

# Dexmedetomidine as an Adjuvant in General Anaesthesia



## Medical Science

**KEYWORDS :** Dexmedetomidine, General Anesthesia, Laproscopic Surgery

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### ABSTRACT

**INTRODUCTION:** Dexmedetomidine is an alpha2 agonist. It inhibits the noradrenergic nuclei in the locus ceruleus of brainstem. It inhibits nociception in spinal cord. It decreases sympathetic outflow, circulating levels of catecholamines and heart rate. It is a very useful drug nowadays particularly in general anaesthesia. Other benefits are: It has a sedative property, decrease requirement of other anaesthetic agents, smoothen recovery and provide postoperative analgesia. Our aim is to study the efficacy of Dexmedetomidine in GA, particularly in laproscopic surgery.

**METHODS:** This is a prospective randomized study of 40 pts of ASA grade 1, 2, 3 scheduled for laproscopic surgery divided into 2 groups. Group-1 received GA with Dexmedetomidine and Group-2 received GA without Dexmedetomidine. Induction dose of dexmedetomidine is 1 mcg/kg and maintainance dose is 0.6 mcg/kg/hr. Ramsay score every 2 min for the first 10 min considering time of study of infusion as a time zero.

**RESULTS:** In Group-1 Ramsay score is 5. Haemodynamic stability is better in group-1 both during laryngoscopy and intraoperatively. It decreases requirement of Pentothal during induction and isoflurane requirement. Only few patients required analgesia during first 12 hour.

**CONCLUSION:** Dexmedetomidine provides sedation preoperatively, provides haemodynamic stability, attenuate stress response, provides sedation throughout extubation and in recovery room.

### INTRODUCTION:

Dexmedetomidine is an alpha2 agonist. It has 8 times more affinity for alpha2 receptors. It inhibits the noradrenergic nuclei in the locus ceruleus of the brainstem, inhibits nociception in spinal cord. It decreases sympathetic outflow and circulating catecholamines. It decreases heart rate. It possesses properties of sedation, analgesia and opioid sparing effect. Laproscopic surgery under GA are associated with haemodynamic changes in the form of increased systemic vascular resistance, leading to hypertension, forcing anaesthetic to increase the depth of anaesthesia and requires use of vasodilators to tackle the rising BP. Dex used as an adjuvant in the form of infusion.

Our aim is to study the efficacy and clinical profile of dexmedetomidine in general anaesthesia especially preoperative sedative property, decrease stress response to laryngoscopy, decrease requirement of other anaesthetic agents per-op and intraoperative haemodynamic stability, smoothen recovery after extubation and postoperative analgesia.

### METERIAL AND METHODS:

A prospective randomized study was done. 40 patients were classified as ASA grade - 1, 2, and 3 scheduled for laproscopic surgery. They divided into 2 groups (20 each).

- Group- 1 receiving General Anesthesia with dexmedetomidine
- Group - 2 receiving General Anesthesia without dexmedetomidine

After informed consent, IV line taken and baseline monitors like BP, ECG, SPO2 and HR were noted. Ramsay score every 2 min for first 10 min considering time of start of infusion as time zero. Loding dose of dex was started at the rate of 1 mcg/kg and continued for 15 mins. Pt is premedicated with glycopyrrolate 4mcg/kg and ondansetrone 4 mg IV. Maintainance dose of dex is 0.6mcg/kg/hr. After that patient was intubated by standard anaesthetic technique. Dex infusion was continued until extubation. Haemodynamic response to extubation was documented by pulse and blood pressure.

Intraop monitoring was documented during pre-induction, after loding dose of Dex, at the induction of anaesthesia, during laryngoscopy and then every 15 minutes till the end of surgery and continued during extubation and postoperatively. Any side effects like hypotension, bradycardia, respiratory Depression and postoperative nausea/ vomiting were noted.

### Demographic data:

PARAMETERS	DEXMEDE TO MIDINE	CONTROL
AGE (yrs)	32±8.2	34 ±7.6
WEIGHT (kg)	56± 6.4	60± 2.4
ASA GR ½	12/8	15/5
DURATION OF SURGERY(min)	58± 4.2	60± 4.4
BASELINE HR (per min)	80± 3.2	78± 6.2
BASELINE MAP (mm hg)	104.4± 11.5	101.9± 9.2

- Hypotension (Systemic < 90 mmhg):
  - o Treated by I.V ephedrine 5 mg
  - o I.V ringer lactate 200 ml.
- Bradycardia ( HR < 50 /min)
  - o Treated by giving I.V atropine 0.5 mg
- Pain was assessed by the patient using VISUAL ANALOGUE SCALE (VAS) at 1, 2, 4, 8, 12 hours.
- Inj. Diclofenac 75 mg I.M was given to patients with VAS of 4 or more.

### RESULTS:

#### In group - 1:

- RAMSAY SCORE of 5
- Haemodyanamic stability both during laryngoscopy and intraoperative.
- It decreases requirement of pentothal by 30% during induction and isoflurane requirement by 33 % preoperative.
- Eye opening is longer during recovery.
- Fewer patients require an analgesic during first 12 hours postoperatively.

Chart 1: Heart Rate Analysis

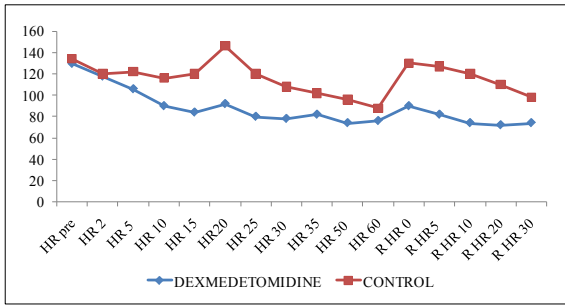


Chart 2: Blood Pressure Analysis

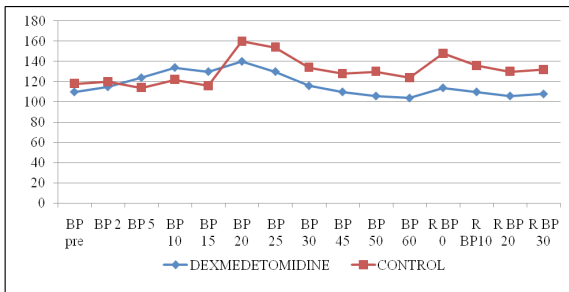
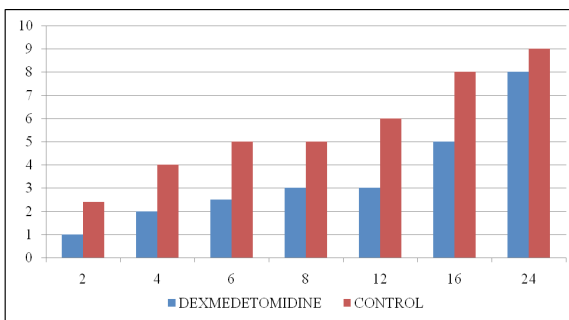
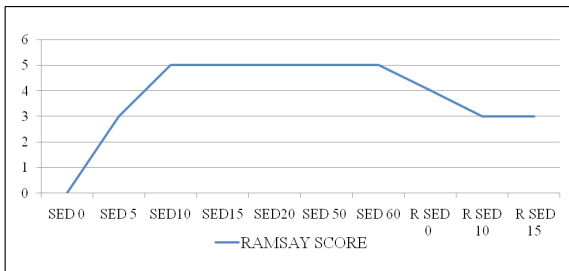


Chart 3: Ramsay Score



**DISCUSSION:**

Laparoscopic surgery offers intraoperative stress during pneumoperitoneum by increasing the systemic vascular resistance and blood pressure at the same time producing nociception. Dex, an imidazole compound, displays specific and selective alpha2 adrenergic receptor agonism. The unique properties of Dex render it suitable for analgesia during the perioperative period. The major sedative and antinociceptive effects of Dex are attributable to its stimulation of alpha2, a subtype located in locus coeruleus. It is the specificity of dex for alpha2 receptor that makes it a more effective sedative and analgesic agent than clonidine.

Dex potentiates anaesthetic effects of all intraoperative anaesthetics. The profound reduction in anaesthetic requirement was shown to be mediated through central alpha2 adrenergic receptors. IV and intramuscular administration has shown to reduce requirement of thiopentone by 17% in a group that receiving low dose Dex, and up to 30% in a group receiving high dose Dex. Dex also decreases the requirement of inhalational agents. First report of reduced requirement of isoflurane with Dex in humans was published in 1991, which showed a 25% reduction of maintenance and concentration of isoflurane in patients who received Dex. Similar observations regarding isoflurane requirement were made in our study. We observed that Dex effectively attenuates the vasopressor response of laryngoscopy and intubation and the sympathoadrenal response occurring with pneumoperitoneum. The alpha2 mechanism of action is involved in modulation of nociception at the level of spinal noradrenergic systems. Dex maintained HR and BP during perioperative period including laryngoscopy and pneumoperitoneum.

Dex has been shown to cause much less respiratory depression than any other sedatives. The danger of respiratory depression with sedative agents often necessitates their discontinuation during extubation period. However, Dex infusion can be continued safely throughout extubation. In our study, none of the 40 patients had episodes of respiratory depression in the post-operative period. Dex use permits lower doses of anaesthetics to be used thus resulting in a more rapid recovery from anaesthesia.

Our intention was to observe the effects of Dex as an anaesthetic adjuvant while maintaining the adequate anaesthetic depth. We observed that Dex is a good anaesthetic adjuvant that decreases the requirement of anaesthetics and opioids, attenuates sympathoadrenal response, maintains the stable haemodynamics and adequate depth of anaesthesia and provides an excellent recovery profile.

**ADVERSE EVENTS:**

Rapid or bolus intravenous administration of dexmedetomidine produces sudden hypotension and bradycardia until central sympatholytic effect dominates, resulting in moderate decreases in both MAP (mean arterial pressure) and heart rate from baseline. It causes post operative nausea and dryness of mouth.

**CONCLUSION:**

1. Dexmedetomidine provides sedation during pre-op period.
2. Intraoperatively it provides stable haemodynamic profile by attenuating stress response during tracheal intubation, during surgery and emergence from anaesthesia.
3. Dexmedetomidine provides possibility of continuing sedation throughout extubation process and in recovery room without significant respiratory impairment.
4. It provides sedation without respiratory depression.
5. It is useful in elderly undergoing colon resection and other stressful procedure and improves postoperative pain management after bariatric surgery.

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