



Anesthesiology

EFFECTS OF LOW DOSE DEXMEDETOMIDINE INFUSION ON HAEMODYNAMIC STRESS RESPONSE, SEDATION AND POST OPERATIVE ANALGESIA REQUIREMENT IN PATIENTS UNDERGOING LAPAROSCOPIC SURGERIES

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ABSTRACT **BACKGROUND** - Dexmedetomidine is a selective alpha-2 agonist which has sedative and analgesic properties. It is a useful drug to blunt the haemodynamic stress response of the patients undergoing stress related surgeries. The aim of my study was to evaluate the use of this drug in comparing the two low dose infusions (0.2 mic/kg/hour and 0.4mic/kg/hour) and a control group using normal saline.

AIM-To compare the effects of low dose 0.2 mic/kg/hr & 0.4 mic/kg/hr Dexmedetomidine infusion on haemodynamic stress response to maneuvers like; Laryngoscopy, Endotracheal intubation, Creation of pneumoperitoneum, Extubation and Sedation. Also the postoperative analgesia requirement in patients undergoing laparoscopic surgeries.

METHODS- 60 patients were taken of American society of anaesthesiologist physical status (ASAPS) I and II, undergoing laparoscopic surgeries. 3 groups were taken, each of 20 patients each. Group J receiving dexmedetomidine infusion of 0.4 mic/kg/hr, Group K receiving dexmedetomidine infusion of 0.2 mic/kg/hr and Group L (control group) receiving normal saline infusion only. Parameters were noted such as MAP (Mean arterial pressure), PR (Pulse Rate), oxygen saturation. The drug infusion was started 15 minutes before induction till the specimen was taken out. The Post operative requirement and rescue analgesia were also noted. The results were statistically analysed using SPSS v 16.0. ANOVA test for continuous variable (p value), post hoc test for intergroup comparison and chi square tests for discrete values were applied.

MATERIALS-Infusion syringe pump with 20 cc syringe, injection Dexmedetomidine 50 mcg /0.5 ml, Boyle's apparatus for providing general anaesthesia, working Laryngoscope, cuffed endotracheal tubes of appropriate size, airway, suction apparatus with a suction catheter, emergency drugs such as inj. Adrenaline, inj. Atropine, inj. Ephedrine, monitor for continuous monitoring of non-invasive blood pressure (NIBP), Electroencephalography (ECG), Pulse Rate (PR), Respiratory Rate (RR), Oxygen saturation (SpO₂).

RESULTS- Haemodynamic stress response to laryngoscopy, intubation, creation of pneumoperitoneum, release of pneumoperitoneum, and extubation was attenuated in groups J receiving 0.4mic/kg/hr with no post operative adverse effects like rebound hypertension, bradycardia, vomiting and headache. Post operative analgesia for and rescue analgesia requirement was also minimal.

CONCLUSION- Low dose of Dexmedetomidine of **0.4mic/kg/hr** compared to 0.2 mic/kg/hr was found to be better in maintenance of the haemodynamic stability in patients undergoing laparoscopic surgeries. Moreover the post operative requirement of rescue analgesics is also significantly lower **in 0.4 mic/kg/hr** (Group J) than 0.2 mic/kg/hr. (Group K). Hence, **0.4 mic/kg/hr** infusion of Dexmedetomidine is the ideal dose to attenuate the stress response in laparoscopic surgeries.

KEYWORDS : dexmedetomidine, laparoscopic surgeries, hemodynamic stress response.

INTRODUCTION-

Laparoscopic surgery is one of the most commonly practiced surgeries for abdominal diseases. Due to its well-known advantages such as less post-operative pain and shorter hospitalization and faster functional recovery, laparoscopic surgery is also called as patient friendly surgery. However, like any other surgery, laparoscopic surgery is also associated with stress response induced by surgery and anaesthesia. Anaesthetic maneuvers like direct laryngoscopy, tracheal intubation and extubation involve severe sympathetic system stimulation. Moreover, the pneumoperitoneum and carbon dioxide insufflation, required in laparoscopic surgeries, will cause an increase in plasma epinephrine, nor-epinephrine levels and plasma renin activity. All these changes lead to increase in heart rate, blood pressure, systemic and pulmonary vascular resistance, and reduced cardiac output.

Dexmedetomidine, is a selective α_2 agonist that shows 8 times more affinity for alpha 2 adrenergic receptors as compared to clonidine and possesses all the properties of alpha 2 agonist without respiratory depression. Intravenous use of Dexmedetomidine in the perioperative period had been found to decrease serum catecholamine levels up to 90%, to blunt the haemodynamic response to laryngoscopy, tracheal intubation, pneumoperitoneum and extubation, to provide sedation without respiratory depression and to decrease post-operative analgesic requirements.

MATERIAL AND METHODS

The study was a prospective, randomised, double blinded, placebo controlled comparative study. 60 patients of ASA physical grading of I and II were taken for the study. The age limit of 18 to 65 years, of either sex and posted for laparoscopic surgeries.

The patients were randomly allocated by envelope method into three

groups of 20 patients each. Group J = patients receiving Dexmedetomidine infusion 0.4 mcg/kg/hr, Group K = patients receiving Dexmedetomidine infusion 0.2 mcg/kg/hr, Group L = patients receiving normal saline 0.9% infusion.

Inclusion criteria

- ASAPS I and 2
- Age 18 to 65 years of either sex.
- Patients posted for laparoscopic surgeries.

Exclusion criteria

- ASAPS 3 and 4.
- Patients with decreased autonomic control such as the elderly, diabetic patients.
- Patients with uncontrolled hypertension.
- Patients with valvular heart disease, on drugs like β blockers or calcium channel blockers.
- Pregnant or lactating women.
- Duration of surgery after creation of pneumoperitoneum >60 minutes.

ANAESTHESIA PROTOCOL

- **Premedication:** After starting an IV line, Inj. Glycopyrolate 0.2 mg iv and Inj. Fentanyl 2 mcg / kg iv were administered. Inj. Dexmedetomidine was started as an infusion through infusion pump 15 min before induction of anaesthesia.
- **Pre-oxygenation:** Pre-oxygenation with 100 % O₂ was given for 3 min.
- **Induction :** Inj. Propofol 2 mg/kg intravenously was given which was then followed by Inj. Succinyl choline of 2mg/kg intravenously.
- **Intubated :** Trachea was intubated with appropriate size cuffed

endotracheal tube. The patients were mechanically ventilated using circle system to keep the EtCO₂ between 35 and 45 mm Hg.

- **Relaxant:** Inj. Atracurium 0.5mg/kg iv.
- **Maintenance:** Anaesthesia was maintained with O₂:N₂O (50:50), isoflurane (0.5%–1%) and inj. Atracurium (0.1 mg/kg iv).
- **Parameters Monitored:** Multipara monitor was attached, the baseline readings such as Pulse Rate (PR), Mean Arterial Pressure (MAP) were recorded. Before starting the infusion, 15 min after starting the infusion, 1 minute after intubation, 1 minute after creation and release of pneumoperitoneum, Intra operative period (every 15 minutes), 1 minute after extubation.
- **Reversal:** Inj. Neostigmine 0.05 mg/kg + injection Glycopyrolate 0.2 for every 1mg of inj. Neostigmine used.
- **Extubation:** Patients were extubated after proper oral suctioning.

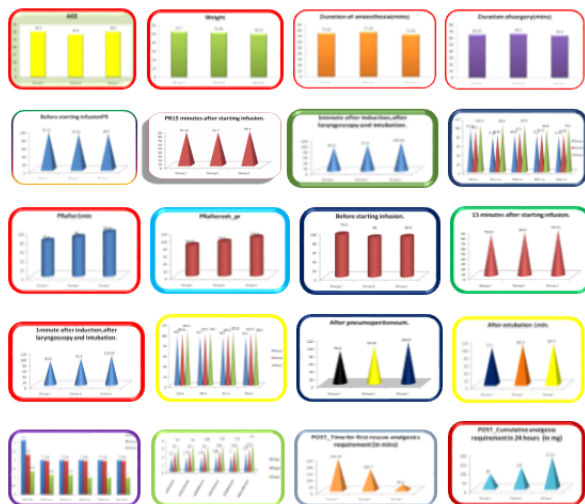
OBSERVATION AND RESULTS

The results were analysed using an ANOVA test for three groups and comparisons of the continuous Variables. If P value was >0.05 was considered insignificant and p value was <0.05 as significant and highly significant if p value was <0.001.

STATISTIC AND ANALYSIS

60 patients were randomly allocated by envelope method into three groups of 20 patients each.

- Group J = patients receiving Dexmedetomidine infusion 0.4 mcg/kg/hr
- Group K = patients receiving Dexmedetomidine infusion 0.2 mcg/kg/hr
- Group L = patients receiving normal saline 0.9% infusion
- P value was computed and found to be significant in group J receiving 0.4 mcg/kg/hr infusion



From the statistic analysis of the data above, in all cases and in all stages of the procedure as discussed in the discussion, we can clearly conclude that the Group J receiving 0.4 mcg/kg/hr Dexmedetomidine infusion was significantly better at maintaining the haemodynamic stability of the patients undergoing laparoscopic surgeries.

DISCUSSION

Dexmedetomidine is an alpha-2 agonist which has a selective sedative and analgesic properties. In my study, I had done 3 groups (groups J, K, L) comparing the low dose of Dexmedetomidine of 0.2 mcg/kg/hr and 0.4 mcg/kg/hr and a control group using normal saline. The haemodynamics such as pulse rate and mean arterial blood pressure (MAP) were noted. In Group K receiving 0.2 mcg/kg/hr the effect of Dexmedetomidine on the haemodynamics of the patient, such as MAP and Pulse rate was not very significant as the MAP remains to be elevated as well as pulse rate at all times during the intra operative period. In the other Group L (normal saline), after intubation and the creation of pneumoperitoneum and with the progression of surgery the haemodynamic stability of the patients were not maintained. After the start of infusion and tracheal intubation the MAP and pulse rate was significantly reduced in group J receiving 0.4 mcg/kg/hr infusion as compared to the control group. After creation and pneumoperitoneum, the MAP and pulse rate of patients receiving 0.4 mcg/kg/hr was

significantly reduced as compared to control group thereby creation a suitable haemodynamics for the patients undergoing laparoscopic surgeries irrespective of the surgery performed. Furthermore, after extubation, the extubation response in pulse rate and MAP was reduced. Moreover, the post operative requirement of analgesics (inj. diclofenac 1.5 mg/kg im), was significantly lesser in Group J as compare to other groups

In 24 hours the total rescue analgesic given to patients was minimal in Group J as compared to the other groups Group J was 80 ± 10.26 , which was significantly less amount with p value = 0.0001.

CONCLUSION

Low dose of Dexmedetomidine of 0.4 mcg/kg/hr compared to 0.2 mcg/kg/hr was found to be better in maintenance of the haemodynamic stability in patients undergoing laparoscopic surgeries. Moreover the post operative requirement of rescue analgesics is also significantly lower in 0.4 mcg/kg/hr (Group J) than 0.2 mcg/kg/hr (Group K). Hence, 0.4 mcg/kg/hr infusion of Dexmedetomidine is the ideal dose to attenuate the stress response in laparoscopic surgeries.

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