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ORIGINAL RESEARCH

Dexmedetomidine and fentanyl in direct laryngoscopy and endotracheal intubation: Comparison of complications

[1]Dr.Ashish S M, [2]Dr.Sahana Hiremath, [3]Dr. Dhanashree Nandanwar, [4]Dr. Rohith Jamadar

[1]Consultant Anaesthesiologist, Balaji Nursing Home, Tandur, Telangana, India
[2]Assistant Professor, Department of Anaesthesia, Bellary Medical College and Research Centre, Bellary,Karnataka, India
[3]Fellow in Chronic Pain Medicine, Ashirvad Institute of Pain Management and Research,Mumbai, Maharashtra, India
[4]Assistant Professor, Department of Anaesthesia, Yadgiri Institute of Medical Sciences,Yadgiri, Karnataka, India

Corresponding Author
Dr. Rohith Jamadar
Department of Anaesthesia, Yadgiri Institute of Medical Sciences, Yadgiri, Karnataka, India

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ABSTRACT
Airwaymanagementisoneofthemostimportantskillsofthephysician; failuretoproviderequiredairflowcancausedeathorsequelaeofthepatient,especially in emergency conditions. The control of circulation and intubation, without losing time, in cardiac and respiratory arrest, saves the patient from hypoxia, improving quality of life in the long term.The present Prospective randomized double blinded study was carried out in 60 Patients admitted for surgeries under general anaesthesia in department of surgery, ENT, orthopaedics r selected for variouselectivesurgical procedures with American Society of Anaesthesia (ASA) physical status I and II. Dexmedetomidine is superior and better drug compared to fentanyl to reduce haemodynamic response i.e., attenuation of pressor response to laryngoscopy and tracheal intubation with single premedication dose.

Key words: Dexmeditomedine, fentanyl, tracheal intubation, complications

INTRODUCTION

Endotracheal intubation is the placement of a tube into the trachea, either orally or nasally for airway management. Endotracheal tube formsanopenpassageinthe upper airways. To be able to ventilate the lungs, the air must be free to enter and exit the lungs. The patient is connected to the mechanical ventilator to provide continuous respiration with an endotracheal tube. The utilized tube is a flexible plastic tube which is called endotracheal tube placed on thetrachea andhas a cuffpartthat can be inflated with air to prevent airway leakage[1].To facilitate the placement of the endotracheal tube, general anaesthesia induction is applied to patients who will be operated and have sufficient fasting time. In emergency cases, endotracheal intubation is performed with various stages and procedures. Sometimes, patients are intubated at the scene or in the emergency room of the hospital. Because the patients' clinical statuscannotbefullyevaluatedduringtheintubationprocedureatthescene,sometimes drugs cannot be given[2].Deep sedation, rapid sequence intubation (RSI),is performed according to the patient's clinical condition in the hospital and also in patients with Glasgow coma scale (GCS) 4, and, below, theproceduresaredone without medication. Intubation without medication to trauma patients with high GCS (above 4) is not safe, resulting in intracranial pressure increase, vomiting, oesophageal intubation, and aspiration risk. Special procedures are required in paediatric patientsand newborns, and their indications for endotracheal intubation can show variability[3].

Airwaymanagementisoneofthemostimportantskillsofthephysician; failuretoproviderequiredairflowcancausedeathorsequelaeofthepatient, especially in emergency conditions. The control of circulation and intubation, without losing time, in cardiac and respiratory arrest, saves the patient from hypoxia, improving quality of life in the

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long term.If the difficulties in patient airway management are predictable (forced airway, lack of mask ventilation), it is important to take precautions and to ensure that adequate instruments and equipment are available[4].

Studies have shown that the likelihood of the rescue of the patient's life increases if life support is initiated within the first 4-8 minutes.It is known that the treatment of nasal oxygen moistened with high flow preventshypoxiaand desaturation, while intubation is performed under emergency conditions.Its use is becoming widespread in the intensive care unit because of its reliability, ease of use, accessibility, and reduction of complication rate.Although high-flow nasal oxygentherapy is sometimes considered an alternative to intubation, it should be remembered that these patients may need non-invasive ventilation (NIV) and intubation in the long term.Although hypoxemia is a component of respiratory failure, tissue hypoxia and lactic acidosis are frequently encountered as a result of ventilation and perfusion imbalance as well as gas exchange dysfunction. As a result, complex and difficult-to-treat metabolic disorders and sometimes mixed decompensated respiratory and metabolic disorders can develop, bringing the clinical situation of a patient to an irreversible state, resulting often in organ failure[5, 6].

METHODOLOGY

STUDY POPULATION

PatientsbelongingtoASA-Grade I and II undergoingelectivesurgeries undergeneral anaesthesia.

STUDY PERIOD: 18 months**.**

STUDY DESIGN: Prospective randomized double blinded study.

SAMPLING TECHNIQUE: Simple random sampling.

SAMPLE SIZE

The calculated minimum sample size for each group in our study was 30. So, the total sample size in our study is 60.

INCLUSION CRITERIA

- Patients with ASA physical status I and II.
- Age between 18-60 years and both gender.
- Mallampatti's Class I and II.
- Patients undergoing elective surgeries under general anaesthesia.

EXCLUSION CRITERIA

- Patients with Cardiorespiratory compromise.
- Patients with Asthma and COPD (Chronic Pulmonary Obstructive Disease).
- Patients with history of drug abuse or alcohol abuse.
- Patients with known allergy to Clonidine or Dexmedetomidine.
- Patientsonbeta-blockers,antidepressants,antipsychotics,anxiolytic sand anticonvulsants.
- Mallampatti Class III and IV.
- Patients with anticipated difficult airway.
- Patients with previous history of difficult intubation.
- Morbid obesity, pregnancy.
- Patient refusal for the procedure.
- PatientsinwhomIntubationtimeexceededmorethan 30secondswillbe excluded from study.

METHODS OF DATA COLLECTION

After obtaining institutional ethical committee approval and written and informed consent from the patient, 60 patients satisfying the inclusion and exclusion criteria will be randomly allocated using a computer-generated randomnumbertableand sealed envelope technique to one of the following two groups of 30 patients each.

Group D-will be receiving Dexmedetomidine 1µg/kg i.v diluted to 10ml with normal saline, over 10 min just before induction of general anaesthesia.

Group F-will be receiving Fentanyl 2 µg/kg i.v diluted to 10ml with normal saline, over 10 min just before induction of general anaesthesia.

AllthepatientswillundergothoroughPre-AnestheticEvaluationwhich includes a detailed history taking, physical examination and necessary investigations like Complete Blood Count (CBC), Blood Urea, Serum Creatinine, Chest X-ray and Electrocardiogram (ECG). Tablet Alprazolam 0.5 mg and Tablet Rantac 150 mg will be given at night before surgery and at 6 am on the day of surgery.

Patients will be explained about the procedure and a written informed consent will be obtained. All the patients will be kept Nil Per Oral (NPO) for atleast 6 hours. Patients will be taken on the operation table and multipara monitor will be connected. Preoperative heart rate and SBP, DBP, MAP, Respiratory rate, oxygen saturation, will be noted. Intravenous line will be secured. Patients will be premedicated with Midazolam 0.03mg/kg i.v, Ondensetron 0.1mg/kg i.v, tramadol 2mg/kg i.v. All other premediction which have any effects on the heart rate, blood pressure or on autonomic nervous systems will be strictly avoided.

Then patients of Group D will be receiving Dexmedetomidine 1µg/kgi.v diluted to 10ml withnormal saline, over 10 min and patients of Group F receiving Fentanyl 2µg/kg i.v diluted to 10ml with normal saline, over 10 min.

Senior Anesthesiologist will prepare the drug for intravenous infusions and codes them. Then it will be handed over to ResidentAnesthesiologistfor administrating to the patients. This Resident Anesthesiologist is unaware of the contents of the syringe and he will be recording the parameters. The

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patient will also be unaware of the group which they belong to.

Patients will be pre-oxygenated with 100% oxygen through Bain's circuit for 5 minutes and then induction will be done with Inj. Propofol 2mg/kg i.v body till loss of eye lash reflex. Then inj. Vecuronium 0.1mg/kg i.v will be given and patient was ventilated for 4 minutes. Then a smooth, swift and gentle laryngoscopy will be attempted using standard technique and patient will be intubated with appropriate size cuffed endotracheal tube.

Patients will be subsequently maintained with O2:N2O=40:60%. Next 10 min no other pharmacological agents, intravenous or inhalational will be administered to the patient. Then vitals parameters like heart rate, SBP, DBP, MAP, Oxygen Saturation, will be monitored 1,2,3,4,5 and 10 minutes.

Any hypotension (SBP fall >20% from baseline) will be treated with increments of IV Mephentermine 3mg and incidence of bradycardia (HR<50 beats) will be treated with IV Atropine 0.6mg. Surgery will be allowed to start only after 10 minutes of intubation after noting down the vital parameters. Then anesthesia will be maintained with Isoflurane and Intermittent doses of Vecuronium Bromide.

After completion of surgery oropharyngeal suctioning will be done, neuromuscular blockade will be reversed with dose of 0.05mg/kg of Inj Neostigmine and 0.01mg/kg of InjGlycopyrrolate. After assessing patients' respiration, eye opening, verbal commands, head lifting patients will be extubated and observed for 10 minutes.

RESULTS

Table 1: Distribution according to age group

		Group D		Group F	
		Frequency	Percent	Frequency	Percent
Age group in years	< 20	4	13.3	6	20.0
	21-30	11	36.7	13	43.3
	31-40	12	40.0	5	16.7
	> 40	3	10.0	6	20.0
	Total	30	100.0	30	100.0

We included total 30 patients in each group i.e. Group D and F respectively. Majority of the patients in Group D were from 31-40 years age group i.e. 12(40%) followed by 11(36.7%) from 21-30years,4(13.3%) from lessthan 20years and 3(10%)from above 40 years. Majority of the patients in Group F were from 21-30 years age groupi.e. 13(43.3%) followed by 6(20%) from less than 20 and above 40 years age group.

Table 2: Distribution according to gender

		Group D		Group F	
		Frequency	Percent	Frequency	Percent
Gender	Male	16	53.3	12	40.0
	Female	14	46.7	18	60.0
	Total	30	100.0	30	100.0

Male preponderance was seen in Group D with 53.3% while female preponderance was seen in Group F with 60%.

Table 3: Distribution according to ASA grade

		Group D		Group F	
		Frequency	Percent	Frequency	Percent
ASAgrade	Grade I	21	70.0	19	63.3
	Grade II	9	30.0	11	36.7
	Total	30	100.0	30	100.0

70% of the patients in Group D and 63.3% in Group F were classified as Grad I. 30% of the patients in Group D and 36.7% in Group F were classified as Grade I.

Table 4: Distribution according to Mallampatti's score

		Group D		Group F	
		Frequency	Percent	Frequency	Percent
Mallampatti's score	Score 1	10	33.3	11	36.7

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	Score 2	20	66.7	19	63.3
	Total	30	100.0	30	100.0

33.3% patients in Group D and 36.7% in Group F had Mallampatti's score 1. 66.7% patients in Group D and 63.3% in Group F had Mallampatti's score 2.

Table 5: Distribution according to side effects

		Group D		Group F	
		Frequency	Percent	Frequency	Percent
Side effects	Hypotension	0	0.0	0	0.0
	Bradycardia	0	0.0	0	0.0
	Respiratory depression	0	0.0	0	0.0

No side effects were observed in either of the group.

Table 6: Comparison of age and BMI between Group D and Group F

Group (D/F)		N	Mean	Std.Deviation	t	p	Inference
Age	Group D	30	31.43	10.08	-0.065	0.948	Not significant
	Group F	30	31.63	13.44		(>0.05)	
BMI (Kg/M2)	Group D	30	23.05	1.20	-0.634	0.528	Not significant
	Group F	30	23.25	1.25		(>0.05)	

Mean age of the patients from Group D was 31.43±10.08 years while from Group F was 31.63±13.44 years. When we compared the mean age between two groups, the difference was not found statistically significant (p>0.05). It means both the groups are comparable in age

Mean BMI of the patients from Group D was 31.43±10.08 years while from Group F was 31.63±13.44 years. When we compared the mean BMI between two groups, the difference was not found statistically significant (p>0.05). It means both the groups are comparable in BMI.

DISCUSSION

The most critical and invasive stimulus during administration of general anaesthesia is direct laryngoscopic endotracheal intubation. During the procedure, stimulation of laryngeal and tracheal tissues will activate the nociceptive receptors thereby activating sympathoadrenal response with release of catecholamines at nerve endings. The responseismanifestedashypertension,tachycardia,laryngospasm,bronchospasm,increased intraocular and intracranial pressures and the effect peaks at 1min after intubation and return to baseline by 5-10min.The sympathoadrenal response leading to haemodynamic changes depends on various factorslikedepthof anaesthesia, anaesthetic agent used, duration of laryngoscopy and intubation and also patient related factors[7].Various different pharmacological agents by different means have been adopted in various studies to obtund these haemodynamic stress responses tolaryngoscopicintubation.Butallsuchdrugsandmethodshavetheirownlimitations. Use of halothane was associated with dysrrhythmias, calcium channel blockers produced reflex tachycardia, direct acting vasodilators needed invasive hemodynamic monitoring and lidocaine did not give consistent results, beta blockers blunt the HR response better than BP response[8].

Recentlya-2agonistslikeClonidineandDexmedetomidinearebeingincreasingly used to suppress the stress response as they showed a better effect than the commonly used drugs. Alpha 2 agonists act both on presynaptic and postsynaptically located a-2A receptorspresentin locus ceruleus within the brain. Presynaptic activation of a-2A receptors inhibits the release of noradrenaline causing hypnosis and sedation. So, when these drugs are used along with other inhalational andintravenousanaestheticsdecreasedtherequirementoftheseanaestheticsandanalgesics. Postsynaptic activation of a-2A receptors in the brain decreases the sympathetic discharge leading to decrease in the HR and BP. Now a day, they are also becoming more popular for conscious sedation at low but at appropriate doses for procedures done outside the operationtheatre without the risk of respiratory depression or PONV[9].

Dexmedetomidine hydrochloride is animidazole compound with molecular weight of 236 and its empirical formula is C13H16N2HCl. It is the dextro-enantiomer of Medetomidine, the methylated derivative of Etomidine. Its specificity for the alpha-2 receptor is 8 times that of Clonidine. It has sedative, hypnotic, amnesic and analgesic properties and these effects are dose dependent. Its alpha 2 actions are short lived with elimination half time of 2 hours. Its action can also be reversed by the administrationofaselectivealpha-2antagonistsuchasAtipamezole.So,itisconsidered to be superior to Clonidine and is gaining popularity among the anesthesiologists in the present day to day practice.

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In our study, no side effects were observed in either of the group.

Srinivas VY *et al*. [10] reported that no cardiovascularsideeffectslike hypotension and bradycardia were noted after the study drugs.

Dexmedetomidine at a dose of 0.6 mg/kg when given slowly over 10 minutes didn't cause hypertension/hypotension and bradycardia. Fentanyl didn't cause much change in HR and BP as compared to Dexmedetomidine and so is considered to be a cardio-stable drug and preferred in patients with cardiovascular diseases. Nausea and vomiting were not seen with any of the study drugs till the induction.

CONCLUSION

- No side effects were observed in either of the group.
- Mean age of the patients from Group D was 31.43±10.08 years while from Group F was 31.63±13.44 years. When we compared the mean age between two groups, the difference was not found statistically significant ($p>0.05$. It means both the groups are comparable in age.
- Mean BMI of the patients from Group D was 31.43±10.08 years while from Group F was 31.63±13.44 years. When we compared the mean BMI between two groups, the difference was not found statistically significant ($p>0.05$). It means both the groups are comparable in BMI

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