

Evaluation of Conventional Versus Low Dose Infusion of Dexmedetomidine on Hemodynamic Stress Response at a Tertiary Care Teaching Hospital

Lokesh Kumar Gupta^{1*}, Subrata Dutta², Vinod Kapoor³

^{1*}Assistant Professor, Department of Anaesthesia, Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh, India.

²Associate Professor, Department of Anaesthesia and Critical Care, Saraswathi Institute of Medical Sciences, Hapur Road, Anwarpur, Uttar Pradesh, India.

³Professor, Department of Pharmacology, SGT Medical College and Hospital, SGT University, Gurugram, Haryana, India.

ABSTRACT

Background: Dexmedetomidine is a new medication endorsed toward the finish of 1999 and is a helpful narcotic specialist with pain relieving properties, hemodynamic solidness and capacity to recuperate respiratory capacity in mechanically ventilated patients encouraging early weaning. Laparoscopic cholecystectomy is viewed as best quality level for bother bladder maladies in the present period. Preferences of laparoscopy incorporate less postoperative agony, little entry points, shorter hospitalization and quicker useful recuperation. Hence; we planned the present study to assess and compare the effect of conventional dose and low dose infusion of dexmedetomidine on hemodynamic stress response in patients undergoing laparoscopic cholecystectomy.

Materials & Methods: The present study included assessment and comparison of effect of low dose and conventional dose infusion of dexmedetomidine on hemodynamic stress response in patients undergoing laparoscopic cholecystectomy. A total of 50 ASA grade I and II patients were included in the present study and were randomly divided into two study groups, Group A: (DEXM 0.3) received infusion of dexmedetomidine 0.3 µg/kg/hr, and Group B: (DEXM 0.6) received infusion of dexmedetomidine 0.6 µg/kg/hr. For the preparation of the infusion, dexmedetomidine 1 mL containing 100 µg of the drug was withdrawn in a 50-mL syringe followed by dilution upto 50 mL with normal saline which resulted in final concentration of 2 mcg/mL. Patients of group DEXM 0.3 and DEXM 0.6 were given dexmedetomidine infusion at 0.5 mcg/kg for 15 min before induction, followed by maintenance infusion at a rate of 0.3 mcg/kg/hr and 0.6mcg/kg/hr respectively, continued till the end of surgery. Monitoring of the pre-operative heart rate was done along with its assessment after drug administration, one

minute after induction at following time intervals. Assessment of all other hemodynamic parameters was done at various time intervals followed by organized recording of their values.

Results: Mean age of the patients of the group A was 42.5 years while mean age of the patients of group B was 44.8 years. While comparing the mean heart rate in between group A and group B, we observed a significant difference at one minute time interval after intubation and during the post-operative period. While comparing the mean arterial pressure in between subjects of the two study groups, we observed that patients of group A had significantly higher mean arterial pressure in comparison to patients of group B.

Conclusion: Conventional dose, in comparison to lower dose, infusion is a better anaesthetic adjuvant in terms of controlling the haemodynamic stress.

Key words: Conventional Dose, Dexmedetomidine, Haemodynamic.

*Correspondence to:

Dr. Lokesh Kumar Gupta,
Assistant Professor,
Department of Anaesthesia,
Rama Medical College Hospital & Research Centre,
Hapur, Uttar Pradesh, India.

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INTRODUCTION

α₂-adrenergic receptor (α₂-AR) agonists have been effectively utilized as a part of a different clinical settings in perspective of various activities which incorporate sedation, absence of pain, anxiolysis, perioperative sympatholysis, cardiovascular settling impacts, lessened soporific prerequisites, and conservation of respiratory capacity.^{1,2} Dexmedetomidine is a moderately new

medication endorsed toward the finish of 1999 by the Food and Drug Administration (FDA) for the purpose of sedation and absence of pain (<24 hours) in the emergency unit. Dexmedetomidine is a helpful narcotic specialist with pain relieving properties, hemodynamic solidness and capacity to recuperate respiratory capacity in mechanically ventilated patients

encouraging early weaning.^{3,4} Laparoscopic cholecystectomy is viewed as best quality level for both bladder maladies in the present period. Preferences of laparoscopy incorporate less postoperative agony, little entry points, shorter hospitalization and quicker useful recuperation. Be that as it may, laparoscopic cholecystectomy is additionally connected with stress-reaction like some other surgery. Soporific intercessions like direct laryngoscopy, tracheal intubation and extubation bring out hemodynamic anxiety reaction.⁵⁻⁸

Hence; we planned the present study to assess and compare the effect of conventional dose and low dose infusion of dexmedetomidine on hemodynamic stress response in patients undergoing laparoscopic cholecystectomy.

MATERIALS & METHODS

The present study was conducted in the department of anaesthesia and general surgery, Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh (India) and included assessment and comparison of effect of low dose and conventional dose infusion of dexmedetomidine on hemodynamic stress response in patients undergoing laparoscopic cholecystectomy. Ethical approval was taken from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. A total of 50 ASA grade I and II patients were included in the present study and were randomly divided into two study groups depending on the rate of infusion of dexmedetomidine as follows:

Group A: (DEXM 0.3) Infusion of dexmedetomidine 0.3 µg/kg/hr,

Group B: (DEXM 0.6) Infusion of dexmedetomidine 0.6 µg/kg/hr.

Inclusion Criteria

- Patients undergoing laparoscopic cholecystectomy,
- Patients without history of any other systemic illness,
- Patients without any known drug allergy,

- Patients without allergy to α2 adrenergic agonist or antagonist,

Separate preparation of infusion was done for all the patients separately. For the preparation of the infusion, dexmedetomidine 1 mL containing 100 µg of the drug was withdrawn in a 50-mL syringe followed by dilution upto 50 mL with normal saline which resulted in final concentration of 2 mcg/mL. Depending upon the weight and allotted group, target infusion rate was delivered. Prior to the surgery, a thorough pre-anaesthetic evaluation of the patients was done. Fundamental research center examinations were directed including hemogram, pee investigation, trunk X-beam, electrocardiogram, glucose, serum creatinine, blood urea, serum electrolytes and coagulation profile. Patients were consoled to lighten their uneasiness. Overnight fasting of all the patients was maintained. On the day of surgical operation, complete monitoring of all the parameters including patient's pulse oximeter, non-invasive blood pressure monitor and three lead ECG monitoring were done. Patients of group DEXM 0.3 and DEXM 0.6 were given dexmedetomidine infusion at 0.5 mcg/kg for 15 min before induction, followed by maintenance infusion at a rate of 0.3 mcg/kg/hr and 0.6mcg/kg/hr respectively, continued till the end of surgery. Maintenance of anaesthesia was done with O₂ in N₂O in fifty- fifty ratio. Management of intra-operative hypertension was done with nitroglycerine infusion. Monitoring of the pre-operative heart rate was done along with its assessment after drug administration, one minute after induction at following time intervals. Assessment of all other hemodynamic parameters was done at various time intervals followed by organized recording of their values.

All the results were analysed by SPSS software. Chi- square test, student t test and one way ANOVA were used for the assessment of level of significance. P-value of less than 0.05 was taken as significant.

Table 1: Demographic details and duration of surgery

Parameter	Group A	Group B
Mean age (years)	42.5	44.8
Gender	Male	8
	Female	17
Mean weight (Kg)	56.9	58.1
Mean duration of surgery (mins)	75.45	79.51

Table 2: Alteration in the heart rate (beats per minute)

Time (Mean)	Group A	Group B	P-value
Pre-operative	97.50	100.25	0.26
One minute after induction	93.45	90.42	0.45
One minute after intubation	108.94	96.52	0.01*
After Pneumoperitoneum	93.15	87.15	0.09
15 minutes	90.48	86.68	0.51
30 minutes	90.99	85.71	0.06
60 minutes	89.64	84.52	0.09
90 minutes	88.98	86.47	0.27
End of Pneumoperitoneum	84.25	83.25	0.52
Post- operative period	101.52	92.15	0.01*

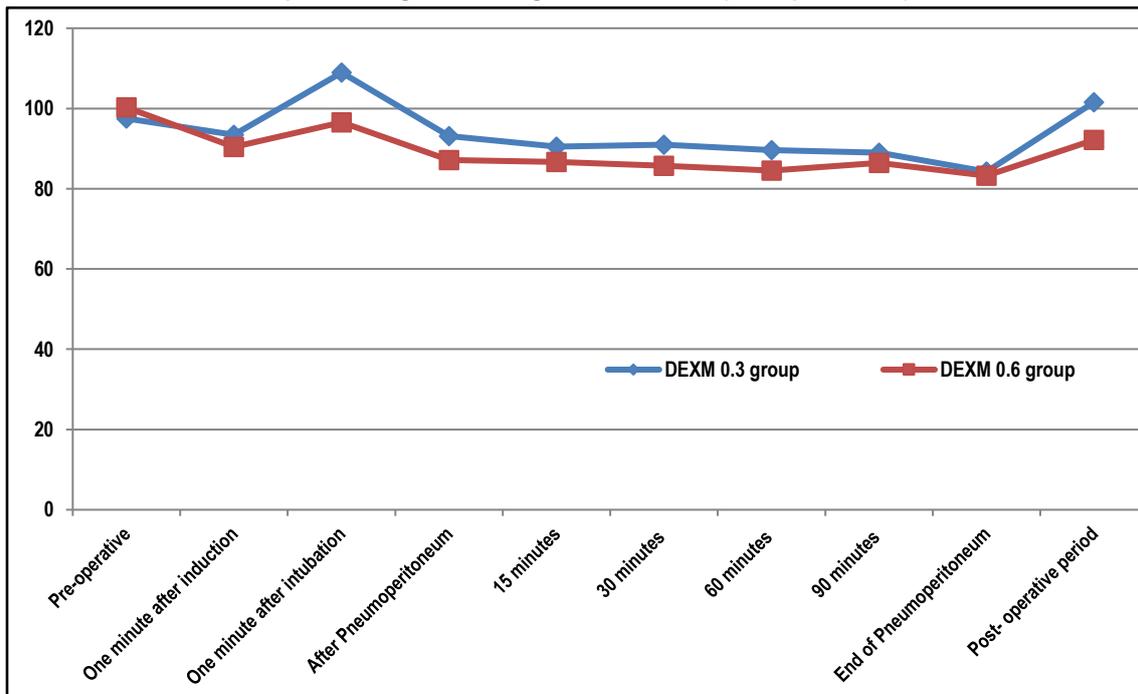
*: Significant

Table 3: Alteration in the arterial pressure (mm Hg)

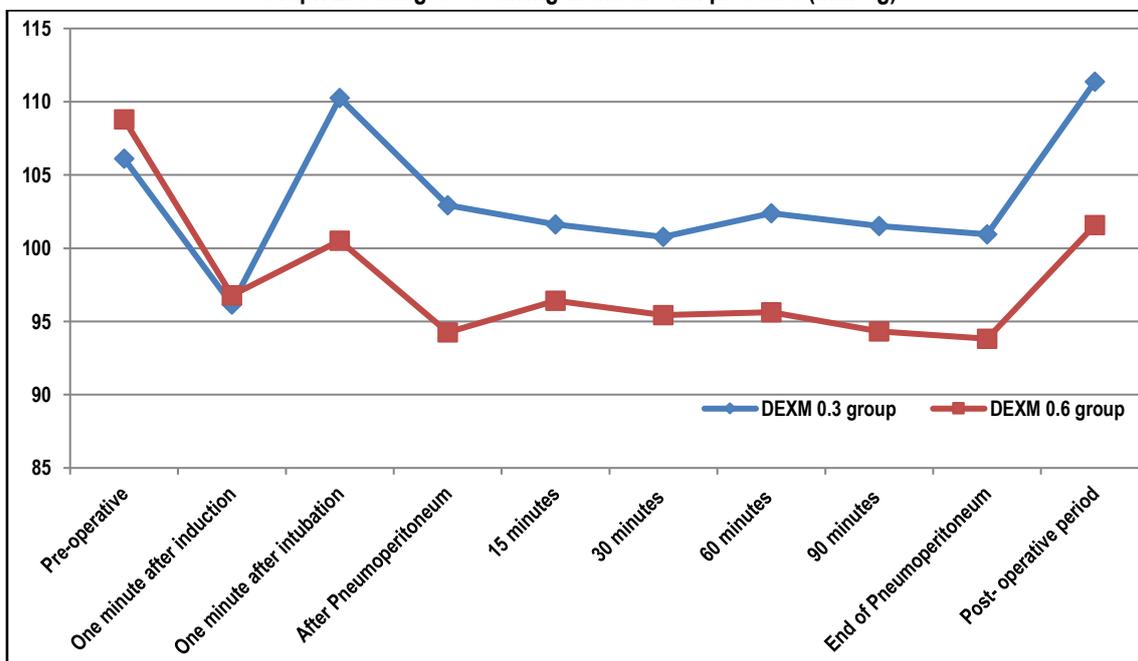
Time (Mean)	Group A	Group B	P-value
Pre-operative	106.12	108.79	0.36
One minute after induction	96.15	96.78	0.52
One minute after intubation	110.25	100.52	0.01*
After Pneumoperitoneum	102.94	94.26	0.02*
15 minutes	101.62	96.41	0.11
30 minutes	100.77	95.43	0.09
60 minutes	102.38	95.62	0.01*
90 minutes	101.51	94.33	0.08
End of Pneumoperitoneum	100.95	93.82	0.06
Post- operative period	111.37	101.58	0.03*

*: Significant

Graph 1: Changes occurring in the heart rate (beats per minute)



Graph 2: Changes occurring in the arterial pressure (mm Hg)



RESULTS

Mean age of the patients of the group A was 42.5 years while mean age of the patients of group B was 44.8 years. Out of 25 subjects in group A, 10 were males while 15 were females, whereas in group B, out of 25, 8 were males and 17 were females (Table 1). While comparing the mean heart rate in between group A and group B, we observed a significant difference at one minute time interval after intubation and during the post-operative period (Table 3). While comparing the mean arterial pressure in between subjects of the two study groups, we observed that patients of group A had significantly higher mean arterial pressure in comparison to patients of group B (Table 3).

DISCUSSION

Laparoscopic cholecystectomy is viewed as a negligibly obtrusive technique. Pneumoperitoneum utilizing CO₂ for laparoscopic surgery causes a quick and prompt increment in plasma catecholamines and vasopressin, perhaps because of an expansion in intraperitoneal weight and incitement of the peritoneum by Co₂.⁹⁻¹¹ Pneumoperitoneum induced haemodynamic changes are modulated by dexmedetomidine by inhibition of release of catecholamines and vasopressin.¹² Hence; we planned the present study to assess and compare the effect of conventional dose and low dose infusion of dexmedetomidine on hemodynamic stress response in patients undergoing laparoscopic cholecystectomy.

In the present study, we observed that conventional dose of dexmedetomidine infusion is a better anaesthetic adjuvant in terms of controlling the haemodynamic stress. Manne GR et al assessed the impacts of low measurements dexmedetomidine imbue ment on haemodynamic reaction to basic rates, for example, laryngoscopy, endotracheal intubation, production of pneumoperitoneum and extubation in patients experiencing laparoscopic cholecystectomy. The optional points were to watch the consequences for extubation time, sedation levels, post-agent absence of pain necessities and event of unfavourable impacts. Sixty patients of ASA physical evaluations I and II experiencing laparoscopic cholecystectomy were arbitrarily designated into three gatherings of 20 patients each. Assemble NS patients got ordinary saline, Group Dex 0.2 and Group Dex 0.4 patients got dexmedetomidine imbue ment at 0.2 mcg/kg/h and 0.4 mcg/kg/h separately, beginning 15 min before enlistment and preceded till end of surgery. Assessment of various hemodynamic parameters was done at different time intervals which included pulse rate, mean arterial pressure, oxygen saturation, post-surgical sedation etc. They observed significant haemodynamic response following surgery in Group NS. Also significant attenuation of the haemodynamic response was seen in both the dexmedetomidine groups. From the results, the authors concluded that low dose of dexmedetomidine infusion effectively attenuated hemodynamic response.¹² Panchgar V et al concentrated the impact of dexmedetomidine on hemodynamic parameters amid perioperative period in patients experiencing laparoscopic surgery. Forty patients of ASA Class I and II were enlisted in this randomized review. The patients were arbitrarily separated into two gatherings; assemble ordinary saline (NS) and gathering dexmedetomidine. Tolerant got either NS or dexmedetomidine in gathering NS and gathering dexmedetomidine, individually, contingent on the portion. The imbue ment rate was balanced by;

stacking dosage more than 10 min and upkeep measurement and perioperative hemodynamics was recorded. Routine general anesthesia was regulated in every one of the patients with traditional method without straying from institutional conventions. Postoperatively, Rasmsay sedation score, time taken for demand of first pain relieving dosage, and reactions if any were recorded. Huge hemodynamic changes are seen in NS bunch amid laryngoscopy, intubation, amid pneumoperitoneum arrangement, and amid extubation. Hemodynamic anxiety reaction in dexmedetomidine gathering was altogether constricted. Pain relieving necessity amid postoperative 24 h was considerably less in dexmedetomidine gather when contrasted with NS gathering. No huge symptoms were noted with the exception of bradycardia; which was seen in two instances of dexmedetomidine gathering. Utilization of dexmedetomidine expands the agony free period postoperatively and in this manner decreasing aggregate pain relieving prerequisite. From the outcomes, they reasoned that dexmedetomidine can be used as a perfect soporific adjuvant amid laparoscopic surgeries.¹³

Srivastava VK et al looked at the adequacy of dexmedetomidine and esmolol on hemodynamic reactions amid laparoscopic cholecystectomy. An aggregate of 90 patients, matured 20-60 years, ASA physical status I or II, of either sex, anticipated laparoscopic cholecystectomy were incorporated. The patients were haphazardly isolated into three gatherings of 30 each. Aggregate D got dexmedetomidine stacking dosage 1 mcg/kg over a time of 15 minutes and support 0.5 mcg/kg/h all through the pneumoperitoneum. Gather E got esmolol stacking measurements 1 mg/kg over a time of 5 minutes and upkeep 0.5 mg/kg/h all through the pneumoperitoneum. Assemble C got same volume of typical saline. Heart rate (HR), systolic circulatory strain, diastolic pulse and mean blood vessel weight (MAP) were recorded preoperative, after review tranquilize, after acceptance, after intubation, after pneumoperitoneum at 15 min interims, post pneumoperitoneum and postoperative period after 15 min. Propofol acceptance dosage, intraoperative fentanyl prerequisite and sedation score were additionally recorded. In gathering D, there was no measurably noteworthy increment in HR and circulatory strain after pneumoperitoneum whenever interims, though in Group E, there was a factual critical increment in MAP after pneumoperitoneum at 15, 45, and 60 min just and HR amid the entire pneumoperitoneum period. There was a huge reduction in enlistment measurement of propofol and intraoperative fentanyl necessity in Group D and E, contrasted with Group C. From the outcomes, the authors inferred that dexmedetomidine is more powerful than esmolol for constricting the hemodynamic reaction to pneumoperitoneum in elective laparoscopic cholecystectomy.¹⁴

CONCLUSION

From the above results, the authors concluded that conventional dose, in comparison to lower dose, infusion is a better anaesthetic adjuvant in terms of controlling the haemodynamic stress. However, future studies are recommended.

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