



## TO COMPARE THE INTUBATING CONDITIONS WITH DEXMEDETOMIDINE VERSUS MIDAZOLAM-FENTANYL COMBINATION FOR AWAKE FIBREOPTIC INTUBATION

### Anaesthesiology

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### ABSTRACT

**Objectives:** To compare the intubating conditions of dexmedetomidine alone versus fentanyl-midazolam combination during AFOI

**Methodology:** Group-I patients (n=30) received dexmedetomidine 1 µg/kg bolus infusion over 10 minutes, followed by infusion of 0.1 µg/kg/hr titrated to 0.7 µg/kg/hr whereas Group-II patients (n=30) received i.v fentanyl 2 µg/kg bolus followed by midazolam infusion of 0.02-0.1 mg/kg/hr until they were adequately sedated i.e. Ramsay Sedation Score (RSS) of 3. Intraoperatively Total Comfort Score, 5 point FOI score was noted and Questionnaire assessment was done 24 hours after surgery.

**Results:** During preoxygenation, the mean TCS was not statistically significant different between the two groups but during FOS and during intubation, the mean TCS was lower in group-I than group-II and the difference between the two groups was statistically significant ( $p < 0.05$ ). Significant differences in the patient's reaction to tube were found during FOS and after intubation between the two groups with lower reaction in dexmedetomidine group ( $p < 0.05$ ). During follow-up assessment 24 hours after the surgical procedure, the dexmedetomidine group patients judged their sedation more positively and were having less pain and discomfort during the procedure than fentanyl plus midazolam patients.

**Conclusion:** The use of dexmedetomidine at 1 mcg/kg bolus over 10 minutes, with maintenance rates of 0.1-0.7 µg/kg/hr offer better tolerance, preservation of a patent airway and spontaneous ventilation, while maintaining hemodynamic stability during AFOI.

### KEYWORDS

### INTRODUCTION

AFOI is a technique which allows a flexible endoscope to pass through oral or nasal route to provide a clear visualisation of the vocal cords and subsequent passage of an endotracheal tube into the trachea under direct vision. During this process good topicalization of the airway is necessary to obtund the sensory afferent impulses from the oropharynx and laryngotracheal region.

But irony is that despite of good topicalization fibreoptic bronchoscopy can still be perceived as an unpleasant experience. To ameliorate this discomfort topical anaesthesia is supplemented with a good sedative agent. Kopman et al. highlighted its advantages as early as 1975 in a review of 267 awake intubations.<sup>[1]</sup>

The ideal sedative for AFOI would provide anxiolysis, analgesia, amnesia, low incidence of recall of the procedure, suppress the cough and gag reflex, easily titratable, without the risk of airway compromise and adverse hemodynamic consequences. In the last three decades, several classes of drugs have been used for AFOI e.g. benzodiazepines like midazolam, opioids like fentanyl, sufentanil, remifentanyl,  $\alpha$ , agonists like clonidine and dexmedetomidine and intravenous induction agents like ketamine and propofol etc.<sup>[2,3,4,5]</sup> A successful awake intubation relies upon a crucial balance between acceptable sedation and adequate respiration. Standardization of such safer levels of sedation for AFOI is difficult to determine. Nevertheless, the quest for the ideal drug for conscious sedation for an AFOI is an ongoing process.

In this study, the intubating conditions of dexmedetomidine alone versus fentanyl-midazolam combination was compared for AFOI.

### MATERIAL AND METHODS

After the Institutional Ethics Committee approval, the study was conducted in Government Medical College, Patiala in 60 patients aged between 18-60 years, ASA Grade I and II scheduled for elective surgery. A written informed consent was obtained from each patient. The patients were randomly divided in two groups of 30 each.

### Exclusion Criteria :

Patient's refusal, Baseline heart rate  $< 60$ , Baseline blood pressure  $< 100/50$ , Coagulopathy, History of nasal surgery / nasal trauma, Nasal polyp, Cardiovascular disease, Liver cirrhosis, Alcohol and drug abusers, Mentally ill patients, Allergic to the drugs used in the study, patients on drugs like digitalis, beta blockers, calcium channel blockers known to produce changes in heart rate and blood pressure cirrhosis.

Preanaesthetic check up was done in every patient. All patients were given inj. Glycopyrrrolate (0.2mg) i.m 30 min before the elective surgery. Base line vital parameters of all the patients like HR, SBP, DBP, SpO<sub>2</sub> were documented.

**Group-I** patients (n=30) received dexmedetomidine 1 µg/kg bolus infusion over 10 minutes, followed by infusion of 0.1 µg/kg/hr titrated to 0.7 µg/kg/hr until they are adequately sedated.

**Group-II** patients (n=30) received i.v fentanyl 2 µg/kg bolus followed by midazolam infusion of 0.02-0.1 mg/kg/hr until they are adequately sedated i.e. Ramsay Sedation Score (RSS) of 3.

Patients were placed in supine position. Each nostril was checked for patency. The nostril with least resistance was chosen for nasal intubation. Nasal mucosa was sprayed with vasoconstrictor xylometazoline (0.1%) and with two puffs of 10% lignocaine. 2% lignocaine viscous gargles were done to achieve adequate topical anaesthesia. For further topical anaesthesia two puffs of 10% lignocaine were sprayed over tonsillar pillars and back of throat. When fibroscope reached upto the vocal cords, 2 ml of 2% lignocaine with some air was injected through the epidural catheter inserted over the working channel of the fibroscope. When vocal cords were crossed 2 ml of 2% lignocaine with some air was injected in the upper part of trachea. Supplemental doses of lignocaine upto a maximum of 9 mg/kg were administered to the airway. On reaching the carina endotracheal tube was railroaded over the fibroscope. The endotracheal tube was secured and G.A was administered.

### Intraoperatively

Comfort scale values were recorded by the anesthesiologist (performing the procedure) during pre-oxygenation, at FOS and at the introduction of ET tube.

### COMFORT SCALE, AS MODIFIED FROM AMBUEL ET AL<sup>[6]</sup>

| Parameter | Score Assessment         |
|-----------|--------------------------|
| Alertness | 1. Deeply asleep         |
|           | 2. Lightly asleep        |
|           | 3. Drowsy                |
|           | 4. Fully awake and alert |
|           | 5. Hyperalert            |
| Calmness  | 1. Calm                  |
|           | 2. Slightly anxious      |
|           | 3. Anxious               |
|           | 4. Very anxious          |
|           | 5. Panicky               |

|                      |                                                                                                                                                                                                                                              |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Respiratory Response | 1. No coughing and no spontaneous respiration<br>2. Spontaneous respiration<br>3. Occasional cough<br>4. Coughing regularly<br>5. Frequent coughing or choking                                                                               |
| Crying               | 1. Quiet breathing, no crying<br>2. Sobbing or gasping<br>3. Moaning<br>4. Crying<br>5. Screaming                                                                                                                                            |
| Physical Movement    | 1. No movement<br>2. Occasional slight movement<br>3. Frequent slight movements<br>4. Vigorous movement limited to the extremities<br>5. Vigorous movements including torso and head                                                         |
| Muscle Tone          | 1. Muscles totally relaxed, no muscle tone<br>2. Reduced muscle tone<br>3. Normal muscle tone<br>4. Increased muscle tone and flexing of fingers and toes<br>5. Extreme muscle rigidity and flexing of fingers and toes                      |
| Facial Tension       | 1. Facial muscle totally relaxed<br>2. Facial muscle tone normal, no facial muscle tension evident<br>3. Tension evident in some facial muscles<br>4. Tension evident throughout facial muscles<br>5. Facial muscles contorted and grimacing |
| Total Score          | 35                                                                                                                                                                                                                                           |

The total comfort score for each patient was calculated by adding the scores of the 7 comfort categories at each time point.

One of the independent, study- blinded observers assessed patient's reaction to placement of the fiberoptic scope and the endotracheal tube on a 5 point FOI score:

| Patient's reaction                           | Score |
|----------------------------------------------|-------|
| 1. No reaction                               | 1     |
| 2. Slight grimacing                          | 1     |
| 3. Severe grimacing                          | 1     |
| 4. Verbal objection                          | 1     |
| 5. Defensive movement of head, hands or feet | 1     |

4. The surgical procedure then proceeded as planned. 24 hours after the surgical procedure, each patient was questioned by one of the blinded observers to assess his/her experience with the AFOI.

#### QUESTIONNAIRE ASSESSMENT 24 HOURS AFTER SURGERY

| Questions                                                                        | Possible Answers                                    |
|----------------------------------------------------------------------------------|-----------------------------------------------------|
| 1. How was the sedation for your procedure                                       | 1=Excellent<br>2= Good<br>3= Fair<br>4= Poor        |
| 2. Do you think you needed any adjustment in the amount of sedation you received | 1= Needed less<br>2= Right amount<br>3= Needed more |
| 3. Do you remember the start of the procedure when the scope was inserted        | 1= No<br>2= Yes                                     |
| 4. Do you remember being awake during the procedure                              | 1= No<br>2= Yes                                     |
| 5. Do you remember the end of the procedure when the scope was removed           | 1= No<br>2= Yes                                     |
| 6. How much discomfort or pain did you experience during the procedure           | 1= None<br>2= Mild<br>3= Moderate<br>4= Severe      |

#### Statistical Analysis

The results obtained in the study are presented in tabulated manner and analysed using IBM SPSS statistics software version 20.0. Statistical analysis was carried out using Student's t-test. Hemodynamic variables were expressed as Mean  $\pm$  SD. P value <0.05 was regarded as statistically significant, and P value >0.05 was regarded as non significant.

#### OBSERVATIONS

**Table-1 Demographic Data**

| Demographic | Group 1          | Group 2           | P value |
|-------------|------------------|-------------------|---------|
| Age(years)  | 43.80 $\pm$ 12.3 | 40.50 $\pm$ 12.06 | 0.29    |
| Weight (kg) | 62.93 $\pm$ 6.53 | 63.53 $\pm$ 4.71  | 0.68    |
| Sex (F/M)   | 24/6             | 22/8              | 0.54    |

Difference between demographic data was statistically insignificant among the two groups.

**Table-2 Total Comfort Score**

| TCS            | Group 1 |      | Group 2 |      | P value |
|----------------|---------|------|---------|------|---------|
|                | Mean    | SD   | Mean    | SD   |         |
| Preoxygenation | 14.10   | 1.18 | 14.37   | 0.89 | 0.328   |
| FOS            | 15.93   | 1.57 | 16.80   | 1.03 | 0.014*  |
| INTUBATION     | 17.87   | 1.50 | 18.97   | 1.75 | 0.011*  |

During preoxygenation, the mean TCS was not statistically significant different between the two groups but during FOS and during intubation, the difference in mean TCS between the two groups was statistically significant.(p<0.05).

**Table-3 Patient's Reaction To The Procedure**

| Reaction   | Group 1 |      | Group 2 |      | P value |
|------------|---------|------|---------|------|---------|
|            | Mean    | SD   | Mean    | SD   |         |
| FOS        | 2.77    | 1.00 | 3.43    | 0.81 | 0.007*  |
| Intubation | 2.00    | 0.58 | 2.43    | 0.56 | 0.005*  |

Significant differences in the patient's reaction were found during FOS and after intubation between the two groups. (p $\leq$ 0.05)

**Table-4 Questionnaire Assessment 24 Hrs After Surgery**

| Question | Group 1 |      | Group 2 |      | P value |
|----------|---------|------|---------|------|---------|
|          | Mean    | SD   | Mean    | SD   |         |
| Q1       | 1.67    | 0.60 | 2.33    | 0.60 | <0.001* |
| Q2       | 1.90    | 0.40 | 2.20    | 0.55 | 0.019*  |
| Q3       | 1.40    | 0.49 | 1.67    | 0.47 | 0.039*  |
| Q4       | 1.20    | 0.40 | 1.47    | 0.50 | 0.029*  |
| Q5       | 1.13    | 0.34 | 1.60    | 0.49 | <0.001* |
| Q6       | 1.07    | 0.25 | 2.30    | 0.46 | <0.001* |

Significant differences were found between the two groups on answers to all the questions (p<0.05)

#### DISCUSSION

The need for conscious sedation during an AFOI is now widely accepted. The practice of conscious sedation has been revolutionized in the past decade, by the introduction of drugs with unique pharmacokinetic properties, such as propofol, remifentanyl and dexmedetomidine,

Dexmedetomidine is a non selective  $\alpha_2$  agonist. The overall response is related to the stimulation of  $\alpha_2$  adrenoreceptors located in CNS and spinal cord. These receptors are involved in sympatholysis, sedation, and antinociceptive effects.<sup>[7]</sup>  $\alpha_2$  receptors in locus caeruleus are responsible for their sedative and hypnotic effect.<sup>[8]</sup> Despite sound levels of sedation with dexmedetomidine, there is limited respiratory depression providing wide safety margins.<sup>[9]</sup> In a study, comparing the effects of remifentanyl and dexmedetomidine on respiratory parameters in normal volunteers, the hypercapnic ventilator response was unaffected even at doses that produced unresponsiveness to vigorous stimulation<sup>[10]</sup>.

Fentanyl provides potent analgesia with minimum sedative effect. Benzodiazepines enhanced the sedation and amnesia and improved patients comfort when added to fentanyl and even to dexmedetomidine. Benzodiazepines alone cannot substitute for inadequate analgesia and topicalization with local anaesthetics. So, a combination of opioid and benzodiazepine provides better intubating conditions and attenuation of pressor response to awake fiberoptic intubation as compared to either drug alone. In this study the intubating conditions with preoperative dexmedetomidine alone versus midazolam and fentanyl was compared during awake fiberoptic nasotracheal intubation.

#### TOTAL COMFORT SCORE:

This study showed that dexmedetomidine provides better intubating conditions as compared to fentanyl and midazolam as Total Comfort

Score was statistically significant different among the two groups.

This results are similar to those observed by Mondal S et al (2015) who compared dexmedetomidine and fentanyl in 60 patients and observed better intubating conditions in dexmedetomidine group.<sup>[11]</sup> A study by Chu et al (2010) also compared dexmedetomidine and fentanyl for sedating 60 oral cancer patients undergoing AFOI and observed that dexmedetomidine produced better intubating conditions than fentanyl.<sup>[12]</sup> Similarly, studies by Bergese *et al.* [2010]<sup>[13]</sup> Patrick BS et al (2010)<sup>[14]</sup> found that patients were more comfortable in dexmedetomidine plus midazolam group as compared to midazolam alone.

### Patient's Reaction To The Placement Of Tube

While comparing the patient's tolerance in this study, by using 5 point fibreoptic intubation comfort score, it was found that there was significant difference between two groups ( $p < 0.05$ ) suggesting that dexmedetomidine had better patient tolerability. Similar results were reported by S Mondal et al (2015) while comparing dexmedetomidine and fentanyl group during AFOI.<sup>[11]</sup> Chu et al (2010) also compared dexmedetomidine and fentanyl for sedating 60 oral cancer patients undergoing AFOI and observed better tolerance to intubation in dexmedetomidine group as compared to fentanyl group.<sup>[12]</sup>

Patrick BS et al (2010) also reported better patient's tolerance while comparing the efficacy of dexmedetomidine with midazolam and midazolam alone for sedation during AFOI in 55 patients.<sup>[14]</sup>

### Questionnaire Assessment At 24 Hrs. After Surgery

During follow-up assessment 24 hours after the surgical procedure, the dexmedetomidine group patients judged their sedation more positively than did fentanyl plus midazolam patients. The dexmedetomidine patients had less pain and discomfort during the procedure than fentanyl plus midazolam patient. The fentanyl plus midazolam patients needed more sedation during the procedure than the dexmedetomidine patients.

However there were no differences between the groups in either recall of the procedure or awareness of fibreoptic scope removal at the end of the procedure. Overall the dexmedetomidine patients were more satisfied with the procedure than the fentanyl plus midazolam group patients.

### SUMMARY

Patients who received dexmedetomidine had lower total comfort score during fiberoptic insertion and endotracheal intubation as compared to those who received fentanyl and midazolam thereby implying better intubating conditions with dexmedetomidine. Similarly 5 Point FOI scores were lower in dexmedetomidine group indicating a better tolerance to AFOI.

Within 24 hours of surgery, patients judged their own AFOI experience. Patients who received dexmedetomidine judged their sedation more positively than those who received fentanyl and midazolam. Apart from sedation, dexmedetomidine patients reported less pain and discomfort during the procedure, leading to more satisfaction.

### CONCLUSION

In conclusion, the use of dexmedetomidine at 1mcg/kg bolus over 10 minutes, with maintenance rates of 0.1-0.7 µg/kg/hr offer better tolerance, preservation of a patent airway and spontaneous ventilation, while maintaining hemodynamic stability during AFOI.

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