ORIGINAL RESEARCH

Assessment of effect of dexmedetomidine and propofol with propofol alone when given in endobronchial ultrasound guided needle aspiration (EBUS) procedure

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ABSTRACT

Background: The most important use of EBUS technique is in the nodal staging of patients with non-small cell lung carcinoma (NSCLC).The present study was conducted to compare and asses the effect of dexmedetomidine and propofol with propofol alone when given in endobronchial ultrasound guided needle aspiration (EBUS) procedure. **Materials & Methods:** A total of 30 patients aged between 40-80 years scheduled for endobronchial ultrasound guided needle aspiration surgeries were divided into two groups by alternative method: Group DP = received i.v. Dexmedetomidine 1mcg/kg with i.v. propofol 0.5mg/kg and Group P = received i.v. propofol 1mg/kg (additional doses of 10-20 mg given until the Sedation Scale score reached 2-4 in both the groups). **Results:** No significant difference was reported in mean age (61.12±5.56 vs. 62.64±4.34 years), duration of disease (41.40±5.30 vs. 41.20±5.26 years), weight (52.60±5.96 vs. 52.32±4.02 kgs), BMI (21.36±4.80 vs. 21.20±5.48 kg/m^2), pulse rate (102.32±9.45 vs. 95.68±2.79), mean arterial pressure (66.22±3.17 vs. 65.20±3.71; p=0.543), SPO2 (95.21±1.63 vs. 94.14±1.43; p=0.423) and respiratory rate (21.68±4.11 vs. 20.78±3.84; p=0.544) between Group DP and Group D respectively. No significant difference was obtained in terms of mean frequency of gag reflex between both the groups as revealed by the insignificant p value of 0.684. No significant difference was obtained in terms of intra-operative frequency of decrease in SPO2 between both the groups as revealed by the insignificant p value of 0.821. No significant difference was obtained in terms of rescue bolus requirement between both the groups as revealed by the insignificant p value of 0.411. A significant difference was obtained in terms of Ramsay sedation scale between both the groups postoperatively as revealed by the significant p value of 0.03. **Conclusion:** Although, patients undergoing EBUS procedure showed increased frequency of gag reflex and additional requirement of propofol doses in dexmedetomidine group, they showed less frequency of dip in saturation or hypoxia as compared to propofol group and were more comfortable postoperatively.

Key words: EBUS, propofol, dexmedetomidine

INTRODUCTION

EBUS is a minimal invasive procedure used to diagnose different type of lung disorder using a flexible scope that causes coughing and breathing difficulty, hypoxia during or after the procedure.[1] As cytopathologists play a crucial role in the success of this technique, it is important to understand the procedure, its indications, limitations and potential for diagnostic pitfalls.[2]

The most important use of this technique is in the nodal staging of patients with non-small cell lung carcinoma (NSCLC). In NSCLC, which represent about 85% of all primary pulmonary malignancies, the single most important determinant of resectability and prognosis is nodal stage.[3] Despite constant improvements in non- invasive nodal staging by computed tomography (CT), positron emission tomography (PET) and combined PET / CT, all candidates for definitive surgical treatment still require cytological or histological assessment of the mediastinum.[4]

Dexmedetomidine is α-2 adrenoceptor agonist, providing analgesic, sympatholytic, and opioid-sparing propertieswith preservation of respiratory

function.[5]Propofol provides hypnosis and amnesia and is antiemetic along with haemodynamic stability. Addition of dexmedetomidine to propofol will reduce complication of both and provide adequate anaesthesia.[6] The present study was conducted to compare and asses the effect of dexmedetomidine and propofol with propofol alone when given in endobronchial ultrasound guided needle aspiration (EBUS) procedure.

MATERIALS & METHODS

After Ethical committee clearance, a total of 30 patients aged between 40-80 years scheduled for endobronchial ultrasound guided needle aspiration surgeries was selected by alternative method. The study was conducted in Sri Aurobindo Medical College and Post Graduate Institute and Mohak Superspeciality hospital. An informed written consent was taken as per inclusion and exclusion criteria. Inclusion criteria was age 40-80 years, ASA II/III/IV, patients undergoing endobronchial ultrasound guided needle aspiration procedure and duration of surgery upto 40 minutes. Exclusion criteria was known hypersensitivity to drugs, patient undergoing emergency procedures, renal impairment (with serum creatinine > 2 mg/dL) or hepatic impairment (elevated liver enzymes > 2 times normal levels) and conversion to general anaesthesia with endotracheal intubation.

Pre-anaesthetic evaluation was done before procedure. Routine investigations and written informed consent was obtained. Patients were advised nil orally for a period of 6 hours prior to procedure.18G intravenous cannula is secured.Patients were divided into two groups by alternative method:Group DP = received i.v. Dexmedetomidine 1mcg/kg with i.v. propofol 0.5mg/kg and Group P = received i.v. propofol 1mg/kg (additional doses of 10-20 mg given until the Sedation Scale score reached 2-4 in both the groups).

Patient was explained about the operative procedure and also the technique of anaesthesia to reduce anxiety of the patient. Continues monitoring was done with Heart rate, mean arterial pressure, Respiratory rate, peripheral oxygen saturation(Sp02) and electrocardiogram(ECG).Oxygen was administered using nasal prongs at 4 litre/minute. Frequency of dip in saturation, frequency of gag reflex and rescue bolus requirement during procedure was observed. Postoperative sedation scores by Ramsay Sedation Scale and any side effects was also recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

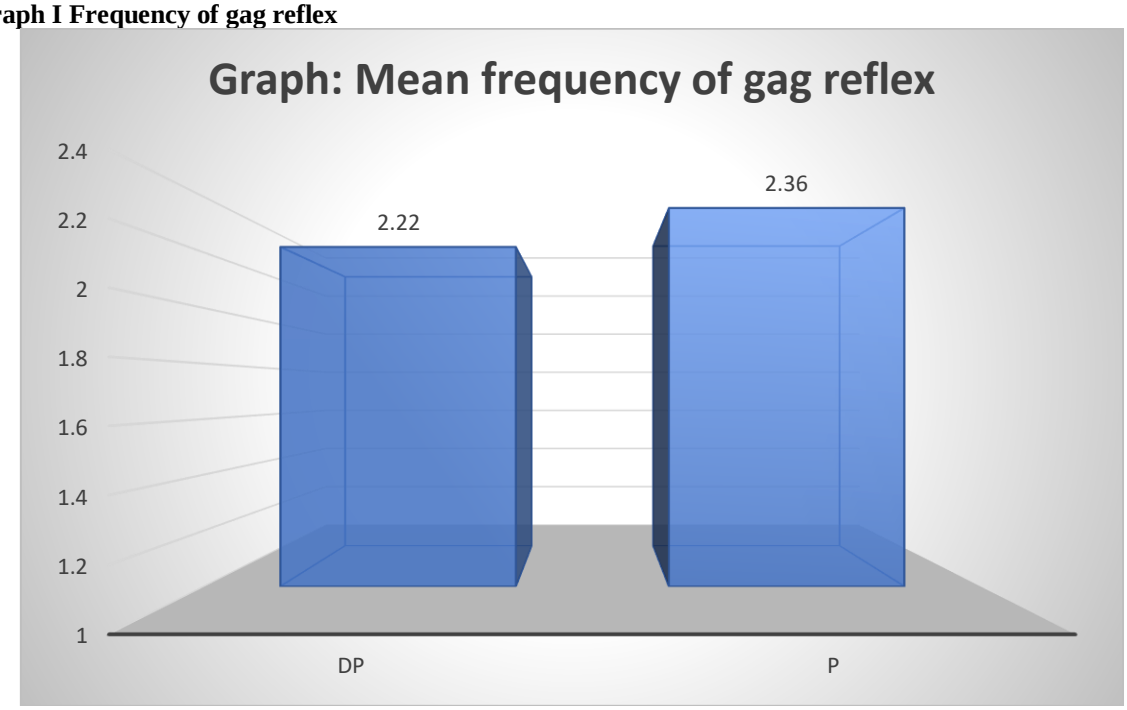
RESULTS

Table I Baseline characteristics

Baseline characteristics	DP	P	P value
Age (years)	61.12±5.56	62.64±4.34	0.287
Weight (Kgs)	52.60±5.96	52.32±4.02	0.846
BMI (kg/m^2)	21.36±4.80	21.20±5.48	0.913
Pulse rate	102.32±9.45	105.68±2.79	0.254
Mean Arterial Pressure	66.22±3.17	65.20±3.71	0.543
SPO2	95.21±1.63	94.14±1.43	0.423
Respiratory Rate	21.68±4.11	20.78±3.84	0.544

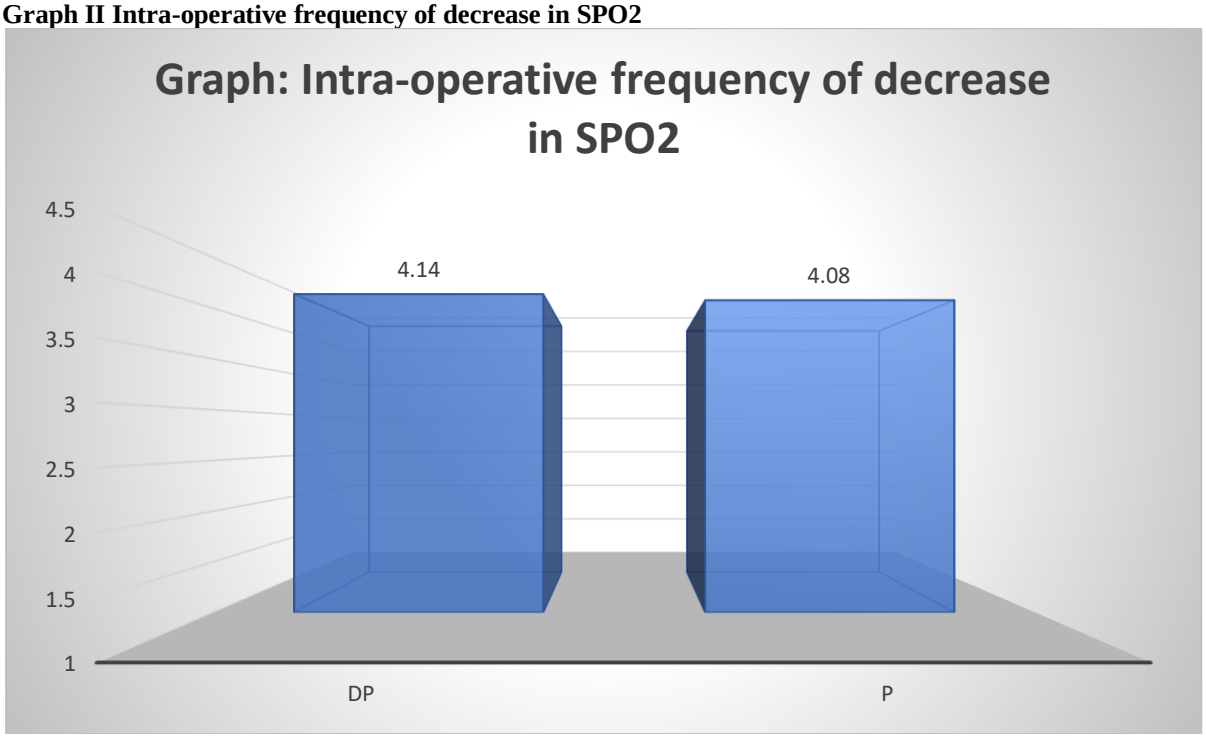
Table 1 shows the baseline characteristics of the study population. No significant difference was reported in mean age (61.12±5.56 vs. 62.64±4.34 years), duration of disease (41.40±5.30 vs. 41.20±5.26 years), weight (52.60±5.96 vs. 52.32±4.02 kgs), BMI (21.36±4.80 vs. 21.20±5.48 kg/m^2), pulse rate (102.32±9.45 vs. 95.68±2.79), mean arterial pressure (66.22±3.17 vs. 65.20±3.71; p=0.543), SPO2 (95.21±1.63 vs. 94.14±1.43; p=0.423) and respiratory rate (21.68±4.11 vs. 20.78±3.84; p=0.544) between Group DP and Group D respectively. This nullifies the fact that the effects obtained by the drugs are not due the characteristics of the study population.

Graph I Frequency of gag reflex



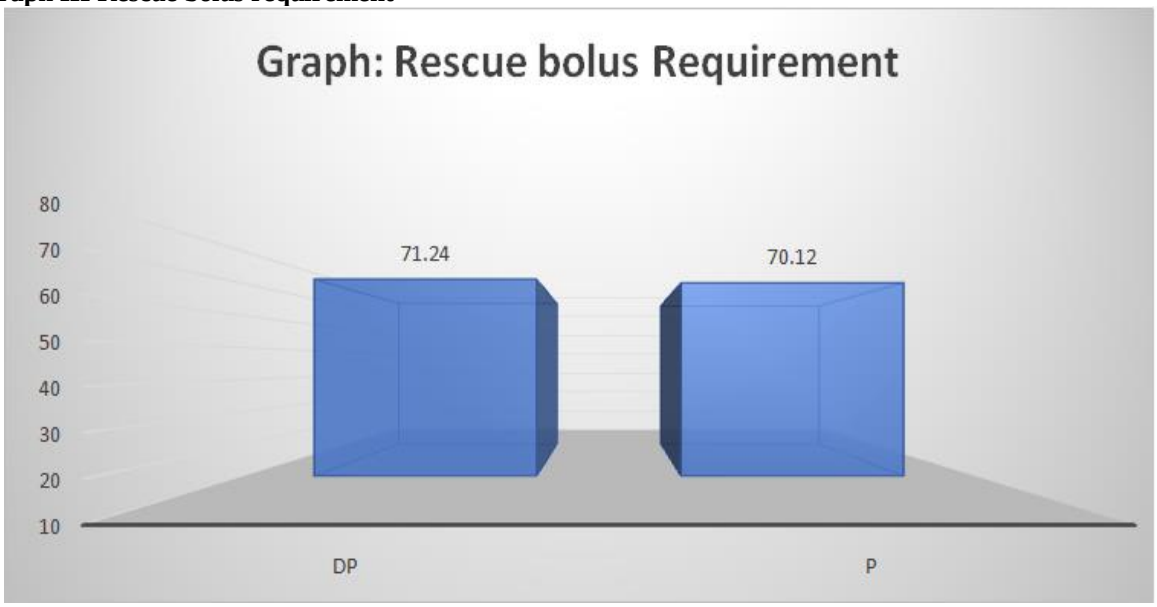
Graph I shows that no significant difference was obtained in terms of mean frequency of gag reflex between both the groups as revealed by the insignificant p value of 0.684. This highlights that both the groups had similar mean frequency of gag reflex.

Graph II Intra-operative frequency of decrease in SPO2



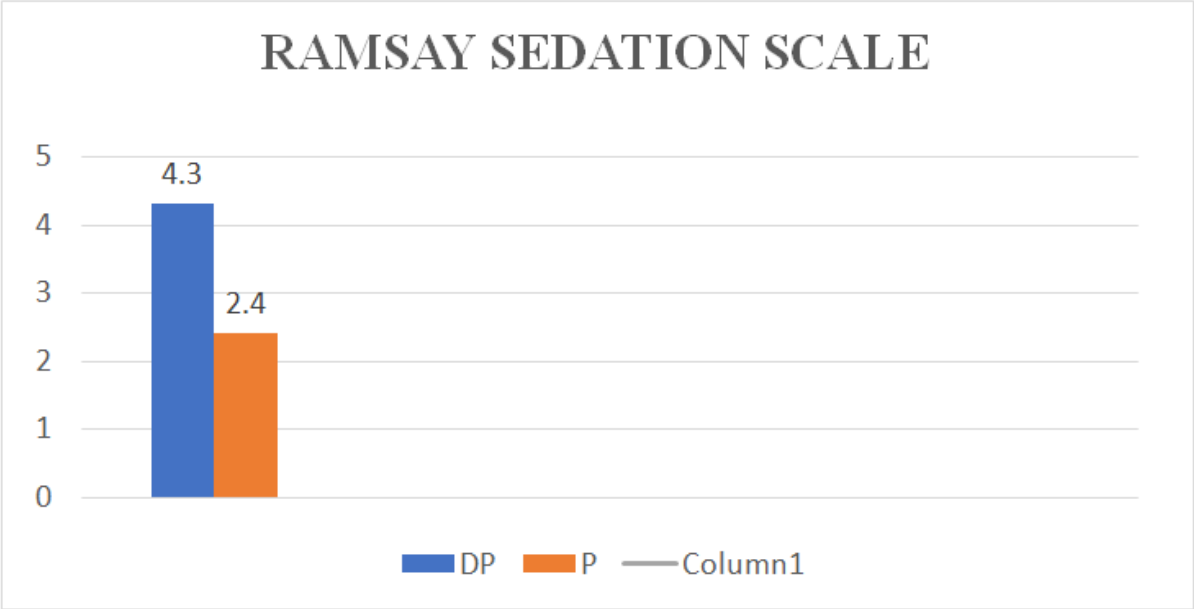
Graph II shows that no significant difference was obtained in terms of intra-operative frequency of decrease in SPO2 between both the groups as revealed by the insignificant p value of 0.821. This highlights that both the groups had similar intra-operative frequency of decrease in SPO2.

Graph III Rescue bolus requirement



Graph III shows that no significant difference was obtained in terms of rescue bolus requirement between both the groups as revealed by the insignificant p value of 0.411. This highlights that both the groups had similar requirement.

Graph IV Postoperative Ramsay Sedation Scale



Graph IV shows that a significant difference was obtained in terms of Ramsay sedation scale between both the groups postoperatively as revealed by the significant p value of 0.03.

DISCUSSION

Endobronchial ultrasound-guided transbronchial fine needle aspiration (EBUS-TBNA) is a novel, minimally invasive method to sample peribronchial masses using real-time guidance.[7,8] Lung cancer represents a major health burden worldwide and remains the leading cause of cancer mortality for both men and women in the United States, accounting for >25% of all cancer deaths.[9] Particularly for non-small cell lung cancers (NSCLCs), recent advances in tumor classification and the identification of targetable driver mutations have revolutionized the clinical management of these patients. The cornerstone for treatment decisions in lung cancer, however, still relies on appropriate staging.[10] The present study was conducted to compare and asses the effect of dexmedetomidine and propofol with propofol alone when given in endobronchial ultrasound guided needle aspiration (EBUS) procedure.

We found that no significant difference was reported in mean age (61.12±5.56 vs. 62.64±4.34 years), duration of disease (41.40±5.30 vs. 41.20±5.26 years), weight (52.60±5.96 vs. 52.32±4.02 kgs), BMI (21.36±4.80 vs. 21.20±5.48 kg/m^2), pulse rate

(102.32±9.45 vs. 95.68±2.79), mean arterial pressure (66.22±3.17 vs. 65.20±3.71; p=0.543), SPO2 (95.21±1.63 vs. 94.14±1.43; p=0.423) and respiratory rate (21.68±4.11 vs. 20.78±3.84; p=0.544) between Group DP and Group D respectively. Ryu et al[11] conducted the first randomized controlled trial (RCT) that evaluated the use of dexmedetomidine during bronchoscopy. The Dexmedetomidine group had a significantly lower rate of desaturation events, with no between group difference in level of sedation, oxygen saturation, mean arterial pressure and heart rate.

We found that no significant difference was obtained in terms of mean frequency of gag reflex between both the groups as revealed by the insignificant p value of 0.684. There was no significant difference was obtained in terms of intra-operative frequency of decrease in SPO2 between both the groups as revealed by the insignificant p value of 0.821. Pertzov B et al[12] conducted the randomized controlled trial (RCT) in patients who underwent an elective bronchoscopy procedure, number of desaturation event, heart rate, mean arterial pressure was similar between the groups propofol and dexmedetomidine, however rescue boluses requirement was higher in dexmedetomidine group due to inadequate anaesthesia resulting in adverse events.

We found that no significant difference was obtained in terms of rescue bolus requirement between both the groups as revealed by the insignificant p value of 0.411. A significant difference was obtained in terms of Ramsay sedation scale between both the groups postoperatively. Lin et al[13] compared the efficacy and safety of dexmedetomidine sedation with propofol in cases of EBUS-TBNA. Patients requiring EBUS-TBNA were randomly assigned dexmedetomidine sedation (D, n=25) or propofol sedation (P, n=25). Vital signs, diagnostic yield and the bispectral index (BIS) were recorded throughout the bronchoscopic procedure and recovery period. The tolerance and cooperation of the patients were evaluated using questionnaires. The lowest mean arterial blood pressure in group D (79.2±9.9 versus 72.5±12.9 mm Hg, p=0.049) exceeded that in group P, the lowest heart rate was lower (60.9±10.2 versus 71.4±11.8 beats·min−1, p=0.006) and the mean BIS during sedation was significantly higher (84.1±8.3 versus 73.6±5.7, p<0.001). Patients in group D were more likely to report perceiving procedure-related symptoms and express an unwillingness to undergo the bronchoscopy again, if indicated (41.1 versus 83.3%, p=0.007). One subject in group D aborted EBUS-TBNA due to intolerance. Many of the variables in the two groups were similar, including the proportion of hypoxaemic events, recovery times, patient cooperation and diagnostic yield.

Guo et al[14]evaluated the safety and efficacy of dexmedetomidine in bronchoscopy through a systematic review. Nine studies were included, with a total of 765 cases. Compared to Group C, the incidence of hypoxemia (OR = 0.40, 95% CI (0.25, 0.64) p = 0.0001, I^2 = 8%) and tachycardia (OR = 0.44, 95% CI (0.26,0.74), p = 0.002, I^2 = 14%) were lower, but bradycardia (OR = 3.71, 95% CI (1.84, 7.47), p = 0.0002, I^2 = 0%) was higher in Group D; no significant difference was observed in other outcome indicators. Dexmedetomidine reduces the incidence of hypoxemia and tachycardia during bronchoscopy but is more likely to provoke bradycardia.

The limitation the study is small sample size.

CONCLUSION

Authors found that although, patients undergoing EBUS procedure showed increased frequency of gag reflex and additional requirement of propofol doses in dexmedetomidine group, they showed less frequency of dip in saturation or hypoxia as compared to propofol group and were more comfortable postoperatively.

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