

ORIGINAL RESEARCH

Evaluation of head elevated position for prediction of intubation difficulty using video laryngoscope

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ABSTRACT

Background: The head elevated position, also known as the "ramped" position, involves elevating the patient's head during intubation. The present study was conducted to evaluate head elevated position for prediction of intubation difficulty using video laryngoscope. **Materials & Methods:** 72 ASA grade I and II patients of both genders were enrolled. The Glottic visualization was measured by using the modified Cormack Lehane classification and the Percentage of glottic opening (POGO) score. Intubation difficulty was assessed by the Intubation Difficulty Scale (IDS). **Results:** Out of 72 patients, males were 30 and females were 42. The mean mouth opening in males and females was 5.1 cm and 4.5 cm, neck length was 11.6 cm and 10.2 cm, neck circumference was 33.2 cm and 33.0 cm, TM distance was 8.1 cm and 8.3 cm and SM distance was 13.4 cm and 13.1 cm in males and females respectively. The difference was non-significant ($P > 0.05$). CL grade I was seen in 56, II in 10, III in 3 and IV in 3. MPC I was seen in 42 and II in 30. The difference was significant ($P < 0.05$). IDS was 0 in 32 and 1-5 in 40 patients. The difference was significant ($P < 0.05$). POGO 100% was seen in 63, 50% in 5 and 0% in 4 patients. The difference was significant ($P < 0.05$). **Conclusion:** Increasing head elevation, external auditory meatus and sternal notch in the horizontal plane and laryngoscopy angle significantly improves POGO scores during laryngoscopy.

Key words: direct laryngoscopy, POGO, sternal notch

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INTRODUCTION

Intubation difficulty refers to situations where the process of inserting the endotracheal tube into the trachea becomes challenging.¹ Factors such as anatomical variations, limited mouth opening, or restricted visualization of the vocal cords can contribute to difficulty in achieving successful intubation. Video laryngoscopy is a technique that uses a camera attached to the laryngoscope blade to provide a clear visualization of the airway structures during intubation.² It enhances the visualization of the vocal cords and helps the healthcare provider navigate the tube into the trachea.³ Direct laryngoscopy is the mainstay of emergency airway management, and despite the proliferation of difficult airway devices, alternative methods of intubation are used extremely infrequently in all settings. Whether in the emergency department or in the operating room, there is a large discrepancy between the incidence of difficult laryngoscopy ranging from 5% and 18%, and the rate of failed laryngoscopy, which ranges from less than

0.4% in the ED to 0.05% in the operating room. In most instances, difficult laryngoscopy correlates with poor laryngeal exposure.⁴

The head elevated position, also known as the "ramped" position, involves elevating the patient's head during intubation. It is believed to improve the alignment of the airway and facilitate visualization of the vocal cords, thereby increasing the chances of successful intubation. Video laryngoscopes are devices that incorporate a camera and a screen to provide a better view of the airway structures during intubation.⁵ The present study was conducted to evaluate head elevated position for prediction of intubation difficulty using video laryngoscope.

MATERIALS & METHODS

The present study consisted of 72 ASA grade I and II of both genders. Patients gave their written consent to participate in the study.

Data such as name, age, gender etc. were recorded. Patients with anticipated easy intubation were placed

on a surgical table with noncompressible pillows under the head till horizontal alignment was achieved between the external auditory meatus and the sternal notch and the pillow height was measured. The modified Cormack Lehane classification was used for Glottic visualization and the percentage of glottic

opening (POGO) score. Intubation difficulty was assessed by the Intubation Difficulty Scale (IDS). Results of the study were subjected to statistical analysis. P value < 0.05 was considered significant (P< 0.05).

RESULTS

Table I Distribution of patients

Total- 72		
Gender	Males	Females
Number	30	42

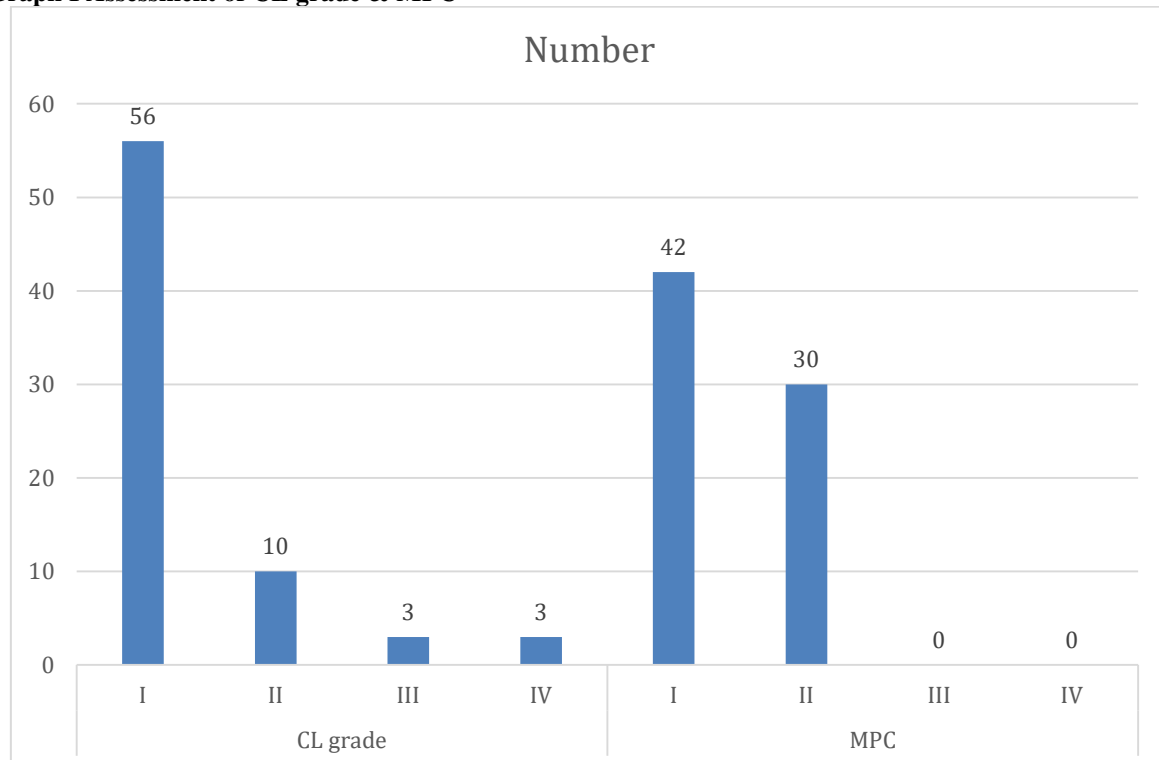
Table I shows that out of 72 patients, males were 30 and females were 42.

Table II Assessment of predictors of difficult intubation

Parameters	Male	Female	P value
Mouth opening (cm)	5.1	4.5	0.83
Neck length (cm)	11.6	10.2	0.05
Neck circumference (cm)	33.2	33.0	0.91
TM distance (cm)	8.1	8.3	0.94
SM distance (cm)	13.4	13.1	0.87

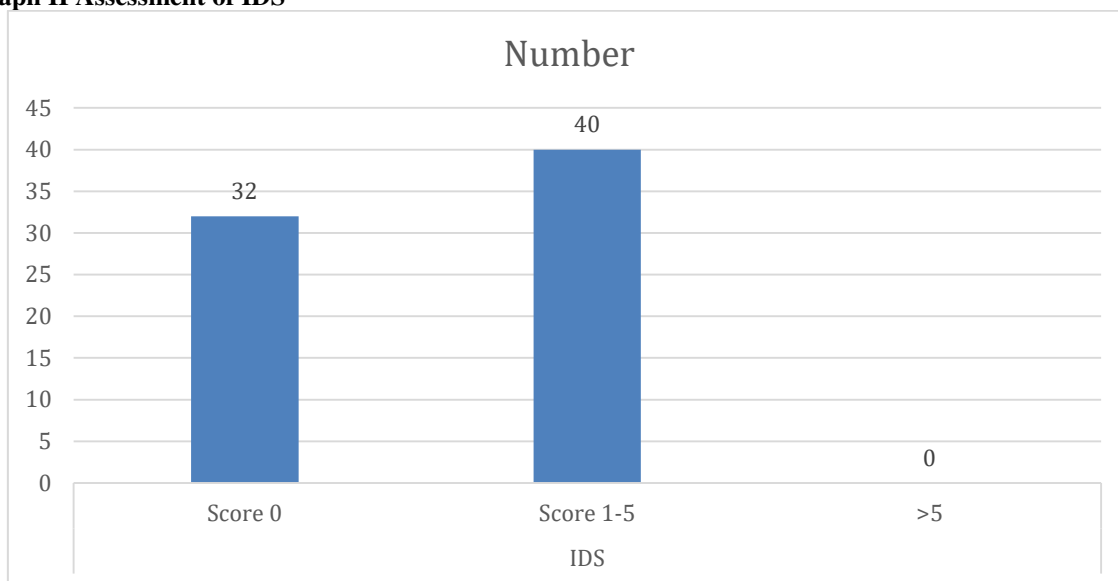
Table II shows that mean mouth opening in males and females was 5.1 cm and 4.5 cm, neck length was 11.6 cm and 10.2 cm, neck circumference was 33.2 cm and 33.0 cm, TM distance was 8.1 cm and 8.3 cm and SM distance was 13.4 cm and 13.1 cm in males and females respectively. The difference was non-significant (P>0 .05).

Graph I Assessment of CL grade & MPC



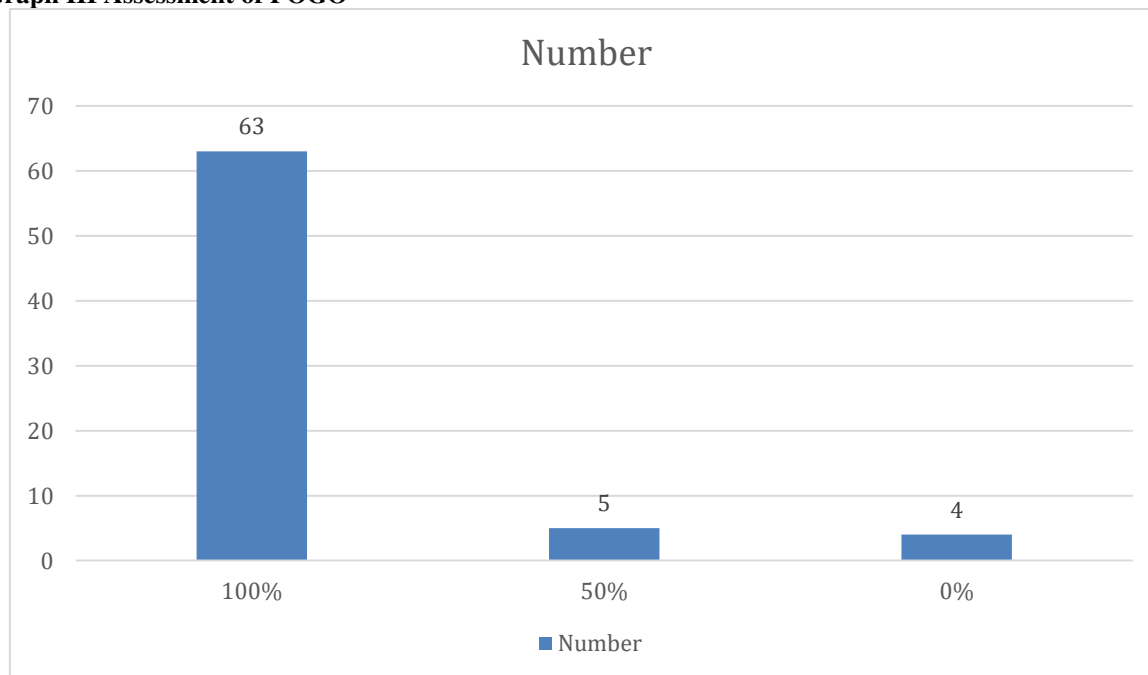
Graph I shows that CL grade I was seen in 56, II in 10, III in 3 and IV in 3. MPC I was seen in 42 and II in 30. The difference was significant (P< .05).

Graph II Assessment of IDS



Graph II shows that IDS was 0 in 32 and 1-5 in 40 patients. The difference was significant ($P < .05$).

Graph III Assessment of POGO



Graph III shows that POGO 100% was seen in 63, 50% in 5 and 0% in 4 patients. The difference was significant ($P < 0.05$).

DISCUSSION

Better glottic visualization under direct laryngoscopy demand proper head positioning. The “sniffing position” causes alignment of laryngeal, pharyngeal and oral axis, causing line of vision to fall on the glottis. In this position, the neck must be flexed on the chest, elevating the head with a cushion under the occiput and extending it at atlanto-occipital joint.⁶ However, the sniffing position, although considered the standard of care, needs scientific evaluation. Various other positions used are simple head extension, neutral position, ramping in obese patients,

25 degrees back up position and head elevated laryngoscopic position. Various other positions used are simple head extension, neutral position, ramping in obese patients, 25 degrees back up position and head elevated laryngoscopic position.⁷ Different techniques are used for difficult intubation management such as alternative laryngoscope blades, awake intubation, blind intubation (oral or nasal), fiberoptic intubation, laryngeal mask airway as an intubation conduit, light wand, retrograde intubation and surgical airway access. Video Laryngoscopes facilitate endotracheal intubation by visualization of glottis structures through

optical systems especially when difficult intubation is predicted.⁸ The present study was conducted to evaluate head elevated position for prediction of intubation difficulty using video laryngoscopy.

We found that out of 72 patients, males were 30 and females were 42. The mean mouth opening in males and females was 5.1 cm and 4.5 cm, neck length was 11.6 cm and 10.2 cm, neck circumference was 33.2 cm and 33.0 cm. Schmitt HJ et al⁹ found that elevation of the head beyond the sniffing position may improve glottis visualization. El Orbany et al¹⁰ conducted a study in which direct laryngoscopy was done in 3 different head height positions. They found that head elevated sniffing position improves glottic exposure and should be considered before direct laryngoscopy in all patients with anticipated difficult intubation.

We observed that CL grade I was seen in 56, II in 10, III in 3 and IV in 3. MPC I was seen in 42 and II in 30. IDS was 0 in 32 and 1-5 in 40 patients. POGO 100% was seen in 63, 50% in 5 and 0% in 4 patients. Levitan et al¹¹ determined the effect of increasing head elevation and neck flexion on the quality of laryngeal view during laryngoscopy. The laryngoscopy angle ranged from a mean of 32 degrees +/-8 degrees with the head flat on the table to a mean of 67 degrees +/-8 degrees with the head-elevated laryngoscopy position. The mean mid-position laryngoscopy angle was 49 degrees +/-6 degrees. Comparing the 3 positions, mean POGO scores +/-1 SD significantly increased from 31% +/-10% (flat position) to 64% +/-12% (mid-position) to 87% +/-13% (head-elevated laryngoscopy position). Both the mid-position and the head-elevated laryngoscopy position compared with the flat position were statistically significant at a P value of less than .0001. The mid-position also differed significantly from the head-elevated laryngoscopy position. Additionally, there was a significant linear relationship among the 3 positions

We found that TM distance was 8.1 cm and 8.3 cm and SM distance was 13.4 cm and 13.1 cm in males and females respectively. Mohod et al¹² determined the effect of head elevation on the quality of laryngeal view and ease of intubation using video laryngoscopy. None of the 100 patients in the study had CL Grade > 2, POGO score 3. The mean pillow height of patients with POGO score 100% was 9.27 ± 1.27 and with POGO score 50% was 10.5 ± 1.20 (p < 0.001). Similarly, the mean pillow height of patients with CL Grade I was 9.27 ± 1.23 cm and with CL Grade II was 10.44 ± 1.20.

The limitation of the study is small sample size.

CONCLUSION

Authors found that increasing head elevation, external auditory meatus and sternal notch in the horizontal plane and laryngoscopy angle significantly improves POGO scores during laryngoscopy.

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