ORIGINAL RESEARCH PAPER

Anaesthesiology

KEY WORDS: awake fiberoptic intubation, AFOI, FOI, conscious sedation, dexmedetomidine, fentanyl, anticipated difficult airway

COMPARATIVE STUDY FOR AWAKE FIBEROPTIC INTUBATION BETWEEN DEXMEDETOMIDINE VS FENTANYL FOR PROVIDING CONSCIOUS SEDATION IN ANTICIPATED DIFFICULT AIRWAY

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ABSTRACT

Background: Awake fiberoptic intubation (AFOI) is recommended for patients with anticipated difficult airway.it ensures maintenance of airway reflexes and spontaneous breathing while intubating. The intended goal provide sedation are to ensure patient comfort, cooperation, amnesia, hemodynamic stability, and to suppress airway reflexes while maintaining an open airway and allowing for spontaneous ventilation. Fentanyl is a synthetic opioid that offers mild sedation, analgesia, and hemodynamic stability and Dexmedetomidine is an extremely selective, centrally acting -2 agonist producing hypnosis, amnesia, analgesia, anxiolysis, decreases sympathetic response, and saliva production. All of these effects are beneficial during AFOI. **Objectives:** To compare patient compliance and comfort, Intubation time, Hemodynamic response, post intubation side effects such as hoarseness, unpleasant memories in patient undergoing AFOI. **Material And Methods:** we compared two groups, one received dexmedetomidine 1 mcg/kg over 10 min followed by 0.25 mcg/kg/hr while other group received fentanyl 2mcg/kg followed by 0.5 mcg/kg/hr. AFOI was done post anesthetizing airway when RSS 3 was achieved. **Results:** time to sedation and the time to intubation were shorter with dexmedetomidine and Hemodynamic variable such as HR, SBP, DBP, MAP, SPO2 significantly more stable in dexmedetomidine with no significant differences in cough score, intubating condition, intubation tolerance, airway obstruction among two groups. **Conclusion:** Both dexmedetomidine and fentanyl can be used to achieve adequate sedation for AFOI along with regional block and topical anesthesia. However, dexmedetomidine achieved target sedation faster, early intubation and provided better hemodynamic stability.

INTRODUCTION:

Awake fiberoptic intubation (AFOI), introduced in the 1960s, allows airway visualization and intubation while maintaining consciousness, airway reflexes, and spontaneous breathing. AFOI is particularly useful for difficult airway cases, failed intubations, or unstable cervical spine injuries. These situations often involve anatomical challenges, limited mouth opening, or facial trauma, necessitating a tailored approach for patient comfort, reflex suppression, and hemodynamic stability. Topical anesthesia and nerve blocks are frequently used to suppress airway reflexes and ensures patient comfort during procedure.

It is challenging to provide adequate sedation and maintain patent airway and ventilation. An ideal sedation regimen should provide patient comfort and compliance, blunting of airway reflexes, hemodynamic stability, amnesia, and doesn't cause airway obstruction while maintaining spontaneous ventilation.

In this study, we compared the safety and effectiveness of dexmedetomidine with fentanyl for awake fiberoptic intubation in patients with anticipated difficult airway undergoing elective surgery.

MATERIAL AND METHODS:

This was a prospective, randomized, double-blinded, non-placebo study conducted over a 1-year period at the Department of Anesthesiology & Critical Care, Moti Lal Nehru Medical College, Prayagraj after institutes ethical approval. study included participants aged 18-50 years, classified as ASA grade I/II, with anticipated difficult airways who were scheduled for elective surgery. sample size was obtained by using following formula

$$\text{Sample size} = \frac{Z_{1-\alpha/2}{}^2 p(1-p)}{d^2}$$

Technique: Two groups of 20 patients were compared. One group received dexmedetomidine, with a loading dose of 1 g/kg over 10 minutes and a maintenance dose of 0.25 g/kg/hr. The other group received Fentanyl, with a loading dose of 2 g/kg over 10 minutes and a maintenance dose of 0.5 g/kg/hr. Airway anesthesia with trans-tracheal, superior laryngeal nerve block ,and nebulization with 5ml of 4%lignocaine was done. Flexible bronchoscopy-guided intubation was conducted once the Ramsay Sedation Score-3 by an experienced anesthesiologist. The fiberscope, lubricated with KY jelly, was loaded with a 6.0–7.0 size endotracheal tube (ETT). After white balancing and orientation, 2 puffs of 10% lignocaine were sprayed into the nostril for passage of the scope. The fiberscope was advanced through the nostril to the nasopharynx, oropharynx, and further observing the landmarks (epiglottis, trachea, and carina). The ETT was positioned 3–5 cm above the carina. Throughout the procedure, nasal prongs delivered oxygen at 5 L/min.

Observations:

intubating conditions were evaluated using the following criteria: cough score (1: None, 2: 1/2 coughs, 3: 3-5coughs), limb movement (1: Slight, 2: Moderate, 3: Severe), and vocal cord position (1: Open, 2: Moving, 3: Closing, 4: Closed).

HR, MAP and SPO2 were monitored at baseline and at 1, 3, 5, 10, 20, and 30 minutes after starting the drug infusion. Systolic and diastolic blood pressure were recorded before and after intubation.

Episodes of apnea lasting >20 seconds or SPO2 dropping <95%, The time to achieve adequate sedation and the time to complete intubation were recorded.

RESULTS

the male to female ratio was 10:10 for group A and 11:9 for Group B. The mean value of age in the group A was 34.6 ± 9.156yrs and in the group B was 33.60 ± 10.738yrs. The mean

value of weight in the group A was 69.15 ± 10.63 kg and in the group B was 63.40 ± 9.18 kg. ASA1: ASA2 ratio was 13:7 in group A and 14:6 in group B. The distribution of age, sex, and weight and ASA grade was similar among two groups.

Time To Sedation:
The mean time to sedation was significantly shorter in group A 5.45± 0.807 compared to group B 7.17± 0.846 (P = 0.0001).

Time To Intubation:
The mean time of intubation in group A was 12.7± 1.37 and in group B it was 15.7± 20.79 with p value (P = 0.515) by independent t-test was insignificant.

Intubation Comfort:
35% of Group A and 30% of Group B had no reaction, while 55% in both groups exhibited slight grimacing. Heavy grimacing occurred in 10% of Group A and 15% of Group B, with no verbal objections or defensive hand movements in either group. These differences were not statistically significant (p = 0.549).

Intubation Condition:
Intubating condition while performing Fiberoptic bronchoscopy was assesd base on cough score(p = 0.433), degree of limb movement (p = 0.002) and vocal cord movement (p = 0.524) which was comparable in both groups with no statistical significance. [Table1]

Table1: Intergroup Comparison Of Intubation Score

Cough Score	Group A (n=20)	Group B (n=20)	P Value
Slight	10 (50%)	6 (30%)	0.433
Moderate	8 (40%)	11 (55%)	
Severe	2 (10%)	3 (15%)	
Degree of limb movements	Group A (n=20)	Group B (n=20)	P Value
Slight	16 (80%)	5 (25%)	0.002
Moderate	4 (20%)	12 (60%)	
Severe	0 (0%)	3 (15%)	
Vocal cord movement	Group A (n=20)	Group B (n=20)	P Value
Open	9 (45%)	7 (35%)	0.524
Moving	11 (55%)	12 (60%)	
Closing	0 (0%)	1 (5%)	
Closed	0 (0%)	0 (0%)	

Oxygen Saturation:
At baseline, the SPO2 levels were 99.55 ± 0.759 for group A and 99.90 ± 0.305 for group B. Throughout the procedure, SPO2 levels remained consistently stable, showing no significant deviations from either the baseline or among each other. The results were not statistically significant (P > 0.05). [Table 2]

Table 2: Intergroup Comparison Of Oxygen Saturation

Time Interval	Mean Groups (Mean ± S.D.)		P Value
	Group A (n=20)	Group B (n=20)	
Base line at 0 min	90.90± 5.447	89.45± 9.344	0.552
Post-Intubation 1 min	78.25± 4.339	98.65± 8.756	0.0001
3 Minute	73.00± 5.840	95.10± 8.410	0.0001
5 Minute	70.40± 5.124	91.70± 10.204	0.0001
10 Minute	73.35± 6.158	91.55± 9.168	0.0001
20 Minute	74.35± 7.051	90.70± 8.868	0.0001
30 Minute	76.30± 7.420	92.20± 8.095	0.0001

Mean Arterial Blood Pressure:
The distribution of MAP at various intervals among the study participants. The MAP for group A was 90.90± 5.447, and 89.45± 9.344 for group B at baseline measurements were without any statistical significance. However, throughout the procedure, the MAP in group B remained consistently higher in comparison to group A at time intervals of 1, 3, 5, 10, and 20 minutes; these differences were statistically significant. The comparison of MAP observed at 1, 3, 5, 10, 20 and 30 minutes revealed statistical significance (P =0.0001). [Table 3]

Table 3: Intergroup Comparison of Mean Arterial Blood Pressure

Time Interval	Mean Groups (Mean ± S.D.)		t Value[1]	P Value
	Group A (n=20)	Group B (n=20)		
Base line at 0 min	90.90± 5.447	89.45± 9.344	1.450	0.552
Post-Intubation 1 min	78.25± 4.339	98.65± 8.756	-9.336	0.0001
3 Minute	73.00± 5.840	95.10± 8.410	-9.653	0.0001
5 Minute	70.40± 5.124	91.70± 10.204	-8.343	0.0001
10 Minute	73.35± 6.158	91.55± 9.168	-7.370	0.0001
20 Minute	74.35± 7.051	90.70± 8.868	-6.454	0.0001
30 Minute	76.30± 7.420	92.20± 8.095	-6.475	0.0001

Heart Rate:
The baseline mean heart rate (beats per minute) was 82.65 ± 10.634 in Group A and 81.25 ± 13.026 in Group B, with no statistically significant difference (t = 0.372, p = 0.712). However, immediately after intubation, the mean heart rate was significantly higher in Group A (110.45 ± 9.833) compared to Group B (97.05 ± 17.148), with a statistically significant difference (p < 0.01). [Table 4]

Systolic Blood Pressure:
Baseline mean systolic blood pressure was similar between Group A (124.80 ± 8.445 mmHg) and Group B (125.80 ± 10.561 mmHg, p = 0.743). Post-intubation, Group A had significantly lower SBP (106.90 ± 7.88 mmHg) than Group B (136.40 ± 10.966 mmHg) with (p < 0.01).

Diastolic Blood Pressure:
Baseline mean diastolic blood pressure was comparable 73.90 ± 5.748 mmHg in Group A and 67.40 ± 16.60 mmHg in Group B,(p = 0.106). Post-intubation, Group A had a significantly lower DBP (66.90 ± 9.884 mmHg) compared to Group B (79.80 ± 7.838 mmHg, p = 0.0001).

Airway Obstruction:
In Group A and Group B, 85% had no obstruction. Neck extension relieved obstruction in 10% of Group A and 15% of Group B, while jaw thrust was required in 5% of Group A and none in Group B. No statistically significant differences were observed.

DISCUSSION:
The ASA difficult airway algorithm highlights the importance of considering awake intubation as preferred method in anticipated difficult airway scenarios. [1] Fentanyl is a synthetic opioid that offers mild sedation, analgesia, and hemodynamic stability, making it suitable for AFOI. [2]

Dexmedetomidine is an extremely selective, centrally acting -2 agonist. The effects it produces are hypnosis, amnesia, analgesia, anxiolysis, blocking the sympathetic nervous system, and decreasing saliva production. [3]

In our study we compared dexmedetomidine with fentanyl, we found that time taken to achieve mean Ramsay sedation score3 (RSS) was much longer (p value 0.0001) in group-B patient compared to group-A. and intubation time lesser in group A, compared to group B although this difference did not reach statistical significance (P = 0.515).

The study done by Mondal et al. [4] showed that RSS was better with dexmedetomidine group (RSS 3 ± 0.37) compared with fentanyl group (RSS 2.07 ± 0.254). They compared RSS score between two groups rather than time to sedation. This finding was in agreement with our study. A study by Liu et al.

[5] showed that the time to intubate patients with dexmedetomidine was 673.1 s ± 8.3 SD. This is similar to the findings in our study.

On comparing intubation score among both groups, Although we did not find any significant differences in the cough score(P value=0.4),and vocal cord movements across the groups(p value=0.52), it was noticed that the percentage of participants with a cough score ≥2 and vocal cord movement ≥3 was greater in group, and the degree of limb movement score ≥2 was significantly higher in group B compared to group A (p value 0.002)in a study conducted by Acharhya R et al. [6] Baiju et al. [7] found similar results.

In our study We observed that both groups had favorable intubation comfort score ≤2 85% and 80% in group A and group B respectively. only 10% of participants in group A and 15% of participants in group B had Heavy grimacing These differences were statistically insignificant, (p = 0.549). result of study conducted by Sayeed et al [8] Agrawal et al [9] was in agreement to our study

We compared hemodynamic changes in heart rate, oxygen saturation, mean arterial pressure, systolic blood pressure and diastolic blood pressure while performing AFOI. We noticed that the mean heart rate, SBP and DBP were comparable at baseline but intubation response was much reduced in patients who received dexmedetomidine (p value <0.01). oxygen saturation was comparable in both groups throughout the procedure. Mean arterial pressure was more stable and remain lower in patient receiving dexmedetomidine (P = 0.0001). The hemodynamic effects of dexmedetomidine result from a decrease in the sympathetic tone by central mechanism and increased vagal activity. Dexmedetomidine infusion may cause bradycardia, atrial fibrillation, hypotension, or hypertension particularly in higher dose. However, there are reports of unaltered hemodynamics even in higher doses of dexmedetomidine infusion. In our study, there was no significant change in oxygen saturation when both groups were compared. We premedicated all patients with midazolam and glycopyrrolate. We used glycopyrrolate as an antisialogogue which might have prevented side effects like bradycardia in both the groups.

CONCLUSION:

This study found that dexmedetomidine infusion provided faster sedation, shorter intubation time, and better hemodynamic stability compared to fentanyl. Both groups achieved adequate patient comfort, intubation scores, and post-operative satisfaction. Optimal sedation, effective airway topicalization, and practitioner skill are critical for the safety and success of awake fiberoptic intubation.

Acknowledgement: We are extremely thankful to the faculty at the Departments of Anesthesiology at Motilal Nehru medical college, and Swaroop rani Nehru hospital, prayagraj, for the conduct and completion of this research.

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