Research Paper Medical Science

Effect of Intravenous Infusion of Dexmeditomidine on Perioperative Hemodynamics & Postoperative Recovery During Laparoscopic Surgeries

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ABSTRACT

Background&Aim: Dexmeditomidine ,an alpha2 agonist , when used as adjuvant to general anesthesia attenuates stress response to various noxious stimuli,maintains perioperative hemodynamic stability and provides sedation without respiratory depression post operatively during laparoscopic surgeries. We designed this prospective, randomized, double blind, and placebo-controlled dose-ranging study to evaluate the effect of Dex on perioperative hemodynamic stability, analgesic requirement and the time to recovery after laparoscopic surgeries.

Methods: After ethical committee approval and informed consent, sixty patients were randomly assigned to 3 groups ,Group 1 –control group received placebo saline infusion, Group 2-dex 0.2 µ group received dexmeditomidine 0.2µ/kg/hr IV infusion, Group 3-dex 0.4 µ group received dexmeditomidine 0.4 µ/kg/hr IV infusion. Dex infusion was started 5 min before induction of anesthesia & fentanyl used as narcotics and isoflurane for maintenance of anesthesia. Mean arterial blood pressure values maintained 20% pre induction values by varying inspired isoflurane concentration. Parameters like perioperative hemodynamic variables at various intervals, time to recovery, post operative sedation score and time to discharge from PACU recorded

Results: Dexmedetomidine infusion, 0.2, and 0.4µ/kg/hr , reduced the average inspired isoflurane concentration significantly.There was no change in recovery from anesthesia in both dex & control group.In dex group hemodynamic parameters are well maintained (±20 % of baseline) with less inspired concentration of isoflurane compared to control group which needed more isoflurane concentration or rescue esmelol infusion. The length of the PACU stay & rescue tramodol administered is significantly less in Dex groups .

Conclusion:Adjuvant use of intra operative Dex infusion of both 0.2& 0.4µ/kg/hr attenuated intra operative sympathetic stimulation & reduce analgesic requirement ,antiemetic therapy, length of PACU stay.

KEYWORDS : Dexmedetomidine, Intraoperative hemodynamics, Laparoscopic Surgeries

Introduction:
It is a prospective, randomised ,placebo controlled, double blinded study. The study was designed to evaluate the effect of Dexmeditomidine ,an alpha2 agonist on perioperative hemodynamic stability, analgesic requirement and the time to recovery when used as adjuvant to general anesthesia during laparoscopic surgeries

Materials and Methods:
Ethical committee approval & written informed patient consent obtained

Study population-60(n-60)

- Group 1(control)-placebo saline infusion
- Group 2(Dex 0.2µ)-dexmeditomidine 0.2µ/kg/hr infusion
- Group 3(Dex 0.4µ)-dexmeditomidine 0.4µ/kg/hr infusion

Inclusion criteria
- Age-18-55 yrs
- ASA I &II
- Written informed consent
- Posted for Laparoscopic surgeries
- Exclusion criteria
- Known allergy to study drug
- ASA III &IV
- Morbidly obese patients
- Significant neurologic, cvs , renal, hepatic diseases
- Heart block
- Uncontrolled HT
- Pts on adrenergic blocking drugs

In the Theatre:
Routine monitors connected -- ECG, NIBP, EtCO2 and SpO2. The study drug was prepared at 1µ/ml concentration in 50ml syringe. Infusion was done by syringe infusion pump. The infusion was started 5min before induction. Patients were induced with Inj.Glycopyrolate 4µ/kg IV, Inj. Fentanyl citrate 2µ/kg, Inj.Propofol 2mg/kg, followed by Inj. Suxamethonium 2mg/kg. Maintanance of anesthesia was done with N2O:O2 2:2L ,Isoflurane , and Inj. Atracurium in graded dose

Hemodynamic parameters SBP, DBP,MAP, HR recorded preoperatively, then at regular intervals intra operatively and postoperatively. MAP and HR were maintained within 20% of baseline values by varying inspired isoflurane concentration

Hypotension(< 20 % baseline MAP) was treated by reducing isoflurane 0.5-1%; if persistent, with Inj. Ephedrine 6mg bolus

Hypertension(>20% baseline MAP) was treated by increasing isoflurane 0.5-1 %; if persistent, with inj. Esmolol 10 mg incremental doses.

Bradycardia (HR< 50/min) was treated with Inj.Glycopyrolate 10µ/kg

Isoflurane & infusion of study drug were stopped at start of wound closure. From this time to time to recovery is noted

Post operatively BP, HR, analgesic requirement (inj.Tramadol 50-100mg IM if VAS 6), Sedation score(1-Awake, 2-sleepy, arousable, 3-sleepy , difficult to arousable), Time to discharge from PACU (Aldrete score) were noted

Parameters monitored
- Hemodynamic parameters-Systolic BP , Diastolic BP , Mean arterial Pressure, Heart rate
- Time to spontaneous eye opening
- Time to verbal response
- Time to extubation
- Any complications
- Post op BP , HR
- Sedation score
- Analgesic requirement
- Nausea , vomiting
- Time to discharge from PACU

Results:

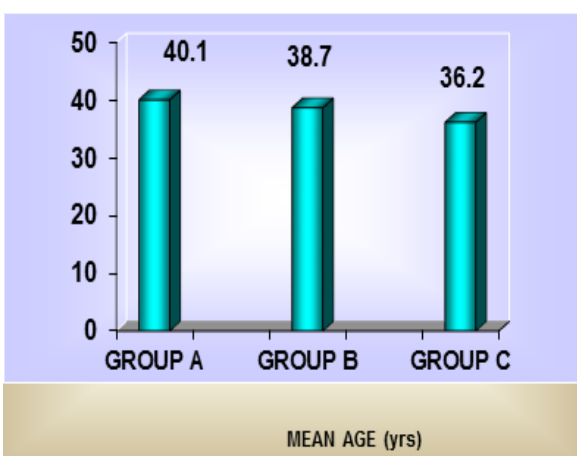
Statistical tools:

The data collected were recorded in a Master Chart. Data analysis was done using Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta. chi square , 'F' value and 'p' values were calculated. ANOVA test was used to test the significance of difference between quantitative variables. A 'p' value less than 0.05 denotes significant relationship.

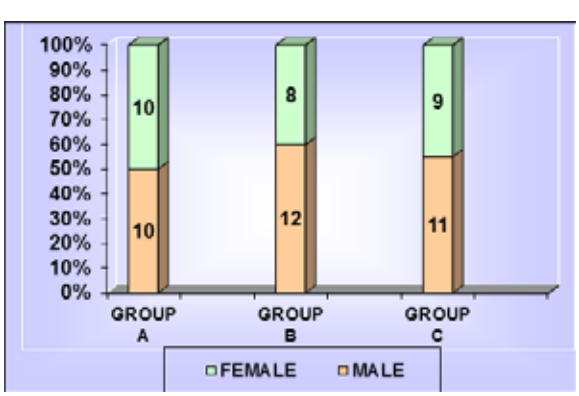
Table 1 : Characteristics of Cases Studied

Variable	Parameter	Group A	Group B	Group C	'p'
Cases Studied	Number	20	20	20	-
Age in yrs	Range	22 - 52	20 - 58	20 – 58	0.5632 Not Significant
	Mean	40.1	38.7	36.2	
	SD	10.6	13.0	11.1	
Sex	Male	10 (50%)	12(60%)	11 (55%)	-
	Female	10 (50%)	8(40%)	9(45%)	
Height(cms)	Range	140 - 165	130 - 162	130 - 162	0.8018 Not Significant
	Mean	152.4	150.9	150.9	
	SD	7.5	8.3	8.5	
Weight (kgs)	Range	51 - 79	49 - 75	49 – 78	0.5563 Not Significant
	Mean	60.1	61.0	63.0	
	SD	8.0	7.9	9.8	

Mean Age
Fig 1



SEX DISTRIBUTION
Fig 2



HEIGHT / WEIGHT
Fig 3

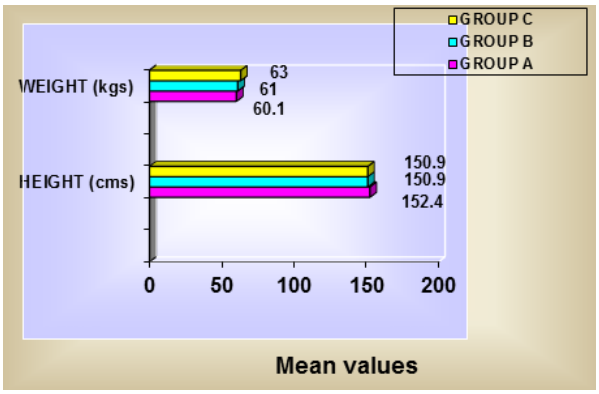


Table 3 : Changes in Mean Arterial Pressure

MAP at	MAP (mm/Hg) in Group A Mean	Group A SD	Group B Mean	Group B SD	Group C Mean	Group C SD	'p'
Induction	110.2	10.8	106.1	10.6	109.7	11.3	0.4466 Not Significant
Intubation	106.9	9.5	103.3	9.7	106.0	9.2	0.4513 Not Significant
After intubation							
5 minutes	127.1	13.7	125.4	13.6	125.8	12.4	0.9174 Not Significant
10 minutes	124.5	7.6	122.5	7.9	121.5	9.1	0.5041 Not Significant
15 minutes	121.3	8.8	119.5	9.3	118.0	10.4	0.5636 Not Significant
20 minutes	118.7	8.9	116.5	9.1	116.7	9.5	0.7041 Not Significant
25 minutes	110.5	10.9	107.7	11.0	107.0	10.8	0.5647 Not Significant
30 minutes	112.4	13.0	110.5	12.1	107.3	14.7	0.6214 Not Significant
35 minutes	95.3	9.2	98.0	9.2	94.0	8.0	0.8125 Not Significant
40 minutes	95.3	9.2	98.0	9.2	94.0	8.0	0.8125 Not Significant
45 minutes	-	-	-	-	-	-	-

Table 4 : Changes in Pulse Rate

Pulse Rate at	Pulse Rate of Group A Mean	Group A SD	Group B Mean	Group B SD	Group C Mean	Group C SD	'p'
Induction	90.0	4.6	92.7	4.2	90.5	4.8	0.1383 Not Significant
Intubation	90.2	5.4	90.2	4.9	91.1	5.2	0.8074 Not Significant
After intubation							
5 minutes	104.9	8.3	103.5	10.8	101.0	11.1	0.4733 Not Significant
10 minutes	107.7	11.0	105.3	13.7	103.6	11.7	0.5763 Not Significant
15 minutes	98.5	10.1	96.0	11.3	94.2	11.0	0.449 Not Significant
20 minutes	95.9	9.4	94.1	10.1	92.5	9.2	0.5253 Not Significant
25 minutes	89.6	9.1	89.9	8.2	89.2	7.7	0.9596 Not Significant
30 minutes	83.9	10.3	86.0	9.6	85.3	9.8	0.9149 Not Significant
35 minutes	84.7	4.6	83.5	4.4	81.5	1.0	0.5259 Not Significant
40 minutes	83.3	5.8	82.5	5.0	80.0	0	0.5618 Not Significant
45 minutes	-	-	-	-	-	-	-

Table 5 : Isoflurane concentration (%)

ISO Con. (%) at	ISO Concentration (%)						'p'
	Group A		Group B		Group C		
	Mean	SD	Mean	SD	Mean	SD	
Immediately after Intubation	1	0	1	0	1	0	-
After intubation							
5 minutes	1.5	0.28	0.98	0.26	1.03	0.3	<0.0001 Significant
10 minutes	1.7	0.3	1.18	0.37	0.98	0.3	<0.0001 Significant
15 minutes	1.75	0.41	1.23	0.44	0.88	0.28	<0.0001 Significant
20 minutes	1.63	0.46	1.13	0.43	0.85	0.37	<0.0001 Significant
25 minutes	1.2	0.41	0.73	0.26	0.68	0.24	<0.0001 Significant
30 minutes	1.0	0.29	0.67	0.25	0.59	0.2	<0.0001 Significant
35 minutes	1.0	0	0.5	0	0.5	0	<0.0001 Significant
40 minutes	0.5	0	0.5	0	0.5	0	-
45 minutes	-	-	-	-	-	-	-

Variable	Parameter	Group A	Group B	Group C	'p'
Duration of Surgery (minutes)	Range	15 - 30	15 - 30	15 – 30	0.5247 Not significant
	Mean	20.8	22.5	22.0	
	SD	4.7	5.3	4.9	
Duration of Anesthesia (minutes)	Range	25 - 40	25 - 40	25 – 45	0.7094 Not Significant
	Mean	29.0	30.5	30.0	
	SD	5.3	6.3	5.8	
Duration of infusion (minute)	Range	30 - 50	35 - 50	30 – 55	0.4099 Not significant
	Mean	38.5	40.5	38.3	
	SD	5.9	5.4	6.1	
Time to spontaneous eye opening (minutes)	Range	5 - 15	5 - 15	5 – 20	0.9738 Not Significant
	Mean	8.2	8.3	8.45	
	SD	3.04	3.47	3.8	
Time to verbal response (minutes)	Range	6 - 20	6-20	6 – 25	0.7787 Not Significant
	Mean	11.2	11.6	12.0	
	SD	2.97	3.32	4.29	
Time to Extubate (minutes)	Range	10 - 25	10 -25	10 – 28	0.5154 Not Significant
	Mean	13.8	14.4	15.4	
	SD	3.6	4.0	5.1	
Time to discharge from PACU (minute)	Range	25 - 60	25 - 60	20 – 40	<0.0001 Significant
	Mean	46.0	34.3	29.5	
	SD	11.0	8.5	7.1	

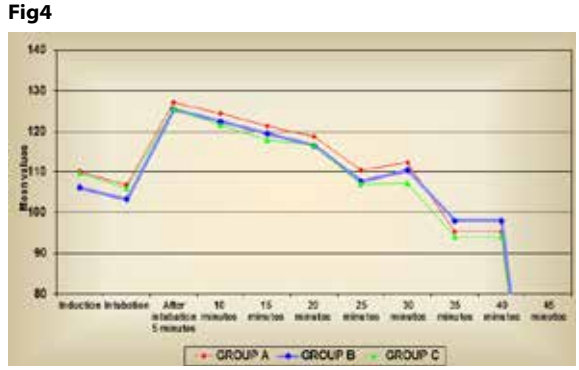
Table 6 : Changes in PACU MAP

PACU MAP at	PACU MAP						'p'
	Group A		Group B		Group C		
	Mean	SD	Mean	SD	Mean	SD	
0 minute	111.2	22.9	110.0	20.0	104.5	17.	0.5441 Not significant
15 minutes	106.2	20.0	105.9	18.2	99.1	15.7	0.378 Not Significant
30 minutes	100.0	17.0	100.8	15.3	95.2	11.8	0.4414 Not Significant
45 minutes	95.1	13.6	98.6	13.4	92.1	9.2	0.3544 Not Significant
60 minutes	110.0	0	110	0	110	0	-

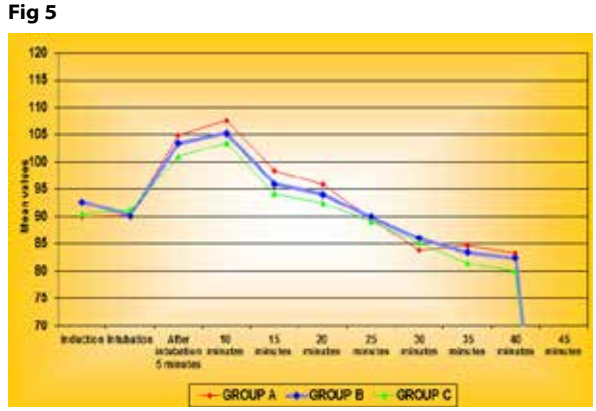
Table 8 : Analgesic Requirement

Group	Analgesic Requirement			
	Yes		No	
	No	%	No	%
Group A	10	50	10	50
Group B	4	20	16	80
Group C	3	15	17	85
'p' Value Between				
Group A & B	0.0479 Significant			
Group A & C	0.0204 Significant			
Group B & C	0.5 Not Significant			

CHANGES IN MEAN ARTERIAL PRESSURE
Fig4



CHANGES IN PULSE RATE
Fig 5



CHANGES IN ISOFLURANE CONCENTRATION %
Fig 6

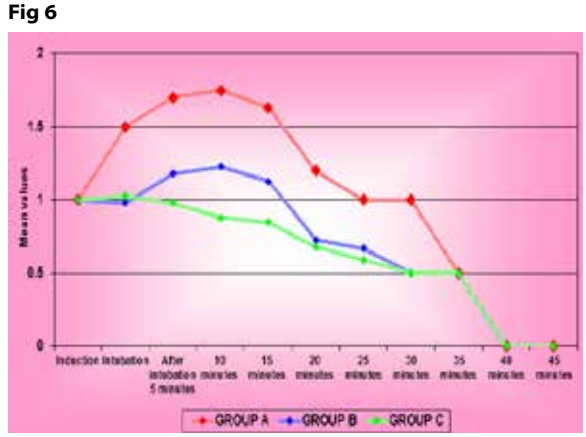
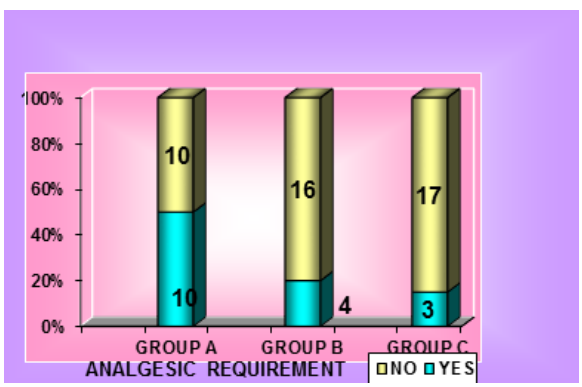


Fig 7

ANALGESIC REQUIREMENT

Fig 8

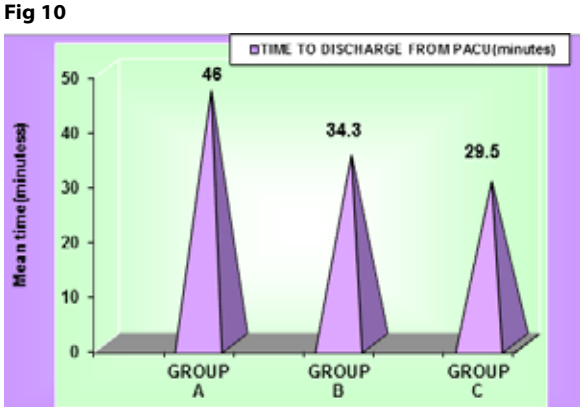


NAUSEA / VOMITING

Fig 9

TIME TO DISCHARGE FROM PACU

Fig 10



DISCUSSION:

Dexmedetomidine is a highly selective and specific α2 adrenoceptor agonist. By its central sympatholytic action, it promotes haemodynamic stability. It has potent sedative & analgesic and anaesthetic sparing property without respiratory depression (4). Dexmedetomidine is eight times more specific for α2 receptors than clonidine (α2: α1 ratio for dexmedetomidine is 1620:1; for clonidine, 220:1) (5)

Dexmedetomidine has sedative and antinociceptive effects due to stimulation of α2A in locus coeruleus.

It reduces analgesic requirement by modulation of nociception at spinal noradrenergic systems & α2 receptors in dorsal horn of spinal cord release endogenous opiate compounds.

Usage of Dexmedetomidine is associated with less incidence of nausea, vomiting & reduced antiemetic therapy. There is a reduced analgesic requirement

Length of PACU stay may be reduced due to less nausea , vomiting & better hemodynamic stability(3)

Earlier studies like burcu tufangullari et al (1) have shown that intra operative Dexmedetomidine infusion attenuated sympathetic response & reduce analgesic requirement, length of stay in PACU which is consistent with our study

Chirag ramlal patel,(2) in their study there is delay in post operative recovery. But in our study there is no delay in recovery

CONCLUSION:

Adjuvant use of intra operative Dexmedetomidine infusion of both 0.2& 0.4µ/kg/hr attenuated intraoperative sympathetic stimulation & reduce analgesic requirement, nausea, vomiting & antiemetic therapy, length of PACU stay.

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