Original Research Paper

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AN OBSERVATIONAL STUDY OF COMPARISON OF AN INFUSION OF DEXMEDETOMIDINE AND AN INFUSION OF FENTANYL AS A BALANCED ANAESTHESIA FOR LAPAROSCOPIC SURGERIES

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KEYWORDS :

INTRODUCTION

Balanced anaesthesia is a technique of general anaesthesia based on the concept of administering a mixture of a small amounts of several anesthetic agents. Laparoscopic surgery a modern day care surgical technique and preferred over open procedures due to its multiple benefits such as reduced trauma to the patient, disturbance of homeostasis, morbidity, mortality, recovery time, and hospital stay[1].

All laparoscopic surgeries are challenging from an anaesthesia point of view due to significant hemodynamic alterations, resulting from the combined effects of pneumoperitoneum, patient position, and hypercapnia . Pneumoperitoneum raises the intra-abdominal pressure which is immediately followed by an increased plasma renin activity, plasma norepinephrine and epinephrine levels. An increase in the circulating blood volume is because of the shifting of blood from the splanchnic capacitance blood vessels to the systemic circulation. All these collectively lead to an elevated arterial pressure, systemic and pulmonary vascular resistance, and decreased cardiac output. These hemodynamic responses are well tolerated in healthy individuals, but in patients with comorbidities these transient changes can cause potentially deleterious effects such as left ventricular failure, pulmonary oedema, myocardial ischemia, ventricular dysrhythmias, and cerebral haemorrhage[2,3].

Dexmedetomidine is an imidazoline derivative which selectively acts on the alpha 2 receptors as an agonist. It acts at both supraspinal and spinal level and modulate the transmission of nociceptive signals in the central nervous system.. it basically decreases the heart rate and systemic vascular resistance by inhibiting release and uptake of norepinephrine.[4] Continuous intravenous dexmedetomidine administration during abdominal surgeries, provided an effective postoperative analgesia, and reduced the postoperative morphine requirements without increasing the side effects especially when stress is expected.[5,6].

Fentanyl citrate interactes predominantly with the opioid μ receptor and its principal pharmacological effect on CNS. Its primary therapeutic value is analgesia and sedation.

The study was aimed to compare the efficacy of infusion of Dexmedetomidine Vs infusion of Fentanyl as a balanced anaesthesia in laparoscopic surgeries.

AIMS AND OBJECTIVES

- To compare the efficacy of Dexmedetomidine and Fentanyl on hemodynamic stability during intraoperative period ,on post-operative analgesia andsedation in recovery period.
- To compare the side effects of the study drugs, if any.

METHOD AND MATERIAL

In the present study 100 adult patients, aged 16-60 years ASA grade of I-II scheduled for various elective laparoscopic surgeries under general anaesthesia. Patients aged > 60 yrs, with H/O recent respiratory tract infection,Alcohol abuser,Patients with uncontrolled diabetes Mellitus and Hypertension, and severe bronchopulmonary disease,Cardiovascular, endocrinological, neuropathic, renal or hepatic disorders,Allergy to opioids or current use of analgesics or psychoactive drugs,Difficult airway are excluded.

Pre-anaesthetic evaluation of the patients done and informed consent taken. Patients were randomly divided into two groups of 50 each. All patients received injection Glycopyrrolate 0.2mg intravenously before the induction of anaesthesia.

(group D) Dexmedetomidine 1mcg/kg as loading dose over 10 minutes prior to induction followed by 0.5μg/kg/hour as maintenance dose or (group F), Fentanyl 2 μg/kg as loading dose over 1 minute prior to induction followed by 0.4 μg/kg/hour as maintenance dose till surgery is over.

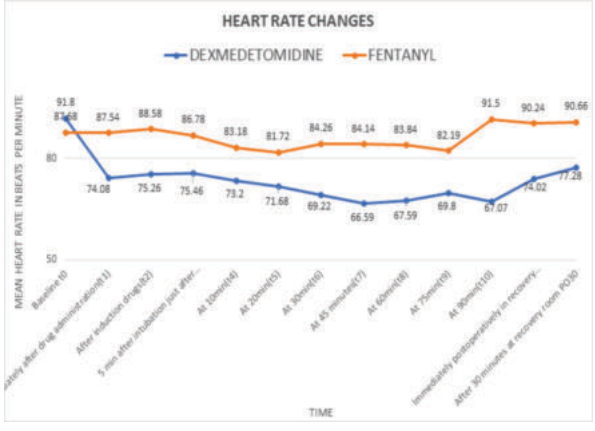
In the premedication room, baseline values of the Heart rate, SBP, DBP, MAP $spo_{2onroomair}$ were documented, before giving the study drug. All patients received 8-10 ml per kg body weight Ringer lactate intravenously before induction and continued to receive Ringer lactate 10 ml/kg/hr during the surgery.

15 minutes after starting the Dexmedetomidine drug infusion and 1 minute after starting the Fentanyl infusion, pre-oxygenation with 100 % oxygen performed for 3 min. Patients were induced with injection Propofol 2μg/kg intravenously followed by injection Succinyl choline 2 mg/kg intravenously. Trachea intubated with appropriate size cuffed endotracheal tube. Injection Dexmedetomidine infusion and Fentanyl infusion was continued till end of surgery. Anaesthesia maintained with O_2: N_2O (50:50), sevoflurane and injection atracurium as a muscle relaxant. Intraabdominal pressure kept between 12 and 14 mmHg throughout the laparoscopic procedure. The patients were mechanically ventilated to keep the $EtCO_2$ between 30- and 40-mm Hg. Drug infusion and anaesthetic agents were stopped at the end of surgery.

After desufflation reversal and extubation done after patient's respiration become sufficient and patient was able to follow simple commands. the systolic, diastolic and mean arterial pressure, heart rate, SpO2 were recorded at Baseline, Immediately after study drug infusion ,After injecting induction drugs,5 min after intubation just after pneumoperitoneum,Every 10 minute for 30 minutes,Then every 15 minutes till surgery over, Ramsay sedation score and VAS score noted after shifting to recovery room and half an hour after surgery. time to first rescue analgesic requirement also noted.

Observation and results

Demographic data among two groups in terms of age, gender, weight & ASA grade, which were comparable and statistically not significant.



Graph 1: Heart Rate changes

Baseline mean Heart Rate was 91.8 in group D and 87.68 in group F which were comparable in both the groups. (P>0.05).

The mean trend of Herat Rate in both the groups was different over the period with significantly lower in group D especially from the 30 minutes to till end of surgery. The mean Heart Rate in group D ranged from 66.59 per minute to 77.28 per minute and in group F ranged from 81.72 per minute to 91.5 per minute after giving study drug.

In postoperative period increase in the heart rate noted in group F more than group D.

Table 1: Comparison Of Systolic Blood Pressure In Both The Groups During Perioperative Period

VARIABLE	GROUP D (number of patients=50)	GROUP F (number of patients=50)	p VALUE	SIGNIFICANCE
Baseline t0	132.78 ±10.17	130.46 ±30.06	0.6064	NS
Immediately after drug administration (t1)	131.34± 18.02	124.2 ±13.33	0.026	S
After induction drugs(t2)	115.14± 13.85	111.54 ±15.32	0.220	NS
5 min after intubation just after pneumoperitoneum(t3)	117.14 ±14.01	124.42± 13.21	0.0088	S
At 10min(t4)	117.34 ±12.08	122.7± 12.42	0.0311	S
At 20min(t5)	110.3± 6.34	129.22 ±8.47	0.0021	S
At 30min(t6)	114.58 ±10.04	122.68± 10.65	0.0002	S
At 45 minutes(t7)	111.75± 8.23	121.02± 10.82	<0.0001	S
At 60min(t8)	111.10± 8.17	122.66 ±16.47	0.0003	S
At 75min(t9)	114.56± 10.02	121.53± 11.75	0.0273	S
At 90min(t10)	110.76 ±12.39	127.66± 13.21	0.0038	S
Immediately postoperatively in recovery room (PO0)	118.5± 8.44	135.4 ±10.49	<0.0001	S
After 30 minutes at recovery room PO30	125.84± 8.36	136.06± 14.31	<0.0001	S

Baseline mean systolic blood pressure in group D and in group F which were comparable in both the groups. (P>0.05).

Systolic blood pressure at the time of Intubation(t2) was 115.14±13.85 in group D and 111.54 ±15.32 in group F which were nonsignificant .

Systolic blood pressure at the creation of pneumoperitoneum(t3) it was 117.14 ±14.01 and after 10 minutes it was 117.34 ±12.08 in Group D and 124.42± 13.21 and 122.7± 12.42 respectively in Group-F so the difference was significant (P<0.05). Decrease in systolic blood pressure was more with group D than with group F and reduction in systolic blood pressure persisted throughout surgery and postoperative period also in group D than group F.

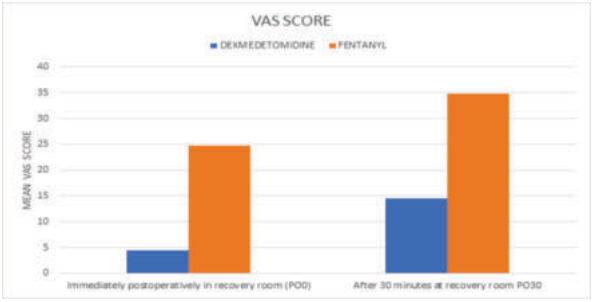
Table 2: Comparison Of Diastolic Blood Pressure

VARIABLE	GROUP D (number of patients=50)	GROUP F (number of patients=50)	P VALUE	SIGNIFICANCE
Baseline t0	81.3± 8.47	80.98± 8.39	0.8499	NS
Immediately after drug administration(t1)	83.9± 13.18	78.44± 9.99	0.0216	S
After induction drugs(t2)	73.36±11.37	71.18 ±11.89	0.0277	S
5 min after intubation just after pneumoperitoneum (t3)	74.36 ±10.07	81.88 ±11.12	0.0006	S
At 10min(t4)	76.68 ±10.66	82.66± 11.67	0.0088	S
At 20min(t5)	74.06± 10.12	86.7± 7.91	0.0005	S
At 30min(t6)	74.28 ±9.16	79.68± 8.77	0.0033	S
At 45 minutes(t7)	73.61± 8.50	78.45± 8.94	0.0094	S
At 60min(t8)	71.83± 6.73	77.97± 10.14	0.0028	S
At 75min(t9)	74.52± 7.46	76.61± 8.35	0.3512	NS
At 90min(t10)	71.92 ±5.59	78.58 ±7.86	0.0242	S

Baseline mean diastolic blood pressure in group D and in group F which were comparable. (P>0.05).

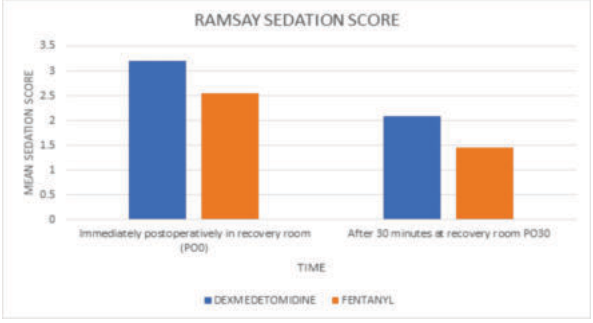
At pneumoperitoneum, diastolic blood pressure was 74.36 ±10.07 and after 10 minutes was 76.68 ±10.66 in group D and 81.88 ±11.12 and 82.66± 11.67 respectively in group-F. It shows diastolic blood pressure trend was constantly less from at and after pneumoperitoneum to even in the postoperative period compared to the group F.

There was no significant difference in perioperative Spo2 values in both the Groups.



Graph 2: Comparison Of VAS Score In Both The Groups During Postoperative Period

Mean VAS immediately postoperatively and after 30 minutes of shifting to recovery room were 4.4 ±6.97 and 14.2 ±10.21 respectively in Group D and 24.8 ±16.15 and 34.71 ±14.67 in Group F.



Graph 3: Comparison Of Ramsay Sedated Score In Both The Groups During Postoperative Period

Ramsay sedation score was observed that patients remained sedated for longer time in Group D than Group F.

In group D, none of the patients had any side effects whereas in group F 3 had nausea, 2 had vomiting and 3 had shivering.

DISCUSSION

Laparoscopy is a minimally invasive procedure also called as keyhole surgery allowing endoscopic access to the peritoneal cavity after creating pneumoperitoneim with insufflation of a CO_2. this creates space between the anterior abdominal wall and the viscera which is necessary for the safe manipulation of instruments and organs. The three major forces that uniquely alter patient's physiology during laparoscopy are; the increase in intraabdominal volume and pressure transmitted to thorax, the effects of patient positioning and carbon dioxide pneumo-insufflation. These three forces separately or in combination have profound effects on the patients' hemodynamic, respiratory and metabolic functions.

The purpose of study was to compare the effect of intravenous infusion of Dexmedetomidine and Fentanyl on intraoperative and postoperative hemodynamic stability, postoperative analgesia (Vas score), sedation scores and adverse effects in patients undergoing laparoscopic surgeries.

Demographic data showed that group D and group F were comparable .

Baseline Mean **Heart Rate** was 91.8 in group D and 87.68 in group F which were comparable and nonsignificant . Mean heart rate was 75.46 per minute and 86.78 per minute in group D and group F respectively after 5 minutes of intubation and pneumoperitoneum which is showing heart rate was lower in group D than group F. The Mean Heart Rate in group D ranged from 66.59 per minute to 77.28 per minute and in group F ranged from 81.72 beats per minute to 91.5 per minute.

Our results correlate with results of Patel C R et al[7], Chauhan Parikh et al[8], Kalpana Vora et al[9].

Baseline mean Systolic Blood Pressure were comparable in both the Groups. SBP at the time of Intubation(t2) was nonsignificant that shows both drugs having comparable effect on systolic blood pressure. SBP at the creation of pneumoperitoneum(t3) it was 117.14 ±14.01 and after 10 minutes of pneumoperitoneum it was 117.34 ±12.08 in Group D and 124.42± 13.21 and 122.7± 12.42 respectively in Group-F, so the difference was significant (P<0.05). Decrease in systolic blood pressure was observed more with group D than with group F and reduction in systolic blood pressure persisted throughout surgery and postoperative period also in group D than group F.

Our results correlates with results obtained from studies such as Patel C R et al[7], Lovina et al[10], Chauhan Parikh et al[8].

Baseline mean Diastolic Blood Pressure was comparable in both the Groups. (P>0.05). At pneumoperitoneum, DBP was 74.36 ±10.07 and after 10 minutes was 76.68 ±10.66 in Group D and 81.88 ±11.12 and 82.66± 11.67 respectively in Group-F. It shows DBP trend was constantly less from at and after pneumoperitoneum to even in the postoperative period compared to the Group F.

Our results corelates with results obtained from studies such as Patel C R et al[7], Lovina et al[10], Chauhan Parikh et al[8].

There was no significant difference in perioperative Spo2 values in both groups.

At the end of surgery, the Mean Visual Analogue Scale(VAS)of Group D differed and lowered significantly(p value <0.05) as compared to Group F. Mean VAS immediately postoperatively and after 30 minutes of shifting to recovery room were 4.4 ±6.97 and 14.2 ±10.21 respectively in Group D and 24.8 ±16.15 and 34.71 ±14.67 in Group F.

Our results correlates with results obtained from obtained from studies such as as Patel C R et al[7],Laxmi et al[11] , Kalpana et al[9].

Ramsay sedation score was observed to be more in Group D as compared to Group F(p value < 0.05)

Our results correlates with results obtained from studies such as as Patel C R et al[7], Laxmi et al[11], Kalpana et al[9].

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