

Anesthesiology

KEYWORDS:

Dexmedetomidine, Heart rate,
Laparoscopic surgery, Blood
pressure

EFFECTS OF DEXMEDETOMIDINE ON ATTENUATION OF HEMODYNAMIC CHANGES DURING LAPAROSCOPIC SURGERIES



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**ABSTRACT:**

BACKGROUND: Dexmedetomidine has been shown to provide good perioperative hemodynamic stability with minimum alveolar concentration sparing effect on inhalational anesthetic agents during laparoscopic surgeries performed under general anesthesia.

AIM: This study was aimed to investigate the effects of dexmedetomidine on attenuation of hemodynamic changes and requirements of intra operative analgesic and inhalational anaesthetic during laparoscopic surgeries and its postoperative side effects.

MATERIALS & METHODS: 70 Patients were recruited and divided into two groups Group D: Dexmedetomidine (n-35) Receive bolus dose of dexmedetomidine 1mcg/kg, over 10 minutes followed by continuous infusion of the same at the rate of 0.5 mcg/kg/hr Group S: Saline (n-35) same infusion rate. Heart rate systolic blood pressure diastolic blood pressure were measured at baseline, After loading dose, After intubation, 20 mins after pneumoperitoneum, 60 mins after pneumoperitoneum, After extubation. And Post operative pain.

RESULTS: Intra operative mean HR and mean BP in GROUP D were lower than GROUP S throughout the laparoscopy surgery. Requirement of intra operative fentanyl, inhalational agent and post operative analgesic were significantly more in GROUP S compared to GROUP D. Significant nausea and vomiting were noted in GROUP S.

CONCLUSION: Dexmedetomidine as an adjuvant in general anaesthesia for laparoscopic surgeries provided a stable hemodynamic profile in the perioperative period and effectively blunted pressor response to intubation and extubation, leading to minimal requirement for additional analgesics and potent inhalational agents.

1.INTRODUCTION

First laparoscopic cholecystectomy was successfully performed by Phillippe Mouret in 1987 with benefits Minimal access techniques include less pain, early mobilization, shorter hospital stay and better cosmetic results. During general anaesthesia laryngoscopy, tracheal intubation and extubation provoking transient, marked sympathoadrenal response. In laparoscopic surgery CO₂ is routinely used to create pneumoperitoneum, which causes increased plasma level of catecholamine and vasopressin[1]. Elevation of intra-abdominal pressure with raised diaphragm causes decreased cardiac output, elevated arterial pressure and increased systemic and pulmonary vascular resistance.[2] Dexmedetomidine is an alpha-2-adrenergic agonist, It has properties of analgesia, sympatholysis and sedation without major respiratory depression.

It reduces opioid requirements and stress response to surgery ensuring a stable hemodynamic state

2.AIM:

The study was aimed to investigate the effects of dexmedetomidine on attenuation of hemodynamic changes and requirements of intra operative analgesic and inhalational anaesthetic during laparoscopic surgeries and its postoperative side effects.

3..METHODS & MATERIALS

STUDY DESIGN: Randomized case control double blinded study

SAMPLE SIZE: 70 Patients.

After getting Ethical committee approval, and patient consent study was done

- **Group D:** Dexmedetomidine (n-35) Receive bolus dose of dexmedetomidine 1mcg/kg, over 10 minutes followed by continuous infusion of the same at the rate of 0.5 mcg/kg/hr
- **Group S:** Saline (n-35) same infusion rate

INCLUSION CRITERIA

- ASA I, II,
- Age 18-40yrs.

EXCLUSION CRITERIA

Emergency surgical procedures, Pts with cardiovascular, respiratory, renal disorders, Diabetes, Hypertension, Difficult airway, pregnant, breast feeding, Psychiatric disorder.

METHODOLOGY:

After attaching all monitors, the patient was preloaded with 5ml/kg of crystalloid. Before induction of anaesthesia the group D patients were given dexmedetomidine 1mcg/kg loading dose infusion over 10 min and group S received same dose of normal saline. After premedication patient was induced with Inj. Thiopentone (5mg/kg), intubated with Inj. Succinylcholine (2mg/kg), and muscle relaxation maintained with 0.5mg/kg of Atracurium bolus doses. Anaesthesia maintained with N₂O :O₂ 3:2 ratio. Inj. Dexmedetomidine maintenance infusion of 0.5mcg/kg /hr started in group D, and saline infusion started in group S. Measurements were taken at the following times: Baseline, After loading dose, After intubation, 20mins after pneumoperitoneum, 60 mins after pneumoperitoneum, After extubation. Post operative pain intensity was assessed using a 10 point visual analogue scale. The degree of sedation was assessed using 6 point Ramsay sedation scale.

STATISTICAL ANALYSIS : By using Paired t test, Chi-square test, ANOVA test. The results were expressed as mean, standard deviation, pvalue <0.05 was considered as significant.

TABLE NO:1 : COMPARISON OF HEARTRATE BETWEEN TWO GROUPS

HR	GROUP D (20 cases)		GROUP S (20 cases)		p value	Significance
	Mean	SD	Mean	SD		
Baseline	97.15	8.035	99.7	9.804	0.282	NS
After Loading	82.35	8.425	83.2	8.811	0.636	NS
After Intubation	77.3	7.175	110.5	5.145	<0.001	Sig
After 20mins Pneu	68.8	5.559	104.1	7.369	<0.001	Sig
After 60mins Pneu	64.8	5.327	97.9	10.073	<0.001	Sig
Extubation	72.6	5.968	112.5	7.222	<0.001	Sig

TABLE NO:2: COMPARISON OF SYSTOLIC BLOOD PRESSURE BETWEEN TWO GROUPS

Systolic BP	GROUP D		GROUP S		p value	Significance
	Mean	SD	Mean	SD		
Baseline	83.7	8.974	85.5	9.242	0.101	NS
After Loading	67.4	8.45	76.4	8.647	<0.001	Sig
After Intubation	74.8	9.047	96.7	7.42	<0.001	Sig
After 20mins Pneu	59	4.104	92.2	6.63	<0.001	Sig
After 60mins Pneu	55.85	5.354	84.6	7.612	<0.001	Sig
Extubation	92.8	8.192	101.7	9.229	0.023	Sig

TABLE NO :3 COMPARISON OF DIASTOLIC BLOOD PRESSURE BETWEEN TWO GROUPS

Diastolic BP	GROUP D		GROUP S		p value	Significance
	Mean	SD	Mean	SD		
Baseline	133	7.8	135.3	8.138	0.067	NS
After Loading	111	5.876	118.2	8.532	0.002	Sig
After Intubation	116.4	5.093	145.4	4.838	<0.001	Sig
After 20mins Pneu	99.5	5.042	139.3	4.846	<0.001	Sig
After 60mins Pneu	95.6	4.135	133.8	7.353	<0.001	Sig
Extubation	137.1	6.017	151.6	6.411	<0.001	Sig

TABLE NO 4 : COMPARISON OF MEAN ARTERIAL PRESSURE BETWEEN TWO GROUPS

MAP	GROUP D		GROUP S		p value	Significance
	Mean	SD	Mean	SD		
Baseline	95.2	8.942	97.6	10.169	0.413	NS
After Loading	74	6.258	92.9	4.471	<0.001	Sig
After Intubation	78.1	5.893	109.4	3.952	<0.001	Sig
After 20mins Pneu	73	5.109	104.1	6.373	<0.001	Sig
After 60mins Pneu	67.8	4.607	96.4	9.372	<0.001	Sig
Extubation	91.6	5.256	111.8	4.124	<0.001	Sig

FIGURE NO 1 :BLOOD PRESSURE CHANGES DURING STUDY

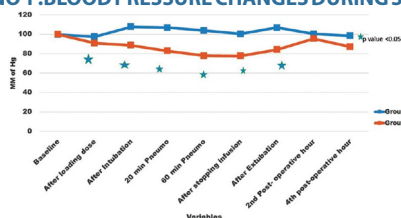


FIGURE NO 2:HEART RATE CHANGES DURING STUDY

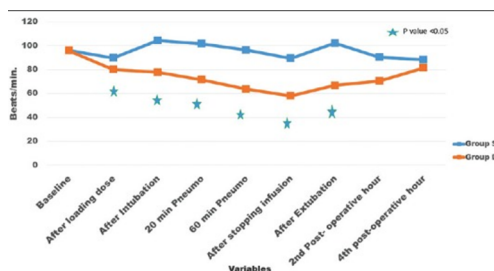


FIGURE NO 3 :INHALATIONAL ANAESTHETIC REQUIREMENT

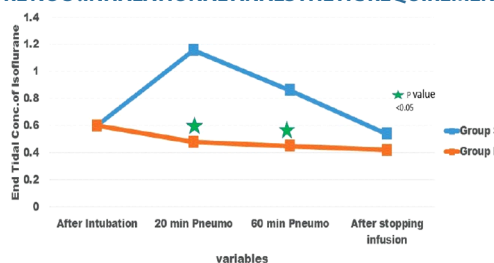


TABLE NO 5 :TRAMADOL AND FENTANYL REQUIREMENT

Number of patients	Group S	Group D	P value
Number of patients requiring intra operative fentanyl	2	0	0.02
Total number of patients requiring injection tramadol	1	0	0.01
Total number of patients requiring injection ondansetran	1	0	0.01

TABLE NO 6 : ADVERSE EFFECTS OBSERVED IN BOTH GROUPS

ADVERSE EFFECT	GROUP S	GROUP D	P value
Nausea, Vomiting	2	0	0.004
Undue sedation	0	0	0
Shivering	1	0	0.003
Bradycardia	0	1	0.003
Hypotension	0	0	0
Respiratory depression	0	0	0
Laryngospasm, bronchospasm	0	0	0

4.RESULTS:

Intra operative mean HR and mean BP in GROUP D were lower than GROUP S throughout the laparoscopy surgery. Requirement of intra operative fentanyl, inhalational agent and post operative analgesic were significantly more in GROUP S compared to GROUP D. Significant nausea and vomiting were noted in GROUPS.

5.DISCUSSION & CONCLUSION

Dexmedetomidine as an adjuvant in general anaesthesia for laparoscopic surgeries provided a stable hemodynamic profile in the perioperative period and effectively blunted pressor response to intubation and extubation, leading to minimal requirement for additional analgesics and potent inhalational agents. Dexmedetomidine could result in cardiovascular depression, that is, bradycardia and hypotension. The activation of alpha-2-adrenoceptors, imidazoline-preferring receptors or both in the ventrolateral medulla and especially in the solitary nucleus tract by dexmedetomidine causes bradycardia. We saw three patients had bradycardia in the postoperative period, which is statistically insignificant. This low incidence of bradycardia might be due to slow infusion of bolus. Our results are comparable to those of Bekker *et al.*, who reported that dexmedetomidine, given at a similar dose, was effective in blunting the increase in systolic BP perioperatively, although it did not increase the incidence of hypotension or bradycardia.[3] Hogue *et al.* reported that dexmedetomidine preserves baroreflex sensitivity, and that patient had a normal HR response to BP. The noted slowing of the HR is mostly from sympathetic withdrawal and not due to enhanced vagal activity.[4] The incidence of

postoperative bradycardia has been reported as high as 40% in healthy surgical patients who received dexmedetomidine, especially high doses. Usually, these temporary effects are successfully treated with atropine or epinephrine and volume infusions. Turan *et al.* found that cough, difficulty in breathing, laryngeal edema and bronchospasm were not observed with a single dose of dexmedetomidine. [5] It may be that the analgesic and sedative characteristics of dexmedetomidine contribute to a lower level of sensitivity to laryngeal stimulation during extubation.

6. REFERENCES:

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