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ORIGINAL RESEARCH

Head elevated position for prediction of intubation difficulty using video laryngoscope

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Abstract

Background: Proper positioning of the patient's head and neck appears to be the main determining factor for obtaining a good glottic visualization under direct laryngoscopy. The present study assessed head elevated position for prediction of intubation difficulty using video laryngoscope.

Materials & Methods: 80 patients who were ASA grade I/II between 18 years and 60 years 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: The mean mouth opening (cm) was 4.6 and 5.2, neck length (cm) was 10.3 and 11.9, neck circumference (cm) was 33.2 and 33.6, TM distance (cm) was 8.4 and 8.2 and SM distance (cm) was 13.2 and 13.6 in females and males respectively. The difference was non-significant (P>0 .05).

Conclusion: Increasing head elevation, external auditory meatus and sternal notch in the horizontal plane and laryngoscopy angle (neck flexion) significantly improves POGO scores during laryngoscopy. A pillow height of approximately 9 cm was optimum while intubating.

Key words: direct laryngoscopy, glottis, Head

Introduction

Better glottic visualization under direct laryngoscopy demand proper head positioning.[1] 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.[2] 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 degree back up position and head elevated laryngoscopic position.[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.[4,5] 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

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laryngeal exposure.[6] The present study assessed head elevated position for prediction of intubation difficulty using video laryngoscope.

Materials & Methods

The present study comprised of 80 patients who were ASA grade I/II between 18 years and 60 years of both genders. All were agreed to participate in the study.

Demographic characteristics 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 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 of the study was compiled and assessed statistically. P value less than 0.05 was considered significant (P< 0.05).

Results

Table I Distribution of patients

Total- 80		
Gender	**Females**	**Males**
Number	50	30

Table I shows that out of 80 patients, females were 50 and males were 30.

Table II Predictors of difficult intubation

Parameters	Female	Male	P value
Mouth opening (cm)	4.6	5.2	0.91
Neck length (cm)	10.3	11.9	0.05
Neck circumference (cm)	33.2	33.6	0.92
TM distance (cm)	8.4	8.2	0.95
SM distance (cm)	13.2	13.6	0.99

Table II, graph I shows that mean mouth opening (cm) was 4.6 and 5.2, neck length (cm) was 10.3 and 11.9, neck circumference (cm) was 33.2 and 33.6, TM distance (cm) was 8.4 and 8.2 and SM distance (cm) was 13.2 and 13.6 in females and males respectively. The difference was non-significant (P>0 .05).

Graph I Predictors of difficult intubation

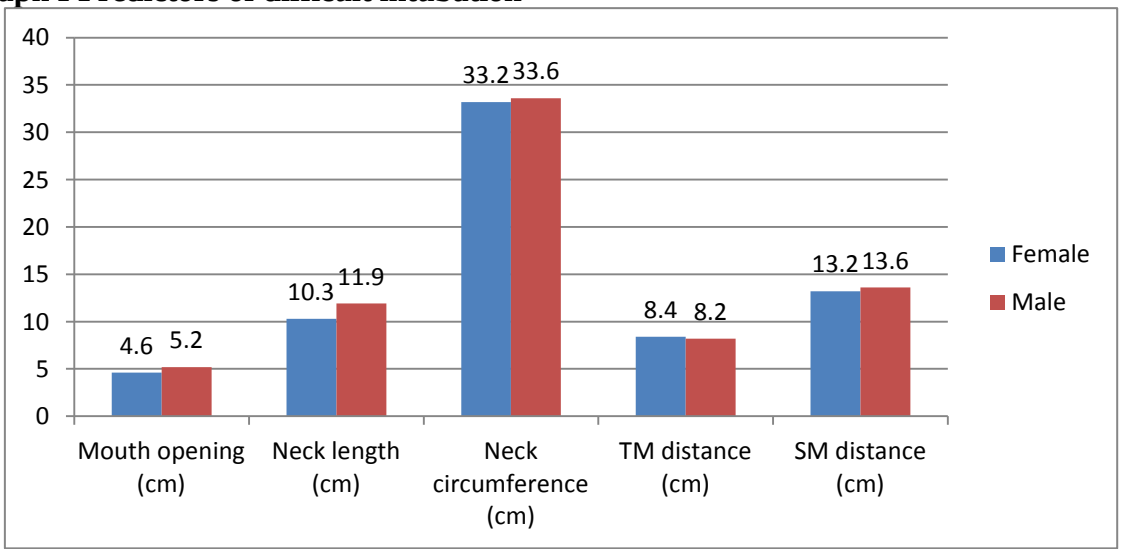

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Table III Assessment of parameters

Parameters	Variables	Female	P value
MPC	I	46	0.02
	II	34	
	III	0	
	IV	0	
CL grade	I	65	0.01
	II	10	
	III	3	
	IV	2	
POGO	100%	65	0.04
	50%	10	
	0%	5	
IDS	0	35	0.05
	1-5	45	
	>5	0	

Table III shows that MPC I was seen in 46, II in 34, CL grade I was seen in 65, II in 10, III in 3 and IV in 2. POGO 100% was seen in 65, 50% in 10 and 0% in 5. IDS was 0 in 35, 1-5 in 45. The difference was significant (P< .05).

Discussion

Various other positions used are simple head extension, neutral position, ramping in obese patients, 25 degree 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), fibreoptic intubation, laryngeal mask airway as an intubation conduit, light wand, retrograde intubation and surgical airway access.[8] Video Laryngoscopes facilitate endotracheal intubation by visualization of glottis structures through optical systems especially when difficult intubation is predicted.[9] The present study assessed head elevated position for prediction of intubation difficulty using video laryngoscope.

We found that out of 80 patients, females were 50 and males were 30. Mohod et al[10] 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 (p< 0.001) which was highly significant.

We found that mean mouth opening (cm) was 4.6 and 5.2, neck length (cm) was 10.3 and 11.9, neck circumference (cm) was 33.2 and 33.6, TM distance (cm) was 8.4 and 8.2 and SM distance (cm) was 13.2 and 13.6 in females and males respectively. Levitan et al[11] 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

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We found that MPC I was seen in 46, II in 34, CL grade I was seen in 65, II in 10, III in 3 and IV in 2. POGO 100% was seen in 65, 50% in 10 and 0% in 5. IDS was 0 in 35, 1-5 in 45. El Orbany et al[12] 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. Schmitt HJ et al[13] found that elevation of the head beyond the sniffing position may improve glottis visualization.
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 (neck flexion) significantly improves POGO scores during laryngoscopy. A pillow height of approximately 9 cm was optimum while intubating.

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