ORIGINAL ARTICLE

Comparison of ease of intubation in right and left lateral position using C-MAC videolaryngoscope

Ravi Bhat*, C S Sanickop** , M G Dhorigoll**, Vijay Umrani***, S N Suresh**

*Assistant professor, **Professor, ***Associate Professor

Dept of Anesthesiology, Jawaharlal Nehru Medical College, KLE University, Belgaum-590010, (India)

Correspondence: Dr. Ravi Bhat, Assistant professor, Dept of Anesthesiology, Jawaharlal Nehru Medical College, KLE University, Belgaum-590010, (India); Cell: +91- 9482181582; Phone: 08312551292; E-mail: kakkodravi@yahoo.co.in

ABSTRACT

Introduction: Endotracheal intubation is conventionally performed in the supine position. It may sometimes be required to secure the airway in the lateral position, but in lateral position intubation is usually considered to be difficult because the laryngeal view is often compromised. Also anesthesiologists are not used to intubation in lateral position. There can be many methods of securing airway in lateral position besides with the aid of direct laryngoscopy, e.g. through laryngeal mask airway or intubating LMA, or with the use of light wand or a video laryngoscope. C-MAC video laryngoscope, a newer device using a modified Macintosh blade, may be useful in intubation in lateral position.

Aim of the study: To compare ease of intubation in right and left lateral position using C-MAC video laryngoscope.

Methodology: Study was conducted in KLE, Dr Prabhakar Kore Charitable Hospital. 100 patients with ASA grade I and II, randomly allocated to either Group I (right lateral position) or Group II (left lateral position). Patients with predicted difficult airways were excluded. After induction of anesthesia, the patient was put in lateral position and intubation was done by a consultant anesthesiologist who is well-versed in using C-MAC laryngoscope. Time for intubation, number of attempts, modified Cormack-Lehane grade, mucosal injury, and need of external laryngeal manipulation were noted.

Results: Overall intubation success rate was 100%. The time taken in right lateral group was 25.8±9.5 seconds and in left lateral group was 26.8±5.5 seconds; the difference being statistically not significant. The number of intubation attempts was not significant. Cormack-Lehane grade was comparable. Mucosal injury and use of external laryngeal manipulation was more in right lateral group.

Conclusion: Intubation can be done in right or left lateral position with similar success and ease. C-MAC video laryngoscope thus seems to be an effective approach for emergently securing airway in patients positioned laterally.

Key words: Endotracheal intubation; C-MAC video laryngoscope; Modified Cormack-Lehane grade

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INTRODUCTION

The anesthesiologists must be skilled in airway management, and especially to cope with a sudden accidental loss of airway during surgery. They may be required to ensure patency of the airway in the lateral position in certain circumstances. Patients who require airway support may need to be intubated to maintain airway patency at an emergent basis. Previous studies have shown that tracheal intubation in lateral position can be difficult.[1-2] Several studies have shown successful ventilation in lateral position with the laryngeal mask airway,[3] ventilation and intubation in the lateral position with the intubating laryngeal mask airway (ILMA)[4] with and without the aid of a lightwand,[5] intubation with the lightwand,[6] and fibreoptic intubation.[7] However, recently developed videolaryngoscopes have not been formally evaluated for tracheal intubation in patients in lateral position.

The C-MAC videolaryngoscope or simply C-MAC, as it is commonly known, is a new videolaryngoscope using a modified Macintosh blade, which may be a useful alternative both for routine and difficult airway management and for educational purposes. The C-MAC has an original Macintosh steel blade shape with a closed blade design with no edges and gaps for hygienic traps. The C-MAC blade is flattened, resulting in a very slim blade profile (maximum 14 mm), and the edges are slanted to avoid damage to the mouth and teeth. The view obtained includes the tip of the blade and, therefore, allows visual guidance of the tip of the blade into the vallecula.

We compared ease of intubation in right and left lateral position using C-MAC.

METHODOLOGY

With approval of the institutional ethical committee, and written informed consent, we enrolled 100 patients scheduled for various surgical procedures requiring tracheal intubation. Patients were aged 18 years or older, and were ASA physical status I and II. Patients were randomly allocated to right or left lateral group by computer generated table of random numbers. Exclusion criteria were increased risk of pulmonary aspiration, cervical spine pathology, morbid obesity or anticipated difficult airway. All patients were premedicated with tab alprozolam 0.5 mg and ranitidine 150 mg HS and at 6.00 am early morning.

Anesthesia was induced with patients in the supine position with inj. fentanyl 2 μg/kg and inj. thiopentone 5 mg/kg. Sucinylcholine 2 mg/kg (maximum 100 mg) was given for neuromuscular blockade. After complete muscle relaxation was confirmed, patients were positioned either in right (Group I) or left lateral (Group II) position. Head was supported with a firm pillow of 6 cm height. Trachea was intubated using C-MAC by a consultant anesthesiologist who is well versed with the use of this device.

In each group, tracheal intubation was considered a failure if not accomplished within three attempts. Any single insertion of the laryngoscpe past the patient's lips was considered an intubation attempt. If intubation failed, the trachea was intubated after turning the patient to supine position. The investigator who performed intubations had previously performed 50 intubations using the C-MAC in an optimal intubation condition in the supine position, but none in either lateral position.

The following outcomes were recorded by an unblinded observer: (1) overall intubation success rate (2) number of intubation attempts (3) Modified Cormack-Lehane score; visualization of the laryngeal inlet was assessed according to the classification of Cormack and Lehane: I = vocal cords visible; II = less than half of the glottis or only the posterior commissure is visible; III = only the epiglottis is visible; and IV = none of the foregoing is visible. (4) intubation time (defined as the time from picking up the laryngoscope to confirmation of tracheal intubation by capnography); (5) frequency of esophageal intubation; (6) Optimizing manoeuvres were the external manipulation of the larynx (BURP manoeuvre), use of a gum elastic bougie (7) mucosal trauma i.e., blood detected on the device; (8) lip or dental injury; and (9) desaturation (SpO_2 <95%).

When more than one intubation attempts were required, time from picking up the laryngoscope for the first intubation attempt until confirmation of successful intubation by capnography was considered to be the total intubation time.

Data analysis: The randomized groups were descriptively compared for demographics and baseline airway assessments using summary statistics, such as mean and SD, median and quartiles, or frequency. All data were analysed using SPSS software. Unpaired t-test was used to assess intubation time. Number of attempts, oesophageal intubation, dental injury, mucosal injury, use of stylet, application of external laryngeal manipulation were analysed using chi–square test. P value <0.05 was considered statistically significant.

RESULTS

Demographics and baseline airway assessments among the groups were comparable (Table 1). The time taken for intubation was 26.8± 5.5 sec in left lateral group and 25.8±9.2 sec in right lateral group. Eight patients in left lateral group required more than one attempts at intubation, where as only one patient required multiple attempts in right lateral group.(Table 2). Use of stylet was significant in left lateral position group (10 vs 2 patients; p= 0.014). There was no failed intubation or dental injury in either group (Table 3).

Table 1: Demographic data

Parameter	Left lateral (n=50)	Right lateral (n=50)	P-value
Age (in years)	36.92±15.1	37.02±15.13	1.60
Sex(M/F)	25/33	33/17	0.105
Weight (kg)	50.54±8.46	48.8±7.90	1.60
Modified Mallampatti grade	36/14/0/0	31/19/0/0	0.288
Dentition (partial/full/ edentulous)	35/13/2	32/17/1	0.278
Mouth opening (in cm)	4.8 (0.6)	4.7 (0.6)	0.118

Table 2: Intubation data

Parameter	Left lateral (n=50)	Right lateral (n=50)	P-value
Intubation time(in sec)	26.8± 5.5	25.8±9.2	0.193
Modified Cormack-Lehane score [n(%)]			
1	18(36)	31(62)	
2	17(34)	15(30)	0.007
3	15(30)	4(8)	
No of intubation attempts [n(%)]			
1	43(86)	47(94)	
2	7(14)	3(6)	0.182
3	0	0	
Over all intubation success	50	50	-
External laryngeal manipulation [n(%)]	10(20)	5(10)	0.161
Use of stylet [n(%)]	10(20)	2(4)	0.014

Table 3: Airway complication data: n(%)

Complication	Left lateral (n=50)	Right lateral (n=50)	P-value
Desaturation	0	0	-
Dental injury	0	0	-
Mucosal injury	8(16)	1(2)	0.03
Esophageal intubation	0	0	-

DISCUSSION:

We compared tracheal intubation with the C-MAC video laryngoscope in patients placed in lateral position. Airway loss in surgical patient positioned laterally can be managed using LMA or face mask ventilation. But airway loss in lateral position can be hazardous and tracheal intubation in lateral position may be difficult. Previous study[8] has shown intubation can be performed in less than one minute using intubating laryngeal mask airway. With intubating LMA success rate was 96% and no difference between right and left lateral position. Overall intubation success rates were similar in both groups in our study. Intubation time in our study was 26.8± 5.5 sec in left lateral and 25.8±9.2 sec in right lateral position which is comparable with previous study. Modified Cormack-Lehane grade 1 was 62% in right lateral position even though time taken for inubation was similar in both groups. Relative difficulty in the right lateral position was likely attributable to the positioning of the tongue, which (influenced by gravity) has a tendency to slip off the laryngoscope blade while the blade is inserted from the right side of the tongue[9]. In a study [6]using a light wand-guided technique of intubation in the lateral position, the success rate was 100%. They reported first attempt intubation in 92% of patients and no difference between right and left lateral position.

Intubation with direct laryngoscopy in the left-lateral position has been studied by McCaul et al[1] who report a success rate of 79% with a mean intubation time of 39 seconds. In their study endotracheal intubation took longer and was less successful compared with LMA insertion in lateral position. In our study time taken for intubation was 25 sec and hence C MAC is useful for intubation in laterally positioned patient. Besides the deteriorated laryngeal view, limited space between the laryngoscope handle and the tabletop in the right-lateral position would contribute to intubation difficulty if direct laryngoscopy were attempted conventionally, by inserting the tracheal tube from the right corner of the mouth. C-MAC has advantage over conventional Macintosh laryngoscope having shorter handle and videoscreen providing real time display. Laryngeal view is better with C-MAC videolaryngoscope and hence reducing intubation time and also no of attempts at intubation.[10] In study by Kaplan MB et al[11] Video-assisted laryngoscopy provides an improved view of the larynx, as compared with direct visualization. This technique may be useful for cases of difficult intubation and reintubation as well as for teaching laryngoscopy and intubation. Also external laryngeal manipulation can be applied effectively by the assistant as he can visualise on video screen. Patients with anticipated airway difficulties were excluded from our study; this explains why modified Cormack-Lehane grade 3b or higher scores were not encountered in any of the groups.

In a recent multicenter randomized controlled trial evidenced no difference in performance of awake tracheal intubation between flexible fiberscope and video laryngoscope.[12] In emergency situations, the patient's blood or secretions in the airway often complicate intubation attempts, and pharmacological optimization of airway management with adequate sedation and muscle relaxation might not be available. In these situations, the C-MAC may prove less effective than in the current study because the camera view could be compromised by fogging or pharyngeal blood.

Existing protocols regarding airway emergencies do not provide evidence-based recommendations for airway management for unanticipated airway loss in the lateral position.[13] From our study intubation in lateral position can be done with similar success and ease as in supine position. But most of anaesthesiologists are not used for intubation in lateral position.

CONCLUSION

The C-MAC offers high success rates in lateral position. Furthermore, intubation can be accomplished in less time. The use of C-MAC thus seems to be an effective approach for endotracheal intubation in lateral position. We suggest further studies in patients with difficult airways.

Conflict of interest: none

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