Original Research Article

Comparative study of midazolam and nalbuphine with midazolam and fentanyl for analgesic and sedative effect in patients undergoing awake fiberoptic intubation

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Abstract

Background: Awake nasal or oral flexible fiberoptic intubation (AFOI) is the airway management technique of choice in known or anticipated difficult airway, severe cervical stenosis, etc. One challenge associated with this procedure is providing adequate sedation and anxiolysis while maintaining a patent airway and adequate ventilation, especially with difficult or critical airways. Present study was conducted to compare the midazolam and nalbuphine with midazolam and fentanyl for analgesic and sedative effect in patients undergoing awake fiberoptic intubation at our tertiary hospital. **Material and Methods:** Present study was a prospective, comparative and randomized study, conducted in patients of either gender, 18 - 60 years of age, belonging to ASA-I/II, scheduled for elective surgery under general anaesthesia and willing to participate. 60 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) intravenous and group F patients were given inj. Fentanyl (2 µ g/kg) intravenous both five mins before intubation. **Results:** In present study total 60 patients were studied. 30 patients each were allocated to each group (group F and group N). General characteristics such as age, gender, height, weight, ASA status were comparable in both groups and difference was not statistically significant. Haemodynamic parameters (heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, SpO2, EtCO2) were comparable in both groups and difference was not statistically significant. Intubation time (mins) was less in group F as compared to group N and difference was statistically significant. **Conclusion:** Fentanyl-midazolam combination proved to be superior compared to midazolam plus nalbuphine for awake fiberoptic intubation, provided better sedation and analgesia, obtunded airway reflexes and minimized pressor response to awake fiberoptic intubation and provided better patient comfort.

Keywords: midazolam, nalbuphine, fentanyl, awake fiberoptic intubation, total comfort score, Ramsay sedation scale

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INTRODUCTION

Awake nasal or oral flexible fiberoptic intubation (AFOI) is the airway management technique of choice in known or anticipated difficult airway, severe cervical stenosis, Chiari malformation, unstable cervical fracture, limited mouth opening as in temporomandibular disease, mandibular-maxillary fixation, severe facial burn and vertebral artery insufficiency.[1] Fiberoptic intubation has become the instrument of first choice in difficult intubation cases particularly after the publication of the American

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society of Anesthesiologists (ASA) guidelines in Difficult Airway Management.[2] One challenge associated with this procedure is providing adequate sedation and anxiolysis while maintaining a patent airway and adequate ventilation, especially with difficult or critical airways. The main goal of conscious sedation for the patient is that he has to be awake, calm and cooperative, following our verbal commands. Hence there is need for an ideal sedation regimen which would provide patient comfort, blunting of airway reflexes, patient cooperation, hemodynamic stability, amnesia and maintenance of a patent airway with spontaneous ventilation. Fentanyl, is a synthetic narcotic analgesic, with rapid onset and short duration of action, routinely used for intravenous analgesia. It has proved to be very effective to control short term hemodynamic change.[4] Nalbuphine is agonist at κ receptor and acts as antagonist at μ receptor. It is also effective in suppressing the hemodynamic changes during airway stimulation. Its cardiovascular stability, long duration of analgesia, lack of respiratory depression and decreased incidences of nausea and vomiting, makes it an ideal analgesic during anaesthesia.[5] Present study was conducted to compare the midazolam and nalbuphine with midazolam and fentanyl for analgesic and sedative effect in patients undergoing awake fiberoptic intubation at our tertiary hospital.

MATERIAL AND METHODS

Present study was a prospective, comparative and randomized study, conducted in Department of Anesthesiology, Dr Patnam Mahender Reddy Institute of Medical Sciences. Study approval was taken from ethical committee. Study period was of 1 year (from July 2019 to June 2020).

Inclusion criteria

Patients of either gender, 18 - 60 years of age, belonging to ASA-I/II, scheduled for elective surgery under general anaesthesia and willing to participate.

Exclusion criteria: Emergency surgery, severe bradycardia/heart block, pregnant patients, patients having known allergy to any drugs used in the study, patients on long-term opioids or sedative medications, patients with grossly distorted airway anatomy and bleeding disorders. Patient refusal, lack of understanding or psychiatric patients, All patients received injection of glycopyrrolate (0.2 mg) as premedication 30 min before the procedure and 2% lignocaine viscous gargles were done to achieve adequate topical anaesthesia. Inj. midazolam 0.05mg/kg was given 15 mins prior to intubation. Nasal mucosa was sprayed with xylometazoline 0.1% vasoconstrictor and two puffs of 10% lignocaine. A nasopharyngeal dilator with lignocaine jelly was introduced. For further topical anaesthesia two puffs of 10% lignocaine were sprayed to tonsillar pillars and back of the throat. Transtracheal block was performed by piercing the cricothyroid membrane in the midline of the neck with 4 ml of 4% lignocaine. 60 patients were Two groups of 50 each were studied. Group-DK and group-DP patient received IV dexmedetomidine 1μg/kg over 10 mins. Upon completion of the dexmedetomidine bolus, preoxygenation was done with 100% oxygen via face mask with Bain's circuit. Group-DK patients received ketamine 0.25 mg/kg IV and Group-DP patients received propofol 1mg/kg IV so as to achieve an adequate level of sedation i.e. Ramsay sedation scale=3 (patients responded to command only). 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) intravenous and group F patients were given inj. Fentanyl (2 μ g/kg) intravenous both five mins before intubation. Fibreoptic nasotracheal intubation was carried out in both groups of patients. Once tracheal intubation was completed and the tube was secured, general anaesthesia was administered. Haemodynamic parameters (heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, SpO2, EtCO2), comfort score and patient's reaction to placement of endotracheal tube (VAS) were recorded during preoxygenation, fiberscope insertion (1,2,3,4 and 5 min. intervals) and endotracheal intubation (1,2,3,4 and 5 min. intervals). The total comfort score for each patient was calculated by summing the scores of the seven comfort categories at each time point. The total score was 35.

Table 1: Total comfort score

Parameter	1	2	3	4	5
Alertness	Deeply asleep	Lightly asleep	Drowsy	Fully awake and alert	Hyper-alert
Calmness	Calm	Slightly anxious	Anxious	Very anxious	panicky
Respiratory response	No coughing and no spontaneous respiration	Spontaneous respiration	Occasional cough	Coughing regularly	Frequent coughing or choking
Crying	Quiet breathing, no crying	Sobbing or gasping	Moaning	Crying	Screaming
Physical movement	No movement	Frequent slight movement	Vigorous movement limited to extremities	Vigorous movements including torso and head	Occasional slight movement

Muscle movement	Muscles totally relaxed, no muscle movement	Reduced muscle tone	Normal muscle tone	Increased muscle tone and flexing of fingers and toes	Extreme muscle rigidity and flexing of fingers and toes
Facial tension	Facial muscle totally relaxed	No facial tension evident	Tension evident throughout facial muscle	Facial muscle contorted	Grimacing

Patient's tolerance[6] was assessed by an independent observer on the basis of 5 point Fiber Optic Index (FOI) score: No reaction (1); Slight grimacing (2); Severe grimacing (3); Verbal objection (4); Defensive movement of head, hands or feet (5). Level of sedation was evaluated by Ramsay sedation score (RSS) just after completion of infusion of study drug as: 1 = Anxious, agitated or restless, 2 = cooperative, oriented and tranquil, 3 = sedated but responds to command, 4 = asleep, brisk glabellar reflex responds to loud noise, 5 = asleep, sluggish glabellar reflex or responds to loud noise, 6 = asleep with no response to a painful stimulus. The data was analyzed using SPSS version 22 and Microsoft Excel. Descriptive statistics was done for all data and reported in terms of mean and percentages. Appropriated statistical tests of comparison were applied. Continuous variables were analyzed with Mann Whitney U test and t test. Categorical variables were analyzed with the help of chi square test. Statistical significance was taken as $p<0.05$.

RESULTS

In present study total 60 patients were studied. 30 patients each were allocated to each group (group F and group N). General characteristics such as age, gender, height, weight, ASA status were comparable in both groups and difference was not statistically significant.

Table 2: General characteristic

Parameter	Group F (Mean ± SD)	Group N (Mean ± SD)	P value
Age (in years)	46.6 ± 12.4	47.4 ±10.6	0.66
Gender			0.69
Male	17 (57%)	16 (53%)	
Female	13 (43%)	14 (47%)	
Weight (kg)	57.3 ± 12.1	58.8 ± 11.3	0.49
Height (cm)	162.7 ± 10.2	161.2± 9.6	0.57
ASA status			0.72
I	19 (63%)	20 (67%)	
II	11 (37%)	10 (33%)	

Haemodynamic parameters (heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, SpO2, EtCO2) were comparable in both groups and difference was not statistically significant. Intubation time (mins) was less in group F as compared to group N and difference was statistically significant. VAS score during ET was comparable in both groups. Total comfort score (during preoxygenation, FOS and ET), Ramsay sedation scale and Patients tolerance (FOS, ET) was better in group F as compared to group N and difference was statistically significant.

Table 3: Study parameters

Parameters	Group F (Mean ± SD)	Group N (Mean ± SD)	p-value
Intubation time(mins)	3.95 ± 0.82	4.67 ± 0.68	0.042
VAS score - During ET	2.19 ± 0.45	2.08 ± 0.58	0.58
Total comfort score			
During Preoxygenation	14.12 ± 1.29	14.97 ± 1.38	0.64
During FOS	14.38 ± 1.58	15.70 ± 1.43	0.015
During ET	14.80 ± 1.51	16.04 ± 1.26	0.034
Ramsay sedation scale (RSS)	2.78 ± 0.71	2.21 ± 0.54	0.001
Patients tolerance			
FOS	3.18 ± 0.27	3.63 ± 0.46	0.023
ET	2.44 ± 0.45	2.94 ± 0.65	0.012

DISCUSSION

Awake fiberoptic intubation (AFOI) is indicated for patients with anticipated difficult airways because of their anatomy, airway trauma, morbid obesity, and unstable cervical spine injuries. One challenge associated with this procedure is providing adequate sedation and anxiolysis while maintaining a patent airway and adequate ventilation, especially with difficult or critical airways. The flexibility and versatility of fiberoptic endoscopy allows dynamic assessment of the airway anatomy in the

supraglottic and subglottic region in an atraumatic fashion. Further Awake Fiberoptic Intubation is safe with a higher success rate due to the preserved Muscle tone avoids airway collapse and keeps the airway patent, spontaneous breathing on command can open the obstructed airway passages and chances of desaturation is minimal in awake state/spontaneous breathing.[2] An ideal sedative is expected to provide comfort and elicit patient cooperation while maintaining hemodynamic stability and spontaneous ventilation. Drugs used for sedation during awake fiberoptic intubation include midazolam, diazepam, ketamine, propofol, sevoflurane, fentanyl, remifentanil and dexmedetomidine. etc.[3] Midazolam is an ultra-short-acting benzodiazepine derivative. It has potent anxiolytic, amnesic, hypnotic, anticonvulsant, skeletal muscle relaxant, and sedative properties. Ojaswani RS *et al.*,[7] studied 60 patients who were randomly divided into 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. Group F patients had better sedation score, VAS score, significantly better intubation score, intubation time and patient comfort score. Hemodynamics (heart rate, systolic blood pressure, diastolic blood pressure) were significantly better in group F. They concluded that fentanyl-midazolam combination for awake fiberoptic intubation, provided better sedation and analgesia, obtunded airway reflexes and minimized pressor response to awake fiberoptic intubation and provided better patient comfort. Similar findings were noted in present study. Dhasmana S *et al.*,[8] noted that fentanyl with midazolam improved the quality of sedation, provides good anxiolysis and amnesia without cardiorespiratory depression. This combination has been proved to provide better patient comfort and sedation in patients undergoing awake blind nasotracheal intubation Kaur S er al.,[9] studied 100 patients and compared intubating conditions using fentanyl plus propofol versus nalbuphine plus propofol during fiberoptic intubation. A significant difference between two groups in terms of HR, SBP, DBP, MAP, total comfort score and patient tolerance was noted during fiberscope insertion and endotracheal intubation. Fentanyl plus propofol regimes are suitable for fiberoptic intubation. Fentanyl plus propofol appeared to offer better tolerance, preservation of an airway and spontaneous ventilation, while maintaining haemodynamic stability. Parmod Kumar *et al.*,[10] noted that fentanyl plus midazolam group showed better patient comfort and maintenance of oxygen saturation than fentanyl plus propofol group during fiberoptic intubation. Both fentanyl plus midazolam and fentanyl plus propofol regimes are suitable for fiberoptic intubation. Fentanyl plus midazolam appeared to offer better tolerance, preservation of an airway and spontaneous ventilation, while maintaining haemodynamic stability. While other authors noted that nalbuphine provides good hemodynamic and excellent post-operative analgesia which is comparable to fentanyl but at a less frequent dosing thus decreasing the overall opioid requirement for general anesthesia,[11,12] which is not coinciding with present study findings. Limitations of present study were small sample size, variation between patients pain threshold and study was limited scheduled for elective surgery without comorbidities. Further studies are recommended to know the effect of studied drugs on comorbidities such as diabetes or hypertension.

CONCLUSION

Nalbuphine and fentanyl were effective in controlling the haemodynamic response to stress of endotracheal intubation. However, fentanyl-midazolam combination proved to be superior compared to midazolam plus nalbuphine for awake fiberoptic intubation, provided better sedation and analgesia, obtunded airway reflexes and minimized pressor response to awake fiberoptic intubation and provided better patient comfort.

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