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## RESEARCH ARTICLE

# EFFECT OF CRICOIDS PRESSURE AND JAW THRUST MANEUVERS ON GLOTTIS VISUALIZATION DURING C-MAC VIDEOLARYNGOSCOPY

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Videolaryngoscopy, cricoids  
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### ABSTRACT

**Aim:** The aim of this study is to compare the effect of cricoids pressure and jaw thrust maneuvers on glottis visualization using C-MAC videolaryngoscope.

**Methodology:** 100 patients aged 18 to 60 years of ASA Grade I and II undergoing elective surgeries under general anaesthesia were enrolled in the study. Before induction of anaesthesia airway assessment was done in all patients by modified Mallampati score. After induction of general anaesthesia, laryngoscopy was performed and the study was done in two parts, the first part consisted of laryngeal viewing with C-MAC videolaryngoscope and grading according to the modified Cormack- Lehane laryngeal grade (CL) with 3 different maneuvers, viz;

- Conventional( on laryngoscopy without any airway manipulation)
- After application of cricoids pressure, and
- After application of jaw thrust ( two handed assisted by an assistant) and

Second part consisted of recording of the images of glottis view on all the three maneuvers and assessing the percentage of glottis opening( POGO score) by an expert (senior anaesthesiologist) who is blinded .

**Results:** The average age of the patients was 41.2+/-5.2, the Modified Cormack lehane grading reduced significantly on C-MAC videolaryngoscopy with both cricoids pressure and jaw thrust but more so with jaw thrust. The POGO score also increased significantly with both both cricoids pressure and jaw thrust but more so with jaw thrust.

**Conclusion:** Jaw thrust maneuver was superior to cricoids pressure maneuver in improving the glottic visualization during C-MAC videolaryngoscopy.

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## INTRODUCTION

Passing the endotracheal tube under direct vision of glottis structures is of utmost importance to the anaesthesiologist. Many newer types of laryngoscope blades and videolaryngoscopes have been developed to improve the glottis view. Many maneuvers have also been developed to improve the glottis view<sup>1</sup>. C-MAC videolaryngoscope is conceptually and structurally different from other videolaryngoscopes, it incorporates a conventional Macintosh type blade with the addition of a micro video camera on the distal portion of the blade<sup>2</sup>. Cricoid pressure is commonly adopted to improve the glottic view but the results are variable<sup>3</sup>. Similarly jaw thrust has also been adopted to improve the glottis view<sup>4</sup> but studies comparing the maneuvers are lacking. The aim of this study is to compare the effect of cricoids pressure and jaw thrust maneuvers on glottis visualization using C-MAC videolaryngoscope.

## METHODOLOGY

After obtaining the institutional ethical committee approval 100 patients aged 18 to 60 years of ASA Grade I and II undergoing elective surgeries under general anaesthesia were enrolled in the study. Exclusion criteriae consisted of an increased risk of pulmonary aspiration, craniofacial anomalies, cervical spine pathology, and temporo- mandibular joint pathology and history of difficult endotracheal intubation.

Before induction of anaesthesia all the patients underwent a pre-operative airway assessment that a modified Mallampati score. The patient characters including age and sex were recorded.

Following placement standard monitors for electrocardiography, pulse-oximetry and non-invasive blood pressure, the patients were pre-oxygenated with 100% oxygen

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for 3 min. General anaesthesia was induced intra venously with propofol (1-2mg/kg) To facilitate tracheal intubation vecuronium (0.1mg/kg) was administered. After confirmation of the neuromuscular blockade using train-of-four, we performed the study protocol as follows.

The study consisted of two parts, the first part consisted of laryngeal viewing with C-MAC videolaryngoscope and grading according to the modified Cormack- Lehane laryngeal grade (CL) with 3 different maneuvers, viz;

- a. Conventional( on laryngoscopy without any airway manipulation)
- b. After application of cricoids pressure, and
- c. After application of jaw thrust ( two handed assisted by an assistant) and

Second part consisted of recording of the images of glottis view on all the three maneuvers and assessing the percentage of glottis opening (POGO score) by an expert (senior anaesthesiologist) who is blinded i.e, does not know to which maneuver the image corresponds to.

Once the endotracheal intubation was done the position of the endotracheal tube was confirmed by auscultation for bilateral equal air entry, all the patients were then ventilated mechanically, vitals were recorded every 5 mins. The patients were reversed with glycopyrolate (0.008mg/kg) and neostigmine (0.05mg/kg) and were extubated after thorough oral suctioning.

**Statistical analysis:** Mc Neumor- Bowker test was used for intra and inter group comparison for Cormack-Lehane grading and Paired 't' test was used for comparison of POGO score.

## RESULTS

### Demographic data

Sex	Male	Female	P value
	44	56	0.04
Age(mean+/- S.D) in years	41.2+/-7.9	40+/- 9.39	0.043

Modified Cormack-Lehane(CL) grading on C-MAC videolaryngoscopy

	CL grade I	CL grade II	CL grade III	CL grade IV
Only C-MAC	15	68	17	0
Cricoid pressure	23	72	5	0
Jaw thrust	38	60	2	0

### POGO Scores

	C-MAC	Cricoid pressure	Jaw thrust
POGO( % of glottis opening)	50-65	30-40	60-85

Comparison of modified CL scores on C-MAC with Cricoid Pressure

	Cricoid Pressure			Total
CL Grade	I	II	III	
C-MAC	I	15	0	15
	II	8	60	68
	III	0	12	17
Total	23	72	5	100

Mc Neumor Bowker test:  $X^2 = 20$ ,  $p < 0.001$

Comparison of modified CL scores on C-MAC with Jaw Thrust

	Jaw Thrust			Total
CL Grade	I	II	III	
C-MAC	I	15	0	15
	II	22	46	68
	III	1	14	17
Total	38	60	2	100

Mc Neumor Bowker test:  $X^2 = 37$ ,  $p < 0.001$

Comparison of modified CL scores on Cricoid Pressure with Jaw Thrust

	Jaw Thrust			Total
CL Grade	I	II	III	
Cricoid Pressure	I	23	0	23
	II	15	57	72
	III	0	3	5
Total	38	60	2	100

Mc Neumor Bowker test:  $X^2 = 18$ ,  $p < 0.001$

Comparison of POGO Scores on C-MAC with Cricoid pressure

	C-MAC	Cricoid pressure
Glottic area % (Mean+/-S.D.)	55.84+/-4.92	34.93+/-3.92

Mean paired reduction 20.9+/- 4.88,  $p < 0.001$

Comparison of POGO Scores on C-MAC with Jaw thrust

	C-MAC	Jaw thrust
Glottic area % (Mean+/-S.D.)	55.84+/-4.92	69.93+/-7.38

Mean paired increase 14.09+/- 6.99,  $p < 0.001$

Comparison of POGO Scores on Cricoid pressure with Jaw thrust

	Cricoid pressure	Jaw thrust
Glottic area % (Mean+/-S.D.)	34.68+/-3.91	69.93+/-7.38

Mean paired increase 34.63+/- 6.77,  $p < 0.001$

## DISCUSSION

In our study conducted to compare the effect of cricoid pressure and jaw thrust on glottis view we observed that the modified Cormack Lehane grading reduced significantly on application of cricoid pressure ( $p < 0.001$ ). The glottis view at laryngoscopy is improved when the arch of the cricoid cartilage is pushed in upward direction<sup>5</sup>. The mechanism of this improved view may not be just the upward movement of the larynx towards the laryngoscope blade; it is possible that tilting the cricoids cartilage may give further benefit. The cricoid cartilage tilts because of its articulation with the inferior cornu of the thyroid cartilage by a synovial joint on each side. Tilting the cricoids cartilage this way opens the glottis by moving the arytenoids cartilages in a posterior direction which may give a better view at laryngoscopy<sup>3</sup>.

Whereas the area of glottic opening POGO (percentage of glottic opening) score reduced significantly probably because

of the variable effect of the pressure applied on cricoids cartilage in different patients<sup>6</sup>.

Modified Cormack Lehane grading reduced significantly on application of jaw thrust ( $p < 0.001$ ). The increase in the modified Cormack Lehane grade is due to the fact that jaw thrust maneuver can reopen the obstructed airway by lifting the base of the tongue and the epiglottis in anaesthetized patient and is confirmed by fiberoptic bronchoscopy<sup>7</sup>.

The area of glottic opening POGO (percentage of glottic opening) score increased significantly by application of jaw thrust. Macintosh laryngoscope cannot lift the epiglottis away from the posterior pharyngeal wall as it cannot exert force on the hypoepiglottic ligament and cannot move the collapsed structures around the laryngeal aperture<sup>8,9</sup>. In contrast, the modified jaw thrust maneuver lifted the epiglottis and moved the soft tissues around the larynx by applying force in a different direction from the laryngoscope blade<sup>9,10</sup>.

Modified Cormack Lehane grading reduced significantly on application of jaw thrust in comparison to cricoids pressure, also the glottis opening area (POGO score) increased significantly on application of jaw thrust in comparison to cricoids pressure as mandibular protrusion as result of jaw thrust generates more tension on the suprahyoid muscles, which then elevates the hyoid bone vertically and elevates the root of the tongue and epiglottis through the hypoepiglottic ligament<sup>10</sup>, therefore jaw thrust may have an additional benefit. None of the patients in our study had modified Cormack Lehane grade of IV on C-MAC laryngoscopy therefore, further investigations are necessary to conclude if jaw thrust maneuver is effective in difficult intubations.

## CONCLUSION

Jaw thrust maneuver was superior to cricoids pressure maneuver in improving the glottic visualization during C-MAC videolaryngoscopy.

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