

Comparison of Left Paratracheal Pressure versus Cricoid Pressure on Tracheal Intubation Conditions using CMAC Video Laryngoscope: A Non Inferiority Randomized Controlled Trial

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Background

- Cricoid pressure, used in RSI to prevent aspiration, often impairs laryngoscopic view and prolongs intubation time.
- Left paratracheal pressure offers similar efficacy with fewer drawbacks.
- Its performance with C-MAC videolaryngoscope is unstudied.
- This study tests whether paratracheal pressure is non-inferior to cricoid pressure in intubation time and conditions using C-MAC.

Aims & Objectives

Primary Objective

- To evaluate intubation time with paratracheal pressure versus cricoid pressure using C-MAC video laryngoscopy.

Secondary Objective

- To assess difference in glottic view
- To evaluate tube advancement difficulty
- To assess esophageal compression

Methods

- **Study Population:** Patients undergoing non-emergent surgery under GA with endotracheal intubation

Inclusion Criteria

- Age 18-70 years of age.
- ASA I and II patients.

Exclusion Criteria

- BMI > 35kg/m2.
- Anticipated difficult airway.
- Modified Mallampati grading 4.
- Mouth opening < 3 fingers.
- Inter incisor distance <2.5cm.
- Loose teeth.
- Patients requiring RSI
- Laryngeal or pharyngeal pathology.
- Pregnancy
- Refusal to consent
- History of GERD
- High cardiac or respiratory insufficiency.

Study Design

- Participants randomized into 2 groups:
 - ❑ Paratracheal Pressure (PP) & Cricoid Pressure(CP) group.
- Single blind study

Methodology

- Preoperatively airway parameters noted:
 - ❑ Modified Mallampati class, Thyromental distance, Inter-incisor distance, Neck mobility, and Upper Lip bite test

- Anesthetist trained for applying 30 N pressure via dyanometer.
- A standard induction with 3 minutes of preoxygenation with 100% oxygen was done
- Osophageal anteroposterior diameter was measured before & immediately after applying the assigned pressure
- Intubation was done using CMAC video laryngoscope
- Following parameters noted
 - ❑ Intubation time
 - ❑ Glottic view: POGO scoring & CL grading
 - ❑ Intubation difficulty scale(measured by 11-point numerical rating scale (NRS)
 - ❑ Postoperative pharyngeal pain measured

Sample Size & Statistical Analysis

- Kim et al. reported mean intubation time of 43 ± 12 s with cricoid pressure.
- A 15% non-inferiority margin (6.5 s) required 50 patients per group (90% power, α=0.05).
- With 10% dropout, total sample size was 110 (55 per group).
- Categorical data: n (%), analyzed by Chi-square/Fisher's exact test.
- Continuous data: mean ± SD or median (IQR), analyzed by t-test/Mann-Whitney U test.

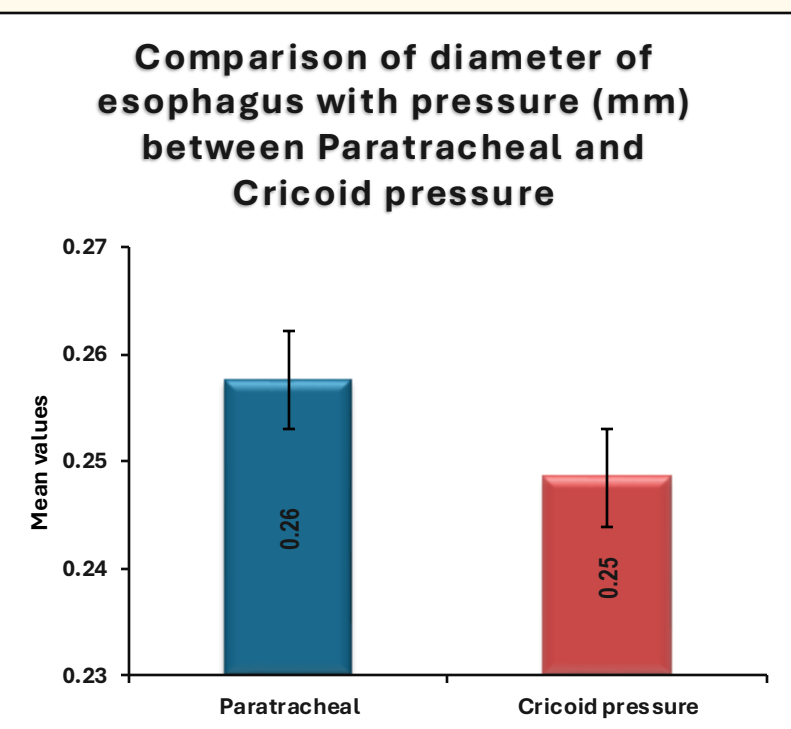
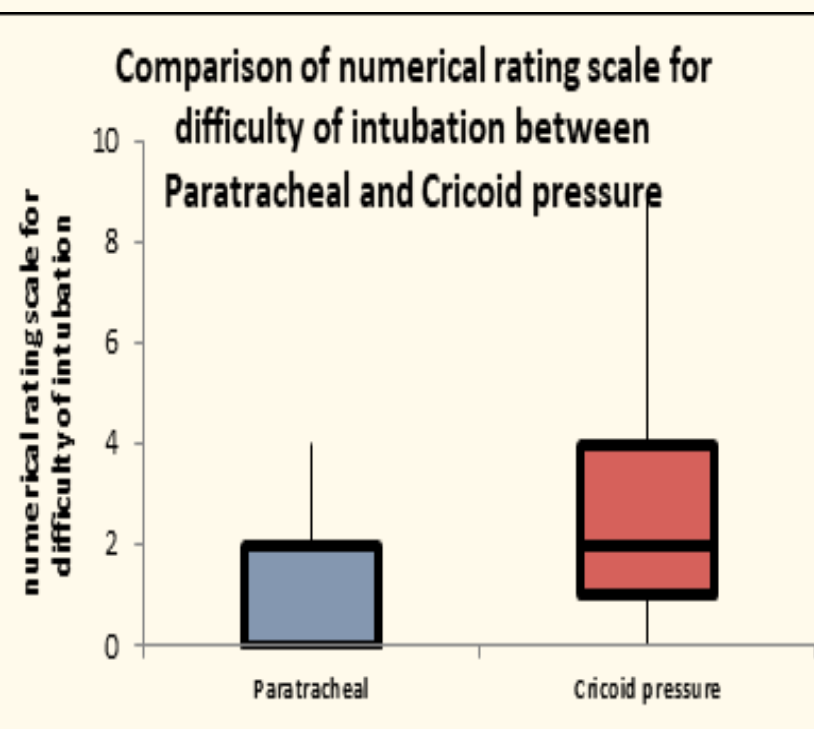
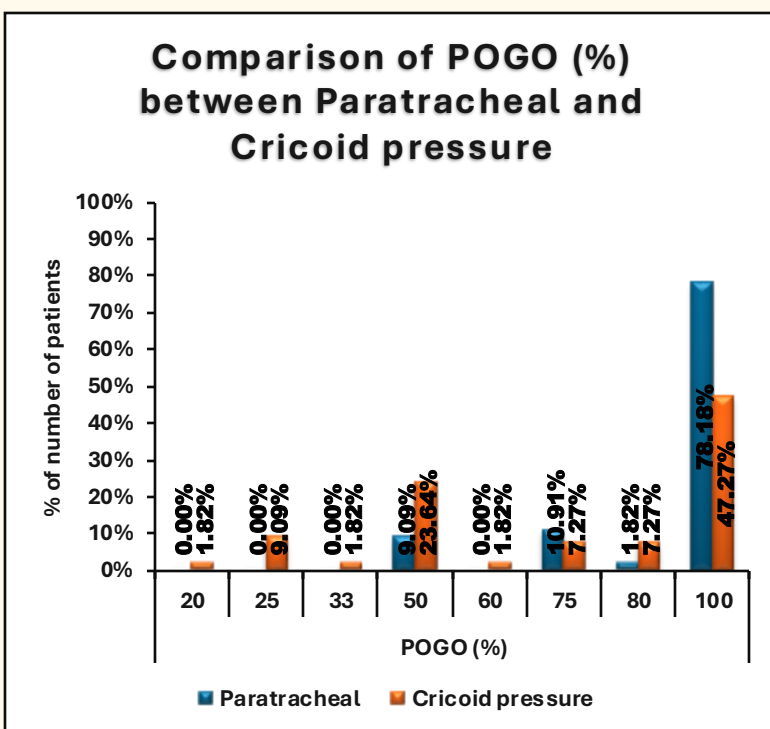
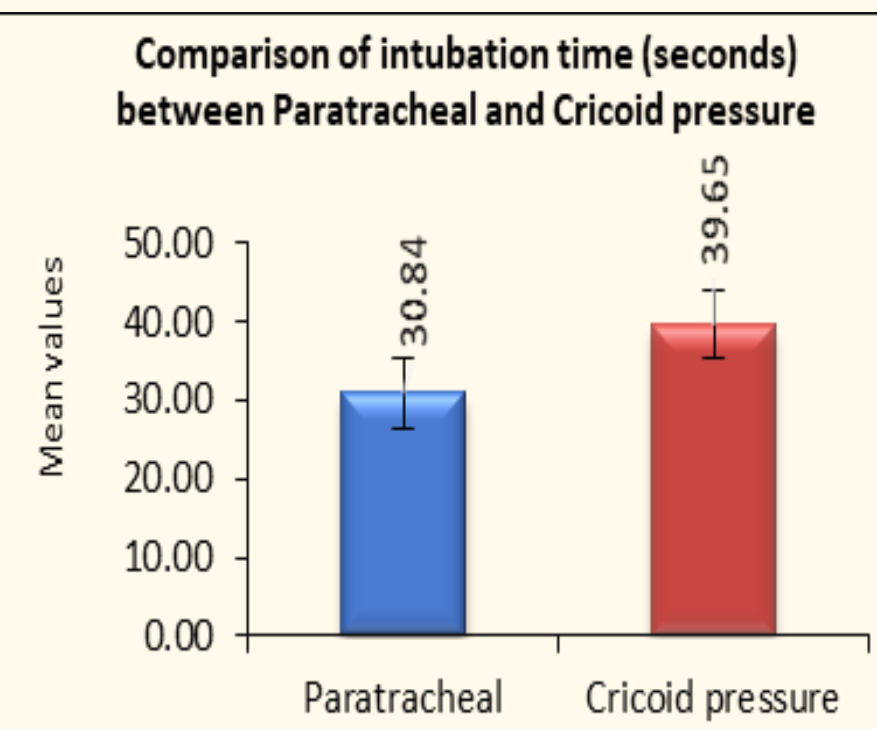
Results

- Of 156 patients assessed for eligibility, 46 were excluded, leaving 110 for randomization.
- Demographic and airway characteristics of participants showed in Table 1.
- Median Intubation time was shorter in PP group vs CP group(30.84 sec, IQR: 22–33 vs 39.65 sec IQR: 24 –41.5, p value= 0.008)
- Statistically significant p-value and non-inferiority margin of >6.5seconds confirms that PP is non-inferior to CP & suggests potential superiority.
- First-attempt Success was 100% in the PP vs. 89.09% in the CP group.
- POGO score was significantly higher with PP (92.36 ± 15.78%) vs. CP (74.69 ± 27.88%; p < 0.0001), with 100% glottic view in 78.18% vs. 47.27% respectively (p = 0.003).
- Intubation Difficulty scores were significantly better in the PP group, with 94.7% of patients scoring 0 compared to 66.7% in the CP group.
- Esophageal compression was comparable between both groups (p = 0.568).

Table 1: Demographic and Airway Characteristics

Parameters		Paratracheal Pressure (PP) Group(n=50)	Cricoid Pressure (CP) Group (n=50)	P-value
Age (Years)		40.24 ± 12.64	39.49 ± 11.13	0.743 [‡]
Gender (Female/Male)	Female	23(46%)	32(64%)	0.056 [‡]
	Male	27(55%)	18 (36%)	
Weight (Kg)		62.85 ± 9.88	62.13 ± 8.99	0.687 [‡]
ASA Grade I/II		41/14 (75/24 %)	44/11 (80/20 %)	0.495 [‡]
MMP Grade I/II/III (%)		21/31/3 (38/56/6)	22/30/3 (40/54/6)	1*
Mouth Opening (cm)		5.6 ± 0.42	5.66 ± 0.44	0.442 [‡]
TMT distance (cm)		6.05 ± 0.15	6.03 ± 0.11	0.467 [‡]
ULBT	Class I/II/III	55/0/0 (100%/0/0)	55/0/0 (100%/0/0)	na
Neck Movement	Adequate	55 (100%)	55 (100%)	na
Oesophagus Diameter (With Pressure)		0.26 ± 0.08	0.25 ± 0.09	0.568 [‡]

Data expressed as Median ± SD & in percentage as appropriate. ASA- American Association of Anesthesiologists; MMP- Modified Mallampati; TMT- Thyromental; ULBT- Upper Lip Bite Test. † Independent t test; ‡ Chi-square test; *Fisher's exact test



Discussion

- Our study using C-MAC showed shorter intubation time with paratracheal pressure than cricoid pressure.
- Paratracheal pressure yielded significantly higher POGO scores than cricoid pressure.
- Kim et al. showed paratracheal pressure with Pentax airway scope reduced intubation time & eased tube passage versus cricoid pressure, without worsening glottic view.
- Won et al. found paratracheal pressure non-inferior to cricoid pressure for glottic view deterioration (0% vs 2.9%), while improving mask ventilation and lowering peak inspiratory pressures.

Limitations

- May not apply to high-risk (emergency/obstetric) cases.
- Intubator unblinded (objective outcomes used).
- Minor variations in applied pressure possible.
- Tested only with C-MAC; device-specific results.

Conclusion

- Paratracheal pressure was non-inferior to cricoid pressure for intubation time with C-MAC videolaryngoscopy and proved superior.
- So, paratracheal pressure may be a safer and more effective alternative to cricoid pressure for tracheal intubation during RSI.

References

- Kim, H Y. et. al. A noninferiority trial comparing left paratracheal pressure versus cricoid pressure on tracheal intubation conditions using the Pentax Airway Scope. Scientific Reports 12.1 (2022): 16263.
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