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COMPARISON BETWEEN DEXMEDETOMIDINE VS FENTANYL ON INTUBATING CONDITION DURING FIBEROPTIC INTUBATION

Anaesthesiology

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ABSTRACT

Introduction: Various drugs are used for providing favorable intubation conditions during awake fiberoptic intubation (AFOI). However, most of them cause respiratory depression and airway obstruction leading to hypoxemia. The aim of this study was to compare dexmedetomidine with fentanyl for conscious sedation during AFOI in adult patient. **Materials & Methods:** Patients randomly allocated into two groups: Group D received dexmedetomidine 1 mcg/kg and Group F received fentanyl 2 mcg/kg. Patients in both groups received glycopyrrolate 0.2 mg intravenous, nebulization with 2% lidocaine 4 ml over 20 min and 10% lidocaine spray before undergoing AFOI. Adequacy of intubation condition was evaluated by cough score and post-intubation score. Sedation using Ramsay sedation scale (RSS) were noted and compared between two groups. **Results:** Cough Score, post-intubation Score and RSS were significantly favorable ($P < 0.0001$) along with minimum hemodynamic responses to intubation ($P < 0.05$) in Group D than Group F. So, we conclude that dexmedetomidine is more effective than fentanyl during AFOI.

KEYWORDS

Dexmedetomidine, Fentanyl, AFOL

INTRODUCTION

The fundamental responsibility of an anesthesiologist is to maintain adequate oxygenation in perioperative period. The management of difficult airway is one of the most challenging tasks for an anaesthesiologist. Endotracheal intubation-related complications are a frequent cause of deaths associated with general anaesthesia [1]. Intubation can be done either orally or nasally. Nasally, it can be done blind or fibreoptic guided. Fibreoptic intubation is a valuable modality for airway management of patients with difficult airways. It can be done in awake patients under local anaesthesia and sedation. This method is an effective, safe and reliable technique. One challenge associated with this procedure is to provide adequate sedation while maintaining a patent airway and ensuring ventilation. Sedation is used to relieve anxiety, induce amnesia, eliminate pain and blunt reflexes (e.g. cough). Also, this procedure is accompanied with several pressor responses like tachycardia, hypertension and even arrhythmias. Many agents have been reported to achieve conscious sedation for intubation including Fentanyl, Midazolam, Ketamine, Propofol, Remifentanil and Dexmedetomidine [2,3]. Opioids such as fentanyl and remifentanyl are helpful for attenuating hemodynamic response and discomfort during passage of the bronchoscope through vocal cords. However all of them are respiratory depressants.[4,5] Fentanyl belongs to an opioid group of family, which helps in analgesia and sedation. Dexmedetomidine is an α-2 adrenoreceptor agonist with several unique properties that make it ideally suited for the management of patients with difficult airways. First, a Dexmedetomidine infusion provides a unique form of sedation in which patients appear to be sleepy, but if stimulated they are easily aroused, co- operative, and communicative. Second, Dexmedetomidine has moderate analgesic and antisialagogue effects. Third, Dexmedetomidine causes minimal respiratory impairment, even when given in large doses, and arterial pCO2 levels resemble those found in normal sleep. Thus, Dexmedetomidine has many properties that make it a suitable drug for use in managing patients with difficult airways and it is feasible that when used as a sole agent or an adjuvant, it is efficacious for conscious sedation. [6,7]On the other hand, Dexmedetomidine has sympathetic modulating properties which may be responsible for potential haemodynamic side effects, such as bradycardia, hypotension or conduction block, particularly in those who are hypovolaemic, bleeding or have cardiac conduction or cardiac contractility limitations.[8,9] It is important to perform a RCT to assess the effectiveness of Dexmedetomidine during awake fibreoptic intubation and to document any possible adverse effects or complications. In the present study we compared dexmedetomidine with fentanyl for conscious sedation during AFOI in adult patient.

METHODOLOGY:

This prospective, randomized study was conducted in a tertiary care hospital for a period of 2 years. A total of sixty patients of the American Society of Anesthesiologists (ASA) physical status (PS) I and II of either sex, in the age group 18-60 years having predicted difficult intubation undergoing elective surgeries were allocated using computer- generated randomization list into two groups of thirty patients each after taking written informed consent and approval from the institutional review board. Uncooperative patients, patients with age below 18 years and allergy to drugs used, patients requiring emergency surgery, and patients with coagulopathies were excluded from the study. A detailed pre-anaesthetic evaluation of each patients was carried out. Tablet ranitidine 150 mg and tablet ondansetron 4 mg were given as premedication 2 h before surgery. A patient was shifted to operating room on trolley, and baseline monitors such as electrocardiogram, heart rate (HR), mean arterial pressure (MAP), and oxygen saturation (SpO2) were recorded after securing wide bore (18 G) cannula. Injection glycopyrrolate 0.2 mg i.v. was given. Patency of both nostrils was tested and the nostril with better patency was chosen for awake nasal fiberoptic intubation. Topicalization of both the upper and lower airway was accomplished by nebulization with 2% lidocaine 4 ml (80 mg) for 20 min. Xylometazoline nasal drops and lidocaine jelly were applied to both the nostrils. Tongue and hypopharynx were sprayed with two puffs of 10% lidocaine (20 mg). After that dexmedetomidine (1 mcg/kg over 10 min) and fentanyl (2 mcg/kg over 10 min) was infused according to the subject's inclusion number. After lubrication bronchoscope was loaded with appropriate size cuffed polyvinyl chloride endotracheal tube. At the end of the study drug infusion, sedation was evaluated by Ramsay sedation scale (RSS).[10] Intubation condition was evaluated by cough score. Tolerance to intubation was evaluated by post-intubation score after placement of endotracheal tube.[11] After achieving Score ≥2, bronchoscopy was performed through nasal approach. After proper placement of tube in trachea general anesthesia was induced and surgery was allowed to proceed. Study vitals (MAP,HR, SPO_2) were recorded at baseline, after giving drug at 10 min & after AFOI at 2 min, 4 mins, 6 mins, 8 min & 10 min.

For statistical analysis, the collected data were organised, tabulated, and analysed using "SPSS." Descriptive statistics such as mean with standard deviation or proportions were presented. Mean, median, standard deviation and variance were calculated. T-tests were used to compare two independent groups of continuous data, while the chi-square test was utilised for comparing categorical data. The significance level was determined by comparing the calculated value with the tabulated value at a specific degree of freedom, with a p-value considered non-significant if $p > 0.05$ and significant if $p < 0.05$.

RESULTS:

Demographic characteristics like age, Gender and ASA-PS (I/II) were comparable between two groups. [Table 1] Cough score ≤2 was considered as favourable intubation condition, which was achieved in

29 out of 30 patients in Group D, but only in 2 out of 30 patients in Group F. The difference was statistically significant (P < 0.0001). Better post-intubation score (Score 1) was found in 26 patients of Group D and none of any patients from Group B achieved postintubation score 1. This difference was also statistically significant (P < 0.0001). At the end of study drug infusion, higher RSS was achieved in Group D (3.90 ± 0.30) than in Group F (2.03 ± 0.31) (P < 0.0001) [Table 2]

Table 1: Distribution Of Patients According To Demographic Data

Demographic Parameter		Group F N(%)	Group D N(%)	p Value
Gender	Male	18(60%)	16(5.3%)	0.271
	Female	12(40%)	14(46.7%)	
Age Group	30-40	1(3.3%)	5(16.7%)	0.343
	41-50	13(43.3%)	11(36.7%)	
	51-60	16(53.3%)	14(46.7%)	
ASA Grade	I	16(53.3%)	20(66.7%)	1.111
	II	14(46.7%)	10(33.3%)	

Table 2 : Distribution Of Patients According To Post-intubation Parameter

Post-intubation Parameters		Group F N(%)	Group D N(%)	p Value
Cough Score	1	0(0%)	7(23.33%)	0.0001
	2	2(6.7%)	22(73.33%)	
	3	28(93.3%)	1(3.3%)	
Post-intubation Score	1	0(0%)	26 (86.7%)	0.0001
	2	2(6.7%)	3(10%)	
	3	28(93.3%)	1(3.3%)	

The baseline MAP, HR and SpO2 were comparable between two groups. There was a significant increase in HR in the post-intubation period (102 ± 8.2 beats/min) in comparison with the baseline value (91.27± 8.83 beats/min) in Group F (P < 0.0001). The postintubation HR (82.17 ± 9.38 beats/min) decreased significantly in comparison with baseline value (92.53 ± 9.21 beats/min) in Group D (P value 0.005). There was significant decrease in MAP in Group D (76.37± 2.81) than baseline as compared to Group F (82.80± 3.36), where it was increased. [Fig-1,2,3]

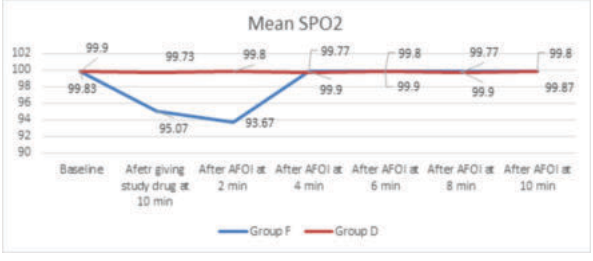

Fig 1: Mean SPO2 Between Groups

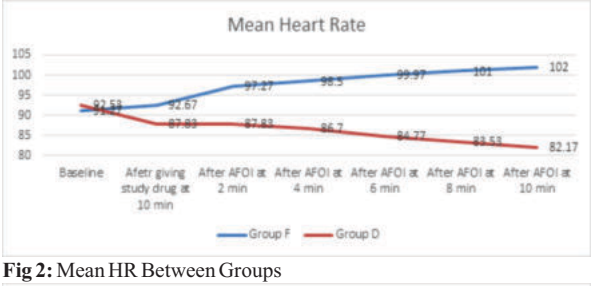

Fig 2: Mean HR Between Groups

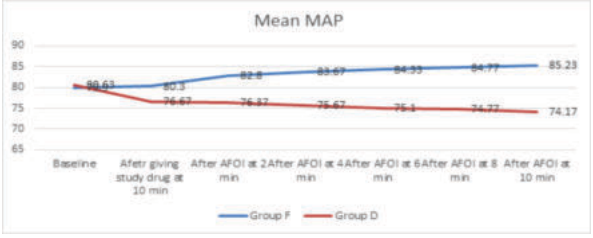

Fig 3: Mean MAP Between Groups

DISCUSSION –

We compared dexmedetomidine 1 mcg/kg (Group D) with fentanyl 2 mcg/kg (Group F) and found more favourable intubation conditions and better tolerance to intubation in dexmedetomidine group than fentanyl group. Most of the patients (29 out of 30) of Group D, but only two patients of Group F had cough score ≤2.. Poor post-intubation Score (≥2) was found in all patients of Group F and only in one patient of Group D (P < 0.0001). In our study we found that better intubating condition in group D than group F. The study conducted by Mondal et al [11] found similar results. Chu et al. [12] observed better tolerance to intubation without respiratory depression and upper airway obstruction in dexmedetomidine group (1 mcg/kg) compared with fentanyl group (1 mcg/kg). Dexmedetomidine has also been proved as an effective agent for AFOI in certain difficult airway scenarios. [8] Study conducted by Bergese et al.[13] found that dexmedetomidine was safe & beneficial for patients undergoing AFOI even without airway nerve block or topical anesthesia.

In our study, higher RSS was achieved in Group D (3.90 ± 0.30) than in Group F (2.03 ± 0.31). The study carried out by Ryu et al.[14] found that, no significant difference of sedation level, MAP & HR (P > 0.05) but cough score and incidence of desaturation was significantly lower (P < 0.01) in dexmedetomidine group than remifentanil group. In our study, patients of dexmedetomidine group showed better hemodynamic stability. There was a significant increase in HR in the post-intubation in comparison with the baseline value in Group F (P < 0.0001). The postintubation HR decreased significantly in comparison with baseline value in Group D. There was significant decrease in MAP in Group D than baseline as compared to Group F, where it was increased. The study conducted by Venn RM et al.[15] found that unaltered hemodynamics even in higher doses of dexmedetomidine infusion. Hassani et al [16] observed lower MAP in Dexmedetomidine group as compared to fentanyl – midazolam group, indicative of more haemodynamic stability. Kar K et al [17] have reported that dexmedetomidine does not decrease arterial oxygen saturation <90. Yousuf et al [18] reported lower rate of desaturation in dexmedetomidine group.

Fentanyl suppresses respiratory center, produces chest wall rigidity and there is a risk of hypoxia and desaturation. The unique property of dexmedetomidine is that it produces sedation without airway obstruction and respiratory depression. We observed that the incidence of desaturation was less in Group D than Group F.

LIMITATION :

Due to the age range of 18-60 years in our study, the generalisation of results to patients outside this age range may not be applicable. Additionally, all patients included had ASA I & II physical status, which limits the assessment of drug effects on patients with significant comorbidities. It's essential to note that this study was conducted solely on elective surgical cases and may yield different results in emergencies. Monitoring adequate depth of anaesthesia and neuromuscular relaxation relied solely on clinical observations, which may not provide a comprehensive evaluation.

We conclude dexmedetomidine is more effective than fentanyl during AFOI, as it provides better patients tolerance, intubation condition, spontaneous ventilation, hemodynamic stability and adequate sedation without desaturation.

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