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RESEARCH ARTICLE

A prospective randomized controlled study to assess the efficacy of fentanyl and dexmedetomidine for conscious sedation in awake fiberoptic intubation

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ABSTRACT

Background: Awake fiberoptic intubation (AFOI) is usually the primary method for airway management in patients with anticipated difficult airway. To achieve optimal conditions for AFOI, the pharmacological agents chosen for sedation should be short acting and have little suppression of spontaneous ventilation. **Aims and Objectives:** The aim of this study was to compare the efficacy between dexmedetomidine and fentanyl for conscious sedation in AFOI. The objectives were to assess the intubating conditions, intubation attempts, and the hemodynamic responses between the groups receiving the two drugs. **Materials and Methods:** This prospective randomized double-blind study was done in 40 patients of the American Society of Anesthesiologists physical statuses I, II, and III, aged between 20 and 65 years. One group received fentanyl 2 mcg/kg infusion over 10 min. The other group received dexmedetomidine 1 mcg/kg infusion over 10 min. AFOI was done in both groups when patients achieved Ramsay sedation score of three. Time to sedation and time to intubation were noted. Intubating conditions were assessed with cough score. Heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, and oxygen saturation were also monitored for 30 min with 3 min interval after starting the drug infusion. The number of intubation attempts was also noted. **Results:** We found that the time to sedation and the time to intubation were shorter with dexmedetomidine than with fentanyl. There were no significant differences in cough score, number of intubation attempts, heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, and oxygen saturation between the 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 compared to fentanyl enabling early intubation.

KEY WORDS: Fentanyl; Dexmedetomidine; Awake Fiberoptic Intubation; Sedation

INTRODUCTION

Endotracheal intubation is one of the most fundamental skills that anesthesiologists acquire during their training period. The first intubation for the purpose of providing anesthesia was done by Dr. William Macewan, a surgeon in 1878.[1]

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The first awake intubation documented in the literature was done by direct laryngoscopy published by Bailenson *et al*.[2] in 1967 using "fetacaine" as topical anesthetic. They suggested that the patient should be warned that as soon as intubation is done, he/she will be unable to speak and that he/she will soon fall asleep. Luckily, we have made significant advances in techniques since then.

Awake nasal or oral flexible fiberoptic intubation (AFOI) is usually the primary method for airway management in patients with anticipated difficult airway. Experience with AFOI is not easily acquired, and success of the procedure is highly dependent on adequate preparation and sedation techniques.[3]

Optimal conditions for AFOI include that the patient be comfortable, cooperative, free of oropharyngeal blood and secretions, and able to maintain airway with spontaneous ventilation. To achieve these conditions, the pharmacologic agent chosen for sedation should be short acting, easily titratable, provide the required amount of sedation and have little suppression of spontaneous ventilation. Techniques to improve success rate have included nasal over oral intubation (not always possible) and different protocols for sedation (sevoflurane, propofol, and fentanyl or remifentanyl with titrated or target controlled infusion).[3-11]

Conscious sedation is a drug-induced depression of consciousness where spontaneous ventilation and cardiovascular functions are usually preserved and the patients respond to commands.[12] Conscious sedation is an integral component for performing AFOI as deep sedation may cause loss of airway resulting in serious problems. Hence, the search for an ideal sedative regimen for AFOI is being constantly pursued by various clinical studies.

High dose propofol may cause loss of the upper airway tone making the procedure difficult. The majority of patients receiving dexmedetomidine experienced clinically effective sedation yet were still easily arousable, a unique feature not observed with other clinically available sedatives.[13] Dexmedetomidine is highly selective, centrally active alpha-2 agonist which produces amnesia, hypnosis, anxiolysis, sympatholysis, analgesia, and antisialogogue effects. All these effects are desirable during AFOI.[14] Dexmedetomidine can cause bradycardia and hypotension but much less respiratory depression than other sedatives. Fentanyl is a potent opioid providing mild sedation, analgesia, and hemodynamic stability beneficial for AFOI, but it causes respiratory depression, chest wall rigidity, nausea, and vomiting.[15]

Our aim was to compare the efficacy between dexmedetomidine and fentanyl for conscious sedation in AFOI. Our objectives were to measure the time to sedation, time to intubation, the quality of intubating conditions, and the hemodynamic responses between the dexmedetomidine group and the fentanyl group. The number of attempts to secure the airway in each group was also evaluated.

MATERIALS AND METHODS

This prospective randomized double-blind study was done on 40 patients aged 20–65 years belonging to ASA Grades 1, 2, and 3 scheduled for elective surgeries and planned for AFOI at a multispecialty teaching hospital in central Kerala over a period of 2 years after getting clearance from the hospital ethics committee. Written consent was obtained from all patients. Those patients allergic to local anesthetic agents, with grossly distorted anatomy, difficult airway with impending airway obstruction, fracture base of skull, penetrating eye injuries, and infection/contamination of the upper airway (blood, friable tumor, and open abscess) were excluded from the study.

The sample size was estimated based on the results of study conducted by Cattano *et al*.[16] in 2012 comparing remifentanil and dexmedetomidine for sedation during AFOI. A sample size of 40 was calculated from the above study with a power of 80.

Patients selected for the study were assessed before the day of surgery with a detailed history, general examination, systemic examination, airway assessment, and necessary laboratory investigations were done. The procedure of AFOI was explained and informed consent from the patients was obtained. Patients were premedicated with tablet Alprazolam 0.5 mg before shifting to the operation theater.

The patients were randomly assigned by a computer generated table into two groups – group fentanyl and group dexmedetomidine. The randomization list was maintained by the operation theater technician by sealed envelope technique. In the operation theater, nil per oral status was confirmed. Baseline blood pressure, pulse rate, and SpO_2 were recorded. Intravenous access was obtained by cannulating a peripheral vein with an 18 gauge cannula and glycopyrrolate 0.2 mg was administered. A sterile autoclaved tray was used consisting of flexible bronchoscope, light source, suction tube, adequate cotton gauze, oxygen mask, infusion pump, sterile drapes, 2% lignocaine, 4% lignocaine, 10% lignocaine spray, disposable 5 cc/20 cc syringes, and 22G cannula. A tray containing emergency drugs and resuscitation equipment were kept ready.

Patients in fentanyl group were administered 2 mcg/kg fentanyl (diluted to 10 ml in 20 cc syringe) infused over 10 min. Patients in the dexmedetomidine group were administered 1 mcg/kg dexmedetomidine (diluted to 10 ml in a 20 cc syringe) infused over 10 min. Loading of drugs was done by a person not involved in the study. Both the patient and the anesthesiologist were blinded to the procedure. Cricothyroid (trans-tracheal) injection (2.5 ml of 4% Lignocaine), to anaesthetize subglottic region, vocal cords, and trachea were done using a 22 G needle. Supra laryngeal block was given with 5 ml of 2% lignocaine, 2.5 ml behind the hyoid bone on either side. After starting the infusion, Ramsay Sedation Score (RSS) score[17] was assessed and once it reached RSS 3 (sedated but responding to commands), flexible bronchoscopic

intubation was attempted by an expert anesthesiologist. A single introduction of the fiberscope through nasal route for intubation was defined as one attempt.

We lubricated the fiberscope with aqueous gel/KY jelly and loaded it with the uncut endotracheal tube (ETT) size 6.0–7.0. After white balancing and properly orienting the scope, 2 puffs of 10% lignocaine were used to spray the nostril through which the fiberoptic scope had to be passed. We introduced the fiberscope through the nostril into the nasopharynx and then into the oropharynx and advanced further observing the three landmarks (epiglottis, trachea, and carina). After identifying the carina, the assistant was asked to hold the fiberscope in position and intubation was performed. The patient was alerted regarding discomfort as the tube was passed through the nose. We removed the fiberscope while visualizing, to ensure tip of the ETT was in the trachea and maintained the ETT in place with the tip at 3–5 cm above the carina. Then, we fixed the ETT in place and connected to the anesthetic breathing circuit. We confirmed the ETT position by capnography, auscultation of bilateral air entry, observation of bilateral chest movement and misting of the tube, and feeling air movement at the tip of the tube. Throughout the process of AFOI, nasal prongs were kept with 5 L/min oxygen flow.

Intubating conditions were assessed by cough score[18] (1 – None, 2 – One or two coughs, 3 – Three to five coughs, 4 – more than 5 coughs, bucking, movement). After intubation, patient was given propofol and skeletal muscle relaxant. The heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, and oxygen saturation were monitored before starting the drug infusion and at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30 min after starting the drug infusion. Changes in heart rate and blood pressure were observed and treated accordingly. Crystalloids (5–10 mL/kg) were administered during the loading phase of the drug. Episodes of apnea >20 s or a drop in O_2 saturation <95% were treated by bag mask ventilation and supplemental oxygen provided as necessary. Time to achieve adequate sedation and time of intubation using fiberoptic bronchoscope after starting the drug infusion, cough score to assess the ease of intubation and the number of intubation attempts were observed in both groups. After completion of the entire study, the groups were revealed to the anesthesiologist.

Data collected were entered into a master chart. Data analysis was performed using SPSS package (version 20, Chicago). The results were represented as mean and standard deviation for parametric data. Continuous variables were tested for normality using Kolmogorov–Smirnov test. Paired *t*-test was used for statistical analysis between the groups. Intergroup comparison was done using independent *t*-test. Power of 80 was used in the study. The results were considered statistically significant, if $P < 0.05$.

RESULTS

In this study, two groups of patients with 20 patients in each group were studied for a period of 2 years. One group was administered fentanyl and the other group was administered dexmedetomidine for conscious sedation to facilitate AFOI. Fentanyl group had 17 male and 3 female patients. Dexmedetomidine group had 14 male and 6 female patients. The mean value of age in the fentanyl group was 30.6 ± 8.207 years and in the dexmedetomidine group was 32.35 ± 9.157 years. The mean value of body mass index (BMI) in the fentanyl group was 22.66 ± 2.35 kg/m^2 and in the dexmedetomidine group was 22.4 ± 2.38 kg/m^2. The study samples were comparable based on age, sex, and BMI. ASA 1:ASA2 ratio was 16:4 in fentanyl group and 14:6 in dexmedetomidine group. The distribution of ASA grades in study samples was similar.

Time to Sedation

The mean time to sedation in the fentanyl group was 7.750 ± 1.499 min and in the dexmedetomidine group was 5.250 ± 0.952 min. The *P* value determined by independent *t*-test was < 0.001 which was significant [Table 1].

Time to Intubation

The mean time of intubation in the fentanyl group was 14.10 ± 1.861 min and in the dexmedetomidine group was 11.25 ± 1.333 min. The p value determined by independent *t*-test was < 0.001 which was significant [Table 1].

Cough Score

Seventeen patients in both fentanyl group and dexmedetomidine group had cough score of 2. Three patients each in fentanyl and dexmedetomidine group had cough score of 3. The difference between the groups was statistically insignificant with a $P = 0.1$ [Table 2].

Intubation Attempts

In the fentanyl group, three patients were intubated in 2nd attempt and 17 patients were intubated in 1st attempt. In the dexmedetomidine group, two patients were intubated in 2nd attempt and 18 patients were intubated in 1st attempt. There was no significant difference between the two groups when number of intubation attempts was compared [Table 2].

Intragroup and Intergroup Comparison of Heart Rate

Heart rate in the fentanyl group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with the basal value by paired *t*-test. There was no significant deviation in heart rate at any time compared to the basal heart rate. Heart rate in the dexmedetomidine group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with basal value by paired *t*-test. There

was statistically significant drop in heart rate at 3rd, 27th, and 30th min. There was no significant difference in the heart rate at any time when both the groups were compared [Table 3].

Intragroup and Intergroup Comparison of Systolic Blood Pressure

Systolic blood pressure in the fentanyl group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with the basal value by paired *t*-test. Significant decrease in systolic blood pressure was noted at 3rd ($P = 0.018$), 24th ($P = 0.042$), 27th ($P = 0.01$), and 30th ($P = 0.001$) min after starting fentanyl infusion. Increase in systolic blood pressure was statistically significant at 12th min ($P = 0.027$). Systolic blood pressure in the dexmedetomidine group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with the basal value. There was significant drop in systolic blood pressure at 1st ($P = 0.004$), 3rd ($P = 0.001$), 24th ($P = 0.050$), 27th ($P = 0.014$), and 30th min ($P = 0.001$). An increase in systolic blood pressure in the 9th, 12th, and 15th min was noted but was not significant statistically. There was no significant difference in systolic blood pressure at any time between the groups [Table 4].

Intragroup and Intergroup Comparison of Diastolic Blood Pressure

Diastolic blood pressure in the fentanyl group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with basal value by paired *t*-test. There was significant drop in diastolic blood pressure at 3rd ($P = 0.001$), 24th ($P = 0.050$), 27th ($P = 0.014$), and 30th min ($P = 0.001$). Diastolic blood pressure in the dexmedetomidine group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with the basal value by paired *t*-test. There was significant drop in diastolic blood pressure at 3rd ($P = 0.011$), 24th ($P = 0.034$), 27th ($P = 0.005$), and 30th min ($P = 0.001$). There was no significant difference in diastolic blood pressure between the groups at any point of time during the study period [Table 5].

Intragroup and Intergroup Comparison of Mean Arterial Blood Pressure

Mean arterial blood pressure in the fentanyl group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with basal value by paired *t*-test. There was statistically significant

Table 1: Time to sedation and time to intubation in the study groups (in min)

Groups	Time to sedation			Time to intubation		
	Mean	Standard deviation	*P*-value	Mean	Standard deviation	*P*-value
Fentanyl	7.750	1.499	< 0.001	14.10	1.861	< 0.001
Dexmedetomidine	5.250	0.952		11.25	1.333	

Table 2: Cough score (indicating ease of intubation) and intubation attempts in the study groups

Score/Number	Cough score			Intubation attempts		
	Fentanyl	Dexmedetomidine	*P*-value	Fentanyl	Dexmedetomidine	*P*-value
1	-	-	1.00	17	18	1.00
2	17	17		3	2	
3	3	3		-	-	

Table 3: Intragroup and intergroup comparison of heart rate (in beats per min)

Time	Fentanyl (Mean±SD)	*P*-value (intragroup)	Dexmedetomidine (Mean±SD)	*P*-value (intragroup)	*P*-value (intergroup)
Basal value	78.45±17.458	-	78.15±17.397	-	-
T1	76.75±17.935	0.183	76.55±17.843	0.061	0.972
T3	75.20±20.297	0.225	71.75±15.764	<0.001*	0.552
T6	74.75±17.8694	0.237	73.70±16.040	0.055	0.846
T9	78.85±13.180	0.909	80.70±15.465	0.441	0.686
T12	85.30±13.666	0.153	85.70±17.655	0.063	0.937
T15	85.75±13.622	0.144	81.65±15.530	0.350	0.380
T18	82.20±12.984	0.418	76.90±14.112	0.710	0.224
T21	78.05±12.833	0.933	68.50±17.819	0.074	0.060
T24	74.15±11.217	2.508	72.20±13.269	0.064	0.619
T27	72.40±9.361	1.83	69.80±13.648	0.023*	0.487
T30	69.65±9.213	0.052*	67.20±12.526	0.004*	0.485

TI, T3, T6, T9, T12, T15, T18, T21, T24, T27, and T30 indicate the values recorded at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30 min, respectively

Table 4: Intragroup and intergroup comparison of systolic blood pressure (in mm of Hg)

Time	Fentanyl (Mean ±SD)	P value (intragroup)	Dexmedetomidine (Mean ±SD)	*P*-value (intragroup)	*P*-value (intergroup)
Basal value	144.15±19.126	-	145.10±17.134	-	-
T1	133.75±33.144	0.184	141.95±17.134	0.004*	0.332
T3	139.50±22.472	0.018*	137.25±16.335	0.001*	0.719
T6	143.50±23.799	0.743	143.85±20.932	0.732	0.961
T9	150.00±22.354	0.104	151.65±24.737	0.177	0.826
T12	155.50±27.035	0.027*	154.55±24.208	0.054*	0.907
T15	150.45±28.752	0.231	151.00±22.457	0.202	0.947
T18	145.60±26.319	0.745	145.40±21.286	0.944	0.979
T21	134.45±27.954	0.124	139.95±20.075	0.211	0.508
T24	131.35±28.283	0.042*	136.95±20.075	0.050*	0.475
T27	128.85±25.828	0.01*	134.30±19.421	0.014*	0.455
T30	125.30±24.121	0.001*	130.00±17.962	0.001*	0.489

TI, T3, T6, T9, T12, T15, T18, T21, T24, T27, and T30 indicate the values recorded at 1, 3, 6, 9, 12, 15, 18, 21, 24,2 7, and 30 min, respectively

Table 5: Intragroup and intergroup comparison of diastolic blood pressure (in mm of Hg)

Time	Fentanyl (Mean±SD)	*P*-value (intragroup)	Dexmedetomidine (Mean ±SD)	*P*-value (intragroup)	*P*-value (intergroup)
Basal value	77.45±12.301	-	75.90±9.931	-	-
T1	75.05±10.741	0.104	74.95±11.473	0.290	0.977
T3	72.75±12.246	0.012*	72.95±11.095	0.011*	0.957
T6	74.75±12.100	0.187	76.15±9.778	0.918	0.690
T9	79.75±13.325	0.492	77.05±20.582	0.814	0.625
T12	82.60±17.043	0.192	76.70±20.202	0.876	0.324
T15	79.25±15.389	0.604	78.50±11.687	0.401	0.863
T18	75.25±15.214	0.539	73.60±11.000	0.422	0.696
T21	72.00±15.934	0.175	69.55±11.208	0.068	0.577
T24	67.75±13.688	0.032*	69.20±10.798	0.034*	0.712
T27	66.25±12.867	0.012*	67.15±10.384	0.005*	0.809
T30	65.40±11.936	0.004*	64.85±10.179	0.001*	0.876

TI, T3, T6, T9, T12, T15, T18, T21, T24, T27, and T30 indicate the values recorded at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30 min, respectively

drop in mean arterial blood pressure at 1st (P = 0.040), 3rd (P = 0.007), 24th (P = 0.039), 27th (P = 0.010), and 30th min (P = 0.002). Mean arterial blood pressure in the dexmedetomidine group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with basal value by paired *t*-test. There was significant drop in mean arterial blood pressure at 3rd (P = 0.004), 24th (P = 0.026), 27th (P = 0.008), and 30th min (P < 0.001). There was no significant difference in mean arterial blood pressure at any point of time when both groups were compared [Table 6].

Intragroup and Intergroup Comparison of Oxygen Saturation

Oxygen saturation in the fentanyl group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with basal value by paired *t*-test. In the 9th (P = 0.009) and 12th (P = 0.002) min, there was statistically significant decrease in oxygen saturation. Oxygen saturation in the dexmedetomidine group at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30th min was compared with basal value by paired *t*-test. In 6th min (P = 0.024) and 9th min (P < 0.001), there was statistically significant decrease in oxygen saturation compared to the basal value. There was no significant difference in oxygen saturation at any point of time when both groups were compared [Table 7].

DISCUSSION

AFOI is most preferred these days for airway management in difficult airway situations. Many drugs have been studied for the purpose of conscious sedation to facilitate AFOI. In our study, we compared fentanyl 2 mcg/kg with dexmedetomidine 1 mcg/kg and found that dexmedetomidine (t = 5.250 ± 0.952 SD) achieved adequate sedation much faster compared to fentanyl (t = 7.750 ± 1.499 SD) (P < 0.001]. We found that

Table 6: Intragroup and intergroup comparison of mean arterial blood pressure (in mm of Hg)

Time	Fentanyl (Mean±SD)	*P*-value (intragroup)	Dexmedetomidine (Mean±SD)	*P*-value (intragroup)	*P*-value (intergroup)
Basal value	99.40±13.994	-	99.10±10.780	-	-
T1	96.80±13.934	0.040*	92.15±21.595	0.224	0.423
T3	94.50±15.763	0.007*	92.65±12.219	0.004*	0.680
T6	97.45±15.527	0.301	98.75±12.148	0.901	0.770
T9	103.25±15.293	0.255	104.20±15.074	0.195	0.844
T12	106.40±19.168	0.094	105.70±15.594	0.100	0.900
T15	103.05±19.549	0.359	101.20±15.443	0.597	0.742
T18	98.60±18.986	0.837	97.65±12.558	0.655	0.853
T21	92.85±18.033	0.147	93.05±12.713	0.102	0.968
T24	89.00±18.428	0.039*	90.25±13.549	0.026*	0.808
T27	87.20±16.491	0.010*	89.90±11.562	0.008*	0.552
T30	85.30±15.482	0.002*	85.65±9.933	<0.001*	0.933

TI, T3, T6, T9, T12, T15, T18, T21, T24, T27, and T30 indicate the values recorded at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30 min, respectively

Table 7: Intragroup and intergroup comparison of oxygen saturation (%)

Time	Fentanyl (Mean±SD)	*P*-value (intragroup)	Dexmedetomidine (Mean±SD)	*P*-value (intragroup)	*P*-value (intergroup)
Basal value	99.05±0.759	-	99.30±0.571	-	-
T1	94.70±19.955	0.527	99.40±0.571	0.649	0.299
T3	98.90±0.718	0.545	99.10±0.641	0.330	0.359
T6	93.00±21.682	0.068	98.50±0.946	0.024*	0.264
T9	96.40±3.899	0.009*	97.25±1.209	0.000*	0.358
T12	97.45±1.761	0.002*	97.10±1.483	0.086	0.501
T15	93.55±19.736	0.217	98.45±1.317	0.285	0.275
T18	99.00±0.795	0.841	94.70±19.958	0.681	0.342
T21	99.05±0.686	1.000	99.45±0.759	0.379	0.089
T24	99.65±0.489	0.070	99.65±0.587	0.069	1.000
T27	99.45±0.510	0.059	99.45±0.686	0.453	1.000
T30	99.50±0.531	0.046	99.45±0.759	0.527	0.089

TI, T3, T6, T9, T12, T15, T18, T21, T24, T27, and T30 indicate the values recorded at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30 min, respectively

we were able to intubate patients in the dexmedetomidine group much earlier (t = 675 s ± 1.33 SD) compared to fentanyl group (t = 846 s ± 1.80 SD). There was no significant difference in the number of attempts of intubation between the dexmedetomidine and the fentanyl group. About 90% of patients in the dexmedetomidine group and 85% of patients in fentanyl group were intubated in the 1st attempt. In our study, intubating conditions were assessed with cough score. About 85% of patients in both dexmedetomidine and fentanyl group had cough scores 2 and 15% of patients in both groups had cough score 3. There was no significant difference between groups when cough score were compared. We also assessed hemodynamic changes while doing AFOI. There were no significant differences in heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, and oxygen saturation between the dexmedetomidine group and the fentanyl group.

In our study, on intragroup analysis, there was statistically significant drop in heart rate at 3rd, 27th, and 30th min in comparison with the baseline value in dexmedetomidine group. However, there was no significant change in heart rate in the post-intubation period in comparison with baseline value in the fentanyl group. One patient each in both groups had bradycardia requiring atropine 0.6 mg intravenously. After successful intubation, we had given propofol and a skeletal muscle relaxant. 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. Furthermore, there was decrease in systolic blood pressure, diastolic blood pressure, and mean blood pressure noted in post-intubation period (10–15 min after giving propofol) in

both dexmedetomidine and fentanyl group of patients. In our study, there was no significant change in oxygen saturation when both groups were compared. However, on intragroup analysis, there was mild drop in oxygen saturation noted in the 9th (96.40 ± 3.899) and 12th (97.45 ± 1.761) min in fentanyl group of patients, and in the 6th (98.70 ± 0.801) and 9th (97.25 ± 1.209) min in dexmedetomidine group of patients, which was statistically significant when compared to baseline. This corresponded to peak sedation and introduction of fiberscope in either group. In our study, all patients were premedicated with alprazolam and glycopyrrolate. We used glycopyrrolate as an antisialogogue which might have prevented side effects like bradycardia in both the groups.

The study done by Mondal *et al*.[19] in 2015 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. The study conducted by Cattano *et al*.[16] showed that patients in the dexmedetomidine group took longer time to attain adequate sedation compared to remifentanyl group for doing AFOI. A study by Liu *et al*.[20] 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. The study conducted by Cattano *et al*.[16] showed that the number of intubation attempts was more in the dexmedetomidine group compared to remifentanyl group. This was different from our study. This could be due to the lower dose of dexmedetomidine they used for loading (0.4 mcg/kg over 10 min). We used 1 mcg/kg dexmedetomidine for infusion over 10 min which might have provided better sedation which, in turn, reduced our intubation attempts. The skill of the endoscopist and the heterogeneity of the study groups would also have influenced the findings. The study conducted by Mondal *et al*.[19] showed that 93.3% patients in dexmedetomidine group had cough score ≤2 and 90% of patients in fentanyl group had cough score ≥3. This difference from our study might be because of the pattern of anesthetising the airway. In their study, they anesthetized the airway by nebulizing 4 ml of 2% lignocaine for 20 min and sprayed the tongue and nasopharynx with 10% lignocaine and also used ligocaine jelly in the nostrils. We used 2.5 ml of 4% lignocaine for transtracheal block and 2% lignocaine for superior laryngeal nerve block and also 2 puffs of 10% lignocaine spray in the nostril through which fiberoptic scope had to be passed. This technique might anesthetize the airway much better compared to nebulization and spraying the upper airway with lignocaine which provided similar intubating conditions in both the study groups. The hemodynamic changes studied are in agreement with the previous studies conducted by Bergese *et al*.[21] in 2010 and by Cattano *et al*.[16] in 2012. The study done by Ryu *et al*.[22] in 2012 also showed no significant difference in mean arterial pressure and heart rate. However, the incidence of desaturation was lower in dexmedetomidine group compared to remifentanyl group.

Our study proved that both dexmedetomidine and fentanyl can be used to achieve satisfactory sedation along with regional block and topical anesthesia. However, dexmedetomidine achieves target sedation faster compared to fentanyl enabling early intubation.

This was a small study involving forty patients. We have not assessed the level of patient comfort or the incidence of recall of the procedure by the patients.

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 compared to fentanyl enabling early intubation. Hemodynamic responses following administration of both drugs were similar.

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