

A COMPARATIVE STUDY BETWEEN DEXMEDETOMIDINE PREMEDICATION AS AN ADJUVANT TO FENTANYL AND FENTANYL ALONE IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY SURGERIES UNDER GENERAL ANAESTHESIA

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Abstract

Dexmedetomidine is a highly selective alpha 2 agonist with properties of sedation, analgesia and anxiolysis. The purpose of this narrative review was to assess the effect and safety of dexmedetomidine in not only decreasing the magnitude of haemodynamic responses to laryngoscopy, surgery and pneumoperitoneum especially when used together with fentanyl but also decreases the dose of opioids and anaesthetics in achieving adequate analgesia and anaesthesia respectively. Intraoperative administration of dexmedetomidine is associated with decreased postoperative pain, opioid and analgesic consumption and it assures haemodynamic stability.

Keywords: Dexmedetomidine, fentanyl, hemodynamic stability, perioperative analgesia

1. Introduction

Dexmedetomidine is well recognized as an extremely preferential α_2 -receptor agonist that has sedative and analgesic effects without unfavourable respiratory suppression ^[1-2]. Previous studies have reported that dexmedetomidine administration during surgery could reduce the amounts of opioids and analgesics used after surgery ^[3-4]. Furthermore, current studies on the combination of Dexmedetomidine with various IV opioid-based techniques have demonstrated that this combination treatment could help provide better analgesia and opioid-sparing effects without any remarkable unfavourable effects ^[5-6].

2. Objective

The present study was carried out to evaluate the effect of IV Dexmedetomidine as premedication on,

- The dose of anaesthetics required.
- The dose of opioids required.

- Intra operative haemodynamic stability.
- Recovery time.

3. Materials

This was a Comparative study was conducted on 20 patients aged between 20 and 50 years of ASA I & II scheduled for elective laparoscopic cholecystectomy surgeries under general anaesthesia in MAMATA GENERAL HOSPITAL for a period of 6 months. 20 patients scheduled for laparoscopic surgery were randomized into 2 groups in which Group F (n=10)-received Fentanyl 2mcg/kg bolus and Group D (n=10)-received Dexmedetomidine 1mcg/kg + Fentanyl 2mcg/kg bolus and maintenance infusion of dexmedetomidine 0.5 mcg/kg/hr.

4. Inclusion criteria

- ASA grade 1 and 2.
- Age 20 to 50 years.
- Mallampati score 1 and 2.

5. Exclusion criteria

- Patient refusal.
- Anticipated difficult laryngoscopy and intubation.
- ASA grade 3 and 4.
- Patient baseline heart rate <60 BPM and baseline BP <100/50mm of Hg.
- Patients with Liver, Renal and CVS disorders.
- Epilepsy.
- COPD patients.
- Pregnancy.
- H/o any drug allergy.

6. Methodology

20 patients scheduled for laparoscopic cholecystectomy surgeries were randomized into 2 groups in which Group F (n=10)-received Fentanyl 2mcg/kg bolus and Group D (n=10)-received Dexmedetomidine 1mcg/kg + Fentanyl 2mcg/kg bolus and maintenance infusion of Dexmedetomidine 0.5 mcg/kg/hr.

Anesthesia was accomplished along with the same standard protocol in above mentioned 2 groups. After the patient arrived in the operating room, all patients were applied with noninvasive arterial blood pressure monitoring device for mean blood pressure (MBP) measurement, electrocardiogram (ECG) for heart rate (HR) monitoring, oxygen saturation (SpO₂) measurement device. Premedication was done with 0.1 mg of glycopyrrolate administered intravenously, along with dexmedetomidine 1mcg/kg with fentanyl 2mcg/kg and maintenance infusion of dexmedetomidine 0.5mcg/kg to group D and fentanyl 2 mcg/kg alone in group F. After premedication, patients are induced with Thiopentone sodium until eye lash reflex disappeared. Relaxation is attained with succinyl choline 2mg/kg was given to facilitate intubation. Anaesthesia was maintained by balanced anaesthesia technique of 70% N₂O + 30% O₂ + Intermittent vecuronium, Inhalational anaesthetics adjusted to maintain

systolic BP within 20% of preop value. Thereafter, mechanical ventilation was kept to maintain the end-tidal carbon dioxide at 30-40 mm Hg in 50% O₂/air throughout the surgery. Hypotension [MBP <60 mm Hg or systolic blood pressure (SBP) <90 mm Hg] was managed with fluid loading at 100 mL increments or intravenous ephedrine at 4 mg increments and 0.25 mg intravenous atropine was used to manage bradycardia (HR <40 beats/min).

Reversal with inj Neostigmine 0.05mg/kg + Glycopyrrolate 0.02mg IV given.

Hemodynamic parameters were recorded at regular intervals of time.

Time needed for recovery is noted.

7. Results

Heart rate

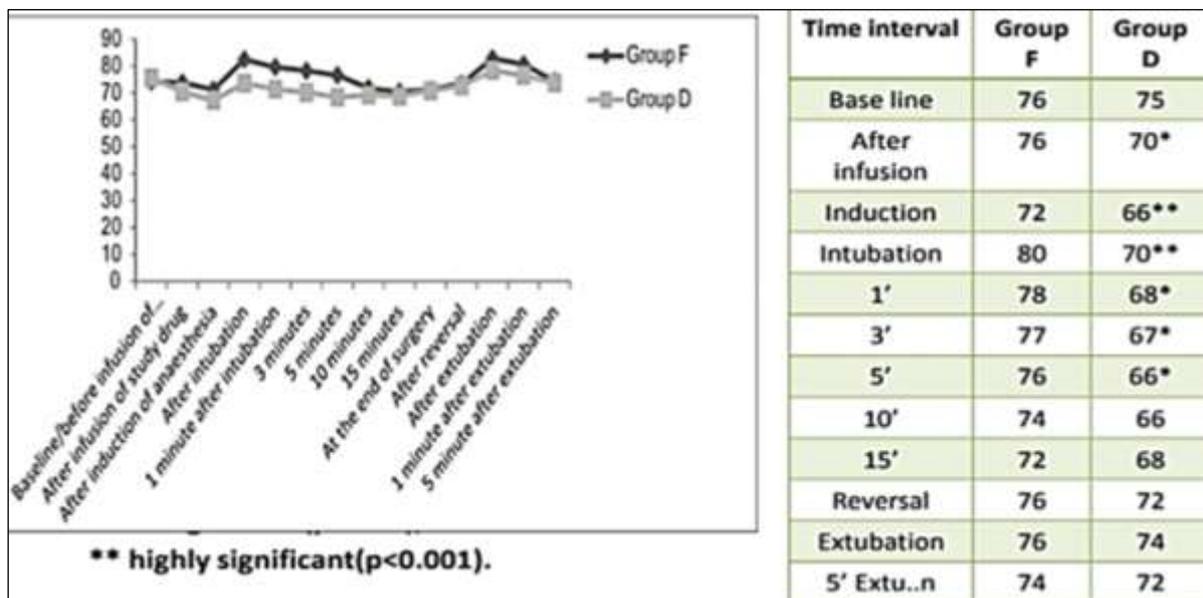


Fig 1: The mean Heart rate was significantly low in group D after infusion compared to group F ($p=0.02$). The laryngoscopy and intubation was associated with a significant rise of heart rate in group F compared to group D ($p<0.05$). Thereafter, till completion of surgery, no significant difference noted in these parameters ($p>0.05$), D: Dexmedetomidine, F: Fentanyl

Mean arterial pressure

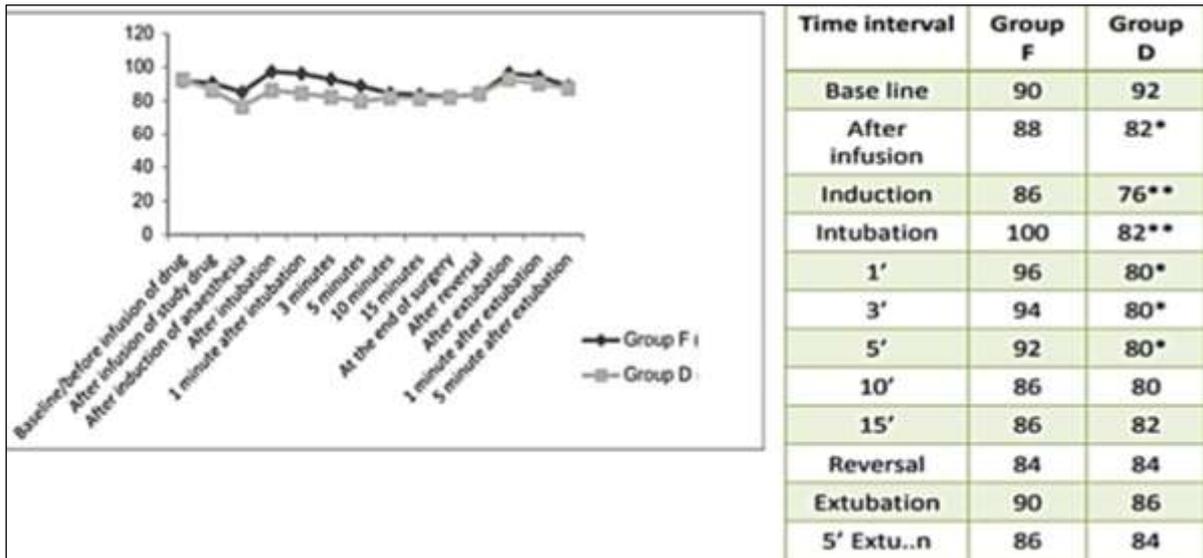


Fig 2: The MAP were significantly low in group D after infusion compared to group F ($p=0.02$). The laryngoscopy and intubation was associated with a significant rise of heart rate & MAP in group F compared to group D ($p<0.05$). Thereafter, till completion of surgery, no significant difference noted in these parameters ($p>0.05$) MAP: mean arterial pressure, D: Dexmedetomidine, F: Fentanyl

O2 Saturation

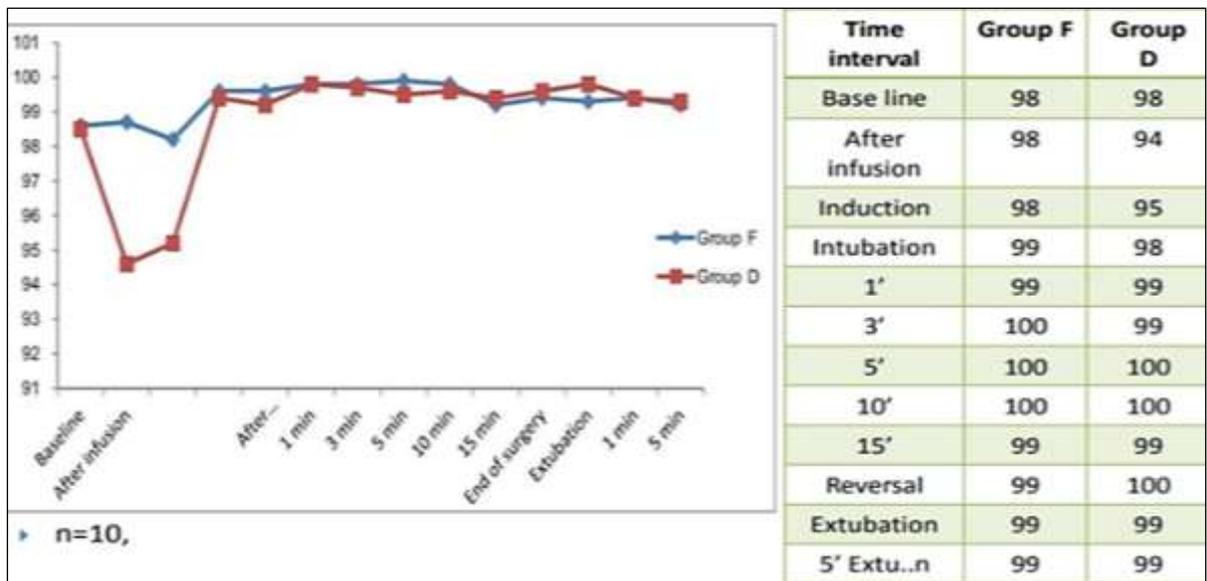


Fig 3: Throughout the procedure saturation was maintained, no significant differences noted ($p > 0.05$)

| Characteristics | Group F | Group D | P |
|--|-----------|-----------|----------|
| Duration of surgery | 47.9±11.4 | 51.2±10.1 | 0.43 |
| Duration of anaesthesia | 58.2±7.5 | 62.3±8.3 | 0.27 |
| Total thiopentone dose consumed (mg/kg) | 6.6±1.4 | 4.8±0.8 | <0.001** |
| Mean inspiratory concentration of isoflurane | 0.72±0.21 | 0.36±0.14 | <0.001** |
| Mean dose of fentanyl (µg/kg) requirement | 2.6±1.2 | 1.2±0.75 | <0.001** |
| Recovery time | 8.98±1.12 | 6.34±1.64 | 0.006* |
| * Significant P < 0.05 | | | |
| ** Highly significant P<0.001 | | | |

Fig 4: Inhalational anaesthetic: The end tidal concentration of isoflurane was observed to be almost 30% less with group D compared to group F ($p<0.001$)

Analgesia: The mean total requirement of fentanyl in entire intra op period was reduced significantly in group D compared to group F ($p<0.001$).

Thiopentone: The mean dose of thiopentone required for induction was reduced significantly in group D compared to group F ($p<0.001$).

Post op sedation score: (Ramsay sedation score)

| Sedation score | Group F | Group D | p |
|-------------------------------|---------|---------|----------|
| 1 | 2 | 3 | 0.011* |
| 2 | 3 | 5 | 0.036* |
| 3 | 4 | 2 | <0.001** |
| 4 | 1 | 0 | <0.001** |
| 5 | 0 | 0 | - |
| * Significant p<0.05 | | | |
| ** Highly significant p<0.001 | | | |

8. Discussion

In the present study, we demonstrated that dexmedetomidine bolus in combination with fentanyl and intra-operative dexmedetomidine maintenance infusion decreased hemodynamic responses to various noxious stimuli perioperatively in laparoscopic cholecystectomy surgeries.

Dexmedetomidine has very good patient outcome. Analgesia, sedation, anxiolysis produced by Dexmedetomidine were excellent via alpha 2 receptor agonistic activity. It provides Less anaesthetics, less analgesic requirement and faster recovery. Dexmedetomidine attenuates pressor response during laryngoscopy, surgery and pneumoperitoneum [10]. The dosage of general anaesthetics for induction and requirements of inhalational anaesthetics are marked reduced. Clear conscious and alert state of mind in Dexmedetomidine group makes recovery earlier than group F.

Pain after the laparoscopic surgeries could lead to restriction of thoracic and abdominal respiration as well as attenuation of vital capacity and tidal volume breathing, which probably have adverse effects on the respiratory drive [7-8]. There after use of Dexmedetomidine intraoperatively provides sedation and analgesia with no accompanying respiratory depression in the postoperative period [7-8,9].

Therefore, combination treatment with dexmedetomidine and opioid like fentanyl provide better analgesic and opioid-sparing effects without any remarkable detrimental influences.

9. Conclusion

Dexmedetomidine along with fentanyl as a premedication decreases the magnitude of haemodynamic responses to laryngoscopy, surgery and pneumoperitoneum but also decreases the dose of opioids and anaesthetics in achieving adequate analgesia and anaesthesia improved postop analgesia, decreased intra op awareness. Provides sedation and analgesia with no accompanying respiratory depression, respectively when compared to fentanyl alone.

10. Source of Funding: Nil.

11. Conflict of Interest: There is no conflict of interest.

12. References

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