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"EVALUATION OF DEXMEDETOMIDINE ON HEMODYNAMICS IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY"

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ABSTRACT

Background: The physiological response to surgical stress and anaesthesia is well documented. Laparoscopic surgery which involves insufflation with carbon dioxideproduces undesirable responses like hypertension, tachycardia and dysrhythmias. Introduction of Dexmedetomidine which is highly specific and selectiveα2 adrenoceptor agonist has been tried in various studies to modify the stress response to surgery and to have a pleasant anaesthetic outcome with minimal cardiovascular changes. In our present study we have taken the pharmacological advantage of Dexmedetomidine to study the various cardiovascular parameters at different periods during the laparoscopic procedure. The aim is to studythe effectiveness of Dexmedetomidineinattenuating the sympathetic response tolaryngoscopy and endotracheal intubation and in maintaining the hemodynamic stability in laparoscopic cholecystectomy.

Materials & Methods: 30 ASA I and II patients of either sex, scheduled for elective Laparoscopic Cholecystectomy under General anaesthesia were randomly allocated to receive either 1mcg/kg of Dexmedetomidine in 100ml of 0.9% normal saline (Group D,n=30) or 100ml of 0.9% normal saline(Group S, n=30) 30min beforeinduction.

Results: In patients who received Dexmedetomidine there was a statistically significant differencein heartrate, systolic blood pressure, diastolic blood pressure and meanarterial pressures during Laparoscopy and Intubation.

Conclusion:

Dexmedetomidine when given as a premedication before Laparoscopic Cholecystectomy attenuates the sympathetic response to laryngoscopy and intubation and provides stable intra operative hemodynamics.

KEYWORDS : Dexmedetomidine, Laparoscopic Cholecystectomy

INTRODUCTION

Laparoscopic surgical procedures are performed by insufflation of carbondioxide which produces adverse cardiac effects like tachycardia and hypertension. The intravenous administration of Dexmedetomidine before induction of anaesthesia attenuates sympathoadrenal response to laryngoscopyand intubation.It also provides hemodynamicstability during intraoperative period.

Dexmedetomidine is a specific α-2 adrenergic agonist. Dexmedetomidine is used as an adjuvant for premedication, especially in patients susceptible to preoperative and perioperative stress because of its sedative, anxiolytic, analgesic, sympatholytic, and stable hemodynamic profile. Dexmedetomidine decreases oxygen consumption in intraoperative period (up to 8%) and in postoperative period (up to 17%)[1]. Dexmedetomidine attenuates hemodynamic stress response to intubation and extubation by sympatholysis[2,3,4,5].

MATERIALS & METHODS

The study was conducted after approval of ethical committee of the institution. Written informed consent was obtained from all patients. Inclusion criteria were American Society of Anesthesiologists (ASA) physical status I or II, either sex, age 18–60 years, presenting for laparoscopic Cholecystectomy. Exclusion criteria were patient allergic to drug, morbidly obese, systemic hypertension, Cardiac and Renal dysfunction.

After thorough Pre-Anesthetic evaluation and up on arrival in the operation theatre, monitors were attached and baseline parameters such as heart rate, systemic arterial pressure and oxygen saturation were noted down. Two intravenous lines were secured, one 20-gauge cannula in the right hand for the infusion and another 18-gauge cannula in left hand for Intravenousfluidsanddrugadministration. Ringer lactate solution was infused at 2–3 ml/kg/h.

Group -D, received Dexmedetomidine 1mcg/kg as infusion in 100ml of 0.9% normal saline 30min before Induction of anesthesia where as Group - S received 100mI of 0.9% normal saline 30min before induction of anaesthesia.

Patients were induced with Thiopentone 5mg/kg. Endotracheal intubation was facilitated by succinylcholine 2mg/kg. Anaesthesia was maintained with 33% oxygen in nitrous oxide, and vecuronium bromide 0.1mg/kg. Intermittent positive pressure ventilation was continued by mechanical ventilator to maintain end tidal carbon dioxide between 35-40 mmHg.

Pneumoperitoneum was created by insufflations of carbondioxide at the rate of 2 liters /min. Intra-abdominalpressure was maintained at 14mmHg throughout the surgical procedure. Throughout the procedure, any rise in mean arterial pressure more than 20% from the baseline was treated with Nitroglycerin infusion.

Systolic, Diastolic and Mean Arterial blood pressure, Heart Rate, Saturation, End tial CO_2 and ECG were recorded pre-operatively, after infusion, 1min after induction, 1min after Intubation, after pneumoperitoneum, 15 min, 30min, 45min and 60 min after pneumoperitoneum, end of pneumoperitoneum and post-operative period.

At the end of surgery, patients were reversed with Inj. Glycopyrrolate 0.01mg/kg and Inj. Neostigmine 0.05mg/kg. Extubation was performed and transferred to recovery room

STATISTICALANALYSIS

The sample size is calculated by using the formula,$n= 4\sigma^2 / L^2$

All the data is compiled and analyzed statistically using Diagrammatic representation, Descriptive data presented as mean± SD and Continuous data are analyzed by paired/unpaired 't' tests and Chi-square test to assess the statistical differencebetween the two groups.

RESULTS

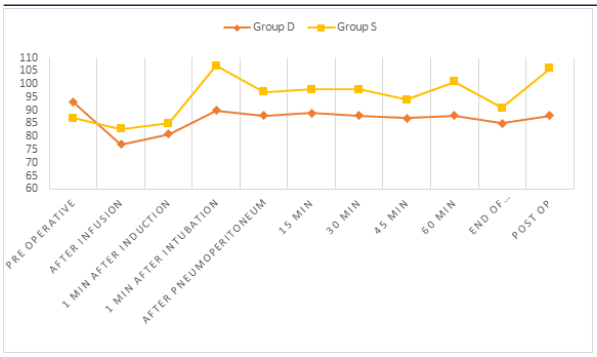
Statistically, there is no difference in the patient characteristics as shown in the table-1.

Table 1: Demography

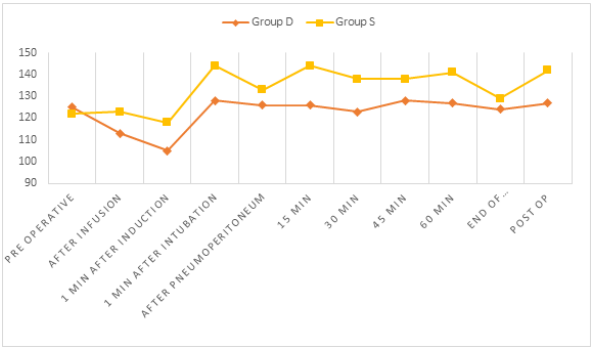
	Group D	Group S	t value	P value
Weight (Kgs) Mean±SD	60.56±9.00	62.03±6.90	0.70811	0.48(NS)
Age (Yrs) Mean±SD	38.56±11.51	33.46±10.62	1.78264306	0.07(NS)
Male	14	17	(NS)	(NS)
Female	16	13	(NS)	(NS)

The hemodynamic parameters like heartrate, systolic blood pressure, diastolic blood pressure and mean arterial pressures were noted at various time periods during the surgery.

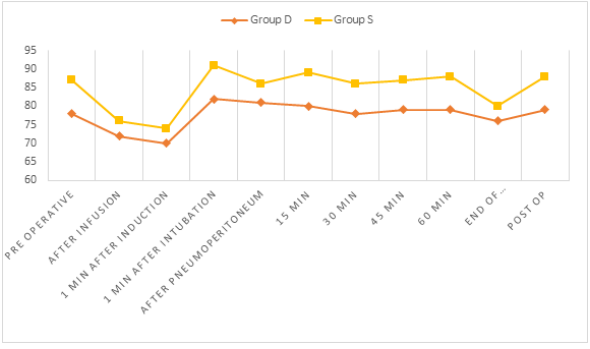
Baseline hemodynamic parameters were comparable in both groups. Group D had a reduction in HR from baseline starting from 2 min of loading dose infusion, and this decline persisted throughout the procedure.



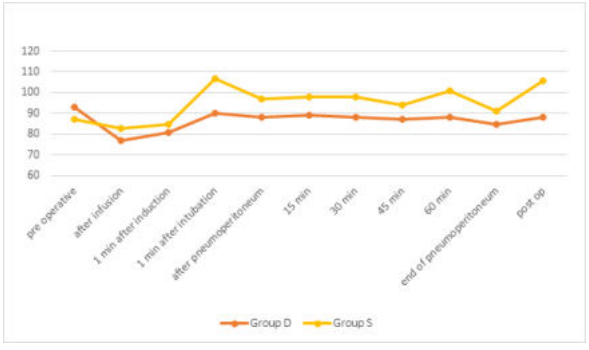
Graph1: Heart Rate



Graph2: Systolic blood pressure



Graph 3: Diastolic blood pressure



Graph 4: Mean Arterial Pressure

After infusion with Dexmedetomidine, heart rate, mean systolic blood pressure, mean diastolic blood pressure, mean arterial blood pressure in Group D were statistically significant (p value 0.00001)

DISCUSSION

Our study was was prospective randomized, done to evaluate the effects of single premedication dose of Dexmedetomidine on Hemodynamic response due to anaesthesia and Laparoscopic surgical procedures.

Laparoscopic procedure involves peritoneal insufflations with Carbondioxideand creates pneumoperitoneum. This induces intra operative ventilatory and hemodynamic changes that complicates an aesthetic management forLaparoscopy[6]. Several studies have demonstrated that the cardiac index was markedly decreased after CO2 peritoneal insufflations because of alterations in the ventricular loading conditions resulting from the increased intra-abdominal pressure[7-10].The hemodynamic variability due to laparoscopy is due to release of humoral factors and potential mediators are catecholamines, prostaglandins and vasopressin[11].

In our present study Dexmedetomidine was infused at 1 mcg/kg over 20 to 30 min the biphasic blood pressure response was not seen. This effect was probably due to slow infusion rate which was given over 30minutes period which may be important in patient with Compromised cardiac function. In all patients the heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure were lower in patients who received Dexmedetomidine. Tracheal Intubation is associated with increases in arterial pressures, heart rate and catecholamines concentrations. Increases in heart rate and blood pressure were observed in control group which was very similar to those reported in earlierstudies.

Varshali M Kemiya in their study gave Dexmedetomidine infusion in a dose of 1mcg/kg over 10 min prior to induction of anaesthesia and when continued as infusion, it significantly attenuated sympathoadrenal response to tracheal intubation[12].

There was certain limitation to our study which should be considered when comparing our results with the other investigators. we have used single dose of Dexmedetomidine to study hemodynamic response to anesthesia an laparoscopy. We have not used any volatile anesthetics as was in previous studies. The hemodynamic effects are solely due to Dexmedetomidine.

Even in spite of limitations from our study, use of Dexmedetomidine as a single premedication doses effectively control haemodynamic responses to larynogoscopy, intubation and stress response to laparoscopic surgery. Clonidine had been earlier used both as a premedicant as perioperatively to attenuate heamodynamic responses in laparoscopy but Dexmedetomidine which is 10 times more selective at alpha 2 seems to be more effective for clinical usage.

No serious adverse events were noted in our study. The commonest side effect was bradycardia which was treated with atropine.The data from our study is convincing that Dexmedetomidine used as premedication prevents undesirable hemodynamic changes due to anaesthesia, surgical stress and laparoscopic procedures. This may be extrapolated to patients with hypertension and ischemic heart disease who may be at risk from undesirable hemodynamic responses.

CONCLUSION

Dexmedetomidine when given as a premedication before Laparoscopic Cholecystectomy attenuates the sympathetic response to laryngoscopy and intubation and provides stable intra operative hemodynamics.

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