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Comparision of sniffing position and 30 degree backup position for view of glottis during direct laryngoscopy and intubation

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Abstract

Backgrounds and Objectives: The ability to maintain good visualization of glottis during direct laryngoscopy is probably the major determinant of easy tracheal intubation. Placing the head and neck in an optimal position is the first and perhaps the most important manoeuvre that is done routinely before laryngoscopy and intubation.

The three axis rule which is the basis of sniffing position has been widely accepted as the foundation for direct laryngoscopy and has been used over all these years. In last two decades the sniffing position has been questioned and other positions like simple head extension and head elevation have been proposed. Simple manoeuvre to facilitate tracheal intubation include external laryngeal manipulation, forward cervical flexion and added use of a stylet. The 30 degree back up position may change the directional force along the laryngoscope handle and the operator's angle of view down the lumen of blade.

Materials and Methods: Present study entitled "Comparision of Sniffing Position and 30 Degree Backup Position for View of Glottis during Direct Laryngoscopy and Intubation" was carried out in the Department of Anaesthesia A.J Institute of Medical Sciences and Research Institute, Mangalore from july 2018 to July 2020**.** Each was randomly allocated to one of the two groups of 50 each.

Group S (Sniffing position) patients will be placed supine and a cushioned wooden block of 8cm height will be placed under head.

Group B (30 degree back up position) patients will be placed 30 degree back up without the wooden block. The head will be extended maximally on the atlanto- occipital joint at the time of laryngoscopy.

Parameters: The effect was studied with respect to Modified Cormack Lehane grading of direct laryngoscopic view and IDS-Intubation difficulty score. Both the groups - Group S and Group B were gender matched. Hundred adults of either sex of ASA class I & Class II were included in the study with age group ranging between 18 - 60 years. It was a prospective observational double-blind study; allocated to either group.

Statistical Methods: Student t test or Chi-square test has been used to find the significance of homogeneity of study characteristics between two groups.

1. Chi-Square Test
2. Fisher Exact Test
3. Student Test

Significant figures:

+ Suggestive significance $0.05 < P < 0.10$

* Moderately significant $0.01 < P \leq 0.05$

**Strongly significant $P \leq 0.01$

Statistical software: The Statistical software namely SPSS 15.0, Stata 8.0, MedCalc 9.0.1 and Systat 11.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Conclusion: In our study the results and statistical analysis revealed that the 30 degree backup position group of patients had better glottic view in comparison to the sniffing position groups and the ease of intubation.

Keywords: Direct laryngoscopy and intubation, 30 degree back up position, Sniffing position, Intubation difficulty Score, C and L grading.

Introduction

Endotracheal intubation was first described by William McEwan in 1878[1] when he passed a tube from mouth into the trachea, using fingers as a guide in conscious. Indirect vision of larynx started in year 1884 by Manuel. In 1913 Jackson[2] stressed the importance of anterior flexion of the lower cervical spine, in addition to extension of the atlanto-occipital joint. We have to maintain proper glottic visualization for easy tracheal intubation in majority of undergoing general anaesthesia. Correct positioning of patient appears to be main factors for obtaining good glottis visualization

Sniffing position has been most commonly advocated as a standard head positioning for direct laryngoscopy by flexion of neck on chest and extension of head at

Atlanto-occipital joint. Bannister and Macbeth[3] introduced the three axis rule in 1944 to explain the optimal patient head position achieved for laryngoscopy by placing in sniffing position. However prospective scientific evaluation of sniffing position was carried out by Adnet et al in 1999 to validate the efficacy of sniffing position. They concluded that although sniffing position provided best laryngeal view, this is not due to alignment of three axis. Present study was designed to evaluate the glottis view and ease of intubation achieved with direct laryngoscopy in the sniffing position with that of 30 degree backup position in a study group of 100 patient divided in 2 groups of 50 each.

Aims and Objectives

This study aims to compare relative efficacy of sniffing position with that of 30 degree back up position for visualization of glottis during direct laryngoscopy and intubation.

With the above aim, the following objectives were set for the study.

1. The laryngoscopic view
2. Ease of intubation.

Using two positions, sniffing position and 30 degree backup position.

Material and methods

We conducted this study as a controlled trial in 50 consecutive patients in each group [Group S and Group B] who met the study criteria who admitted to A.J institute of medical sciences and hospital, Mangalore & underwent elective surgery under general anaesthesia.

Study design: Prospective randomized study

Institutional ethical clearance obtained

Sample size estimation

The sample size estimation was done using precision base calculations.

The formula is

Estimate ± 2 (approx)1 x SE[4]

Inclusion criteria

All patients requiring general anaesthesia with endotracheal intubation aged between 18 to 60 years and ASA grades I and II included.

Exclusion Criteria

Patients with body mass index more than 30 kg/m^2.

1. Bucked teeth.
2. Restricted neck movement.
3. Inter- incisor gap less than 3 fingers.
4. Thyro-mental distance less than 3 fingers.
5. Pharyngeal pathology.
6. Pregnant patients.

The groups were:

Group S: Sniffing Position

Group B: 30 Degree Back UP Position

Brief procedure

- Preoperative examination was done with detailed, MP grading/Thyromental distance/neck movement/pharyngeal pathology/movement of mandible.
- All patients was kept nil per oral overnight and were pre-medicated on the previous night of surgery with oral tablet alprazolam 0.25 mg.
- After arrival in the operation theatre pre induction monitors, including non-invasive blood pressure monitoring, electrocardiography and pulse oximetry were connected. An intravenous line was secured. Before the induction of anaesthesia all the Group S (Sniffing position) patients were in placed supine position and a cushioned wooden block of 8 cm height was placed under the head.
- At the time of laryngoscopy the head was extended on the atlanto- occipital joint maximally. Group B (30 degree back up position) patients were placed in 30 degree back up position without the wooden block. The head was extended maximally on the atlanto-occipital joint at the time of laryngoscopy.
- Following preoxygenation for three minutes, the standard induction technique was applied to all the patents which included, inj Fentanyl 2µg/kg, and inj thiopentone 5mg/kg i.v. was relax with 1.5mg/kg of Succinylcholine.

An independent anaesthesiologist did laryngoscopy in all the patients using three sized Macintosh laryngoscope blade to ensure the consistency of the technique. Glottic visualization during laryngoscopy was assessed by the same observer using Cormack and Lehane classification (without optimal external laryngeal manipulation). External laryngeal manipulation was permitted after evaluation in order to facilitate endotracheal intubation. The "intubation difficulty score" based on the seven parameters recorded by an independent observer was used to asses difficulty in intubation.

Intubation difficulty Scale (IDS) [5]

N1

0 -no supplementary attempt patient required

1 -any supplementary attempt patient required

N2

0 -no supplementary operator required

1 - Any supplementary operator required

N3

0- no alternative intubation technique used

1 -any alternative intubation technique used

N4

0 - Cormack & Lehane Grade I

1- Cormack & Lehane Grade II

2- Cormack & Lehane Grade III

3- Cormack & Lehane Grade IV

N5

Lifting Force during Laryngoscopy

0 - no subjectively increased lifting force required during laryngoscopy

1- Subjectively increased lifting force required during laryngoscopy

N6

External Laryngeal pressure for improved glottis Visualization

0-no optimal external laryngeal manipulation required

1-Optimal external laryngeal manipulation required

N7

Position of Vocal cords at intubation

0 - vocal cords are abducted

1 - Vocal cords are adducted blocking the tube passage

2- Vocal cords not visualized

IDS is the sum of N1 to N7.

Score 0 = no difficulty at all.

Score 1-5 = mild difficulty.

Score >5 = moderate to severe difficulty

Statistical Analysis

Data was compiled and continuous data are presented as Mean α SD and categorised data as percentages. Data analyses done using X2 (chi- square test) for demographic profile, ASA, MPG, laryngeal visualization grading, duration of laryngoscopy and ease of intubation.

P value < 0.05 was considered as statistically significant

Observations and Results

100 patients in ASA I and II of either sex, aged between 18 - 60yrs with Mallampatti grading of I and II posted for elective surgery under general anesthesia were selected for the study.

The study was undertaken to evaluate glottic view in sniffing and 30 degree backup position. Both groups were matched for age, weight, sex, ASA, MP grading, C and L grading and IDS.

Table 1: Demographic distribution

Age(yrs)	Group S	Group B
20-29	26	23
30-39	12	13
40-49	6	7
50-59	6	7
Total	50	50
Mean age ± SD	31.5 ± 10	32.1 ± 10.6
Range	20-55	20-55
p* value	0.74 [NS]	

There was no statistically significant difference in the Age of patients in the two Groups, (p= 0.74).

Table 2: Weight Distribution

Weight (kgs)	Group S	Group B
Mean ± SD	53.4 ± 7.2	55.94 ± 6.9
Range	40 - 65	40-70
Mean difference = 2.54, p = 0.07 NS		

There was no statistically significant difference in the weight of patients in the two Groups, (p= 0.07).

Table 3: ASA Grading

ASA grade	Group S	Group B
Grade 1	33(66%)	34(68%)
Grade 2	17(34%)	16(32%)

There was no statistically significant difference in ASA grading between the two groups (p = 0.8).

Table 4: MP Grading

MP Grading	Group S	Group B
Grade 1	33 (66%)	24 (48%)
Grade 2	17 (34%)	26 (52%)
X^2 = 3.3	p = 0.06 NS	

All patients had comparable MP grading which was not statistically significant (P = 0.06).

Table 5: TMD Grading

TMD grading (cms)	Group S	Group B
6- 6.5	21 (42%)	23 (46%)
> 6.5	29(58%)	27 (54%)
X^2 = 1.442	p = 0.23[NS]	

All patients had comparable TMD grading which was not statistically significant (p = 0.23).

Table 6: C and L grading

C and L grading	Group S	Group B
Grade 1	33 (66%)	42 (84%)
Grade 2	13 (26%)	8(16%)
Grade 3	4 (8%)	0
$X^{2} = 6.2$	P = 0.04 [S]	

The Visualization of the larynx was better in group B(30 Degree backup) as compared to that of group I (sniffing position) which is statistically significant between two groups(p=0.04)

Table 7: Intubation Difficulty Score

IDS Score	Group S		Group B	
	Number	%	Number	%
Score 0	15	30	30	60
Score 1-5	13	26	15	30
Score >5	22	44	05	10

This table depicts intubation will be easier in 30 degree backup position than Sniffing position.

Discussion

Ability to maintain glottis visualization is synonymous with easy tracheal intubation in majority of patients undergoing general anesthesia. Correct positioning of appears to be main factors for obtaining good glottis visualization.

In 1913, Jackson stressed the importance of anterior flexion of the lower cervical spine, in addition to obvious extension of the atlanto-occipital joint for achieving a good glottis exposure. Sniffing position has been commonly advocated as a standard head positioning for direct laryngoscopy which is achieved by flexion of neck on chest and extension of head at atlanto-occipital joint.

In 1936, Sir Ivan Magill[6] recommended placing a pillow under the occiput to raise the head and then to extend it to achieve the best laryngeal exposure. He was the first to describe the optimal head position for DL as the position of the head one assumes when one wishes to sniff the air.

Bannister and MCbeth[7] refined the direct laryngoscopy positioning by proposing a need for alignment of the mouth, pharyngeal and laryngeal axes which is called as three axes alignment theory.

Horton and collegues[8] further proposed ideal angles for upper cervical flexion and lower cervical extension and 15 degree and 35 degree respectively

Adnet and collegues[9] challenged the anatomical soundness of sniffing position in there study comparing sniffing position with simple head extension and Concluded that sniffing position offered no appreciable advantage over simple head extension for improvement of glottic visualization.

B Greenland et al described two phase of direct laryngoscopy and tracheal intubation. The static phase is position of head and neck to straighten the airway passage and dynamic phase of placement of laryngoscopic blade to lift submandibular space to provide visual axes to the glottis and also KB Greenland et al proposed two curve theory to explain the position for direct laryngoscopy and intubation.

Chou in 2001[10] pointed out several deficiencies in three axis alignment theory. He observed that in majority of patients with slight head extension, the tongue could be easily displaced and laryngeal exposure was satisfactory.

J. Lee et al in 2007[11] conducted study on 40 patients divided into two groups of 20 each. Direct laryngoscopy was done in group A with supine position and in group B patients with 25 degree head backup position. They found that laryngeal view is better in the 25 degree backup position than flat supine position.

Present study was conducted in 100 patients belonging to ASA Grade 1 and 2, belonging to either gender and

between the age group of 18-60 years which were divided into group S and B of 50 each.

The study was based on hypothesis that 25 degree backup position provides better laryngeal view than sniffing position based on study by Lee et al.

The two groups in the study where comparable in terms of mean age. Mean age group in group S was 31.5 ± 10.0, in group B - 32.1 ± 10.6, which is not statistically significant. Gender wise distribution in both the groups were equal, hence both the groups were comparable Mean weight in group S was 53.4 ± 7.2kg, in group B - 55.94 ± 6.9kgs with no statistically difference.

In terms of ASA grading, both group does not have statistically difference. In term of MP grading and TMD grading both the groups are comparable.

In our present study in group S, C and L grading of grade I was seen in 66% of patients, CL grade II in 13% and CL grade III in 8% of patients. Where as in group B 84% had C and L grading of I, 8% had C and L grade II which shows statistical significant. No patient had grade III C and L in group B.

Our studies indicates that, 30 degree backup position achieves better glottis exposure as compared to sniffing position, which similar to Lee et al. However Lee et al used POGO score for assessment of glottis exposure.

IDS score 0 is 30% in Group S and 60% in group B, IDS score 1-5 is 26% in group S and 30% in group B, IDS score >5 is 44% in group S and 10% in group B, which is statistically significant

Lee and W. M. Weightman in 2008[12] had conducted study on 20 patients, direct laryngoscopy done in sniffing position and with the neck extended by the head section of the table bent down at 30 degree (extension –extension position). They found that mean laryngoscopic axial force used during direct laryngoscopy was less in head extension position than sniffing position.

Suresh kumar singhal et al[13] in 2008 had conducted randomized study comprised of 200 patients in age group of 20-60 years divided into two group of 100 each. In the group A, laryngoscopy was done in sniffing position. In group B, laryngoscopy was done under simple head extension position. They found that glottis visualization and intubation difficulty score are better in sniffing position than simple head extension.

Bhattarai B et al[14] in 2011 had conducted study on 400 patients with two group of 200 each. Comparing sniffing position with that of simple head extension for intubation and concluded that glottic visualization and intubation difficulty score is better in sniffing position than simple head extension.

Smitha prakash, Amy G Rapsang et al[15] studied the effect of position on mask ventilation, laryngoscopic view, intubation difficulty, and the stance adapted by the anesthesiologist during laryngoscopy and tracheal intubation. They investigated 546 anesthetized adults in a prospective, randomized study. Patients were randomly assigned to either the sniffing position group or the simple extension group. The distribution of Cormack grades was comparable between the two groups. The IDS score was 0 in the sniffing group and 1 in the simple extension group.

Review of available literature shows contrasting results. Lee et al, Adnet, Nita khandelwal et al[16] studies have shown that head up position of various degrees yields better glottis visualization; whereas Bhattarai et al, Smitha prakash et al, Suresh kumar singhal et al studies show that sniffing position is better than any other position. Difference is due to difference in method applied during laryngoscopy.

Limitation of our study is that we have not done any radiological evaluation of the airway to ascertain the alignment of axes. Sniffing position has been the gold standard for direct laryngoscopy and tracheal intubation.

In view of the contrasting literature, larger trails under magnetic resonance image guidance could lead to definitive conclusions.

Conclusion

The glottis visualization was assessed by Cormack Lehane grading, revealed that glottis view was better in 30 degree backup position than sniffing position. Hence we conclude that 30 degree backup position provides better visualization and ease of intubation as compared to sniffing position.

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