

## A comparison of the effectiveness of dexmedetomidine versus propofol-fentanyl combination for sedation during awake fiberoptic nasotracheal intubation

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### Abstract

**Introduction:** In patients with anticipated difficult airway, awake fiber optic intubation (AFOI) is an established modality. Various drugs have been used to provide favourable intubating conditions with good patient comfort and cooperation. Commonly used agents are opioids and benzodiazepines along with the recent agents like dexmedetomidine. We undertook this study to compare dexmedetomidine against propofol-fentanyl combination for AFOI.

**Materials and Methods:** A randomized prospective study was performed on sixty patients with anticipated difficult airway and allocated into two groups each containing thirty. Propofol-fentanyl (PF) group received initial bolus of inj propofol 0.5 mg/kg and fentanyl 0.5µg/kg followed by propofol infusion of 30µg/kg/min and dexmedetomidine (DEX) group received loading dose of 1µg/kg for 10 min and followed by maintenance infusion of 0.5µg/kg/h. We analyzed haemodynamics, saturation, Ramsay sedation score, rescue midazolam requirement, airway obstruction, patient tolerance and intubating conditions.

**Results:** There was no difference in demographic variables between the two groups. PF group achieved higher mean Ramsay sedation score (RSS) during AFOI as compared to DEX group, (P<0.05). PF group (76.7%) had more favourable cough scores ( $\leq 2$ ) as compared to DEX group (40%) (p<0.05). Both the groups had comparable vocal cord movement and limb movement scores. Favorable patient tolerance scores were achieved in twenty-four patients (80%) in PF group in comparison to eighteen patients (60%) in DEX group (P<0.05). Twenty-three (76.7%) in DEX group had patent airway (score 1) compared to twelve patients (40%) in PF group (P<0.05).

**Conclusion:** Both PF and DEX provided comparable satisfactory intubating conditions for AFOI in terms of vocal cord and limb movement scores. However, PF combination provided lower cough scores and better patient tolerance scores. Dexmedetomidine offered better patent airway with spontaneous ventilation. Reduced hemodynamic response to intubation was achieved in both the groups, although PF group caused more hypotension during AFOI. No episodes of hypoxia was seen in both the groups.

**Keywords:** Difficult airway, Awake fiberoptic intubation, Propofol-fentanyl, Dexmedetomidine infusion.

### Introduction

The anticipated or unanticipated difficult airway is a real challenge to every anaesthesiologist. Many airway related complications due to difficult airway have been decreasing in recent times due to the advent of fiberoptic bronchoscope.

Awake fiberoptic intubation (AFOI) has emerged as an effective and preferred lifesaving modality in difficult airway management. A spontaneously breathing awake patient maintains adequate ventilation, oxygenation and protects his airway from aspiration which is of paramount importance in difficult airway management. Providing optimal intubating conditions with good patient comfort are important while preparing the patient for an AFOI and this requires adequate sedation. The components of ideal sedation regimen should include good patient cooperation and comfort, obtundation of airway reflexes, provide hemodynamic stability, amnesia and a patent airway with spontaneous ventilation.<sup>1</sup>

Conscious sedation for intubation has been achieved by usage of many agents.<sup>1-4</sup> The usual sedative agents used for AFOI, are opioids and midazolam which cause respiratory depression, with risk of hypoxia and aspiration.<sup>2,3</sup>

Dexmedetomidine, is a relatively new, short acting, highly selective  $\alpha_2$ -adrenoceptor agonist, which has been

approved by the food and drug administration for ICU sedation of less than 24 hours.<sup>5</sup> Recently it has been used widely to sedate patients in various settings including AFOI, as it provides conscious sedation and analgesia with no respiratory depression.<sup>6,7</sup>

Propofol, an ultra-short-acting nonopioid, nonbarbiturate sedative-hypnotic agent, is also used for conscious sedation owing to its short context sensitive half-life and profound amnesia with added antiemetic properties.<sup>8</sup>

Fentanyl, an opioid, obtunds hemodynamic response and reduces discomfort during the passage of bronchoscope through vocal cords.<sup>3,6</sup> Fentanyl in combination with propofol has shown to provide a suitable condition for AFOI albeit with a higher incidence of hypoxemia.<sup>6</sup>

Therefore we conducted this study to compare the two different intravenous sedation regimens using either dexmedetomidine or propofol-fentanyl combination for AFOI in patients with anticipated difficult intubation, with respect to intubating conditions, patient comfort, level of sedation, hemodynamic stability and patency of airway.

### Materials and Methods

Patients between age 18 and 70 years, ASA physical status I-III and chosen for elective AFOI due to anticipated

difficult airway were included in this prospective, randomised, double blinded study. Baseline heart rate <60/min, heart block on the ECG, congestive cardiac failure, non-elective surgery, pregnancy, contraindications for nasal intubation and prior history of allergy to the study drugs were the exclusion criterias. Institutional ethics committee approval was obtained and written informed consent was taken from 60 patients, who satisfied the inclusion criterias.

Anticipated difficult airway was determined by a non-investigating anaesthesiologist on the basis of a history of previous difficult intubation and the presence of at least one of the following:

Mallampati class III or IV, thyromental distance less than 65 mm, and mouth opening (interincisor distance) less than 35mm.

All patients who were scheduled for AFOI fasted for 6 h prior to surgery. Glycopyrrolate 0.2 mg intramuscular was given as anti sialogogue 30 min before the start of the study. Tab alprazolam 0.5 mg was given for anxiolysis at night before the morning of surgery. On the morning 2 h before surgery tab ranitidine 150 mg and tab ondansetron 4mg were given. Nasal oxygen (2 l/min) was started in the operating room and baseline vital signs such as heart rate (HR), arterial pressure, and arterial oxygen saturation (SpO<sub>2</sub>) were recorded. Vitals were further recorded during pre oxygenation and then every 3 min till drug infusion and every minute during AFOI till the endotracheal tube was in place.

Two experienced consultant anaesthetists, who routinely performed AFOI, conducted the study. The intubating anaesthesiologists, patients, and the person recording the procedures were all blinded to the study. Computer generated random numbers were used for allocating the patients into two groups.

Group PF was the propofol-fentanyl group, which included 30 patients who was administered an initial bolus of 0.5 mg/kg propofol i.v plus fentanyl 0.5µg/kg i.v which was followed by continuous infusion of propofol 30 µg/kg/min (prepared in a 50ml syringe at a concentration of 10 mg/ml) over 10 min.

Group DEX was the dexmedetomidine group, which included 30 patients, who received an intravenous loading dose of dexmedetomidine 1 µg/kg for 10 min, followed by 0.5 µg/kg/h as a maintenance dose. Two ml of dexmedetomidine (100 µg/ml) was diluted in 48 ml of a 0.9% saline solution in a 50ml syringe.

After the infusion of the study drugs and prior to airway topicalization, the patient's level of sedation was assessed using the RSS (Table 1).

RSS values were recorded during preoxygenation (Pre-Ox), during AFOI, and introduction of the endotracheal tube. Any patient with less than 2 scoring points on this scale were administered rescue midazolam in 0.5mg bolus doses until RSS was greater than or equal to 2.

Preparation of the airway was started immediately after starting study drug infusions with airway nebulisation of lidocaine 2% solution 4ml for 15 min. Nostril with better

patency was chosen for AFOI. Xylometazoline nasal drops and lignocaine jelly was applied to the nostrils. After achieving a RSS score  $\geq 2$ , fiberoptic intubation was commenced. A fiberoptic scope (5.2 mm; Karl Storz) was loaded with an 8.0mm Portex endotracheal tube for male patients and a 7.0 mm Portex endotracheal tube for female patients, guided into place with a bronchoscope. The laryngo-epithelial region was localised and anaesthetised by spraying 5ml of lidocaine 2% on the supraglottic region through bronchoscope working channel. Also, 2ml of lidocaine 2% was sprayed directly on the vocal cords immediately before passage. Once the tube was successfully passed through the vocal cords, the carina was identified and the tip of the tube was placed 3cms above it. After the tube was confirmed in place, general anaesthesia was induced with propofol 1–2 mg/kg intravenous and positive pressure ventilation commenced. The study drug infusions were stopped and the surgical procedure was performed as planned.

The percentage of patients requiring midazolam for rescue to achieve RSS of 2, throughout the study drug infusion and the total dose of midazolam required were calculated. Immediately after intubation, the primary anaesthetist and the study blinded resident determined the outcome by the following measurements:

1. Intubation scores assessed by vocal cord movement (1=open, 2=moving, 3=closing, 4=closed), coughing (1=none, 2=slight, 3=moderate, 4=severe), and limb movement (1= none, 2=slight, 3=moderate, 4=severe).<sup>9</sup>
  2. Patient tolerance assessed by a 5-point fiberoptic intubation comfort score (1=no reaction, 2=slight grimacing, 3=heavy grimacing, 4=verbal objection, 5=defensive movement of head or hands).<sup>9</sup>
- Scores  $\leq 2$  were considered as favorable patient tolerance scores.
3. RSS during AFOI.
  4. Airway obstruction score (1= patent airway, 2= airway obstruction relieved by neck extension, 3= airway obstruction requiring jaw traction).<sup>9</sup>

Reduction of MAP >20% from baseline was treated initially with i.v. fluids and if not responding, phenylephrine 50 µg i.v. bolus was given and repeated after 5 min if needed. Heart rate <30% from base line was considered as bradycardia and treated with atropine 0.6mg i.v. Oxygen saturation <90% or decrease by 10% below baseline was considered as desaturation and treated with oxygen supplementation. Similarly hypertension was defined as MAP>20% and tachycardia as HR>30% from baseline.

The primary objective of the study was to compare the two groups with respect to intubation scores, patient tolerance scores and airway obstruction scores during AFOI. The secondary objectives were to compare Ramsay sedation scale (RSS) during AFOI, number of rescue midazolam requirement to achieve desired RSS and hemodynamics between the two groups.

## Statistics

Based on previous study conducted by C.-J. Tsai et al,<sup>4</sup> it was found that dexmedetomidine provided better intubation scores in terms of vocal cord movement as compared to the propofol-fentanyl group. Propofol-fentanyl group had a open vocal cord movement in 46% of patients as compared to 80% in dexmedetomidine group ( $p=0.03$ ). In our study aiming for a minimum difference of 30% between the two groups in vocal cord movement, the power was set at 80% and alpha error at 5%. The sample size thus required in each group was estimated to be 30. Descriptive and inferential statistical analysis was utilised in our study. Outcomes of continuous measurements are presented on mean  $\pm$  SD (min- max) and those of categorical measurements are presented in number (%). A 5% level of significance was deemed as significant. The inter group analysis of significance of continuous scale parameters was assessed using student t test (two tailed, independent). The categorical scale parameters were analysed using Chi-square/ Fisher Exact test. The Statistical software SPSS 18.0 and R environment ver.3.2.2 were utilised for the analysis in our study.

## Results

No significance was found in the demographic variables (table 2). Likewise, the vitals at baseline including HR, SBP, DBP, MAP, and SpO<sub>2</sub> were found to be comparable between the two groups (Table 3). However, a significant fall in HR, SBP, DBP, MAP was observed in both the groups at the end of study drug infusions and intubation (Table 3). Both the groups had a comparable fall in mean HR at the end of intubation ( $80.97\pm 13.91$  in DEX group and  $82.43\pm 17.74$  in PF group). However, at the end of intubation mean MAP fell more significantly in PF group as compared to the DEX group ( $94.48\pm 16.87$  in DEX group,  $84.87\pm 15.17$  in PF group ( $p<0.05$ )). Six patients (20%) in DEX group and 4(13%) in PF group developed bradycardia ( $<30\%$  from baseline) which was statistically insignificant ( $p>0.05$ ). Also, 4 patients (13.3%) in PF group developed tachycardia ( $>30\%$  from baseline) during AFOI as compared to 1 patient (3.3%) in DEX group which was statistically not significant ( $p>0.05$ ) (Table 6).

Base line saturation of patients were statistically comparable ( $P=0.351$ ) in both DEX group ( $98.33\pm 1.49\%$ ) and PF group ( $98.67\pm 1.24\%$ ). There were no episodes of hypoxia in both the groups ( $SpO_2<90\%$  or  $<10\%$  from base line).

Mean RSS score during pre-ox was not statistically significant ( $P>0.05$ ) between the two groups [DEX group ( $1.70\pm 0.88$ ) versus PF group ( $1.43\pm 0.68$ )]. RSS scores were higher during AFOI and introduction of tube with PF group ( $2.97\pm 1.25$  and  $2.43\pm 1.14$ ) compared to DEX group ( $2.17\pm 0.95$  and  $1.73\pm 0.74$ ) which was statistically significant ( $P<0.05$ ) (Fig. 1). It illustrated that deep sedation was achieved more in patients in PF group. Seventeen patients (56.6%) in DEX group and twenty patients (66.7%) in PF group required rescue midazolam during pre-ox to

achieve RSS of  $\geq 2$  which was not statistically significant with  $P>0.05$ . During AFOI ten patients (33.3%) in DEX group and four patients (13.3%) in PF group required rescue midazolam which was statistically insignificant ( $p=0.063$ ) whereas during introduction of tube eight patients (26.7%) in DEX group and six patients (20%) in PF group required rescue midazolam which was not statistically significant ( $p>0.05$ ) (Fig. 2). The mean dose of rescue midazolam in DEX group ( $0.52\pm 0.72$ ) mg and in PF group ( $0.53\pm 0.74$ ) mg which was comparable between both the groups ( $p>0.05$ ).

Patients in both the groups underwent successful intubation. Vocal cord movement scores of  $\leq 2$  was considered favorable and were achieved in twenty-six patients (86.6%) of DEX group and twenty-eight patients (93.3%) of PF group which was of suggestive significance ( $0.05<P<0.10$ ). Favorable limb movement scores ( $\leq 2$ ) were achieved in 63.3% in PF group as compared to 46.6% in DEX group which, however, was of no statistical significance. Four patients in DEX group developed (score 4) severe limb movement, whereas as none of the patients had it in PF group. This shows that the patients in the PF group tolerated the procedure well. However, a statistically significant favorable coughing scores ( $\leq 2$ ) were achieved more in the PF group (76.7%) as compared to DEX group (40%) (Table 4). In addition, two patients in DEX group had severe cough and laryngospasm which was managed with a bolus of propofol 30 mg and positive pressure ventilation. Statistically significant favorable patient tolerance scores were achieved in twenty-four patients (80%) in PF group as compared to eighteen patients (60%) of DEX group ( $P<0.05$ ). DEX group had one patient with score 4 (verbal objection) and six patients with score 5 (defensive movements) and none of the patients in PF group developed defensive movements. This shows that the procedure was better tolerated in the PF group (Table 5).

Patent airway (Score 1) was seen in twenty-three (76.7%) patients in DEX group as compared to twelve patients (40%) in PF group with statistical significance ( $P<0.05$ ) (Fig. 3). Airway obstruction scores of 2 & 3 were seen in seven patients in DEX group (23.4%) as compared to eighteen patients in PF group (60%) which was of statistical significance ( $p<0.05$ ).

Hypotension developed in nine patients (30%) in PF group and three patients (10%) in DEX group. Hypertension occurred in one patient (3.3%) in both the groups. None of the patients in both the groups had hypoxemia.

**Table 1: RSS**

| Score | Description  |
|-------|--|
| 1     | Anxious and agitated, or restless or both                          |
| 2     | Cooperative, oriented and tranquil                                 |
| 3     | Responding to commands only  |
| 4     | Brisk response to light glabellar tap or loud auditory stimulus    |
| 5     | Sluggish response to light glabellar tap or loud auditory stimulus |
| 6     | No response to stimuli   |

**Table 2: Demographics**

|                            | DEX group(n=30) | PF group(n=30) | P value |
|----------------------------|-----------------|----------------|---------|
| Sex M/F                    | 18/12           | 16/14          | 0.602   |
| Age (years)                | 50.03±10.35     | 52.43±14.64    | 0.466   |
| Weight (kg)                | 56.60±11.70     | 57.73±13.62    | 0.731   |
| Height (cms)               | 157.43±7.87     | 158.67±9.34    | 0.582   |
| ASA I/II/III               | 3/20/7          | 6/17/7         | 0.656   |
| Mallampati III/IV          | 1/29            | 2/28           | 1.000   |
| TMD(cm) <6.5/>6.5          | 13/17           | 19/11          | 0.121   |
| Mouth opening(cm)<3.5/>3.5 | 29/1            | 26/4           | 0.353   |

Values expressed as mean±SD. ASA= American society of Anaesthesiologists physical status, TMD=Thyromental distance.

**Table 3: Comparison of mean heart rate (HR), Mean arterial pressure (MAP), and oxygen saturation (SpO<sub>2</sub>)**

| Parameter                                 | DEX group (n=30) | PF group (n=30) | P value |
|---|------------------|-----------------|---------|
| Baseline HR(mean±SD)                      | 88.00±14.52      | 89.27±18.18     | 0.767   |
| HR after infusion(mean±SD)                | 74.50±15.29      | 79.20±13.82     | 0.146   |
| HR after intubation(mean±SD)              | 80.97±13.91      | 82.43±17.74     | 0.110   |
| Baseline MAP(mm hg)(mean±SD)              | 107.56±16.23     | 108.50±15.23    | 0.534   |
| MAP after infusion(mm hg)(mean±SD)        | 99.45±14.69      | 91.01±12.76     | <0.005* |
| MAP after intubation(mm hg)(mean±SD)      | 94.48±16.87      | 84.87±15.17     | <0.005* |
| Baseline SpO <sub>2</sub> (mean±SD)       | 98.33±1.49       | 98.67±1.24      | 0.351   |
| Postintubation SpO <sub>2</sub> (mean±SD) | 98.64±2.06       | 97.21±2.52      | 0.112   |

**Table 4: Intubation scores**

|                     | DEX (n=30) | PF (n=30) | Total (n=60) | P value |
|---------------------|------------|-----------|--------------|---------|
| Vocal cord movement |            |           |              |         |
| • 1                 | 7(23.3%)   | 15(50%)   | 22(36.7%)    | 0.096+  |
| • 2                 | 19(63.3%)  | 13(43.3%) | 32(53.3%)    |         |
| • 3                 | 4(13.3%)   | 2(6.7%)   | 6(10%)       |         |
| • 4                 | 0(0%)      | 0(0%)     | 0(0%)        |         |
| Coughing            |            |           |              |         |
| • 1                 | 2(6.7%)    | 2(6.7%)   | 4(6.7%)      | 0.010** |
| • 2                 | 10(33.3%)  | 21(70%)   | 31(51.7%)    |         |
| • 3                 | 15(50%)    | 7(23.3%)  | 22(36.7%)    |         |
| • 4                 | 3(10%)     | 0(0%)     | 3(5%)        |         |
| Limb movement       |            |           |              |         |
| • 1                 | 1(3.3%)    | 4(13.3%)  | 5(8.3%)      | 0.134   |
| • 2                 | 13(43.3%)  | 15(50%)   | 28(46.7%)    |         |
| • 3                 | 12(40%)    | 11(36.7%) | 23(38.3%)    |         |
| • 4                 | 4(13.3%)   | 0(0%)     | 4(6.7%)      |         |

Chi-square test/Fisher Exact test

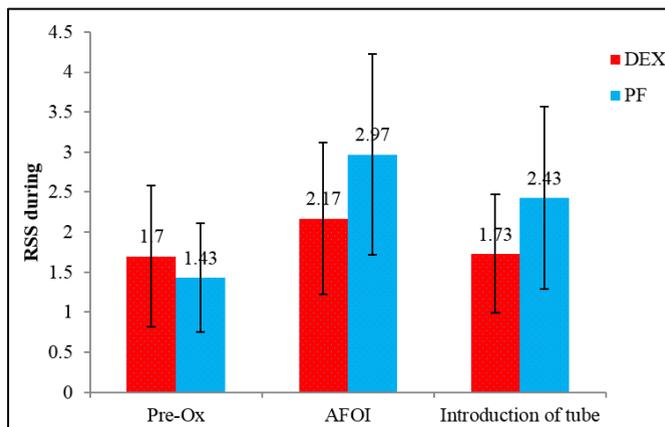
**Table 5: Patient tolerance score distribution in two groups of patients studied**

| Patient tolerance score | DEX       | PF        | Total     |
|-------------------------|-----------|-----------|-----------|
| 1                       | 1(3.3%)   | 8(26.7%)  | 9(15%)    |
| 2                       | 17(56.7%) | 16(53.3%) | 33(55%)   |
| 3                       | 5(16.7%)  | 6(20%)    | 11(18.3%) |
| 4                       | 1(3.3%)   | 0(0%)     | 1(1.7%)   |
| 5                       | 6(20%)    | 0(0%)     | 6(10%)    |
| Total                   | 30(100%)  | 30(100%)  | 60(100%)  |

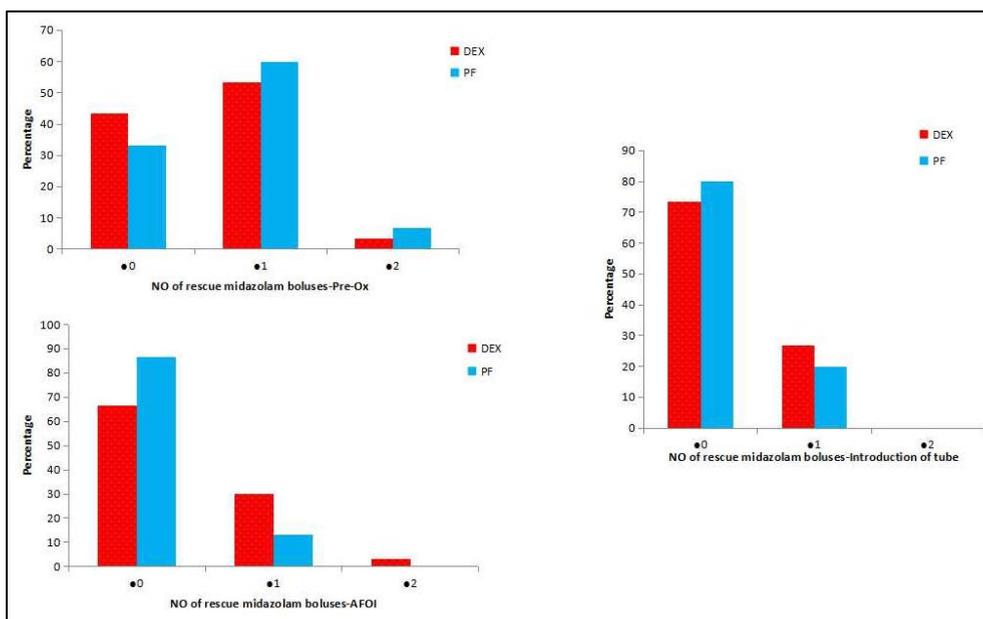
P=0.006\*\*, Significant, Fisher Exact test

**Table 6: Adverse events during study**

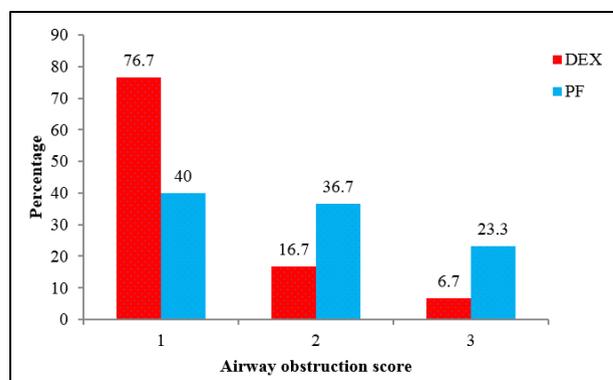
| Adverse effects       | PF group(N=30) | DEX group(N=30) | P value |
|-----------------------|----------------|-----------------|---------|
| Bradycardia           | 4(13.3%)       | 6(20%)          | 0.24    |
| Tachycardia           | 4(13.3%)       | 1(3.3%)         | 0.35    |
| Hypotension           | 9(30%)         | 3(10%)          | 0.05    |
| Hypertension          | 1(3.3%)        | 1(3.3%)         | >0.9    |
| Hypoxemia             | 0              | 0               |         |
| Others (Laryngospasm) | 0              | 2(6.6%)         | 0.49    |



**Fig. 1: Comparison of RSS score distribution in the two groups**



**Fig. 2: Number of rescue midazolam boluses distribution in two groups**



**Fig. 3: Airway obstruction score distribution in two groups of patients studied**

### Discussion

Awake fiberoptic intubation has remained the primary choice of difficult airway management<sup>1,10</sup> where a spontaneously breathing patient with a patent airway plays a major role. AFOI may be performed orally or nasally depending on the surgeries and patient characteristics.<sup>11</sup> In our study we performed nasotracheal AFOI. The important prerequisites for AFOI are alleviation of stress and discomfort by adequately anaesthetizing the upper airway and suppressing the gag, swallow and cough reflexes<sup>12,13</sup> with preservation of spontaneous respiration.

AFOI can be done with either topical or regional anaesthesia alone or in combination with conscious sedation. Sedation during AFOI is expected to provide anxiolysis, amnesia, analgesia and patient comfort, tolerance,<sup>14</sup> co-operation with greater haemodynamic stability and optimal intubating conditions. Over sedation or deep sedation can cause airway obstruction, respiratory depression or even apnea resulting in significant morbidity and mortality. A number of sedation regimens are available for AFOI; benzodiazepines, opioids and propofol are typically used drugs with a potential to cause respiratory depression.<sup>2-14</sup> Hence there is a search for ideal sedation regimen which can satisfy the requirements for AFOI.

In our study we compared the effectiveness of dexmedetomidine and propofol-fentanyl combination for sedation during awake fiberoptic nasotracheal intubation.

Dexmedetomidine is a sedative by virtue of its action on post synaptic alpha 2 adrenoceptor in locus coeruleus resulting in sedation similar to natural sleep.<sup>15</sup> In addition, it has analgesic, anxiolytic and antisialogogue actions with minimal respiratory depression and airway obstruction.<sup>15</sup> However, few studies have reported respiratory complications when used in large and rapid initial doses.<sup>16,17</sup> In our study we used an initial bolus dose of 1µg/kg over 10 minutes and a maintenance dose of 0.5 µg/kg/hr. Two patients had an airway obstruction score of 3 requiring jaw thrust and 2 patients developed laryngospasm during AFOI. This is in contrast to an earlier similar study conducted by Hesham Fathy Soliman et al,<sup>6</sup> who had reported no respiratory complications in the dex group.

Propofol is a widely used intravenous sedative-hypnotic drug for conscious sedation. It produces sedation and amnesia through its action on GABA and NMDA receptors.<sup>8</sup> It has been used in a wide range of dosages for conscious sedation. Propofol has been used for AFOI as continuous infusion with or without an initial loading bolus dose. Over sedation and respiratory depression have been reported in studies which have used an initial bolus dose. In our study, we used an initial bolus dose of propofol (0.5mg/kg) in combination with fentanyl (0.5µg/kg) prior to continuous infusion and 7 patients developed airway obstruction requiring jaw thrust.

Our primary outcome of the study was to compare intubation conditions and patient tolerance for the procedure between the two groups. The study showed that both DEX group and PF group provided satisfactory intubation conditions for AFOI in terms of vocal cord and limb movement scores. Adequate level of suppression of airway reflexes are required while passing bronchoscope during AFOI. Propofol depresses airway reflexes along with amnesia and anxiolysis whereas dexmedetomidine preserves airway reflexes.<sup>15</sup> This is reflected by the lower cough scores achieved in the PF group. Eighteen patients (60%) in dex group experienced moderate to severe cough compared to only seven patients (23.3%) in PF group. This is in contrast to the studies conducted by C.-J. Tsai et al<sup>4</sup> Hesham Fathy Soliman et al<sup>6</sup> where intubation scores were better in dex group in terms of vocal cord movement with insignificant difference for cough and movement. In studies conducted by Cattano D and coworkers<sup>18</sup> and J.H. Ryu et al,<sup>19</sup> patients in remifentanyl administered group experienced less coughing compared to dexmedetomidine group. The favorable cough response in our study can be attributed to the additive antitussive actions due to blunting of airway reflexes by fentanyl in combination with propofol.

Regional anaesthesia with nerve blocks is often performed to anaesthetize the airway during AFOI. These blocks are technically more difficult to perform and is associated with higher risk of complications such as bleeding, intravascular injection of local anaesthesia and nerve damage than noninvasive methods.<sup>20</sup> It is difficult to perform and is contraindicated in huge tumours of neck with wound infection. In our study we didn't utilize airway nerve blocks and employed topical anaesthesia by nebulization of local anaesthetic in combination with "spray as you go" technique.<sup>21</sup> A good topical anaesthesia is most essential in suppressing the airway, however spraying of liquid local anaesthetic can also induce gag reflex and coughing as it strikes the sensitive mucosa and vocal cords<sup>21</sup> especially in patients with intact airway reflexes. Two of our patients in dexmedetomidine group developed laryngospasm while doing AFOI which was managed with propofol bolus and successfully intubated. However no incidence of laryngospasm was found in PF group.

Favourable patient tolerance scores were highly significant in PF group ( $p < 0.05$ ) as none of the patients showed defensive movements and verbal objection, in contrast to dex group where six patients (20%) showed

defensive movements and one showed verbal objection during the procedure. This is in contrary to the studies conducted by Nitesh Goel et al<sup>22</sup> and C.-J. Tsai et al<sup>4</sup> where better patient tolerance scores were achieved with dex group. The difference found in our study can be attributed secondary to the better sedation levels and suppression of airway reflexes achieved in PF group.

Haemodynamic stability was achieved in most of patients in both the groups in our study. However more patients in PF group experienced hypotension (30%) compared to dex group (10%). This can be attributed to the loading doses of propofol and fentanyl used in our study. Propofol use can cause relatively higher incidence of dose dependent hypotension.<sup>8</sup> This is in contrast to the study conducted by Hesham Fathy Soliman et al,<sup>6</sup> where more patients in dex group experienced hypotension. Bradycardia occurred more frequently in dex group (20%) compared to PF group (13.3%) which was in concurrence with the studies conducted by Nitesh Goel et al,<sup>22</sup> C-J Tsai et al.<sup>4</sup> Heart rate is expected to decrease with dexmedetomidine because of its reduction in sympathetic outflow and augmentation of cardiac- vagal activity, whereas in propofol heart rate typically remains unchanged. Tachycardia was seen in 4 patients in PF group as compared to 1 patient in the dex group, which however was not statistically significant.

Incidence of airway obstruction was less in dex group (23.4%) as compared to propofol-fentanyl group (60%) which was statistically significant ( $p < 0.05$ ). This difference was in concurrence with the previous studies done by C-J Tsai et al,<sup>4</sup> Nitesh Goel et al,<sup>22</sup> Hesham Fathy Soliman et al<sup>6</sup> where airway obstruction was more in the PF group. However airway obstruction was easily relieved by neck extension or jaw thrust without any desaturation or hypoxia ( $SpO_2 < 90\%$ ) in any of the patients. In our study we used an initial small bolus doses of propofol (0.5mg/kg) and inj fentanyl (0.5µg/kg) with a lower infusion rate of inj propofol (30µg/kg/min). Avoiding the initial bolus, would have probably reduced the incidence of airway obstruction.

In the studies conducted by R. M. Venn and R. M. Grounds<sup>14,15</sup> they compared dexmedetomidine and propofol for sedation in ICU by using RSS and BIS as a guidance for sedation. They observed that a good correlation existed between BIS values and RSS scores. In our study we used RSS scores for assessing the level of sedation. In patients who received dexmedetomidine, a mean RSS score of  $2.17 \pm 0.95$  was achieved in comparison to a mean RSS score of  $2.97 \pm 1.25$  in PF group during AFOI. This difference was statistically significant ( $p < 0.05$ ). In concurrence with our study similar results were found in the C-J Tsai et al<sup>4</sup> study, where propofol group patients were deeply sedated with lower entropy values than dexmedetomidine group.

In Davide Catalano et al,<sup>18</sup> study dexmedetomidine treated patients took longer time to achieve desired RSS and also attained lower RSS scores compared to remifentanyl group. In contrast in earlier studies conducted by Nitesh Goel et al<sup>22</sup> and Hesham Fathy Soliman et al<sup>6</sup> RSS scores were more favorable in the DEX group compared to PF

group. In our study the mean dose of rescue midazolam in DEX group ( $0.52 \pm 0.72$ ) mg and in PF group ( $0.53 \pm 0.74$ ) mg were comparable ( $p > 0.05$ ). This is in contrast to the study of, Hesham Fathy Soliman et al,<sup>6</sup> where the DEX group required lower dose of rescue midazolam (mean dose 0.6mg) compared to PF group (mean dose 1mg). These differences could be attributed to the initial loading dose of propofol and fentanyl in our study.

There were few limitations in our study. We did not use target controlled infusion (TCI) for propofol. TCI can provide defined drug concentration in a tissue of interest, consistent pharmacodynamics with a predictable and safe sedation.<sup>4</sup> Instead we used an initial bolus dose of propofol followed by a continuous infusion resulting in the higher incidence of airway obstruction in propofol group. Secondly we did not use BIS monitoring as a guidance for sedation and instead we used RSS scores.

## Conclusion

To conclude, both dexmedetomidine and propofol-fentanyl provided optimal intubating conditions and stable haemodynamics in majority of the patients who underwent awake fiberoptic nasal intubation. In addition, propofol-fentanyl combination offered better patient tolerance and favorable cough scores albeit with the limitation of causing higher incidence of airway obstruction.

**Conflict of Interest:** None.

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