Original Article

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Anaesthesia Section

Comparison of Dexmedetomidine and Midazolam as Co-induction Agents to Propofol for Proseal Laryngeal Mask Airway Insertion: A Randomised Control Trial

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ABSTRACT

Introduction: The Laryngeal Mask Airway (LMA) is a supraglottic device designed to secure the airway during minor to moderate surgical procedures. Second-generation LMAs, such as the ProSeal LMA (PLMA), offer enhanced safety features, including a gastric drain to reduce the risk of aspiration. Optimal insertion conditions depend on effective sedation with agents like propofol and adjuvants such as dexmedetomidine, which provide stable haemodynamics and suppress airway reflexes.

Aim: To compare dexmedetomidine and midazolam as co-induction agents with propofol for ProSeal laryngeal mask airway (PLMA) insertion, assessed using the Muzi scoring system.

Materials and Methods: This prospective, randomised controlled trial was conducted at the Department of Anaesthesiology, ACS Medical College, Chennai, India, over a period of 16 months and included 60 patients scheduled for elective surgeries under general anaesthesia. Patients were randomly assigned to Group I (n=30) - dexmedetomidine (0.5 mcg/kg) with propofol (2.5 mg/kg), or Group II (n=30) - midazolam (0.04 mg/kg) with propofol (2.5 mg/kg). PLMA insertion conditions, insertion time, first-attempt success rate, and haemodynamic stability were compared between the two groups using the t-test and Chi-square test.

Results: There were no significant differences in age, gender, height, or weight between the groups. Group I demonstrated significantly better PLMA insertion conditions, including a higher first-attempt success rate (93.3% vs. 70%, p=0.019) and shorter insertion time (18.30±4.39 seconds vs. 21.27±6.21 seconds, p=0.04). Haemodynamic stability was superior in Group I, with lower heart rates (75.07±10.40 vs. 81.13±11.98 bpm, p=0.04) and lower systolic mean arterial pressures (115.67±5.70 vs. 119.93±5.69 mmHg, p=0.005 at 5 min; 117.20±4.69 vs. 121.07±4.83 mmHg, p=0.003 at 10 min). The requirement for additional propofol doses was lower in Group I (3.3% vs. 20%). The incidence of complications, such as sore throat (3.3% in Group I vs. 10% in Group II) and patient movement, was minimal in both groups, with no significant differences.

Conclusion: Dexmedetomidine, as a co-induction agent with propofol, significantly improves PLMA insertion conditions, reduces the need for additional propofol, and provides superior haemodynamic stability, suggesting it is a more effective adjunct for PLMA insertion than midazolam.

Keywords: Analgesics, Benzodiazepines, General anaesthesia, Hypnotics and sedatives, Opioid

INTRODUCTION

The laryngeal mask is a device designed with a lumen that seals the laryngeal inlet, enabling both spontaneous and positive pressure ventilation at airway pressures below 15 cm H_2O [1]. It serves as a valuable alternative to endotracheal intubation for minor to moderate surgeries. Adequate sedation during LMA insertion is essential to avoid adverse events such as coughing, laryngospasm, or patient movement.

Second-generation supraglottic airway devices, such as the PLMA, offer advantages over traditional LMAs. They provide a secure seal around the glottis without increasing mucosal pressure and include a gastric drain tube to prevent aspiration of gastric contents [2]. Induction agents such as propofol, sevoflurane [3], and thiopentone sodium [4] are commonly used to facilitate smooth PLMA insertion. Propofol is particularly effective due to its short duration of action and its suppression of pharyngeal and laryngeal reflexes. Adjuvants such as opioids, benzodiazepines, and low-dose muscle relaxants [5-7] further improve insertion conditions. However, opioids such as fentanyl, while enhancing insertion success rates, may exacerbate respiratory depression, apnea, and haemodynamic instability [8].

Dexmedetomidine, a selective α_2-adrenoceptor agonist, provides sedative and analgesic effects by acting on receptors in the central nervous system, particularly in the locus coeruleus, which influences respiratory control and alertness. It reduces airway and circulatory responses during intubation and extubation [9,10]. Literature specifically comparing dexmedetomidine and midazolam as adjuncts to propofol prior to PLMA insertion is sparse [11,12], with only one prior study conducted in adults [12]. The present study aimed to compare the effects of single intravenous doses of dexmedetomidine and midazolam, administered prior to propofol, on PLMA insertion conditions.

The primary outcome assessed was the ease of PLMA insertion. Secondary outcomes included apnea time, number of insertion attempts, intraoperative haemodynamic parameters, and postoperative parameters such as complications (hypotension, bradycardia, sore throat, postoperative nausea and vomiting), pain scores {Visual Analogue Scale (VAS)}, sedation levels (Ramsay Sedation Scale), and emergence time.

MATERIALS AND METHODS

This single-center, prospective, randomised, double-blinded controlled trial was conducted at a tertiary care hospital (ACS Medical College,

Chennai, India) over a period of 1 year and 4 months, from October 2022 to February 2024, following approval by the Institutional Ethics Committee (No. 595/2022/IEC/ACSMCH). The trial was registered under CTRI/2024/03/063738.

Sample size calculation: Sample size was calculated using the formula:

$$\text{Size}=\frac{(Z_{1-\alpha/2}+Z_{1-\beta})^{2*}\ (S_1^{\ 2}+S_2^{\ 2})}{(x_1-x_2)^2}$$

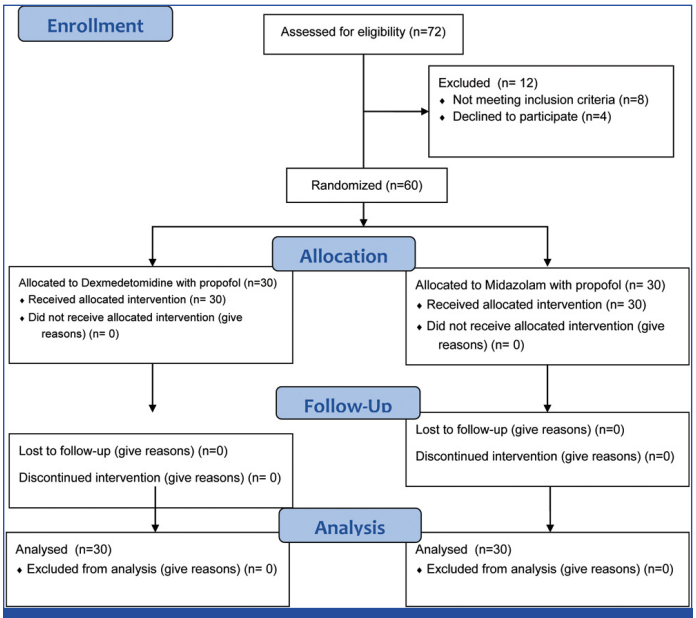
The parameters were obtained from the study by Gurjar SS et al., [12]: mean time for PLMA insertion in the propofol + midazolam group (x_1)=14.86 sec, Standard Deviation (SD) (s_1)=4.46; mean time in the propofol+dexmedetomidine group (x_2)=11.48 sec, SD (s_2)=3.34. Using Z_1-$\alpha/2$=1.96 (two-sided, 95% CI) and Z_1-β=0.842 (80% power), the calculated sample size was 21.1 participants per group. Accounting for a 10% dropout rate, 25 participants per group were required; 30 per group were ultimately included in the study.

Inclusion criteria: Patients aged 18-65 years, weighing 30-80 kg, with American Society of Anesthesiologists (ASA) physical status I or II, scheduled for elective short-duration surgeries (<90 minutes) under general anesthesia, and who provided informed consent were enrolled. Patients were randomly assigned to Group I (dexmedetomidine 0.5 mcg/kg+propofol 2.5 mg/kg) or Group II (midazolam 0.04 mg/kg+propofol 2.5 mg/kg), with 30 patients in each group [12,13].

Exclusion criteria: Patients under 18 or over 65 years, those undergoing emergency surgeries, or unable/unwilling to provide informed consent were excluded. Additional exclusions included morbid obesity, conditions increasing aspiration risk (e.g., pregnancy, gastroesophageal reflux, full stomach, hiatus hernia), and known hypersensitivity to study drugs.

Study Procedure

Randomisation and blinding: Allocation to groups was randomised using a sealed envelope technique by a study administrator not involved in data collection or statistical analysis. The CONSORT flow chart is presented in [Table/Fig-1]. Patients, anesthesiologists performing PLMA insertion, and trial statisticians were blinded to group assignments.



[Table/Fig-1]: CONSORT flow chart of the study.

Preoperative preparation: After informed consent, patients were assessed via history, physical examination, and relevant investigations. Patients were kept nil per oral for 6 hours for solids and 2 hours for clear fluids, according to ASA guidelines [14]. Standard monitoring {Electrocardiography (ECG), peripheral Oxygen Saturation (SpO_2), and Non-Invasive Blood Pressure (NIBP)} was initiated in the operating room. An intravenous line was secured, and crystalloid fluids were commenced. Glycopyrrolate 4 mcg/kg Intravenous (IV) and fentanyl 1 mcg/kg IV were administered as premedication. Patients were preoxygenated for 3 minutes prior to induction.

Intervention: Study drugs were diluted in 10 mL normal saline. Group I received dexmedetomidine 0.5 mcg/kg IV over 10 minutes, and Group II received midazolam 0.04 mg/kg IV over 10 minutes. Propofol 2.5 mg/kg IV was then administered without neuromuscular blocking agents [13]. After 90 seconds, PLMA (size 3-5 based on weight) was inserted: size 3 for 30-50 kg, size 4 for 50-70 kg, and size 5 for 70-80 kg. The cuff was inflated with the recommended volume, and ventilation was confirmed via chest expansion and capnography. Manual ventilation was provided until spontaneous respiration resumed. Apnea time (from LMA insertion to resumption of spontaneous ventilation) was recorded.

Anesthesia was maintained with 50% Nitrous Oxide (N_2O) and 2% sevoflurane in oxygen at a fresh gas flow of 4 L/min. Vital signs {Heart Rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP), and SpO_2} were recorded at baseline and at 1, 3, 5, 10, and 15 minutes post-PLMA insertion.

Outcome Measures

The primary outcome was ease of PLMA insertion, assessed using six parameters: resistance to mouth opening, resistance to insertion, coughing, gagging, head and body movements, and laryngospasm, each scored on a 3-point scale (modification of Muzi scoring system) [9,12]. Jaw relaxation was assessed using Young's criteria [15]: excellent (fully relaxed), satisfactory (moderately relaxed), or poor (full muscle tone). PLMA insertion time was recorded from onset of apnea to confirmation of successful placement.

Secondary outcomes included apnea time, number of insertion attempts, intraoperative haemodynamic parameters, and postoperative parameters such as complications (hypotension, bradycardia, sore throat, nausea, vomiting), pain scores (VAS at hourly intervals up to 6 hours postoperatively), sedation levels (Ramsay Sedation Scale immediately postoperative and at 6 hours), and emergence time (cessation of sevoflurane to spontaneous eye opening to verbal commands). Rescue analgesia (IV paracetamol 1 g) was provided for VAS >4. Hypotension (MAP <60 mmHg or >30% drop from baseline) was treated with IV fluids and ephedrine (6 mg), and bradycardia (HR <45 bpm or >30% drop) with atropine (0.01 mg/kg). Apnea >30 seconds was monitored and recorded.

STATISTICAL ANALYSIS

Data were entered into Microsoft Excel (Version 13.0) and analysed using Statistical Package for the Social Sciences (SPSS) (Version 26.0, Chicago, USA). Continuous variables were analysed using independent t-tests, and categorical variables using chi-square tests. Mean differences with 95% Confidence Intervals (CIs) were calculated, followed by effect size estimation using Cohen's d (0.2=small, 0.5=medium, 0.8=large). A p-value <0.05 was considered statistically significant.

RESULTS

The comparative analysis of Group I (dexmedetomidine+propofol) and Group II (midazolam+propofol) revealed no significant differences in demographic data [Table/Fig-2]. There was no significant difference in the distribution of ASA physical status between the groups. The types of surgical procedures performed are listed in [Table/Fig-3].

Regarding vital signs, Group I demonstrated significantly lower heart rates at multiple time points, including after induction and at 3, 5, 10, and 15 minutes post-PLMA insertion. Effect sizes ranged

Parameters		Group I (n=30)	Group II (n=30)	p-value
Age (years)		Mean: 31.93 (SD: 7.43)	Mean: 32.70 (SD: 8.26)	0.71
Gender	Male, n (%)	21 (70%)	19 (63.3%)	0.58
	Female, n (%)	9 (30%)	11 (36.7%)	
Height (cm)		Mean: 156.17 (SD: 4.97)	Mean: 155.17 (SD: 5.40)	0.46
Weight (kg)		Mean: 63.97 (SD: 9.85)	Mean: 64.4 (SD: 10.56)	0.87
BMI (kg/m^2)		Mean: 26.21 (SD: 3.64)	Mean: 26.72 (SD: 4.04)	0.61
ASA category I		19	17	0.59
ASA category II		11	13	

[Table/Fig-2]: Comparison of demographic data and baseline parameters of patients included in the study.
Independent t-test used; *Pearson's Chi-square test used; SD: Standard deviation

Surgical procedures	Group I	Group II
Breast mass excision	2	1
Abscess drainage	7	8
Suction and evacuation	1	0
Hysteroscopy and biopsy	5	7
Uterine cervical biopsy	4	3
Cervical lymph node excision biopsy	2	2
Extremity K-wire insertion	5	6
Penile circumcision	4	3
Total	30	30

[Table/Fig-3]: Surgical procedures performed in study patients.

from 0.53 to 0.76, denoting moderate to large effects, suggesting clinically relevant differences in heart rate regulation or stress response between the groups. SBP at 5 and 10 minutes was also significantly lower in Group I. At other time points, although minor numerical differences were present, they were neither statistically nor clinically significant. Similarly, MAP was significantly lower in Group I at 10 minutes, while being otherwise comparable between the groups at most time points [Table/Fig-4].

Parameters	Group I Mean (SD)	Group II Mean (SD)	Mean difference (95%CI)	Cohen's d	p-value
Heart rate (bpm)					
Baseline	82.80 (10.85)	83.13 (13.12)	-0.33 (-6.55, 5.89)	0.03	0.91
After induction	75.07 (10.40)	81.13 (11.98)	-6.06 (-11.9, -0.27)	0.53	0.04
Before insertion	76.10 (9.71)	82.37 (11.66)	-6.27 (-11.8, -0.72)	0.56	0.03
After insertion, 1 min	76.93 (8.89)	83.10 (12.01)	-6.17 (-11.6, -0.69)	0.56	0.03
3 min	77.27 (8.23)	84.23 (8.89)	-6.96 (-11.4, -2.5)	0.76	0.003
5 min	76.63 (9.92)	82.43 (10.99)	-5.8 (-11.2, -0.39)	0.54	0.04
10 min	76.30 (9.17)	82.23 (9.66)	-5.9 (-10.8, -1.07)	0.61	0.01
15 min	76.67 (8.77)	81.87 (9.88)	-5.2 (-10.03, -0.37)	0.54	0.03
Systolic BP (mmHg)					
Baseline	114.50 (10.77)	111.50 (7.72)	3.0 (-1.84, 7.84)	0.32	0.19
After induction	104.57 (10.38)	103.73 (7.52)	0.83 (-3.85, 5.5)	0.09	0.72
Before insertion	108.60 (8.44)	109.00 (5.25)	-0.4 (-4.03, 3.2)	0.06	0.83
After insertion, 1 min	111.67 (9.98)	114.47 (5.60)	-2.8 (-6.9, 1.4)	0.34	0.18
3 min	115.20 (6.88)	117.67 (4.84)	-2.5 (-5.5, 0.61)	0.41	0.11
5 min	115.67 (5.70)	119.93 (5.69)	-4.3 (-7.3, -1.3)	0.71	0.005
10 min	117.20 (4.69)	121.07 (4.83)	-3.9 (-6.3, -1.4)	0.76	0.003
15 min	117.27 (5.34)	118.27 (4.26)	-1.0 (-3.5, 1.49)	0.21	0.43
Diastolic BP (mmHg)					
Baseline	67.5 (10.76)	68.4 (5.79)	-0.90 (-5.4, 3.6)	0.10	0.69
After induction	63.66 (6.86)	66.73 (7.51)	-3.1 (-6.8, 0.65)	0.42	0.10
Before insertion	64.26 (6.32)	67.13 (5.78)	-2.9 (-5.9, 0.27)	0.46	0.07
After insertion, 1 min	65.16 (9.57)	67.4 (7.31)	-2.23 (-6.6, 2.2)	0.26	0.31
3 min	65.66 (8.55)	64.7 (10.19)	-0.97 (-5.1, 3.1)	0.12	0.64
5 min	65.66 (8.55)	64.7 (10.19)	0.97 (-3.9, 5.8)	0.10	0.69
10 min	63.5 (5.97)	66.93 (9.13)	-3.4 (-7.4, 0.56)	0.44	0.09
15 min	68.4 (5.03)	70.73 (10.29)	-2.3 (-6.5, 1.86)	0.29	0.27
MAP (mmHg)					
Baseline	83.17 (10.77)	82.77 (4.41)	0.40 (-3.85, 4.65)	0.05	0.85
After induction	77.30 (7.63)	79.07 (7.52)	-1.3 (-5.2, 2.6)	0.17	0.37
Before insertion	79.04 (6.86)	81.09 (5.32)	-1.7 (-4.9, 1.5)	0.27	0.23
After insertion, 1 min	80.67 (9.67)	83.09 (5.17)	-2.07 (-6.09, 1.96)	0.27	0.23
3 min	83.18 (8.48)	84.64 (4.34)	-1.4 (-4.9, 2.1)	0.21	0.40
5 min	82.33 (6.94)	83.11 (6.72)	-0.5 (-4.05, 3.05)	0.07	0.66
10 min	81.40 (4.87)	84.98 (6.26)	-3.6 (-6.5, -0.64)	0.61	0.016
15 min	84.69 (4.72)	86.58 (6.93)	-1.6 (-4.7, 1.43)	0.28	0.22
SpO_2 (%)					
Baseline	99.57 (0.57)	99.60 (0.56)	-0.03 (-0.33, 0.26)	0.06	0.83
After induction	99.50 (0.51)	99.57 (0.50)	-0.07 (-0.33, 0.19)	0.13	0.60
Before insertion	99.43 (0.50)	99.57 (0.50)	-0.13 (-0.39, 0.13)	0.26	0.28
After insertion, 1 min	99.53 (0.57)	99.63 (0.49)	-0.10 (-0.38, 0.18)	0.19	0.47
3 min	99.43 (0.50)	99.57 (0.50)	-0.13 (-0.39, 0.13)	0.26	0.28
5 min	99.47 (0.51)	99.60 (0.50)	-0.13 (-0.39, 0.13)	0.27	0.32
10 min	99.37 (0.49)	99.53 (0.51)	-0.13 (-0.39, 0.13)	0.33	0.22
15 min	99.50 (0.51)	99.57 (0.50)	-0.07 (-0.33, 0.19)	0.13	0.59

[Table/Fig-4]: Comparison of intraoperative vital signs (HR, SBP, DBP, MAP, SpO_2) of the patients included in the study.

PLMA insertion parameters favored Group I, with higher jaw opening scores, greater ease of insertion, and fewer patient movements. No coughing, gagging, or laryngospasm was observed in either group. Excellent jaw relaxation was achieved in 86.67% of Group I patients compared with 50% in Group II. Additionally, Group I had a shorter mean insertion time, a higher first-attempt success rate, and a significantly lower requirement for additional

propofol. Apnea time was significantly shorter in Group I [Table/Fig-5] and [Table/Fig-6].

Parameters	Group I (n=30)	Group II (n=30)	p-value
Jaw opening	Mean (SD) 2.93 (0.25)	Mean (SD) 2.73 (0.45)	0.038
	Mean diff (95% CI) 0.20 (0.01, 0.39)	Cohen's d 0.53	
Ease of insertion	Mean (SD) 2.97 (0.50)	Mean (SD) 2.73 (0.45)	0.009
	Mean diff (95% CI) 0.23 (0.06, 0.41)	Cohen's d 0.65	
Patient movements	Mean (SD) 2.9 (0.3)	Mean (SD) 2.67 (0.48)	0.031
	Mean diff (95% CI) 0.23 (0.03, 0.44)	Cohen's d 0.56	
Jaw relaxation Grade (n, %)	Good: 26 (86.67%)	Good: 15 (50%)	0.007
	Incomplete: 4 (13.33%)	Incomplete: 12 (40%)	
	Poor: 0 (0%)	Poor: 3 (10%)	
Time for insertion (seconds)	Mean (SD) 18.30 (4.39)	Mean (SD) 21.27 (6.21)	0.04
Apnoea time (seconds)	Mean (SD) 55.7 (20.9)	Mean (SD) 150.6 (21.5)	0.0001

[Table/Fig-5]: Comparison of PLMA insertion parameters between the two groups of patients included in the study.
CI: Confidence interval Independent t-test used; Effect size calculated using Cohen's d; SD: Standard deviation

Parameters	Group I (n=30)	Group II (n=30)	p-value
First attempt success rate (N, %)	28 (93.3%)	21 (70%)	0.019
Additional propofol required (N, %)	Yes: 1 (3.3%)	Yes: 6(20%)	0.044
	No: 29 (96.7%)	No: 24 (80%)	

[Table/Fig-6]: Comparison of first attempt success rate and additional propofol requirement in the two groups of patients included in the study.
Pearson's Chi-square test used

Emergence time was also significantly shorter in Group I. There was no significant difference in Ramsay Sedation Scale (RSS) scores between the two groups in the immediate postoperative period; however, Group I showed significantly lower RSS scores at 6 hours post-procedure. Postoperative VAS scores were similar immediately after surgery, but Group I exhibited significantly lower pain scores at all subsequent time points up to 6 hours, except for the 3rd hour, when most patients in Group II had already received rescue analgesia [Table/Fig-7].

Postoperative parameters	Time interval	Group I (Mean±SD)	Group II (Mean±SD)	p-value
Ramsay sedation score	Immediate postoperative (0 mins)	5.06±0.25	5.03±0.18	0.59
	6 hours	2.36±0.49	3.8±0.61	0.0001
Postoperative VAS score	0 hr	1.16±0.37	1.06±0.36	0.29
	1 hour	1.43±0.77	3.3±0.6	0.0001
	2	1.73±1.1	2.86±1.56	0.002
	3	1.73±0.9	1.33±0.47	0.03
	4	1.1±0.4	1.36±0.49	0.02
	5	1.1±0.3	2.03±0.49	0.0001
	6	1.23±0.62	3±0.45	0.0001
Emergence time (in minutes)	-	2.7±1.14	5.5±1.25	0.0001

[Table/Fig-7]: Comparison of postoperative parameters - RSS, VAS score and emergence time between the two groups of patients included in the study.
SD: Standard deviation; Independent t-test used

No adverse events such as coughing, gagging, or laryngospasm were observed in either group, indicating safe and well-tolerated procedures overall. Complications were minimal in both groups, with no significant differences. Blood staining on the PLMA was observed in one patient (3.3%) in the dexmedetomidine group and none in the midazolam group. Sore throat was reported in 3.33% of Group I patients and 10% of Group II patients (p=0.36) [Table/Fig-8]. No Postoperative Nausea and Vomiting (PONV) occurred in either group.

Complication	Group I (n=30)	Group II (n=30)	p-value
Sore throat	1 (3.33%)	3 (10%)	0.36

[Table/Fig-8]: Complications and Adverse Events encountered in the study participants.
Pearson's Chi-square test used

DISCUSSION

PLMA provides effective ventilation and airway maintenance without the need for a face mask or endotracheal intubation. Compared with endotracheal intubation, the classical LMA offers several benefits, including improved haemodynamic stability during induction and emergence, reduced anesthetic requirements, decreased coughing during emergence, and a lower incidence of postoperative sore throat. However, classical LMA use is associated with increased risk of gastric insufflation, gastroesophageal reflux, and aspiration of gastric contents [13,14].

Propofol is widely used as an induction agent at doses of 2-3 mg/kg due to its effectiveness in achieving adequate depth of anesthesia. However, factors such as mouth opening, Mallampati grade, jaw relaxation, and presence of coughing can influence the success of LMA insertion. Propofol alone, even at higher doses, may be insufficient to suppress patient responses during insertion. Hence, adjuvants such as midazolam [16], lidocaine [17], clonidine [18], or dexmedetomidine [19] are often used to enhance insertion conditions.

In the present study, the mean PLMA insertion time was shorter in the dexmedetomidine group (18.30±4.39 seconds) than in the midazolam group (21.27±6.21 seconds), although the clinical relevance of a 3-second difference may be limited. Insertion time is influenced by factors such as operator experience, placement technique, and the criteria used to define timing. Consistent with our findings, Gunwal P et al., [11] reported a median insertion time of 19 seconds for dexmedetomidine and 21 seconds for midazolam when co-administered with propofol. Similarly, Gurjar SS et al., [12] reported shorter insertion times in the dexmedetomidine group (11.48±3.34 seconds) than in the midazolam group (14.48±4.46 seconds).

The first-attempt success rate was significantly higher with dexmedetomidine (93.3%) than with midazolam (70%). Gurjar SS et al., [12] reported similar findings, with success rates of 98% and 84%, respectively. Gunwal P et al., [11] reported a 100% success rate for dexmedetomidine, possibly due to their use of a higher dose (1 µg/kg). While some studies suggest that neuromuscular blockers reduce the percentage of difficult LMA insertions [20,21], the present study did not involve their use. Brimacombe J et al., [22] found no significant difference in LMA insertion with or without muscle relaxants, though further investigation is warranted.

The Muzi score, which evaluates six variables related to PLMA insertion, has been widely used in prior research [23-25]. In the present study, jaw opening and ease of insertion were less favorable in the midazolam group, with more patient movements observed. Importantly, no incidents of coughing, gagging, or laryngospasm occurred in either group. Statistically significant Muzi scores confirm that dexmedetomidine combined with propofol provides superior insertion conditions compared with midazolam. These results align with findings by Gunwal P et al., [11] and Gurjar SS et al., [12], who reported better jaw relaxation and reduced resistance with dexmedetomidine. Farooqy A et al., [18] found dexmedetomidine more effective than clonidine when combined with propofol,

and Kavakli AS et al., [17] reported that both lidocaine and dexmedetomidine improved LMA insertion when administered prior to propofol induction.

In our study, additional propofol boluses were required in 3.3% of patients in the dexmedetomidine group versus 20% in the midazolam group, a statistically significant difference. This supports the role of dexmedetomidine in reducing propofol requirements during PLMA insertion. Nellore SS et al., [26] reported similar findings, highlighting dexmedetomidine's effectiveness in maintaining favorable insertion conditions with lower anesthetic doses.

Regarding haemodynamic parameters, both groups showed reductions in heart rate following administration of the study drugs, with more pronounced decreases observed in the dexmedetomidine group, consistent with Gunwal P et al., [11] and Gurjar SS et al., [12]. The MAP was consistently lower in the dexmedetomidine group, with significant differences at 5 and 10 minutes post-insertion, likely reflecting peak drug effects. These outcomes align with the known pharmacodynamics of dexmedetomidine, including enhanced vagal tone and reduced central sympathetic activity [27]. The transient increase in MAP at 10 minutes post-insertion in patients who received midazolam with propofol may indicate a heightened cardiovascular or stress response.

Patients receiving dexmedetomidine with propofol consistently demonstrated better insertion conditions, with less resistance and fewer movements during PLMA placement in the present study. Apnea time was significantly longer in the midazolam group, probably due to the lack of the respiratory-sparing effects of dexmedetomidine. Emergence time and sedation scores were lower in the dexmedetomidine group compared to the midazolam group, consistent with the findings of Gunwal P et al., [11].

Complications were minimal in both groups. Blood staining on the PLMA was observed in one patient (3.3%) in the dexmedetomidine group and in none from the midazolam group. Postoperative sore throat was reported in one patient (3.3%) in the dexmedetomidine group and in three patients (10%) in the midazolam group, although the difference was not statistically significant. Gurjar SS et al., [12] reported no complications with dexmedetomidine, while blood staining and sore throat were noted with midazolam. Cook TM et al., [28] identified blood staining on the LMA as the most common complication.

Limitation(s)

Due to logistical constraints, blinding of the anesthesiologists administering the anesthetic agents could not be performed, which may represent a potential source of bias. However, the anesthesiologists inserting the PLMA and the statistician analysing the data were blinded to group allocations. This was a single-center study, and some parameters did not demonstrate statistically significant differences. A larger multicenter trial may provide more robust data in this regard.

CONCLUSION(S)

Dexmedetomidine, when used as a co-induction agent with propofol prior to PLMA insertion, resulted in a higher first-attempt success rate, shorter insertion time, better jaw relaxation, and easier insertion compared to midazolam. In addition, dexmedetomidine provided superior intraoperative haemodynamic stability and improved overall recovery.

Overall, this study demonstrates that dexmedetomidine, when combined with propofol, provides superior conditions for PLMA insertion compared to midazolam. It significantly shortens insertion time, improves first-attempt success rates, and reduces the need for additional propofol boluses. Dexmedetomidine also results in better jaw relaxation, less resistance, and fewer patient movements during insertion, while maintaining stable haemodynamics. While complications were minimal in both groups, dexmedetomidine showed a slightly lower incidence of sore throat. These findings suggest that dexmedetomidine is a more effective and reliable option for enhancing PLMA insertion compared to midazolam.

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