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ORIGINAL RESEARCH

Comparative study of midazolam and nalbuphine with midazolam and fentanyl for analgesic and sedative effect in patients undergoing awake fibre-optic intubation- Original research

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ABSTRACT

Aim: The purpose of the present study was to assess the comparison between midazolam-nalbuphine and midazolam-fentanyl combinations for analgesic as well as sedative effect in patients who have undergone fibre-optic intubation in awake state.

Methodology: 100 patients between the age of 20 and 60 yrs of either sex, scheduled for elective surgery were included after taking written informed consent. Premedication with Inj. Glycopyrrolate 0.2 mg i.m. 30 mins before and Inj. Midazolam 1 mg i.v. 15 mins before the procedure was given. Then patients were randomly divided into 2 groups. Group N (n=30) received inj. nalbuphine 0.2 mg/kg i.v. and group B (n=30) received inj. fentanyl 2 mcg/kg i.v., both 5 mins prior to the introduction of fiberscope. The nasotracheal fiberoptic intubation was carried out using spray as you go technique. Level of sedation, intubation score and VAS score were observed along with patient comfort score

Results: Group F patients had better sedation score (P=0.328), VAS score (P=0.184), significantly better intubation score (P=0.00), intubation time (0.00) and patient comfort score (P=0.05). Hemodynamics (heart rate, systolic blood pressure, diastolic blood pressure) were significantly better in group F.

Conclusion: Fentanyl-midazolam combination for awake fibreoptic intubation using spray as you go technique, provided better sedation and analgesia, obtunded airway reflexes and minimized pressor response to awake fibreoptic intubation and provided better patient comfort.

Keywords: Fiberoptic, Intubation, Spray as you go, Fentanyl, Nalbuphine.

INTRODUCTION

Awake fibreoptic intubation (AFOI) is the gold standard technique for managing patients with anticipated difficult airway.[1] Failure to maintain patent airway is an important cause of anaesthesia-related morbidity and mortality, with subsequent failure of oxygenation and ventilation. AFOI helps in securing airway without losing control over patient's spontaneous respiration, but it can be associated with intense nociceptive stimulation, especially during passage of the endotracheal tube (ETT). Conscious sedation is desirable, not only to make the procedure more tolerable and comfortable for the patient but also to ensure optimal intubating conditions. On the contrary, deeper plain of sedation can result in loss of already compromised airway with serious consequences.[2] Optimal conditions for AFOI include a patient who is comfortable, cooperative, free from oral or pharyngeal secretions or blood, and are able to maintain their airway and spontaneous ventilation.[2,3] Several agents have been utilized to provide sedation for AFOI. These include benzodiazepines, ketamine, propofol, sevoflurane, remifentanil, clonidine, and dexmedetomidine.[3,4] However, there are risks of hypoxia and apnoea with benzodiazepines, propofol, and opioids, especially if used in combinations.[4,5] Benzodiazepines are commonly used for its anxiolytic, amnestic, and sedative properties, but it also has cardiorespiratory depressant effects.[2,5] The selective α2 adrenergic agonist has recently gained popularity for AFOI because of its sympatholytic, analgesic, anxiolytic, and sedative effects.[6-8]Laryngoscopy and endotracheal intubation are invariably associated with certain cardiovascular changes such as tachycardia, rise in blood pressure, and a wide variety of cardiac arrhythmias, all of which are categorized as a pressor response. This response may be due to sympathetic reflex provoked by mechanical stimulation of epipharynx and hence increase in plasma catecholamine concentration.[9] These responses are generally of no serious consequence in normotensive patients, but may be exaggerated and hence more hazardous in patients with hypertension, coronary artery disease, cerebrovascular disease, myocardial infarction, thyrotoxicosis, and various other conditions as they result in increased cardiac workload. The other hazards are rise in intraocular and intracranial pressures.[10]

AIM OF THE PRESENT STUDY

The purpose of the present study was to assess the comparison between midazolam-nalbuphine and midazolam-fentanyl combinations for analgesic as well as sedative effect in patients who have undergone fibre-optic intubation in awake state.

METHODOLOGY

After approval from Institutional Ethical Committee and written informed consent 60 patients of American Society of Anesthesiologist (ASA) grade I and II, either sex, 18–60 years of age, posted for elective surgeries were enrolled in this prospective, randomized controlled study. All the patients had anticipated difficult airway with either Mallampatti grade III or IV or Wilsons score >6 or higher Body Mass Index (BMI). Patients who refused for consent, had emergency surgeries, patients with airway pathologies or with history of bronchial asthma or arrhythmias were excluded from the study. After detailed pre-anaesthetic checkup (including complete airway assessment) routine fasting guidelines was explained and anti-aspiration prophylaxis was given to all the patients night before the surgery. On the operation table, standard monitoring techniques including electrocardiography, noninvasive blood pressure (NIBP) and pulse oximetry (SpO2) were performed on all patients. After recording the baseline blood pressure (BP), heart rate (HR) and oxygen saturation, all the patients were given injection (inj.) glycopyrrolate 0.2 mg intramuscularly (i.m.) 30 minutes before starting

the procedure. Inj. midazolam 0.05mg/kg was given 15 mins prior to intubation. 2 puffs of 10% lignocaine were sprayed on posterior pharyngeal wall and the patient was asked to withhold as much of 10% of lignocaine as possible. This locally anaesthetized the posterior pharyngeal wall. The patients were randomly allocated into two groups-group N and group F by using chit and box method of randomization. Group N patients were given inj. nalbuphine (0.2 mg/kg) i.v. and group F patients were given inj. Fentanyl (2 µ g/kg) i.v. both five mins before intubation. The level of sedation was assessed at this moment using Observer's Assessment of Alertness/sedation (OAS) score. Then a lubricated nasopharyngeal airway of appropriate size was inserted in the contralateral nostril. The breathing circuit was connected to the end of this airway administering 100% oxygen during the procedure. Two milliliter (ml) aliquots of 4% Lignocaine with 3 ml air were loaded into 4 separate syringes and kept ready for instillation in the working channel of fiberscope. A fiberoptic bronchoscope (FOB) with diameter 3.5 mm with a working channel for drug instillation, was lubricated with aqueous gel and loaded with the polyvinyl chloride, cuffed endotracheal tube (ETT) (size 6.0 to 7.0). General anaesthesia was then induced and maintained to provide anaesthesia, amnesia, analgesia and muscle relaxation during the surgery. The level of sedation using OAS score before starting intubation. Score 5=Appropriate verbal response to patient's name, score 4= Lethargic response, score 3=Response only when name is spoken loudly, score 2=Response after mild shaking, score 1=Response after painful stimuli and score 0=No response. Intubation score – this score included observation of vocal cord movement (score 1=open, score 2=moving, score 3=closing, score 4=closed), cough score (score 1=none, score 2=slight, score 3=moderate, score 4=severe) and limb movements (score 1=no movements, score 2=slight, score 3=moderate, score 4=severe). Patient tolerance was assessed by comfort score, whose value was the sum of five-point patient comfort score (1=no reaction, 2=slight grimacing, 3=heavy grimacing, 4=verbal objection, 5=defensive movement of head or hands) and three-point patient comfort score which had scores of 1 to 3 (1=cooperative,2=restless or minimal resistance, 3=severe resistance.

RESULTS

The sample size was decided after consulting statistician taking into account the primary aims. Thus, a sample size of 50 patients in each group was considered to detect a significant difference between the two groups with an alpha risk of 0.05 and beta risk of 0.2. The data was collected in performa and statistically analysed with software IBM SPSS (Statistical Package for Social Sciences) version 23.0. The continuous variables (quantitative data) such as age, BMI, heart rate, blood pressure etc. were presented as mean ± standard deviation and analysed by applying Student's t-test. The categorical variables (qualitative data) were analysed by Chi-square test. $P<0.05$ was considered statistically significant. The demographic profiles of both the groups were comparable with respect to age (P=0.53), BMI (P=0.122), ASA grade (P=0.71), MP grading (P=0.983) and Wilson score (P=0.288). Baseline heart rates (HR) in group F was 85.67±7.95 beats per minute (bpm) and in group N was 84.50±6.53 bpm. This was found to be comparable (P=0.27). After five mins of drug administration, HR decreased significantly in both the groups. In group F decrease was 8.95% (78.00±5.85 bpm) whereas in group N it was 3.16% decrease (81.83±5.94 bpm) (P=0.01). During intubation maximum increase mean HR in group F was 10.89% from the baseline (95±10.09 bpm) while Group N showed a much higher positive variation with increase of 16.62% from baseline (98.54±3.87bpm). HR returned to baseline values at four mins in group F and at six mins in group N. Also, ten mins after intubation HR in group F was 7.04% (78.63±5.18 bpm) lower than baseline while HR in group N was 8.84% (77.03 ±9.48 bpm) lower than baseline which was statistically non-significant (P=0.21). (Table 1)

Table 1- Mean comfort score, intubation time, VAS score

Parameters	Group F	Group N	P value
Mean comfort score	2.36±0.55*	3.00±0.90	0.05(S)
Intubation time(mins)	3.54±0.33*	4.45±0.32	0.00(S)
VAS score	1.90±0.54	2.10±0.52	0.184 (N.S)

*Data is displayed as mean±standard deviation. *Statistically significant compared to group N.VAS: Visual acuity scale.*

The level of sedation in both the groups was assessed by OAS score. Twenty three out of fifty patients (76.7%) in group F had OAS score ≤3 (three patients had score 2 and twenty patients had score 3) while only seventeen out of thirty patients (56.6%) in group N had OAS score ≤3 (one patient had score 2 and sixteen patients had score 3). Group F had 12 out of fifty (20%) of patients with score 4 whereas group N had 20 out of fifty (33.3%) patients with OAS score of 4. Also, only two out of fifty, 3.3% in group F had OAS score of 5 while six out of fifty, 10% in group N had OAS score of 5. The difference between the two groups is statistically non-significant (P=0.328). Patient satisfaction score was assessed in the recovery room. 50% of the patients in group F (30 out of 50) showed excellent satisfaction versus 36.7% patients in group N (11 out of 30). 36.7% patients in both the groups showed good satisfaction (11 out of 50 each). While only 13.3% patients in group F (8 out of 50) and 26.7% patients in group N (16 out of 50) showed reasonable satisfaction. Overall, the values in both the groups were comparable and nonsignificant (P=0.377).(Table 2)

Table 2- Vocal cord movement, cough score, limb movement and intubation score.

Parameters		Group		P value
		Fentanyl	***Nalbuphine***	
Vocal cord movements				
Open (1)	No of patients	11	9	0.313 (NS)
Moving (2)	No. of patients	17	15	
Closing (3)	No. of patients	2	6	
Closed (4)	No. of patients	0	0	
Coughing				
None(1)	No of patients.	5	3	0.380(N.S)
Slight (2)	No. of patients	21	19	
Moderate (3)	No. of patients	4	8	
Severe(4)	No. of patients	0	0	
Limb movements				
None(1)	No of patients.	17	10	
Slight (2)	No. of patients	10	15	
Moderate (3)	No. of patients	3	5	
Severe(4)	No. of patients	0	0	
Mean intubation score		5.26±0.82*	6.96±1.67	0.00 (S)

*Data is displayed as mean±standard deviation. *Statistically significant compared to group N.*

DISCUSSION

Awake fiberoptic intubation is required in many situations like anticipated difficult airway or cervical spine disorders. Patient cooperation is a big contributing factor for the success of the procedure along with psychological preparation, upper airway local anesthesia, and conscious sedation. In the present study, nasal packing, spraying, and nebulization with local anesthetic were done before intubation as a part of upper airway preparation. Following this, spraying of

lidocaine was done once the vocal cords were visualized. This method was recommended by Sidhu et al. who found it to be safe, easy, and comfortable in a study on 58 patients.[11]In our study fentanyl and nalbuphine were given five minutes before commencing fiberoptic intubation. This time was considered optimum to administer these drugs to provide adequate sedation and analgesia and to prevent circulatory responses to tracheal intubation.[12] In a study fentanyl (2 μg/kg) was given at different times before intubation and observed that optimal injection time five minutes before intubation.[13] Also, another trial concluded that nalbuphine given in dose of 0.2 mg/kg 3-5 mins before laryngoscopy prevents stress response.[14] Level of sedation was analysed in both the groups using OAS score. 76.7% patients in fentanyl group and 56.6% patients in nalbuphine group had score ≤3 (P=0.328). This shows fentanyl provides relative deeper sedation. The similar level of sedation was observed in other studies conducting awake fibreoptic intubation using opioids. The mean intubation score in group F was 5.26±0.82 and in group N was 6.96±1.67 (p=0.00). Although the three parameters for its calculation were statistically nonsignificant, fentanyl group provided better intubating conditions over nalbuphine and hence we obtained a significant value of intubation score. The mean intubation time in group F was 3.54±0.33 minutes and in group N was 4.45±0.32 minutes (p=0.00). Fentanyl group had lesser intubation time due to better sedation, analgesia, intubation score and hemodynamic profile. Hence, it provides better tolerance to the procedure. After completion of surgery, satisfaction scores were evaluated. Both the groups had comparable satisfaction scores (P=0.377). These were similar to the scores obtained in study using similar technique for awake fiberoptic intubation.[15] In a study, the authors successfully achieved awake nasotracheal intubation using spray as you go technique in 3.5-3.8 minutes.[16]

CONCLUSION

Fentanyl-midazolam when compared with nalbuphine- midazolam, using spray as you go technique for awake fiberoptic intubation, provided better sedation and analgesia, obtunded airway reflexes, minimized pressor response to awake fiberoptic intubation and provided better patient comfort.

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