total 60 Patients of scheduled for elective burn debridement and dressings at P.R.H. Loni admitted in the wards were enrolled for the study. Patients satisfying the following eligibility criteria were selected and grouped those who received Ketamine and Propofol (Group B) with and without Dexmedetomidine (Group A) and both the groups were assessed to find out difference in the dose requirement, haemodynamic variables and recovery time (using Ramsay Sedation scale). **Results:** The haemodynamic parameters like heart rate, systolic and diastolic Blood pressure was significantly higher in Group A as compared to Group B. The recovery time in Group A was 12.9 mins as compared to 9.5 mins in Group B. It was observed that dose requirement of Ketamine (228.8±21.9) and Propofol (263.2 ± 22.5) was significantly more in Group A as compared to Group B (101.1±20.3 and 120.8±22.4 respectively).**Conclusion:** Dexmedetomidine (1 µg/kg IM dose) is a good anaesthetic adjuvant that decreases the requirement of Propofol and Ketamine during burns debridement and dressings, maintains stable intraoperative haemodynamics and also has an excellent recovery profile.

Key words: Dexmedetomidine, Haemodynamic Changes, Ketamine, Propofol, Recovery Time,

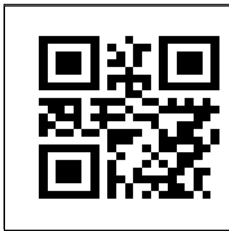
INTRODUCTION

Burn patients undergo frequent extensive burn debridement and painful dressing changes. During these procedures the patient requires anesthetic agents to provide necessary deep sedation, along with analgesia. Along with the anesthetic agents Opioids and Benzodiazepines are the most commonly used group of drugs. Frequent use of Opioids and Benzodiazepines leads to tolerance to the analgesia and sedation [1,2]. Tolerance to Opioids and Benzodiazepines leads to increase in doses in order to maintain adequate sedation and analgesia during the procedure. The most common problems associated with significant burns (>20% total body surface area) are prolonged recovery with high Opioid and benzodiazepine after each dressing change and heterotopic ossification as a result of pain-limited mobility [3].

Ketamine and Propofol are the most common anesthetic used along with Opioids and Benzodiazepines in burns dressings. The addition of these anesthetics to a regimen of Opioids and Benzodiazepines for dressing not only decreases the Opioid and benzodiazepine requirements but also facilitate improved compliance with physical and occupational therapy leading to a decreased incidence of heterotopic ossification [4].

Ketamine has been a safe and effective anesthetic agent for burns dressings with a few limitations such as delayed recovery, emergence phenomenon, and nausea and vomiting [5].

Propofol have favorable pharmacokinetics but it lacks the analgesic property intrinsic to Ketamine [6]. Fentanyl is added to Propofol to compliment the analgesic property. Recently Dexmedetomidine (Dex), a highly selective α2-adrenoreceptor agonist, is used for sedation in various clinical settings and shows an anesthetic-sparing effect [7-11]. Studies have shown that concomitant Dexmedetomidine use may reduce the requirement of Propofol and Ketamine, with faster postoperative recovery and more stable intraoperative haemodynamics [12].



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Hence, it was thought prudent to evaluate the changes with use of Dex in terms of requirement for Propofol, Ketamine and intraoperative haemodynamics during burns debridement and dressing changes.

Aims and objectives: To study the effects of Dexmedetomidine as premedication with Ketamine and Propofol as sole anesthetic agents during burns debridement and dressing in terms of Changes in dose requirements of Ketamine and Propofol, intraoperative haemodynamic, variations, recovery time.

MATERIALS AND METHODS

Study design: This was a longitudinal, prospective study

Ethics approval: Approval from Institutional Ethical Committee was dully taken and study was done after ethical clearance.

Study location:done in department of Anaesthesiology and critical care at Pravara Rural Hospital, Loni

Study duration: Study was done over a period of 2 years.

Sample size: Total 60 Patients of scheduled for elective burn debridement and dressings at P.R.H. Loni admitted in the wards were enrolled for the study during the study period.

Patients satisfying the following eligibility criteria were selected for the study.

Inclusion criteria: Patients scheduled for the elective burn debridement who received injection Propofol and injection Ketamine with or without Dexmedetomidine. Patients willing to give informed written consent. Patients of either sex. Patients of all age groups

Exclusion criteria: Pregnant, Lactating women. Patients with known allergy or contraindications to Dexmed, Ketamine or Propofol. Patients with head injury. Patients with history of Cardio-Respiratory disorders. Hepatic, Renal diseases. Convulsions & neurological deficits and psychiatric disorders.

Grouping: All the patients satisfying the above inclusion and exclusion criteria were grouped as under depending upon receipt of Dexmetomidine:

Group A (n=30): Patients received infusion of injection Ketamine 1 mg/kg/hr and injection Propofol IV 100 mcg/kg/min.

Group B (n=30): Patients received injection Dexmedetomidine 1ug/kg I.M. as premedication 1 hour before induction followed by infusion of injection Propofol IV 100mcg/kg/min & injection Ketamine 1mg/kg/hr.

Both the groups were assessed to find out difference in the dose requirement, haemodynamic variables such as heart rate, blood pressure, immediately after LMA insertion and at 5, 15, 30, 45, and 60 mins in both groups. Recovery time for discontinuation of infusion and achievement of RSS of 3 was noted. The analgesia and sedation achieved were studied by using:

Ramsay sedation scale [13]:

If awake

1. Anxious, agitated, restless
2. Cooperative, oriented, tranquil
3. Responsive to commands only

If a sleep

4. Brisk response to light glabellar tap or loud auditory stimulus
5. Sluggish response to light glabellar tap or loud auditory stimulus4
6. No response to light glabellar tap or loud auditory stimulus

RESULTS

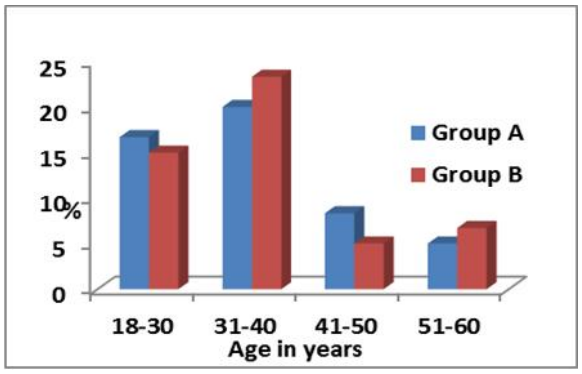

Figure no.1: Age wise distribution of the patients

The maximum number of patients were in between the age of 31 to 40 years followed by 18 to 30 years

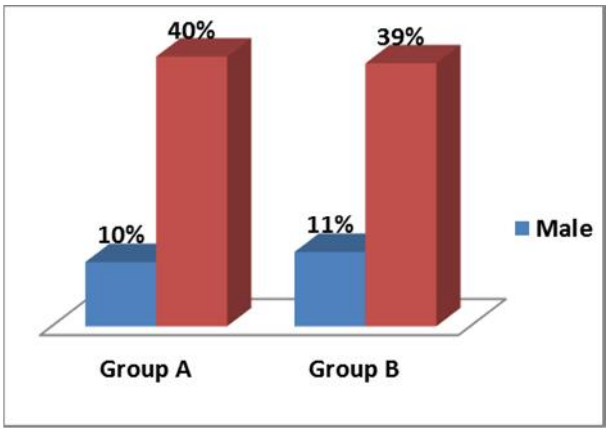

Figure no.2: Gender wise distribution of patients

Shows highly significant number of female patients 79%

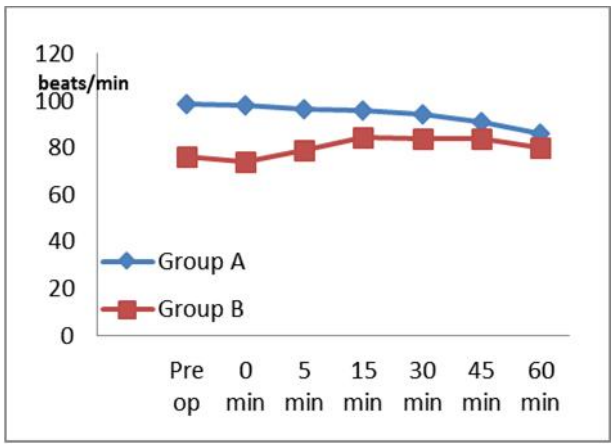

Figure no.3: Comparison of Heart Rate (beats per min) at various time intervals

Comparison of Heart Rate (beats/min) at various time intervals heart rate was significantly higher in Group A as compared to Group B. There was statistically significant difference between the groups as per Student t-test ($p<0.05$).

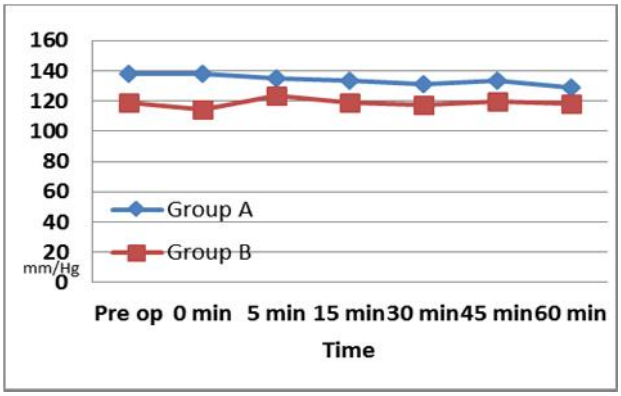

Figure no.4: Comparison of SBP (mm of Hg) at various time intervals

Intraoperatively the diastolic blood pressure was significantly higher in Group A as compared to Group B. There was statistically significant difference between the groups as per Student t-test ($p<0.05$)

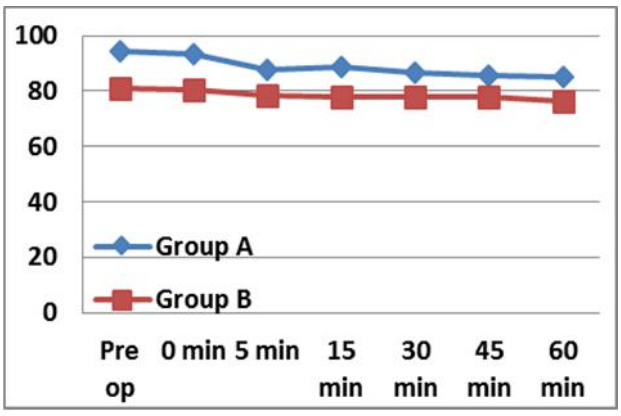

Figure no 5: Comparison of DBP (mmHg) at various time intervals

Intraoperatively the diastolic blood pressure was significantly higher in Group A as compared to Group B. There was statistically significant difference between the groups as per Student t-test ($p<0.05$)

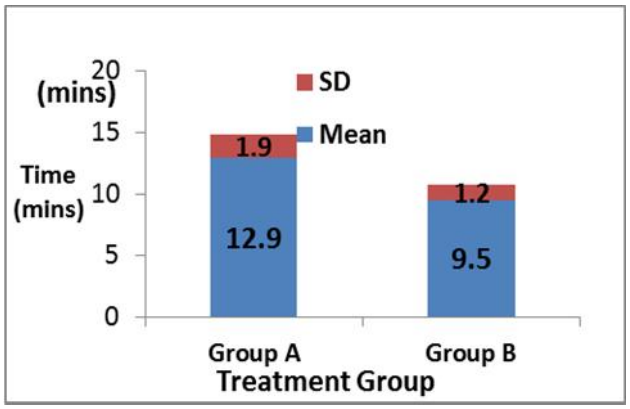

Figure no.6: Comparison of mean recovery time

Unpaired t test P value, the two-tailed P value is < 0.0001, considered extremely significant. t = 8.287 with 58 degrees of freedom. Inference: Less time was required by Group B for recovery.

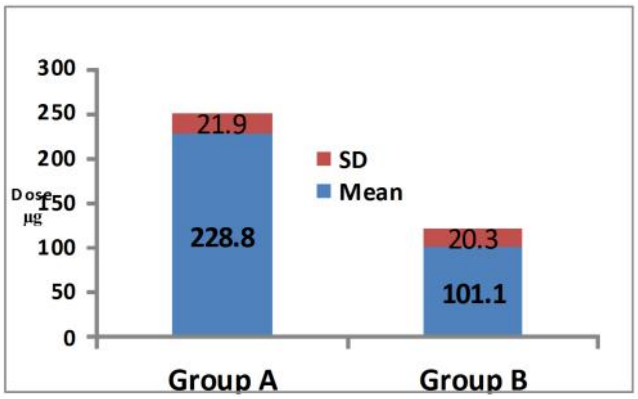

Figure no.7 : Comparison of changes in dose required of Ketamine

Unpaired t test P value, The two-tailed P value is < 0.0001, considered extremely Significant .t = 23.423 with 58 degrees of freedom, Inference: Lower dose of Ketamine was required by Group B.

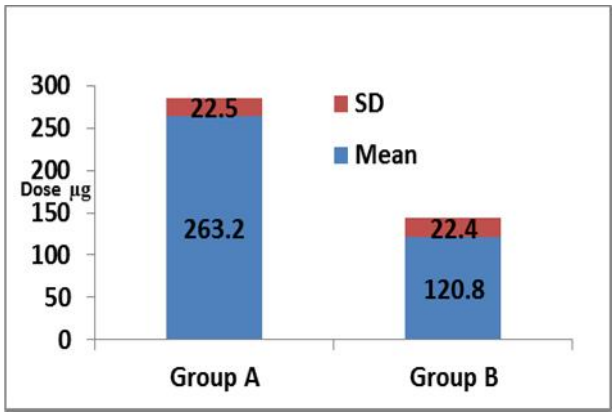

Figure no. 8: Comparison of changes in dose required of Profol

Unpaired t test P value, The two-tailed P value is < 0.0001, considered extremely significant. t = 24.566 with 58 degrees of freedom. Inference: Lower dose of Propofol was required by Group B.

DISCUSSION

The present observational study was undertaken to study the effects of Dexmedetomidine as premedication with Ketamine and Propofol as sole anaesthetic agents during burns debridement and dressing. The patients were randomly divided into following two groups with 30 subjects in each group:

Group A: All patients in this group received 20 ml NS Intravenous over 10 min followed by Ketamine 1mg/kg and Propofol 1mg/kg at induction. Supplements of Ketamine 0.5mg/kg and Propofol 0.5 mg/kg were given as and when required to maintain Ramsay Sedation Score of 5 or more.

Group B: All patients in this group received Dexmeditomidine 1mcg/kg in 20ml NS Intravenous over 10 min

followed by Ketamine 1mg/kg and Propofol 1mg/kg at induction. Supplements of Ketamine 0.5mg/kg and Propofol 0.5mg/kg were given as and when required to maintain Ramsay Sedation Score of 5 or more.

In the present study, majority of the patients (40%) in Group A were in the age group of 31-40 years and (46.7%) in Group B were in the age group of 31-40 years No statistical difference was found by applying Chi-Square test ($p>0.05$).**(Figure no.1)**

The gender distribution in the two groups as per Fisher's test were comparable and statistically not significant ($p>0.05$). 40 % and 39% patients were females in Group A and B respectively **(Figure no.2)**Ravipati P et al [13] observed there was no statistically significant difference in the demographic and clinical characteristics among the two groups.

It was observed that intraoperatively the heart rate, systolic and diastolic Blood pressure was significantly higher in Group A as compared to Group B. There was statistically significant difference between the groups as per Student t-test (**$p<0.05$**). **(Figure no.3, 4, and 5).** The recovery time in Group A was 12.9 mins as compared to 9.5 mins in Group B. There was statistically significant difference between the groups as per Student t-test ($p<0.05$).

Ravipati P et al [13] observed Time to recovery was 9.57 ± 1.50 min in the Dex group which was significantly lower than in the control group 11.53 ± 2.56 min ($P = 0.0006$). **(Figure no.6)**

It was observed that dose requirement of Ketamine (228.8±21.9) and Propofol (263.2 ± 22.5) was significantly more in Group A as compared to Group B (101.1±20.3 and 120.8±22.4 respectively). Statistically significant difference was found by applying Student t-test (**$p<0.05$**). **(Figure no.7)** Ravipati P et al [13] observed mean dose of Ketamine used in Dex group was significantly less (100.5 ± 17.58 mg) whereas it was 231.5 ± 60.39 mg in the control group ($P < 0.0001$). Similarly, mean dose of Propofol in Dex and control groups were 127.7 ± 15.47 mg and 254 ± 59.22 mg respectively ($P < 0.0001$).

Dexmedetomidine, by activating pre and postsynaptic α2-receptors of sympathetic system produces vasodilatation. By acting on postsynaptic α2-receptors of vascular smooth muscle cells it produces vasoconstriction. It thereby, shows a biphasic, dose-dependent response on blood pressure and heart rate, characterized by an initial short-term increase in BP followed by a longer lasting reduction in BP and HR [14-17] Most previous investigations have proven the cardiovascular depressive effects of IM Dex at a dose of 2.5 µg/kg which increases the incidence of hypotension and bradycardia [18]. However, VirkkilaM et al [19] showed that IM Dex 1 µg/kg produced sedation and a reduction of intraocular pressure with minimal haemodynamic side effects when given as premedication before cataract surgery under regional anesthesia. According to Anttila Met al [20] IM Dex provides complete bioavailability and needs less preoperative monitoring as compared to IV Dex. Also, Scheinin H et al [21] showed that the intramuscular doses resulted in linearly dose-related plasma concentrations of Dexmedetomidine; henceforth, clearance and half-life remains constant irrespective of its plasma concentration. For all these reasons we evaluated the effect of 1.0 µg/kg IM Dex on the requirement for supplemental Propofol and Ketamine during anesthesia for burns debridement and dressing changes.

Despite the limited data, the advantage of adding Dexmedetomidine with Ketamine is that both balance the haemodynamic and adverse effects of each other. Dexmedetomidine may decrease the incidence of tachycardia, hypertension, salivation, and emergence phenomena from Ketamine, while Ketamine may prevent the bradycardia and hypotension of Dexmedetomidine. Additionally, Ketamine as part of the sedation induction may speed the onset of sedation and eliminate the slow onset time of IM Dex [22].

CONCLUSION

Dexmedetomidine (1 µg/kg IM dose) is a good anesthetic adjuvant that decreases the requirement of Propofol and Ketamine during burns debridement and dressings, attenuates sympathoadrenal response, maintains stable intraoperative haemodynamic and also has an excellent recovery profile.

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Conflict of interest : Nil

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