ORIGINAL RESEARCH ARTICLE

Dexmedetomidine as an Adjuvant to Balance General Anaesthesia for Gynecological Laproscopic Surgeries in Terms of Effect on Haemodynamics, Recovery Profile, Analgesia Requirements

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ABSTRACT

Introdcution: laparoscopy is now a days widely used as it gives minimum access,no big scars,early ambulation,less mean hospital stay. CO_2 used for pneumoperitoneum in laproscopy causes sympathoadrenal response. We have used Alpha 2 agonist Dexmedetomidine to attenuate the sympathetic response. Study aimed to compare Haemodynamic responses during laryngoscopy and intubation, Intra-operative haemodynamic stability during laparoscopic surgeries, post-operative hemodynamic stability, analgesia and sedation, effects of i.v. dexmedetomidine on analgesic consumption and inhalation anaesthetic requirements ,post operative side effects.

Material and Methods: Randomised controlled observation study was done inVS General Hospital, NHLM Medical college Ahmedabad Gujarat,from February 2016 to February 2017. Sixty female patients of ASA grade I and grade II posted for elective gynecological laparoscopic sugeries were devided in to two groups, Group D in which inj. Dexmedetomidine was infused.and Group C in which normal saline was infused. Demographic parameters were non significant in both the groups. Baseline Heart Rate and blood Pressure were not significant in both the groups. Group-D patients received inj. Dexmedetomidine 1µg/kg and 0.5 mcg/ kg/hour as maintenance was infused. Group- C received inj.Normal saline of loading dose over 10 minutes before induction and infusion of inj. Normal saline were given respectively in similar 50 cc syringe through syringe pump for blinding. Stress response to intubation, intraoperative haemodynamic stability and effect on requirement of inhalational agent, pressor response to extubation, recovery parameters, peri operative analgesic requirement, post operative sedation and complications were recorded.

Results: In our study post intubation pulse rate, systolic blood pressure and diastolicblood pressure are significantly lower in Group D compared to Group C.($p < 0.05$). The end-tidal Sevoflurane concentration was significantly lower in Group D(0.7%) as compared to Group C(1.1%) intraoperatively. Intraoperative analgesic requirements are significantly lower in Group D(2/30 patients) as compared to Group C (11/30 patients). Post operative sedation and analgesia are significantly high in Group D as compared to Group C up to 4 hours postoperatively. Recovery parameters are comparable in the groups ($p>0.05$) like extubation time, respond to verbal command and time for orientation.

Conclusion: Dexmedetomidine provides attenuation of stress respone. Due to laryngoscopy , intubation, pneumoperitoneum, extubation, decrease endtidal Sevoflurane concentration less Complications when used in gynecological laparoscopic surgery.

Keywords: Dexmedeomidine, Gnecological Laparoscopic Surgery, Haemodynamic Stability, Pressure Response To Pneumoperitoneum

INTRODUCTION

Laparoscopic surgery is one of the most important diagnostic and therapeutic tools in the present surgical era. The benefits of minimal access techniques become obvious when compared to open laparotomies, and include less pain, early mobilization, shorter hospital stay and better cosmetic

results which have further increased its applications. This minimally invasive procedure involves creating an artificial pneumoperitoneum for adequate visualization and operative manipulation. This is achieved by insufflating the abdomen with carbondioxide. Pneumoperitoneum induces patho-physiological changes that have the propensity to complicate anaesthetic management as it affects several homeostatic systems leading to alterations in acid - base balance, cardiovascular system, pulmonary physiology and stress response. The cardiovascular changes associated with pneumoperitonium include an increase in mean arterial pressure (MAP), decrease in cardiac output and increase in systemic vascular resistance which in turn compromise tissue perfusion.

To prevent and counteract these effects, appropriate monitoring and pharmacological interventions are required. Such interventions include preloading with intravenous fluids, administration of general anaesthesia with vasodilating anesthetics and using direct vasodilators like Nitroglycerine (9), high doses of Opioids(7), centrally acting α_2 agonists like Clonidine and Dexmedetomidine(18) Xylocard (4)and oral Gabapentin .

Dexmedetomidine is a selective α_2 receptor agonist with additional properties of analgesia, sympatholysis and titrating sedation without major respiratory depression. It reduces the requirements for opioids and the patient's stress response to surgery. It has a distribution half life of approximately 6 minutes, so it can be used successfully for attenuating the stress response to laryngoscopy.

This study was planned to compare the effects of Dexmedetomidine and normal saline on attenuation of hemodynamic changes and their effects as adjuvants in anaesthesia during laparoscopic surgeries.

This study was carried out with the aim to compare the effect of Dexmedetmdine infusion and saline infusion. The aims and objectives were to compare:

Haemodynamic responses during laryngoscopy and intubation,Intra-operative haemodynamic stability during laparoscopic surgeries, Post-operative hemodynamic stability, analgesia and sedation ,Effects of I.V. Dexmedetomidine on analgesic and inhalation anaesthetic requirements. ,Post operative side effects.

MATERIAL AND METHODS

After taking written informed consent, a total of 60 female patients with ASA physical status I or II, aged between 15-60 years, of either sex were randomly selected for this study. They were scheduled for elective gynecological laparoscopic surgeries lasting for around two hours under general anaesthesia and were divided into two groups (n=30 for each group).

Group Allocation

It was done randomly by odd& even numbering opaque sealed envelopes.execution of Randomisation at time of giving general anaesthesia. Total 60 patients are enrolled in study. They are equally divided in 2 groups (30 each.)

Group D:(Dexmedetomidine group)

Inj . Dexmedetomidine 1 mcg/kg bolus over 10 min& then 0.5 mcg/kg/hour through syringe pump.

Group C:(Control group)

Inj. NS of same volume.

Exclusion criteria

1. Patients posted for emergency surgical procedures
2. Patients with cardiovascular, respiratory or renal disorders, diabetes,hypertension, obesity, difficult airway
3. Pregnant patients
4. Patients who were actively breast feeding
5. Patients with a history of sleep apnea
6. Patients with a history of psychiatric disorders
7. Surgeries that lasted for more than 150 minutes
8. The total time for laryngoscopy was kept below 20 seconds, rest were excluded.

Pre-Anesthestic Evaluation

Pre-anaesthetic check up was conducted and a detailed history and complete physical examination was recorded. Routine investigations like complete haemogram (CBC), random blood sugar (RBS), serum creatinine and blood urea nitrogen (RFT), serum bilirubin and serum alkaline phosphatase and serum acidphosphatase (LFT), Chest X-ray (PA view) (CXR) and electrocardiogram (ECG) were done. On the day of the surgery, the patient's preoperative values for heart rate (HR), noninvasive blood pressure (BP), pulse oximetery (SpO_2), electrocardiogram (ECG) were recorded after the patient was brought to the preoperative room.

In operation theatre

Before induction

Multichannel monitor was applied to each patient. Patients' HR, BP (Systolic and Diastolic) and SpO_2 were recorded before induction(Baseline).

An 18-gauge intravenous cannula was inserted and the patient was pre-loaded with 5ml/kg of crystalloids. Before induction of anaesthesia, all patients received premedication. Intravenous 0.2 mg Glycopyrrolate, 1 mcg/kg Fentanyl, 4mg Ondansetron were given before induction of anaesthesia.

The group-D patients were given Dexmedetomidine 1 μg/kg loading dose over 10 minutes via infusion pump while in group-C, patients received the same volume of normal saline over 10 minutes. The patient's HR, BP (Systolic and Diastolic) and SpO2 were recorded at the end of the bolus drug injection.

Induction

Balanced general anaesthesia was administered to all the patients. Induction was achieved with 5 mg/kg intravenous inj. sodium Thiopentone sodium and inj. Lignocaine 1 mg/kg. Intubation was facilitated by 2 mg/kg intravenous inj Succinylcholine.

Maintanance

Muscle relaxation was maintained with Vecuronium (0.8

mg/kg loading dose, 0.2 mg/kg maintenance dose as and when required). The lungs were ventilated by maintaining a tidal volume of 7-10 ml/kg, a frequency of 12-14 breaths/min and fresh gas flow of 3 L/min with 60% nitrous oxide in oxygen in the closed circuit with fresh soda lime. Sevoflurane inhalation was started with 1.5% in both the groups. Inj. Dexmedetomidine maintenance infusion at 0.5 µg/kg/hour was started in group-D and saline infusion was started in group-C in the same dose. End tidal sevoflurane was monitored with multi gas analyzer of Drager work station.

Intraoperative monitoring

Routine monitoring consisted of HR, BP, SpO_2, ECG and $EtCO_2$. The measurements were taken on the same arm throughout the study at the following times : baseline, after loading dose, after 1,3 & 5 minute of intubation, before pneumoperitoneum, after pneumoperitoneum, after 1st trocar insertion, after 10, 20, 30, 40, 60, 80, 100, 120 minutes of pneumoperitonium.

Infusion was stopped at the time of closure of ports.

Intra-operative bradycardia (pulse rate < 50) was treated with Inj. Atropine 0.6 mg.

Intra-operative hypotension was treated with intravenous crystalloids and by reducing the concentration of Sevoflurane.

An increase in HR and/or BP > 20% from baseline values was treated by increasing the Sevoflurane concentration in increments of 0.2% as required.

If there is no response within 5 minutes, 1 µg/kg of intravenous Fentanyl was administered.Sevoflurane inhalation was stopped 10 minutes before the end of surgery.

Duration of surgery was time interval between skin incision to the skin closure.

Reversal and Extubation

On completion of the surgery, the neuromuscular blockade was reversed with 0.2 mg Glycopyrrolate for each milligram of Neostigmine and 0.05 mg/kg intravenous Neostigmine. Vitals were recorded after extubation. Recovery parameters were noted which included extubation time, response to verbal command and time for orientation.

Postoperative haemodynamics, vas score, sedation score

Vitals were monitored in post-operative ward at 1 hour, 2 hours, 3 hours, 4 hours and at 6 hours. Patients were watched for any adverse effects. Patients in both the groups were monitored for sedation and pain using the Ramsay sedation score and VAS score for up to 6 hours after the surgery.

Intravenous Diclofenac was given if VAS ≥ 4 and other post operative complications were treated accordingly.

Post-operative pain intensity was assessed using a 10-point VAS score (Visual Analogue Scale) in which 0 indicated no pain and 10 indicated the worst pain imaginable.

The degree of sedation was assessed using the 6 point Ramsay sedation scale:

1 Anxious or agitated and restless or both
2 Cooperative, oriented and tranquil
3 Drowsy but responds to commands
4 Asleep, brisk response to light glabellar tap or loud auditory stimulus
5 Asleep, sluggish response to light glabellar tap or loud auditory stimulus
6 Asleep and unarousable

STATISTICAL ANALYSIS

The results were tabulated and statistically analysed using SPSS (Statistical Package for Social Sciences) version 12.

Independent t-test was used to compare the study group and the control group.

Paired t-test was used to compare the variable before and after the intervention

Chi-square test was used to analyze the categorical data and for testing the association between the variables.

The results are expressed as mean ± SD.

P<0.05 was considered as significant.

RESULTS

60 female patients were randomly selected and divided into two groups. The Dexmedetomidine group (Group D, n=30) received Dexmedetomidine and the control group (Group C, n=30) received normal saline in elective laparoscopic surgery. Both groups were compared for their efficacy in regards to pressor response to intubation and extubation, haemodynamic stability, effect on the requirement of inhalational agents and analgesics, and side

	Group-D		Group-C		P-value	Inference
	MEAN	SD	MEAN	SD		
Age	35	8.8	35	10.5	>0.05	NS
Weight	66	8.8	63	7.01	>0.05	NS
Duration of surgery	140	11.9	142	11.7	>0.05	NS

Types of surgeries	Group- D	Group C
Laparoscopic tubal ligation	12	14
Laparoscopic assistance Hysterectomy	4	6
Diagnostic Laparoscopy	6	4
Laparoscopic myomectomy	4	2
Laparoscopic ovarian cyst removal	4	4

Table-1:

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		Group-D (n=30)		Group-C (n= 30)		P-value	Inference
		Mean	SD	Mean	SD		
Preoperative	Baseline	83	10.69	83	11.36	>0.05	NS
	After loading dose	80	9.22	94	10.12	<0.05	S
	After 1 minute of Intubation	86	8.14	100	10.01	<0.05	S
	After 3 minutes of Intubation	79	6.69	93	11.03	<0.05	S
	After 5 minutes of Intubation	70	3.6	88	11.06	<0.05	S
Intraoperative	Before Pneumoperitoneum	69	4.41	85	9.49	<0.05	S
	After Pneumoperitoneum	66	5.69	83	7.86	<0.05	S
	After 1st Trocar Insertion	61	3.84	81	9.13	<0.05	S
	After 10 Minutes of Pneumoperitoneum	62	3.99	96	9.62	<0.05	S
	After 20 Minutes of Pneumoperitoneum	55	4.5	91	8.91	<0.05	S
	After 30 Minutes of Pneumoperitoneum	63	10.82	88	8.64	<0.05	S
	After 40 Minutes of Pneumoperitoneum	62	10.55	90	8.83	<0.05	S
	After 60 Minutes of Pneumoperitoneum	63	8.87	92	8.98	<0.05	S
	After 80 Minutes of Pneumoperitoneum	68	10.43	89	8.71	<0.05	S
	After 100 Minutes of Pneumoperitoneum	65	9.86	86	8.8	<0.05	S
	After 120 Minutes of Pneumoperitoneum	63	4.33	83	8.5	<0.05	S
	After stopping Infusion	61	3.39	95	9.24	<0.05	S
	After Extubation	67	4.49	96	9.50	<0.05	S
Post-operative	1st post operative hour	68	5.33	96	7.82	<0.05	S
	2nd post operative hour	66	7.30	90	7.30	<0.05	S
	3rd post operative hour	69	8.35	83	6.74	<0.05	S
	4th post operative hour	69	6.47	75	6.38	<0.05	S
	6th post operative hour	72	7.69	70	5.9	>0.05	NS

Table-2: Changes in heart rate

Time		Group D		Group C		P Value	Inference
		Mean	SD	Mean	SD		
Preoperative	Baseline	124	10.08	123	10.8	>0.05	NS
	After loading dose	114	5.15	119	9.36	<0.05	S
	After 1 minute of Intubation	116	5.21	155	8.69	<0.05	S
	After 3 minutes ofIntubation	113	4.90	148	9.02	<0.05	S
	After 5 minutes ofIntubation	106	3.81	134	8.23	<0.05	S
Intra-operative	Before pneumo peritoneum	104	3.70	137	7.09	<0.05	S
	After pneumo peritoneum	106	4.34	141	9.46	<0.05	S
	After 1st trocar insertion	112	5.44	137	9.55	<0.05	S
	After 10 Minutes of Pneumoperitoneum	120	6.5	134	7.78	<0.05	S
	After 20 Minutes of Pneumoperitoneum	122	7.20	139	10.52	<0.05	S
	After 30 Minutes of Pneumoperitoneum	111	7.64	132	8.65	<0.05	S
	After 40 Minutes of Pneumoperitoneum	110	6.88	141	9.96	<0.05	S
	After 60 Minutes of Pneumoperitoneum	114	7.11	139	13.63	<0.05	S
	After 80 Minutes of Pneumoperitoneum	110	6.53	139	13.37	<0.05	S
	After 100 Minutes of Pneumoperitoneum	109	5.77	131	13.06	<0.05	S
	After 120 Minutes of Pneumoperitoneum	115	7.19	129	12.07	<0.05	S
	After stopping Infusion	116	6.73	134	9.09	<0.05	S
	After Extubation	124	7.07	138	9.59	<0.05	S
Post operative	1st post operative hour	125	7.16	144	9.98	<0.05	S
	2nd post operative hour	125	7.15	132	9.42	<0.05	S
	3rd post operative hour	115	7,15	122	9.16	<0.05	S
	4th post operative hour	115	8.23	123	9.29	<0.05	S
	6th post operative hour	106	9.1	123	6.6	<0.05	S

Table-3: Changes in systolic blood pressure (SBP)

Time		Group D		Group C		P value	Inference
		Mean	SD	Mean	SD		
Preoperative	Baseline	73	9.61	74	11.24	>0.05	NS
	After loading dose	68	5.8	73	8.9	<0.05	S
	After 1 minute of Intubation	73	4.4	84	7.9	<0.05	S
	After 3 minutes of Intubation	68	3.9	76	7.9	<0.05	S
	After 5 minutes of Intubation	67	4.6	69	6.3	<0.05	S
Intra-operative	Before pneumo peritoneum	62	4.6	78	6.3	<0.05	S
	After pneumo peritoneum	62	4.5	72	4.7	<0.05	S
	After 1st trocar insertion	65	5.8	71	8.5	<0.05	S
	After 10 Minutes of Pneumoperitoneum	67	0.9	70	7.1	<0.05	S
	After 20 Minutes of Pneumoperitoneum	62	6.2	70	5.7	<0.05	S
	After 30 Minutes of Pneumoperitoneum	60	4.09	68	5.5	<0.05	S
	After 40 Minutes of Pneumoperitoneum	62	6.59	83	7.9	<0.05	S
	After 60 Minutes of Pneumoperitoneum	58	4.52	80	8.1	<0.05	S
	After 80 Minutes of Pneumoperitoneum	60	3.77	83	8.07	<0.05	S
	After 100 Minutes of Pneumoperitoneum	58	3.83	72	7.2	<0.05	S
	After 120 Minutes of Pneumoperitoneum	56	4.09	64	6.2	<0.05	S
	After stopping Infusion	63	6.94	87	8.3	<0.05	S
	After Extubation	65	6.36	87	8.4	<0.05	S
Post-operative	1st post operative hour	66	6.63	91	8.9	<0.05	S
	2nd post operative hour	66	5.03	85	8.3	<0.05	S
	3rd post operative hour	65	4.83	76	7.5	<0.05	S
	4th post operative hour	65	4.49	79	7.7	<0.05	S
	6th post operative hour	65	4.48	80	8.2	<0.05	S

Table-4: Changes of diastolic BP

Time		Group D		Group C		P value	Inference
		Mean	SD	Mean	SD		
Preoperative	After 1 minute of Intubation	1.5	0	1.5	0	>0.05	NS
	After 3 minutes of Intubation	0.9	0.08	1.4	0.22	<0.05	S
	After 5 minutes of Intubation	0.6	0.15	1.4	0.21	<0.05	S
Intra-operative	Before pneumoperitoneum	0.5	0.1	1.2	0.28	<0.05	S
	After pneumoperitoneum	0.69	0.1	1.2	0.29	<0.05	S
	After 1st trocar insertion	0.79	0.06	1.11	0.21	<0.05	S
	After 10 Minutes of Pneumoperitoneum	0.81	0.07	1.16	0.3	<0.05	S
	After 20 Minutes of Pneumoperitoneum	0.8	0.07	1.17	0.28	<0.05	S
	After 30 Minutes of Pneumoperitoneum	0.67	0.15	1.1	0.19	<0.05	S
	After 40 Minutes of Pneumoperitoneum	0.76	0.09	1.16	0.27	<0.05	S
	After 60 Minutes of Pneumoperitoneum	0.78	0.07	1.12	0.25	<0.05	S
	After 80 Minutes of Pneumoperitoneum	0.78	0.07	1.1	0.21	<0.05	S
	After 100 Minutes of Pneumoperitoneum	0.74	0.13	1.04	0.14	<0.05	S
	After 120 Minutes of Pneumoperitoneum	0.79	0.03	1.05	0.16	<0.05	S
	After stopping Infusion	0.78	0.06	1.03	0.13	<0.05	S

Table-5: Endtidal sevoflurane concentration

Hours after Extubation	Group D		Group-C		P value	Inference
	Mean	SD	Mean	SD		
1	2	0.4	4	0.7	<0.05	S
2	2	0.48	4	0.5	<0.05	S
3	2	0.7	4	0.49	<0.05	S
4	3.	0.58	3.58	0.25	<0.05	S
6	4	0.41	3.8	0.5	>0.05	NS

Table-6: VAS scale

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Hours after Extubation	Group D		Group C		P value	Inference
	Mean	SD	Mean	SD		
1	3	0.71	1.13	0.37	<0.05	S
2	3	0.74	1.13	0.3	<0.05	S
3	2	0	1	0	<0.05	S
4	2	0	1	0	<0.05	S
6	1	0	1	0	>0.05	NS

Table-7: Ramsay sedation score

	Group D	Group C	P value	Inference
Total no.of patientsrequiring inj.Fentanyl	2/30	11/30	<0.05	S

Table-8: Intraoperative analgesic requirement :

effects.

1. Demographic data and operative data

As shown in Table 1, there was no significant difference in the age, sex, weight, type and duration of surgery in each group.

As shown in table 1, the base line mean heart rate was not significant between two groups. Decrease in mean heart rate was found significant after loading dose, after intubation 1 minute, 3 minutes and 5 minutes, and then after up to 4th post operative hour in dexem group (group D) as compared to saline group (group C).

Changes of systolic and diastolic BP

As shown in table 2 table 3,4, base line systolic and diastolic blood pressure was not significant between two groups. Significant decrease in systolic and diastolic blood pressure was found after loading dose till extubation and in postoperative period too.

Table 5 shows that end tidal Sevoflurane requirement was significantly less in Group D as compared to Group C.

Table 6 shows that VAS score is significantly less in Group D up to 4 hours after extubation. Table 7 shows that sedation in Group D is significant till 4th post operative hour as compared to Group C. Table 8 shows that the perioperative requirement of inj.Fentany, inj. Diclofenac is significantly less in Group D as compared to Group C .

DISCUSSION

Patients undergoing laparoscopic surgeries needs general anaesthesia and for that endotracheal intubation is required. Laryngoscopy and endotracheal intubation are known to develope hemodynamic changes such as an increase in blood pressure(BP) and heart rate. In susceptible patients, such changes may lead to myocardial ischemia or a rise in the intracranial pressure. Anish Sharma et al[5] used dexmedetomidine for the same.

Vandana et al[8] also used & compared Dexmedetmdine & propofol to attenuate pressure response to pneumoperitoneum. Hence, a drug that can blunt the sympatho-adrenal response to laryngoscopy and intubation without having many adverse effects was required for this purpose.

CO_2 pneumoperitoneum causes profound haemodynamic changes by significant release of catecholamines, cortisol, renin-angiotensin-aldosterone and vasopressin thus leading to an increase in Systemic Vascular Resistance (SVR), causing systemic hypertension, increase in Pulmonary Vascular Resistance (PVR) and inotropic effects on the heart such as tachycardia. The Trendelenburg position given intraoperatively increases the intra-abdominal pressure which in turn reduces venous return and cardiac output, leading to cardiac dysfunction.[3,4] Tanskanen et al[23] used dexmedetomidine for the same.

Dexmedetomidine is an Imidazoline derivative which selectively acts on the α_2 receptors as an agonist. By attenuating sympathetic activity, it inhibits the release and uptake of Norepinephrine. It acts through three types of α receptors- α_{2A}, α_{2B} and α_{2C} situated in brain and spinal cord. Stimulation of α_{2A} and α_{2C} in locus ceruleus causes sedation. In the spinal cord, activation of both α_{2A} and α_{2C} receptors directly reduce pain transmission by reducing release of substance-P, which produces analgesia.[6,8] It increases cardiac baroreceptor sensitivity and also blunts the stress respone to surgical stimuli. In our study in Group-D, loading dose of inj Dexmedetomidine 1μg/kg in infusion over 10 minutes and maintenance dose of inj.Dexmedetomidine 0.5μg/kg/hour was used.

In group-C same volume of inj. Normal saline was given.

Chirag Patel et al[6] used inj. Dexmedetomidine for better haemodynamic stability in laparoscopic surgeries. In present study, 60 female patients of ASA physical status 1 or 2, aged between 20-55 years, undergoing various elective gynecological laparoscopic surgery were randomly selected and compared for haemodynamic stability, Sevoflurane requirement and post-operative analgesia, sedation, recovery and complications.

Demographic parameters: The patients in the two groups were comparable in demographics. (p>0.05).

Type of Surgery: Aho et al[2] use Dexmedetomidine to attenuate pressure response to pneumoperitoneum in gynecological laparoscopic tubal ligation

Pretreatment: Ali QE& Siddiqui OA[4] used inj.Xylocard pretreatment for attenuation of pressure response to laryngoscopy & incubation as our study.

Response to laryngoscopy

In our study, after giving the loading dose of Dexmedetomidine in Group-D, there was a significant attenuation of heart rate and blood pressure in response to laryngoscopy and intubation as compared to group-C which received normal saline. After 1 minute of intubation HR, SBP and DBP in Group-D are 86±8.1,116± 5.2 and73 ± 4.4 respectively and in group-C 100 ± 10.1 ,155 ± 8.6, 84 ± 7.9 respectively. After 3 minutes of intubation HR, SBP and DBP in Group-D are79± 6.6,113± 4.9 and76 ± 7.9 respectively and in group-C 93 ± 11.03,148 ± 9.02, 76 ± 7.9 respectively. After 5 minutes of intubation HR, SBP and DBP in Group-D are 70±3.6,106± 3.8 and67± 4. respectively and in GROUP-C 88 ± 11.06 ,134± 8.2, 69 ± 6.3 respectively.

There are similar studies in which the pressor response to laryngoscopy and intubation were recorded. Anish Sharma et al.[5] studied that the Dexmedetomidine group, in which patients received 1 μg/kg IV infusion15 minutes before induction, showed significant attenuation of pressor response during laryngoscopy and intubation. Maximum changes in HR, SBP, DBP and MAP were observed at 1 min after intubation in Dexmedetomidine group and control groups. There was a constant decrease in HR, SBP, DBP, MAP from the time of the induction until 10th min of intubation which was statistically highly significant as compared to control group.

Lawrence and De Lange[16] found that a single dose of 2 μg/kg of Dexmedetomidine before induction of anaesthesia attenuated the hemodynamic response to intubation as well as to extubation. Bradycardia was observed at the 1st and 5th minutes after administration of the drug. This might have been due to bolus administration.

Response to intra-opertive hemodynamic parameters

In our study, in Group D the intra-operative heart rates and blood pressures are significantly less as compared to group-C. After pneumoperitoneum, HR, SBP, DBP is Group-D are 66 ± 5.6, 106 ±4.3, 62 ± 4.5 respectively and in Group-S they are 83±7.8, 141±9.46 and 72 ± 4.7 respectively. After 60 minutes of pneumoperitoneum HR, SBP, DBP is Group-D are 63 ± 8.8, 114 ±7.1, 58 ± 4.5 respectively and in group-C they are 92±8.9,139±13.6 and 80 ± 8.1 respectively.

A similar study was done by Tanskanen et al.[23] Their study showed that an intraoperative infusion of Dexmedetomidine at a rate of 0.4 μg/kg/h maintained heart rate and blood pressure in an acceptable range for a longer duration as compared to the placebo group. The decrease in heart rate and blood pressure is similar to the findings by Feld et al[10] who compared Dexmedetomidine with Fentanyl in bariatric surgery, thus showing that Dexmedetomidine, by its sympatholytic activity, attenuates various stress responses during surgery and maintains haemodynamic stability.

Effect on end-tidal sevoflurane concentration

The end tidal Sevoflurane concentration is significantly less in Group D as compared to group-C (p value<0.05) in our study. The average et_{Sevo} concentration during maintenance was 0.7% and 1.1% in Group-D and Group-S, respectively, in present study.

There are many studies in which it has been shown that Dexmedetomidine decreases the intraoperative analgesic requirement and inhalational agent requirement.

A similar study was done by Chirag Patel et al.[6] They studied the effect of intravenous infusion of Dexmedetomidine on perioperative haemodynamic changes and postoperative recovery. In their study, the Fi_{sevo} concentration was significantly less in the Dexmedetomidine group (group B) as compared to the Fentanyl group (Group A) at all time points (p< 0.05). The average et_{Sevo} concentration during anaesthetic maintenance was 1.35% and 1.72% in group B and A, respectively. A significant decrease of 13% to 33% of et_{Sevo} concentration was seen with group B from 5 min to 60 minutes post-intubation (p< 0.05) during surgery.

Aantaa R et al[1] evaluated the effect of Dexmedetomidine on minimum alveolar concentration (MAC) of Isoflurane. It was assessed and observed that the end tidal MAC of Isoflurane was 0.85% in the control group, 0.55% with the low dose of Dexmedetomidine and 0.45% with the high dose of Dexmedetomidine

Effect on **intra-operative requirement of analgesics:**

In present study only two patients required Fentanyl intraoperatively in Group-D which is significantly less as compared to group-C in which 11 pateints required Inj. Fentanyl.

Rabie Soliman and Gomaa Zohry[22] did a similar study where they demonstrated that a loading dose of 1 μg/kg over 15 minutes before induction and maintenance with 0.3 μg/kg/hour of Dexmedetomidine infusion is safe for cardiac patients undergoing laparoscopic cholycystectomy. It attenuated the changes in heart rate and blood pressure and decreased the total dose of Fentanyl and end-tidal Sevoflurane and the requirement for medications in high risk cardiac patients.

Response to extubation

In present study we found that Group-D has significantly higher hemodynamic stability as compared to Group-C in response to extubation. After extubation, the heart rates and blood pressures for the C and D groups showed highly significant p-values in favor of Group-D.

Hall JE[13] did a similar study in which he concluded that Dexmedetomidine0.5 μg/kg given 5 minutes before extubation has been found to be more effective than Fentanyl 1 μg/kg in attenuating airway reflex responses to tracheal extubation and maintaining hemodynamic stability without prolonging recovery.

Priya et al.[20] noted that a single dose of Dexmedetomidine and Esmolol were effective in controlling the rise of pulse and blood pressure during extubation phase and Dexmedetomidine was more effective than Esmolol because of its additional analgesic and sedative actions.

Effect on recovery parameters

In our study, we found that there is a slight delay in extubation, respond to verbal command and orientation

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in Group-D, but they are not significant (p value>0.05). Shirishkumar GC et al[21] in their study found no significant difference in the recovery parameters in Dexmedetomidine group and control group.

Effect on post-operative haemodynamic parameters, sedation and analgesia

Table No. 2, 3, 4 shows, that in Group-D, there was significant stable haemodynamics post operatively (p<0.05). Sedation was significantly high till 4 hours in Group-D (p<0.05) and the post-operative analgesia was earlier in Group-C according to VAS score in table 6. It was < 4 up to 4 hours in Group-D (p < 0.05) so 1st rescue analgesic (inj. Diclofenac) was required late in Group-D patients.

Tobias JD and Berkenbosch JW[24] studied that the quality of sedation is better and the need for rescue sedation is less with Dexmedetomidine use as compared to Midazolam and there is no significant adverse effect on the hemodynamic or respiratory function.

Keniya VM, Ladi S et al.[15] studied that in patients undergoing laparoscopic tubal ligation, a 33% decrease in Morphine use post-operatively was observed when Dexmedetomidine was used at a dose of 0.4 μg/kg.

Venn et al[25] reported that Dexmedetomidine decreased the need for rescue sedation and analgesia significantly for up to24 hours after the operation. Gurbet et al[12] reported that effective postoperative analgesia and a reduction in requirement for postoperative Morphine with consequent reduction in the incidence of adverse effects could be achieved by continuous IV administration of Dexmedetomidine during abdominal surgery.

Post Operative Complications: Dexmedetomidine provides sedation and analgesia with no accompanying respiratory depression.

Respiratory depression: In our study none of the patients had respiratory depression. Patients are able to return to the baseline level of consciousness when stimulated after giving Dexmedetomidine.

This feature was shown by Hall et al[13] using bispectral index (BIS) monitoring system and other psychometric tests.

Guler G[11] found no respiratory depression in any of the patients who received Dexmedetomidine. Dexmedetomidine 0.5 μg/kg given as a single-dose bolus before tracheal extubation has been shown to attenuate airway-circulatory reflexes during extubation with no difference between the groups in the incidence of breath holding or desaturation.

Nausea, vomiting: In our study, we found that total three patients had complications like nausea and vomiting in Group-D but they are not significant as compared to Group-C (p<0.05) Similar studies were done to watch for such complications after giving Dexmedetomidine. Al Mustafa et al[3] in their study concluded that dexmedetomidine single dose of 1 μg/kg decreases incidence and severity of postoperative nausea and vomiting in laproscopy surgery.

Shivering: The mechanism of shivering in patients recovering from anaesthesia is poorly understood, but volatile anaesthetic agents are usually are associated with altered temperature regulation.This effect of Dexmedetomidine might be due to decreased end tidal concentration of Sevoflurane and by its activity at α_{2B} receptors in the hypothalamic thermoregulatory centre of brain.

Horn et al.[14] found in their study that none of the patients in Group Dexmedetomidine had post operative shivering compared to control group.

During extubation, pulse rate and blood pressure values are increased significantly in Group C as compared to Group D.soDexmedeomidine prevent extubation response success fully. Priya V et al[20] also shown Dexmedemidine to attenuate extubation response.

CONCLUSION

In nutshell we conclude that Dexmedetomidine, given, as an adjuvant to balanced general anaesthesia for elective gynecological laparoscopic surgeries provides an effective attenuation of pressor response to laryngoscopy,intubation,extubation, provides stable perioperative haemodynamics with less requirement of analgesic and inhalational agent without any significant adverse effects.

REFERENCES

1. Aantaa R, Jaakola ML, AnteroK, Jussik. Reduction of the Minimal AlveolarConentration of Isoflurane by Dexmedetomidine.Anaesthesiology 1997;86(1):1055-60.
2. Aho M LethtinenAM, Erkola O, KallioA, Korttila K. The effect of intravenously administered Dexmedetomidine on pain after laparoscopic tubal ligation. Anaesthesia and analgesia 1991;73(5):112-8.
3. Al-Mustafa, Subhi M. Alghanem. A balanced anaesthesia with Dexmedetomidine decreases postoperative decreases postoperative nausea and vomiting after laparoscopic surgery. Saudi Med J 2009;Vol.30(12): 1537-1541.
4. Ali QE, Siddiqui OA, Khan YA. Effects of Xylocard pretreatment on haemodynamics in patients undergoing laparoscopic cholecystectomy. RMJ. 2010 ;35(2) : 188-191. Anesth Analg. 1998;86(2):301-3.
5. Anish Sharma N.. G1, Shanakarnarayana Alpha 2 agonist Dexmedemidine attenuates pressure response to laryngoscopy& intubation.A clinics.(Sao Paulo) 2012;56(6):542-546.
6. Chirag Ramanlal Patel, Smita R Engineer, Bharat J Shah, and S Madhu.Effect of intravenous infusion of dexmedetomidine on perioperative haemodynamic changes and postoperative recovery: A study with entropy analysis. Indian J Anaesth. 2012; 56(6): 542-546.
7. Dimitriou V, Chantzi C, Zogogiannis I, Atsalakis J, Stranomiti J, VarveriM, Malefaki A. Remifentanyl preventing hemodynamic changes during laparoscopic adrenalectomy for pheochromocytoma. M.E.J.Anesth 2006; 18(5): 947-54
8. Dr Shah Vandana, Dr Patel Janak, Dr Patel Kirti.

Comparision of Dexmedetomidine and Propofol for hemodynamic changes and depth of anaaesthesia (using BIS monitor) during laparoscopic surgery. NHL journal of Medical Science Jan 2015/ Vol 4/ Issue 1
9. Feig BW, Berger DH, Dougherty TB, Dupuis JF, His B, Hickey RC, OtaDM. Pharmacologic intervention can reestablish baseline hemodynamic parameters during laparoscopy. Surgery 1994; 116(6): 733-9.
10. Feld JM, Hoffman WE, Stechert MM, Hoffman IW, Anandra RC. Fentanyl or Dexmedetomidine combined with desflurane for bariatric surgery. J Clin anesth. 2006 ; 18 (1) :24-8
11. Guler G, Akin A, Tosun Z, Eskitascoglu E, Mizrak A, Boyaci A. Single-dose Dexmedetomidine attenuates airway and circulatory reflexes during extubation. Acta Anesthesiol Scand. 2005;49(2):1088-91.
12. Gurbet A, Basagan-Mogol E, Turker G, Ugun F, Kaya F, Ozcan B.Intraoperative infusion of Dexmedetomidine reduces perioperative analgesic requirements Can J Anesth 2006; 53(6):646-52.
13. Hall JE,Jurich TD,Barney JA,Arian SR,Ebert TJ.sedative amnestic andanalgesic properties of small dose of Dexmedetomidineinfusion Anaesh Analg 2000;90(4);382-705.
14. Horn EP, Schroeder F, Wilhelm S, Sessler DI, Standl T, von dem Busche K et al. Postoperative pain facilitates nonthermoregulatory tremor. Anesthesiology 1999; 91(1): 979
15. Keniya VM, Ladi S, Naphade R. Deximedetomidine attenuates sympathoadrenal response to tracheal intubation and reduces perioperative anaesthetic requirement. Indian J Anesthesia 2011;55(4):352-7 .
16. Lawrence CJ,De Lange S. Effects of a single preoperative Dexmedetomidine dose on isoflurance requirements and perioperative haemodynamics stability. Anaesthesia 1997;52(2):736-44.
17. LobatoEB, Paige GB, Brown MM, BennettB, DavisJD. Pneumoperitoneum as a risk factor for endobronchial intubation during laparoscopic gynecologic surgery.
18. M.T. taittonen, O.A. Kirvela, R. Aantaa, J.H. Kanto. Effect of Clonidine & Dexmedetomidine premedication on perioperative oxygen consumption and hemodynamic state BJA 1997;78(1):400 406.
19. Mohamed H. Bakri, Eman A, Ismail and Ahmed Ibrahim; Comparision of Dexmedetomidine and dexamethasone for postoperative nausea and vomiting after laparoscopic cholecystectomy.Koren J Anesthesiol. 2015; 68(3): 254-260 .
20. Priya V et al. Comparative evaluation of attenuation of post extubation hyperdynemic responses with single dose dexmedetomidine or esmolol: a double blind randomized controlled trial. Asian archives of Anesth and Resuscitation. 2012 :74(2): 2199-205.
21. Shirishkumar G. Chavan, Gaurish P. Shinde,Swati P. Adivarekar, SandhyaH. gujar and Sunita Mandhyan, Anesth Essays Res. 2016; 10(2); 278-283.
22. Soliman R, Zohry G. Assessment of the effect of Dexmedetomidine in highrisk cardiac patients. 2016;19(4):606-613.
23. Tanskanen PE, Kyttä JV, Randell TT, Aantaa RE.Dexmedetomidine as an anaesthetic adjuvant in patients undergoing intracranial tumour surgery:A double-blind, randomized and placebo-controlled study. Br J Anaesth 2006;97(3):658-65.
24. Tobias JD. Dexmedetomidine : applications in pediatric critical care and pediatric anaesthesiology. Pediatrcrit care Med 2007;8(5): 115-131
25. Venn RM, Bradshaw CJ, Spencer R, Brealey D, Caudwell E, Naughton Cet al. Preliminary UK experience of Dexmedetomidine, a novel agent for postoperative sedation in the intensive care unit. Anaesthesia 1999; 54(2): 1136-42

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