ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 17, Issue, 09, pp.34693-34696, September, 2025
DOI: https://doi.org/10.24941/ijcr.49575.09.2025

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

COMBINATION OF DEXMEDETOMIDINE AND PROPOFOL TOPROVIDE EFFECTIVE SEDATION FOR DISE (DRUG INDUCED SLEEP APNEA) PROCEDURE IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA (A CASE SERIES)

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ARTICLE INFO

Article History:
Received 20th June, 2025
Received in revised form
24st July, 2025
Accepted 29th August, 2025
Published online 30th September, 2025

Keywords:

Drug-induced sleep endoscopy,
Obstructive Sleep Apnea,
Dexmedetomidine, Propofol.

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ABSTRACT

Introduction: Drug-induced sleep endoscopy (DISE) is a diagnostic tool for evaluating obstruction of upper airway during sedation and predicting surgical outcomes. **Case Series:** We conducted this case series in total 10male patients with Obstructive Sleep Apnea (OSA). The patientswere sedated with 1mcg/kg of Dexmedetomidine administered over 10 minutes, followed by 0.3-0.7 mcg/kg/hr infusion and Co-administration of inj. Propofol 0.5mg/kg according to lean body weight to achieve a target level of BIS of 60-70 for optimal sedation. Once the desired sedation level was reached, a flexible fiberopticvideolaryngoscope was inserted to observe upper airway obstruction. **Discussion:** Combination of Dexmedetomidine and Propofol provided safe and effective sedation during DISE procedure in patients with OSA. Synergistic effect of both the drugs provided sedation with better hemodynamic stability and desirable BIS. **Conclusion:** Dexmedetomidine and propofol combination resulted in effective sedation, inducing a state closely resembling natural sleep without notable cardiac or respiratory depression.

Citation: Dr. Mamta Patel, Dr. Kumud Ganvit, Dr. Dixita Vaghela and Dr. Vishva Pampaniya. 2025. "Combination of Dexmedetomidine and Propofol toprovide effective sedation for DISE (Drug Induced Sleep Apnea) procedure in patients with Obstructive Sleep Apnea (A case series)". *International Journal of Current Research, 17, (09), 34693-34696.*

INTRODUCTION

Obstructive sleep apnoea (OSA) is defined as complete cessation of breathing for more than 10 seconds occurring 5 or more time per hour of sleep leading to decrease in peripheral oxygen saturation by more than 4%, despite maintaining adequate ventilation. It occurs due to recurrent upper airway blockage or collapses during sleep characterised by snoring, repeated arousal, daytime somnolence and oxygen desaturation. (1)Long-term consequences include pulmonary and systemic hypertension, neurocognitive deficits, behavioural changes, and may lead to heart failure. (2) The standard treatment for OSA is CPAP. But most of the patients cannot tolerate it and require other surgical and non surgical options as definitive treatment. The level of collapse is variable and it may be at multiple sites.(3) To identify that site, endoscopy during physiological sleep is ideal and necessary, but it is unpleasant to the patient. So, Drug Induced Sleep Study has emerged as the most used diagnostic modality. (3,4)DISE is a diagnostic procedure used to assess the obstruction in upper airway in patients with OSA during drug induced sleep like state and to predict the best treatment plan. (4,5).

For doing DISE, patient should be sedated to the level of natural sleep. There are many drugs available for the sedation like Midazolam, Propofol, Dexmedetomidine, Remifentanil and Ketamine (6). In this case series, We aimed to assess the use of combination of Dexmedetomidine and Propofol on upper airway obstruction and effects on the cardiovascular and respiratory systems in DISE procedure.

CASE SERIES

Total 10 Male patients having OSA, posted for DISE study were included in this prospective case series.(Table 1) Patients refusing the study, ASA GRADE IV and patient allergic to local anesthetics are excluded. The DISE study was done at the S.S.G..hospital, Vadodara (January 2024 to June 2024). In all patients, Polysomnography was done to diagnose OSA. Preoperative evaluation, airway assessment and polysomnographic findings of the patients were noted. An informed written consent was taken and procedure was explained. They were instructed to have atleast 6 hrs of minimum sleep in night. Premedication was given as inj. Glycopyrrolate IV(5mcg/kg) and topical nasalOxymetazoline drops. Nebulization with 5ml of 4% lignocaine (3-4ml) was done 10 minutes before the procedure in all patients.

In OT, Multipara monitor attached and parameters like HR, NIBP, SpO2, EtCO2 and BIS were noted. A quiet and dark environment was maintained inside the OT. Atomization was done through both the nostrils using inj. 2%. Lignocaine 3ml in all patients. After providing a sleep favouring environment with dim lights and minimal noise, Peripheral IV line was secured. Sedation was initiated with Inj. Dexmedetomidine 1 mcg/kg IV over 10 minutes, and infusion started at rate of 0.3-0.7 mcg/kg/hr in 100ml Normal saline.(1)In combination with Dexmedetomidine,We have given inj. Propofol 0.5mg/kg according to lean body weight to achieve a target level of BIS of 60-70 for optimal sedation at the time of insertion of Fiberoptic Laryngoscope.(2,12) Because Drug-Induced Sleep Endoscopy requires natural sleep-like state which was achieved between this BIS value where patients maintain spontaneous breathing while achieving sufficient relaxation of upper airway muscles, allowing for realistic visualization of obstructive patterns without the confounding effects of over-sedation or airway instrumentation.Intermittent administration of Inj. Propofol 10 mg IV given and repeated as and when needed (Max total dose of Propofol not exceeded than 60mg) to maintain BIS between 60-70.(2) (Image-2).

Propofol TCI infusion for DISE achieves appropriate levels of sedation and recovery faster than dexmedetomidine continuous infusion, while causing lower SpO2nadirs. (2) Dexmedetomidine as single high dose agent for DISE may achieve some endoscopic views of airway sites of obstruction

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Dexmedetomidine as single high dose agent for DISE may achieve some endoscopic views of airway sites of obstruction DISE procedure was started after patient fell asleep or snoring started and BIS value was between 60-70 and airway obstruction was observed..(Image-1,4)ENT Surgeon has introduced 3.5mm Flexible VideoLaryngoscope through the nostril and areas or level of obstruction were observed. All the patients were monitored vigilantly during the procedure by standard and BIS monitoring. No changes in HR, BP and RR was observed in any case.(Table-2). The procedure was lasted for about 15-20 minutes in every case. We had administered nasal oxygen in every patient throughout the procedure to prevent hypoxia and lowest saturation was noted (Image-2). Airway manipulation or maneuvers like Chin lift, jaw thrust or insertion of Nasopharyngeal airway required to relieve airway obstruction and to maintain an airway were noted down. To relieve obstruction, (No snoring, increase in SpO2), chin lift was required in all patients. Additionally, Jaw thrust was required in 6 patients (60%) and Insertion of Nasal airway was required in 3 patients (30%). All the patients were monitored in recovery room. The postprocedure period was uneventful in all the patients. Statistical analysis for quantitative data were compared using mean ± SD and significance of difference using T test using MedCalc software.

RESULTS

All patients were monitored vigilantly. Demographic data and intraoperative changes in parameters are shown in Table 1 and Table 2. Post procedure period was uneventful in all cases.

Table 1. Demographic Data

PARAMETER	MEAN± SD
AGE(Years)	46.4± 6.36
SEX (M: F)	10:0
ASA Grade (II: III)	4:6
AHI (events)	41.76 ±24.03
BMI (kg/m^2)	29.42±1.93

(AHI: APNEA HYPOAPNEA INDEX, BMI- BODY MASS INDEX)

Table 2. Intraprocedural Parameters

PARAMETER	MEAN ± SD
BASELINE SPO2 (%)	96.3 ± 1.63
FALL IN SPO2 (%) during polysomnography	76.8 ± 11.57392
FALL IN SPO2 (%) during DISE procedure	87.5±9.34239
BIS at 10mins	64.6 ± 1.854724
ETCO2 at 10mins (mm of Hg)	32.1 ± 1.513275

Image 1. Severe Airway Obstruction during DISE

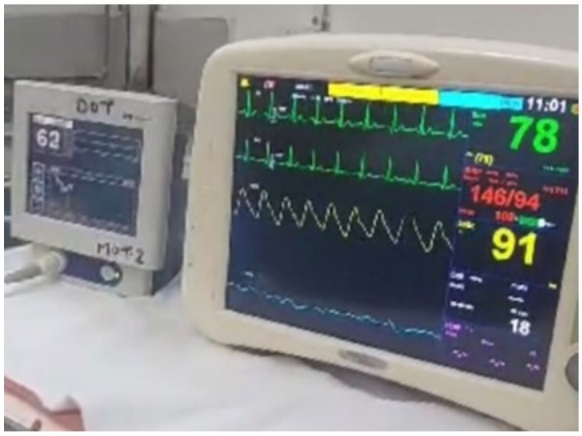

Image 2. Hemodynemic parameters and BIS monitoring during DISE procedure

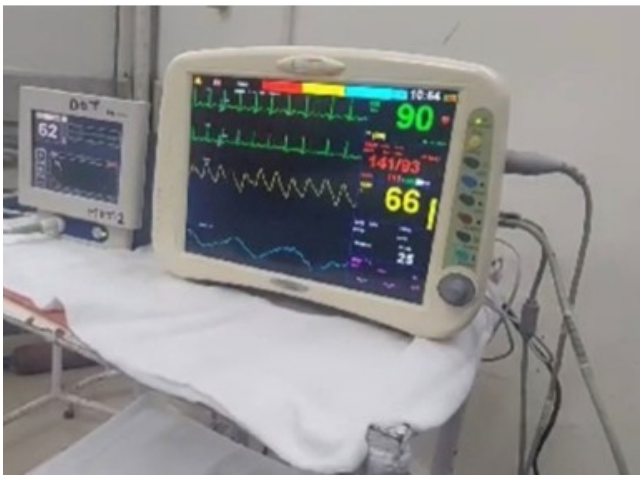

Image 3. Fall in SpO2 during procedure

Image 4. Position of patient during procedure

DISCUSSION

Propofol, Midazolam, Dexmedetomidine, Ketamine, Opioids etc. can be used either in combination or alone for the procedure of DISE. (2,6)Dexmedetomidine is an alpha-2 agonist and produces sedation by causing decreased norepinephrine firing at the locus coeruleus in pons. It induces near normal sleep like state with minimal effects on upper airway dynamics and cause minimal respiratory depression. (1,7). Propofol is a GABA agonist leading to central nervous system depression. It is faster and shorter acting allowing easier maintenance of sedation (3) Propofol can be given in bolus doses or as infusion. It causes rapid return of consciousness with minimal residual sedative effects hence it is a good option for DISE procedure. (8)However, the dose of Propofol should be carefully titrated during the procedure as it can cause over sedation and upper airway collapse at higher dose. (2,4) (Image-4). Ufuk Kuryukluyildiz has done comparative study of Dexmedetomidine vs propofol for DISE for patient with OSA and concluded that Dexmedetomidine has advantages over Propofol for sedative purpose in DISE as it has more respiratory stability (1). Propofol has more rapid sedative action and haemodynamic stability. Combined use of the both the drug provides more advantage due to synergistic effect. (2,9)So, we choose combination of both the drugs to have their advantages in DISE procedure. In this case series, all patients were male and BMI was 29.42±1.93 kg/m^2 as shown in Table-1. Further study may require evaluating effectiveness of combination of these drugs in female patients, pediatric patients and in morbidly obese patients. We have given loading dose of Dexmedetomidine followed by infusion, but as it causes only conscious sedation, it alone is not effective in achieving BIS value between 60-70. So, it is necessary to give injection Propofol as top up doses as it has sedative effect that mimic natural sleep pattern of the human more alike (1,6). Propofol has consistently established itself as the gold standard for sedation in this setting as it combines overall safety and time effectiveness. Moreover, several studies have shown that findings in DISE tests conducted under propofol sedation led to appropriate surgical outcomes (11,12). Propofol can be administered in boluses or as an infusion.(4) In a study using low-dose Dexmedetomidine (1 µg/kg for 10 min, followed by 0.2–1.4 µg/ kg/h) Cho et al(14) had reported inadequate sedation in one-half of the patients requiring an additional administration of propofol. Similarly, Elkalla and El Mourad(15) have reported about the need for propofol rescue doses with low-dose Dexmedetomidine. Marina Carrasco-Llatas have stated that DISE is not a painful procedure, it doesn'trequired local anesthesia to nose.(4,10) And it's easy to suction the secretions out if that's a problem in visualization during study. But in our study, 3.5mm fiberscope without suction channel was used for the procedure. So it required to do suction from the seperate machine and there are chances of damage to mucosa and it's an unpleasant sensation to the patient. So Nasal preparation, Nebulization and Atomization of nasal airway were done before the procedure in all cases (10). In our study, though we have administered oxygen through nasal canula.Events of desaturation were observed. (Image-3) Airway manipulations like chin lift and jaw thrust were used, which improved SpO2 level. Fall in spo2 (87.5±9.34) was observed in all patients. There were no fall in SpO2 more than what was observed during sleep study(76.8±11.57). (Table-2) BIS value was maintained between 60-70 in all procedures because value lower than 60 suggests deep sedation and it may lead to overdiagnosis.(11) Three patient underwent uvelopalatophargoplasty and showed significant improvement i.e.60-70% Reduction in OSA symptoms. So, combination of Dexmedetomidine and Propofol provided safe and effective sedation during DISE procedure in patients with OSA. Synergistic effect of both the drugs provided sedation with better hemodynamic stability and desirable BIS value throughout the procedure. Anesthesia for DISE is an individualized approach. Anesthesia protocol is not yet standardized as larger sample size is needed for further evaluation. The protocols for DISE may vary based on patient characteristics and the specific goals of the procedure like level of obstruction and success of surgical intervention.

CONCLUSION

The combination of Dexmedetomidine and Propofol in adequate doses demonstrated effective sedation inducing a state closely resembling natural sleep for DISE for diagnosis of airway obstruction in patients with Obstructive Sleep Apnea with minimal cardiovascular and respiratory system involvement.

LIMITATIONS OF THE STUDY: As we have conducted this study only on male patients and sample size also is small, further research is require to generalise the results and as there was no control group in our study, there is a scope of further research in that direction and that can provide better idea about it's clinical applicability.

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