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Awake intubation using C-Mac D Blade videolaryngoscope under local anesthesia with or without propofol sedation in anticipated difficult Airway

[1]Pardeep Kumar, Assistant Professor, Department of Anaesthesiology, Pt. B.D. Sharma PGIMS, Rohtak

[1]Vandna Arora, Assistant Professor, Department of Anaesthesiology, Pt. B.D. Sharma PGIMS, Rohtak

[2]Shikha Madan, Associate Professor, Department of Obstetrics & Gynaecology, Pt. B.D. Sharma PGIMS, Rohtak

[3]Shweta Bhardwaj, Senior Resident, Department of Anaesthesiology, Pt. B.D. Sharma PGIMS, Rohtak

Corresponding Author: Vandna Arora, Assistant Professor, Department of Anaesthesiology, Pt. B.D. Sharma PGIMS, Rohtak

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Abstract

Background and Aim: Videolaryngoscopes are being increasingly used in the management of failed as well as anticipated difficult airway. Our study aimed to evaluate the effect of addition of propofol sedation to local anesthesia of airway for awake nasal intubation using C-Mac D Blade videolaryngoscope.

Methods: 104 patients with anticipated difficult airway were randomly allocated into two groups i.e. group A (without propofol) and group B (with propofol sedation) with 52 patients in each. Topical airway anesthesia was administered in all patients. Group B patients also received propofol while no sedation was given in group A. Ease of intubation, patient tolerance and satisfaction were recorded.

Results: Both the groups were statistically similar with respect to ease of intubation, intubation time and number of attempts. Mean patient tolerance and satisfaction level was also similar between the two groups.

Conclusion: There is no significant advantage of using propofol sedation over adequate airway anaesthetization with local anaesthetics during awake nasal intubation using C-Mac D Blade videolaryngoscope.

Keywords: Videolaryngoscope, awake intubation, difficult airway, sedation

Introduction

Awake fibreoptic intubation has been the gold standard for management of anticipated difficult airway. However, videolaryngoscopy has emerged as an acceptable alternative in the management of the difficult airway.[1-4] Various reports and studies evaluating the use videolaryngoscopes for awake intubation in anticipated difficult airway cases are available in literature.[1-6]

Recently, the portable C-MAC videolaryngoscope, a further development of previous videolaryngoscopes by Karl Storz, has been introduced into clinical practice. The C-MAC system (Karl Storz, Tuttlingen, Germany) was derived from the Berci-Kaplan DCI videolaryngoscope.[7,8] The D-BLADE of the C-MAC

system is a half-moon shaped blade curved by 40°. The steel blade is connected to a digital camera and the signals are displayed on a portable monitor. Preliminary clinical study shows that the C-MAC may be a useful alternative in both routine and difficult airway management, and may additionally be used for educational purposes.[9] A study performed on manikins has shown advantages of the C-MAC over both the standard Macintosh laryngoscopes and other indirect laryngoscopes.[10]

Awake intubation is an unpleasant procedure and may lead to patient discomfort and hemodynamic changes. There is ample literature evaluating topical anesthesia of the airway and sedation during awake fibreoptic intubation. However, to our knowledge, there is no study evaluating the same in awake videolaryngoscopic intubation. Therefore we planned a comparative study evaluating ease of intubation, patient tolerance and hemodynamic response to awake nasal intubation using C-Mac D Blade videolaryngoscope under local anesthesia of airway with or without propofol sedation.

Material And Methods

This prospective randomized study was conducted after approval of the institutional ethics committee and written informed consent from all the patients who participated in the study. Adult patients (18-70 years age) of either sex with ASA status I to II diagnosed with carcinoma of oral cavity and undergoing surgery under general anesthesia requiring nasal intubation with atleast one criterion of anticipated difficult airway (Mallampatti grade II-IV, interincisor distance<3 cm, thyromental distance<6.5 cm) were included in the study. However, patients with interincisor distance less than 1.5 cm, severe coronary artery disease (LVEF < 40%), and allergy to local anaesthetics were excluded from the study.

104 patients were randomly allocated into two groups using computer generated random number table. i.e. group A (without propofol) and group B (with propofol sedation) with 52 patients in each group (Fig 1). Written informed consent was obtained from all the patients day before surgery. All patients received detailed information about the procedure. Preoperative evaluation including history, systemic examination and airway assessment was done. Biochemical and hematological investigations were also done. All patients were kept nil per orally after mid night and were given tablet Ranitidine 150 mg and Granisetron 2 mg HS and 2 hours before surgery.

In the preoperative room, intravenous access was established. Monitoring of heart rate, blood pressure), oxygen saturation and electrocardiogram was done. Injection glycopyrrolate 0.2 mg i.m. was administered. Topical airway anesthesia was administered in all patients in preoperative room. Nebulization with 4 ml of 4% lignocaine was done in sitting position. Pledgets soaked in 4% lignocaine were kept in the nostrils for 5 minutes. Patients were made to gargle with 5 ml of 2% viscous lignocaine. Trans-tracheal block was given with 3 ml of 4% lignocaine.

Patients were shifted to operating room. All routine monitors such as heart rate (HR), electrocardiograph (ECG), non-invasive blood pressure (NIBP), pulse oximetry (GE Datex-Ohmeda, TruStat Oximeter) were attached. Baseline parameters like HR, systolic blood pressure (SBP), and saturation of oxygen (SpO_2) were recorded. Group B patients received propofol bolus @ 0.5mg/kg followed by infusion at the rate of 50 microgram/kg/hr maintaining spontaneous ventilation

while no sedation was given in group A. An experienced anesthesiologist performed the nasal intubation in all patients using standard C-MAC D blade. Variables recorded included ease of intubation, time taken for intubation, number of attempts, patient tolerance and satisfaction. Hemodynamic parameters (HR, SBP) were recorded at baseline and after intubation. Any adverse event like bleeding or desaturation (SpO_2<94%) during the procedure was noted.

The time taken for intubation was measured from the start of the procedure (insertion of ETT into nostril) until the appearance of a capnograhy curve. An independent observer assessed the time with a stopwatch.

Grading of ease of intubation was assessed based on the following scale: 1- Easy**;** 2- Moderate; 3- Difficult **;** 4- Failure.

Patient tolerance was assessed by the following scale: 1- no reaction; 2- grimacing; 3-verbal objection; 4- defensive movements of head or hands.

Patients were asked about their satisfaction level after extubation which was labeled as excellent, good and poor.

Sample Size Calculation

Considering both the groups as equipotent, for patient tolerance (grade 1) to awake nasal intubations using C-Mac D Blade to be 70% either with or without Propofol sedation, 52 patients per group would be required, at 80% power within the precision error of estimation of 25% at alpha 0.05.

Statistical analysis

Statistical testing was conducted with the statistical package for the social science system version SPSS 17.0. Continuous variables were presented as mean±SD. Categorical variables were expressed as frequencies and percentages. The comparison of normally distributed continuous variables between the groups was performed using Student's t test. Nominal categorical data between the groups were compared using Chi-squared test/Fisher's exact test. For all statistical tests, a p value less than 0.05 were considered as significant difference.

Results

Both the groups were statistically similar with respect to demographic variables and presence of comorbid illnesses (p>0.05) (Table 1). The surgical diagnosis and its distribution in the two groups is shown in table 2. We found that majority of patients included in our study were suffering from carcinoma of buccal mucosa i.e. 27 patients (51.92%) in group A and 31 patients (59.61%) in group B. Airway assessment parameters were statistically similar between the two groups (p>0.05) (Table 3). HR and SBP were comparable between the two groups at baseline as well as post intubation (p>0.05) (Fig 2,3). We also noted that ease of intubation, intubation time and number of attempts were statistically similar in all the patients (p>0.05) (Table 4). 43 patients (82.70%) in group A were intubated in the first attempt while 9 patients (17.30%) required second attempt. Similarly in group B, 40 patients (76.92%) were intubated in first attempt, 9 patients (17.30 %) in second attempt and 3 patients (5.76%) required third attempt (p>0.05). No cases of failure of intubation observed in either group. Patient tolerance and satisfaction were also comparable in the two groups (p>0.05) (Table 4,5). Maximum number of patients i.e. 19 patients (36.53%) in group A and 22 patients (42.30%) in group B graded the procedure as 'good' followed by 'excellent' grading i.e. 18 patients (34.61%) in both the groups. Only 15 patients (28.84%) in group A and 12 patients (23.07%) in group B were unsatisfied with the procedure and they

graded the procedure to be 'poor'. There were no adverse events in either group.

Discussion

The increasing use of videolaryngoscopy has revolutionized the management of difficult airway. It has been established as a successful alternative technique to fibreoptic bronchoscopy for awake intubation in anticipated difficult airway. Kramer et al[1] compared fibreoptic bronchoscope with C-MAC videolaryngoscope equipped with a D-BLADE for awake nasotracheal intubation under local anaesthesia and sedation in patients with anticipated difficult airway. The median (IQR [range]) time for intubation was significantly shorter with C-MAC i.e. 38 (24-65 [11-420]) seconds vs 94 (48-323 [19-1020]) seconds with fiberscope ($p < 0.0001$). There was no difference in the success rate of intubation (96% for both techniques; $p > 0.9999$) and satisfaction of the anaesthetists and patients between the two groups. The intubation time in our study corresponds to that observed in the C-MAC videolaryngoscope group of the above study. Rosenstock et al[2] conducted a multicentric randomized controlled trial to compare awake tracheal intubation between flexible fiberscope and McGrath video laryngoscope in anticipated difficult airway patients. The median time to tracheal intubation was 80 seconds (IQR 58–117) with the flexible fiberscope, and 62 seconds (IQR 55–109) with McGrath video laryngoscope ($P = 0.17$). There was no statistical difference in number of attempts, ease of procedure, and patient comfort between the two groups. Mahran et al[3] evaluated GlideScope® video laryngoscope with flexible fiberoptic bronchoscope for awake nasal intubation in oral cancer patients. Intubation time in seconds was significantly shorter with GlideScope® (70.85 ± 8.88 seconds) than with fiberscope (90.26 ± 9.41 seconds) ($P < 0.001$). The success rate of the first attempt intubation was slightly higher with videolaryngocope (81.5% vs 78.8%). Another study had similar results comparing GlideScope® video laryngoscope with flexible fibreoptic bronchoscope for awake intubation of morbidly obese patients with predicted difficult intubation.[4]

Multiple studies have compared different sedation and local anesthesia techniques to provide optimum conditions for awake fibreoptic intubation and ensuring patient comfort during the procedure.[11-14] Gupta et al[11] evaluated the clinical efficacy and safety of dexmedetomidine as premedication with propofol infusion for intubation using fibreoptic bronchoscope. They reported a mean intubation time of 3.9±2.9 minutes in dexmedetomidine group and 4.2±2.5 minutes in propofol group with no significant difference. Kundra et al[12] compared lignocaine nebulization with combined regional blocks (translaryngeal block, bilateral superior laryngeal nerve block) for awake fiberoptic nasotracheal intubation and reported satisfactory anaesthesia of the upper airway in all patients but better patient comfort and hemodynamic stability in combined regional block group. Similarly in our study, we evaluated the effect of propofol sedation in addition to local anesthesia of airway for awake intubation using C-Mac D Blade videolaryngoscope and found statistically similar results in the two groups.

Our study is not without limitations. C MAC D blade cannot be used in patients with mouth opening less than 1.5 cm and awake fibreoptic intubation is the technique of choice in such cases. Quite a few patients stated poor level of satisfaction with the procedure. Further research is needed in the area to provide a wider perspective of use of videolaryngoscopy in various clinical scenarios

and techniques to provide ideal intubating conditions and ensure patient comfort for awake intubations.

Conclusion

We conclude that there is no significant advantage of using propofol sedation over adequate airway anaesthetization with local anaesthetics (i.e. lignocaine nebulization, viscous gargles, nasal packing and transtracheal block) during awake nasal intubation using C-Mac D Blade videolaryngoscope.

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Legend Table and Figures

Table 1

Parameters	Group A (Awake)	Group B (Propofol sedation)	P-value
Age (years)	51.19±11.24	51.78±11.77	>0.05
Sex (M/F)	42/10	41/11	0.807
ASA Status (1/2)	13/23/16	12/24/16	0.969
Weight (kg)	60.57 ± 6.73	57.41 ± 10.86	0.105
Comorbid illness	n (%)	n (%)	
Diabetes mellitus	14 (26.92%)	18 (34.61%)	>0.05
Hypertension	6 (11.53%)	9 (17.30%)	>0.05
Post PCI	3 (5.76%)	0	>0.05
Post CABG	4 (7.69%)	3 (5.76%)	>0.05

Table 2

Diagnosis	Group A (Awake) n (%)	Group B (Propofol sedation) n (%)
Carcinoma buccal mucosa	27 (51.92%)	31 (59.61%)
Carcinoma angle of mouth	3 (5.76%)	2 (3.84%)
Carcinoma tongue	13 (25%)	9 (17.31%)
Carcinoma retromolar trigone	5 (9.61%)	3 (5.76%)
Carcinoma alveolus	4 (7.69%)	7 (13.46%)

Table 3: Airway assessment parameters

	Group A (Awake)	Group B (Propofol sedation)	p-value
Mouth opening (cm)	2.52±0.71 cm	2.58±0.669 cm	>0.05
Mallampati grade II III IV	 4 (7.69%) 17 (32.69%) 31 (59.61%)	 5 (9.61%) 15 (28.84%) 32 (61.53%)	 $\chi 2 = 0.252$; $p = 0.881$
Thyromental distance	5.93±0.39 cm	5.85±0.40 cm	>0.05

Table 4

Parameter	Group A (Awake)	Group B (Propofol sedation)	P-value
Ease of intubation	2.26±1.12	2.28±1.03	>0.05
Mean intubation time (seconds)	18.98±5.04	21.03±6.09	>0.05
Number of attempts	1.17±0.38	1.28±0.57	>0.05
Mean patient tolerance	2.46±1.03	2.51±1.09	>0.05

Table 5: Comparison of patient's satisfaction in two groups

Patient's satisfaction level	Group A (Awake) n (%)	Group B (Propofol sedation) n (%)	p-value
Poor	15 (28.84%)	12 (23.07%)	$\chi 2 = 0.552$; p=0.758
Good	19 (36.53%)	22 (42.30%)	
Excellent	18 (34.61%)	18 (34.61%)	

Figure 1: Consort diagram

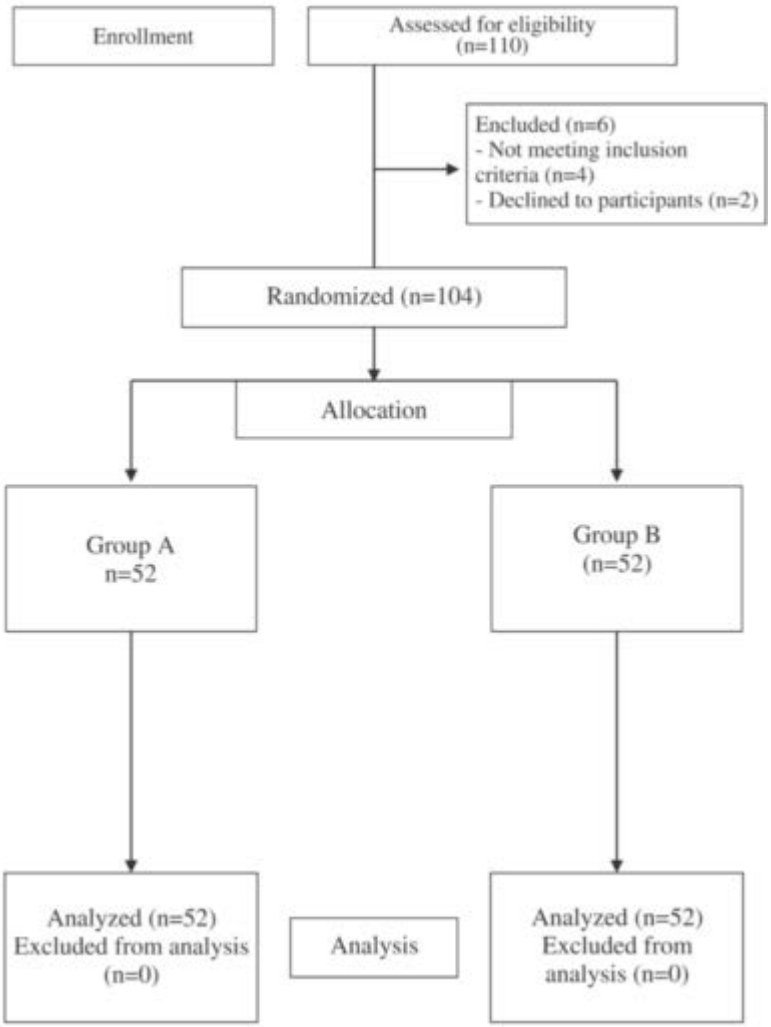

Figure 2: HR variation between the two groups

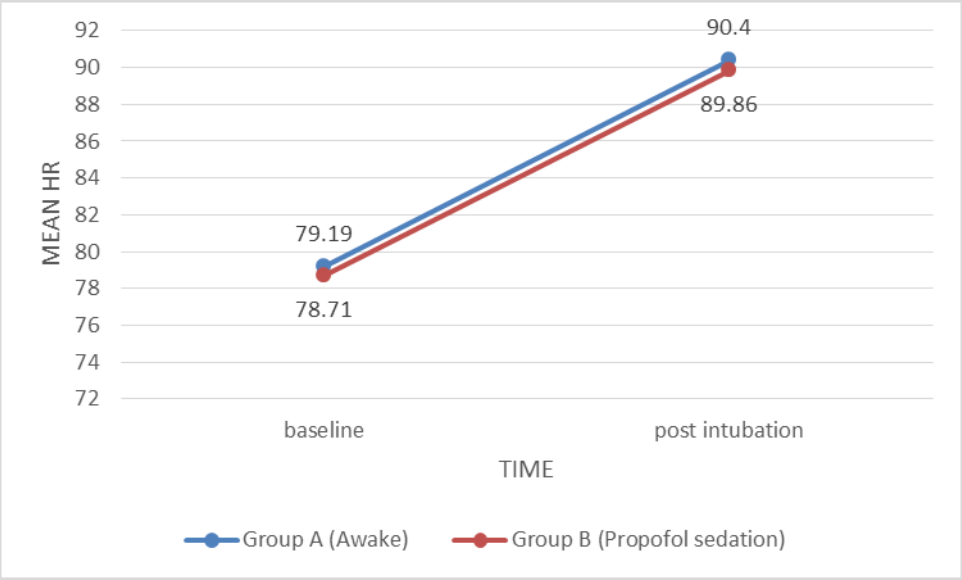

Figure 3: SBP variation between the two groups