Comparison between Sniffing Position and 25 Degree Backup Position in View of Glottis During Direct Laryngoscopy and Intubation - A Study from Mangalore, Karnataka

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ABSTRACT

BACKGROUND

Endotracheal intubation for the purpose of providing anaesthesia was first described by William Mc Ewan. Jackson[1] stressed the importance of anterior flexion of the lower cervical spine, in addition to obvious extension of the atlanto-occipital joint. Sniffing position has been commonly advocated as a standard head positioning for direct laryngoscopy which is achieved by flexion of the neck on chest and extension of the head at the atlanto-occipital joint. Present study was designed to evaluate the glottis view and ease of intubation achieved with direct laryngoscopy in the sniffing position with that of 25 degree backup position in a study group of 100 patients divided in 2 groups of 50 each.

METHODS

This study is a controlled comparative study. Controlled trial in 50 consecutive patients in each group [Group I and Group II] was conducted on patients who underwent elective surgery under general anaesthesia.

Inclusion Criteria - General anaesthesia with endotracheal intubation, Aged 18 to 60 years, American society of Anaesthesiologists (ASA) grades I and II.

Exclusion Criteria - Patients with body mass index more than 30 kg/m2.

1. Bucked teeth.
2. Restricted neck movement.
3. Inter-incisor gap less than 35 mm.
4. Thyro-mental distance less than 6 mm.
5. Patients with risk of regurgitation and aspiration.
6. Pharyngeal pathology.
7. Limitation of anterior and posterior movement of mandible
8. Pregnant patients

Groups were-

Group I – Sniffing position

Group II– 25 degree back up position

RESULTS

The glottis visualization was assessed by Cormack Lehane grading which revealed that glottis view was better in 25 degree backup position than sniffing position.

CONCLUSIONS

In our prospective randomized study in a series of 50 patients undergoing general anaesthesia in SIMS & RC, intubation difficulty scale (IDS) score was better in 25 degree backup position than sniffing position. It implies glottis view is better in 25 degree backup position than sniffing position.

KEYWORDS

Sniffing Position, 25 Degree Backup Position, Laryngoscopy

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BACKGROUND

Endotracheal intubation for the purpose of providing anaesthesia was first described by William Mc Ewan in 1878 when he passed a tube from mouth into the trachea, using fingers as a guide in conscious subject. Indirect vision of the larynx started in 1884, by a Spanish vocal pedagogist named Manuel.

In 1913, Jackson[1] stressed the importance of anterior flexion of the lower cervical spine, in addition to obvious extension of the atlanto-occipital joint.

Ability to maintain glottic visualization is synonymous with easy tracheal intubation in majority of patients undergoing general anaesthesia. Correct positioning of the patient appears to be a main factor for obtaining good glottis visualization.

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. Bannister and Macbeth 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 the best laryngeal view, this is not due to alignment of three axes. Present study was designed to evaluate the glottis view and ease of intubation achieved with direct laryngoscopy in the sniffing position with that of 25 degree backup position in a study group of 100 patients divided in 2 groups of 50 each.

Aims and Objectives

This study aims to compare relative efficacy of sniffing position with that of 25 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 25 degree backup position.

Airway

Airway is the passage through which air/ gas passes during respiration. It may be divided into an upper and a lower airway. Upper airway structures comprise the mouth, nasopharynx, oropharynx, pharynx, and the larynx. The nasopharynx consists of the nasal cavity, septum, turbinates, and adenoids. The oropharynx comprises the oral cavity, including the teeth and tongue. The pharynx includes the tonsils, uvula and the epiglottis. The lower airway includes the trachea, bronchi and the bronchioles, which terminate in 'the alveoli'. The epiglottis separates the larynx (which leads to the trachea) from the hypopharynx (which leads to the oesophagus).

Airway Assessment

A history of difficult airway management in the past may be the best predictor of a challenging airway. If old medical records are available, prior anaesthetic records should be reviewed for the ease of intubation and ventilation (number of intubation attempts, ability to mask ventilate, type of laryngoscope blade used, use of stylet, or any other modifications of technique). Particular importance should be placed on diseases that may affect the airway.

Specific symptoms related to airway compromise should be sought, including hoarseness, stridor, wheezing, dyspnoea, dysphagia etc. Some diseases such as rheumatoid arthritis, and morbid obesity might have progressed in the interim and created a more difficult airway than suggested by the previous record.

History of previous surgery, burns, trauma, or tumour in and around the oral cavity, neck or cervical spine should be asked. Many congenital syndromes that involve the airway may make mask ventilation or endotracheal intubation difficult.

Other diseases of infectious, traumatic, neoplastic or inflammatory origins may also profoundly affect airway management.

General, physical and regional examination: A global assessment should include the following:

1. Patency of nares: Look for masses inside the nasal cavity (eg. Polyps, DNS etc.).
2. Mouth opening of at least 2 large finger breadths between upper and lower incisors in adults is desirable.
3. Teeth: Prominent upper incisors, or canines can impose a limitation on alignment of oral or pharyngeal axes during laryngoscopy and especially in association with a large base of tongue, they can compound the difficulty during the direct laryngoscopy or bag mask ventilation.
4. Palate: A high arched palate or a long, narrow mouth may present difficulty.
5. Assess patient's ability to protrude the lower jaw beyond the upper incisors (prognathism).
6. Temporo-mandibular joint movement: It can be restricted in ankylosis/fibrosis, tumours etc.
7. Measurement of submental space (hyomental/ thyromental length should ideally be > 6 cm).
8. Observation of patients' necks: A short, thick neck is often associated with difficult intubation. Any masses in the neck, extension of the neck, neck mobility and ability to assume 'Sniffing position' should be observed.

METHODS

We conducted this study as a controlled trial in 50 consecutive patients in each group [Group I and Group II] who underwent elective surgery under general anaesthesia at Srinivas Medical College, Mangalore from June 2019 to June 2020.

Inclusion Criteria

All patients requiring general anaesthesia with endotracheal intubation,

- Aged between 18 to 60 years.
- ASA grades I and II.

Exclusion Criteria

Patients with body mass index more than 30 kg/m2.

1. Bucked teeth.
2. Restricted neck movement.
3. Inter-incisor gap less than 35 mm.
4. Thyro-mental distance less than 6 cm.
5. Patients with risk of regurgitation and aspiration.
6. Pharyngeal pathology.
7. Limitation of anterior and posterior movement of mandible.
8. Pregnant patients.

The groups were
Group I – Sniffing position
Group II – 25 degree back up position

Cormack and Lehane Classification

Direct Laryngoscopy

Based on clinical examination, if a difficult intubation is expected, direct laryngoscopy should be done under topical anaesthesia to assess the grade of difficulty.
Divided into 4 grades according to patients

- Grade I – Glottic fully exposed i.e.,visualization of entire laryngeal aperture. No difficulty expected. No extrinsic pressure required.
- Grade II – Visualization of only the posterior part of glottis. Optimal view with external pressure.
- Grade III – Visualization of only epiglottis may have difficulty in intubation even with Bougie.
- Grade IV – No glottic structures seen; Difficult and may even be impossible to intubate. Planned intubation required.

Brief Procedure

- Preoperative examination was done with detailed, MP grading/Thyromental distance/neck movement/pharyngeal pathology/movement of mandible.
- All patients were kept nil per oral overnight and were pre-medicated on the previous night of surgery with oral tablet alprazolam 0.5 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, the entire group I (Sniffing position) patients were in 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 II (25 degree back up position) patients were placed in 25 degree back up position without the wooden block. The head was extended maximally on the atlanto-occipital joint at the time of laryngoscopy.
- After following pre oxygenation 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 relaxed with 1.5mg/kg of succinyl choline.
- 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 scale" based on the seven parameters recorded by an independent observer was used to asses difficulty in intubation.

Intubation Difficulty Scale (IDS) 26

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

For the above study, simple descriptive statistics methods like means and percentages were used to find the results.

RESULTS

Hundred patients in ASA I and II of either sex, aged between 18 - 60 years with Mallampati grading of I and II posted for elective surgery under general anaesthesia were selected for the study. The study was undertaken to evaluate glottic view in sniffing and 25 degree backup position. Both groups were matched for age, weight, sex, ASA, MP grading, C and L grading and IDS.

20 - 29	26	23
30 - 39	12	13
40 - 49	6	7
50 - 59	6	7
Total	**50**	**50**
Mean age +/- SD	31.5 +/-10.0	32 +/- 10.6
Range	20 - 55	20 - 55
Demographic Distribution		

Gender	Group I	Group II
Male	25	25
Female	25	25
Gender Distribution		
Male and female were equally distributed in the group		

Weight	Group I	Group II
Mean +/- SD	53.4 +/- 7.2	55.94 +/- 6.4
Range	40 - 65	40 - 70
Mean Difference 2.54, p = 0.07		
Weight Distribution		
Mean weight of group I was 53.4 +/- 7.2 and group II 55.9 +/- 6.4kg. there was no statistically significant difference between two group		

In our prospective randomized study, 100 patients undergoing general anaesthesia were divided into two groups of 50 each. In group I, patients were subjected to direct laryngoscopy in the sniffing position and group II direct laryngoscopy was done in a 25 degree backup position.

The glottis visualization was assessed by Cormack lehane (CL) grading which revealed that glottis view was better in 25 degree backup position than sniffing position as shown by our results that grade I CL 60 % and 84 % in group I and group II respectively.

Similarly grade II CL was visualized in both the groups 26 % and 8 % respectively in group I and group II. However, grade III CL was nil in group II, 8 % in group I. Hence, from the present study, it can be concluded that a 25 degree backup position provides better visualization and ease of intubation as compared to a sniffing position.

DISCUSSION

Ability to maintain glottis visualization is synonymous with easy tracheal intubation in the majority of patients undergoing general anaesthesia. Correct positioning appears to be the main factor 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 the neck on the chest and extension of the head at the atlantooccipital joint.

In 1936, Sir Ivan Magill[2] 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[3] 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 colleagues further proposed ideal angles for upper cervical flexion and lower cervical extension and 15 degree and 35 degree respectively.

Adnet and Collegues[4]challanged the anatomical soundness of sniffing position in their 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.

K.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 laryngoscope blade to lift submandibular space content 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 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.

B.J.Lee et al.[5] in 2007 conducted a 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 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 I and II 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 I was 31.5 ± 10.0, in group II 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 I was 53.4 ± 7.2kg. In group II, it was 55.94 ± 6.9 kgs with no statistically difference. In terms of ASA grading, both groups did not have statistical difference. In terms of MP grading and TMD grading, both the groups are comparable. In our present study, in group I, 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. Whereas in group II, 84 % had C AND L grading of I, 8 % had C and L grade II which shows statistical significant. No patient had grade III CL in group II. Our studies show that 25 degree backup position achieves better glottis exposure as compared to sniffing position which was similar to Lee et al. Who used POGO score for assessment of glottis exposure IDS score 0 is 30 % in Group I and 60 % in group II, IDS score 1 - 5 is 26 % in group I and 30 % in group II, IDS score > 5 is 44 % in group I and 10 % in group IIwhich is statistically significant L. Lee and W. M. Weightman in 2008 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[6]et al. in 2008 had conducted randomized study comprised of 200 patients in age group of 20 - 60 years divided into two groups 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. in 2011 had conducted study on 400 patients with two groups 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.[7] studied the effect of position on mask ventilation, laryngoscopic view, intubation difficulty, and the stance adapted by the anaesthesiologist 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, Nitin Khandelwal et al.[8] 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. Adnet et al. did the study without use of muscle relaxant. Sahay et al. used muscle relaxant to achieve laryngoscopy. In our study, we used suxamethonium for relaxation (1.5 mg/kg).

CONCLUSIONS

The glottis visualization was assessed by Cormack lehane grading which revealed that glottis view was better in 25 degree backup position than sniffing position as shown by our results that grade I CL 60 % and 84 % in group I and group II respectively.

Similarly grade II CL was visualized in both the groups; 26 % and 8 % respectively in group I and group II. However grade III CL was nil in group II, 8 % in group I. Hence from the present study it can be concluded that 25 degree backup position provides better visualization and ease of intubation as compared to sniffing position.

Limitations of the Study

Limitations 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 trials under magnetic resonance image guidance 40 could lead to definitive conclusions.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.
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