INTERNATIONAL JOURNAL OF CURRENT MEDICAL AND PHARMACEUTICAL RESEARCH

IJCMPR

Available Online at http://www.journalcmpr.com

RESEARCH ARTICLE

EVALUATION OF INTUBATING CONDITIONS DURING DIRECT LARYNGOSCOPY USING SNIFFING POSITION AND SIMPLE HEAD EXTENSION

Biren Suri, Jaipreet and Madhvi Santpur

Department of Anaesthesia, MMIMSR, Mullana, Ambala

ARTICLE INFO

Article History:
Received 20th May, 2016
Received in revised form 6th June, 2016 Accepted 14th July, 2016
Published online 28th August, 2016

ABSTRACT

Aims and Objectives: Evaluate better glottic visualization and ease of intubation using sniffing position and simple head extension during direct laryngoscopy.
Material and Method: The present study was conducted on 200 healthy adult patients of ASA grade 1 and II. of either sex, aged 20-50 years. scheduled for elective surgery under general anaesthesia Patients were divided into two groups of 100 each:
GROUP I: Laryngoscopy was done in sniffing position.
GROUP II: Laryngoscopy was done in simple head extension.
Glottic visualization during, laryngoscopy was assessed using Cormack and Lehanc grading and difficulty in intubation was assessed by using Intubation Difficulty Scale (IDS).
Results: The distribution of patients with different Cormack and Lehanc gradis between two intubation positions were significantly different ($p<0.05$) which indicated that ldottic visualization was much better in sniffine position (62%) as compared to simple head extension (40%). Total IDS score. Indicating the ease of tracheal intubation was significantly better ($p<0.05$) in group I as compared to group II which suggested 'that intubation was easier when the patient's head was placed in sniffing position in comparison to simple head extension.
Conclusion: Sniffing position is superior to simple head extension with regard to better glottic visualization and ease of intubation during laryngoscopy and endotracheal intubation.

INTRODUCTION

Airway management is the most important step in the care of patients who are Undergoing surgery under anaesthesia. Securing and maintaining a patent airway is a fundamental responsibility of the anaesthesiologist and has been recognized as a first principle of general anaesthesia. Failure to maintain a patent airway, even for a brief period of time can be life threatening. Tracheal intubation remains one of the commonest and surest means or establishing an airway. [1.2]

In 18th century, tubes were placed into the trachea during resuscitation of a person who has drowned, but these tubes were passed without direct visualisation and were not used for delivery of anaesthetic agents.

In the year 1878. Sir William Maceven was the first physician to perform the tracheal intubation for the sole purpose of providing anaesthesia by permitting continued administration of' chloroform during an operation in the mouth. He passed a tube into the trachea via oral route using fingers as a guide.[3]
Tracheal intubation is one of the routine procedures carried out during administration of general anaesthesia and is usually accomplished without any difficulties. It is considered to be the "Gold Standard" of airway management during administration of general anaesthesia because of following advantages:

1. It isolates the respiratory tract from GI tract and thus there is a minimal risk of aspiration of gastric contents.
2. It allows safe and sure delivery of oxygen and anaesthetic gases during surgery under general anaesthesia without inflation of stomach.
3. It permits access to the tracheobronchial tree for pulmonary hygiene and administration of drugs (e.g. inhaled bronchodilators).

However, tracheal intubation may occasionally be difficult and can also be anticipated during elective cases. It can also be encountered unexpectedly during, emergency. According to Closed Claims Project database of American Society of Anesthesiologists (ASA), respiratory complications were a major cause of anaesthesia related morbidity and mortality decades ago.[4]

The inability to view the larynx during difficult airway generally results in multiple or prolonged laryngoscopic attempts with increasing force and is generally' associated with oesophageal. pharyngeal and dental injuries [5] hemodynamic instability, arterial desaturation and unanticipated ICU admissions .[6]

American Society of Anesthesiologists (ASA) Task Force defined difficult laryngoscopy as "when it is not possible to visualise any part of vocal cords after multiple attempts- and defined a difficult tracheal intubation as one which requires multiple attempts .[7]

The first and an important manoeuvre that is done routinely before performing laryngoscopy and intubation is placing the patient's head and neck in an optimal position.' Increased incidence of failed intubation when general anaesthesia is induced after a failed regional anaesthesia may occur because of the failure to use optimal head and neck position.

For smooth and easy tracheal intubation, a good and optimal position is expected to provide a complete glottic view during direct laryngoscopy.[9]

In the year 1936, Sir Ivan Magill proposed that by placing a pillow under the occiput to raise the head and then to extend it provides or achieves the best laryngeal exposure. He was the first to describe the optimal head position for direct laryngoscopy as the position the head assumes when one wishes to sniff the morning, air.

The "Three Axes Alignment Theory" was introduced by Bannister and Macbeth in 1944 (figure A) and was the only valid theory. They studied various intubation positions and came to the conclusion • that the main determinant of good and complete glottic visualization was by aligning the line vision of operator with the mouth. Pharynx and laryngeal axis which can be achieved with the head elevated on a pillow which resembles the "sniffing, the morning air" position.

MATERIAL AND METHODS

After approval from the Institutional Ethical Committee the study was conducted on 200 adult patients of ASA physical grade I and II of either sex. aged 20-50 years, scheduled for elective surgery under general anaesthesia. admitted at Maharishi Markandeshwar Institute of Medical Sciences & Research, Mullana. (Ambala). "Ihe present study did not impose any financial burden to the participants. Written informed consent was obtained from all the patients.

Patients were randomly divided into two groups of 100 each:

Group I: Laryngoscopy was done in sniffing position made by putting, a non-compressible cushioned pillow of height 8 cm under the patient's occiput.

Group II: Laryngoscopy was done in simple head extension with head flat on operation table.

Inclusion Criteria

- Either sex.
- Age group between 20-50 years.
- ASA grade I and II.
- Patients scheduled to undergo surgery under general anaesthesia.

Exclusion criteria

- Patients with body mass index more than 30 kg/m^2. Restricted neck movements.
- Bucked teeth.
- Thyromental distance less than 65mm (6.5 cm).
- Limitation of anterior and posterior movement of mandible.
- Pathologic conditions associated with difficulties in larynuoscopy such as malformation of the face, cervical spondylosis, tumours of the airway. long-standing, diabetes, sleep apnea syndrome, limitation of mandibular anterior-posterior movement and loose teeth were examined and ruled out.

Pre-Anaesthetic Check tip

Pre anaesthetic check-up including a detailed history, general and systemic examination was done a day before surgery to rule out any medical illness.

Airway assessment was done as follows:

Modified Mallampati Grading (MPG) was performed without phonation.

- Class I-soft palate, fauces. uvula and pillars seen.
- Class II-soft palate, fauces and uvula seen.
- Class III- soft palate and base of uvula seen.
- Class IV- only hard palate seen.

Inter-incisor gap or Inter-incisor distance (IID) was measured with the mouth fully open.

Thyromental distance (TMD) was measured along a straight line from the thyroid notch to the lower border of the mandibular mentum with the head in full extension.

Amplitude of neck and head movements was measured.

Temporomandibular joint (TMJ) movement was noted.

Body mass index (BMI) was calculated as the weight in kilograms and divided by height in meters square.

All the patients were thoroughly investigated as per requirement of surgery apart from the following routine investigations:

1. Blood examination — Haemoglobin. bleeding lime, clotting, time.
2. 'Complete urine examination.
3. Others- blood sugar. serum electrolytes, blood urea. serum creatinine, x-ray chest and 12 lead electrocardiogram (ECG).

All the patients were kept fasting overnight and given Tab ranitidine 150 mg and Tab alprazolam 0.25 mg on the night before surgery and at 6am on the day of surgery.

Anaesthesia technique

Baseline readings of heart rate, systolic, diastolic blood pressure. SPO_2 were taken in the pre-operative unit. After shifting the patient to operation theatre. An intravenous line was secured under aseptic conditions and routine monitoring including three lead surface electrocardiogram (ECG). heart rate. pulse oximetry ($SP0_2$) and non-invasive blood pressure monitoring was done. All the patients were pre-medicated prior to surgery with inj. Midazolam 0.03m2/kg i, glycopyrolate 0.2 mg and inj. nalbuphine 0.1mg/kg. The patients were randomly divided in two ^{g}roups of 100 each.

Group I **(Sniffing position).** Patients were placed supine and a non- compressible cushioned pillow 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 (Simple head extension). Patients were placed supine without the pillow. The head was extended maximally on the atlanto-occipital joint at the time of laryngoscopy.

Following pre oxygenation with 100% oxygen for three minutes. all the patients were given injection propofol titrated to loss of response to verbal commands and neuromuscular blocker injection vecuronium 0.1 mg/kg.

Laryngoscopy was performed in all the patients using Macintosh larvngoscope to ensure the consistency of the technique. Glottic visualization durimg laryngoscopy was assessed using:

Cormack and Lehane Grading

Grade 1: Most of the glottis (with or without epiglottis visible.
Grade 2: Only the posterior extremity of the glottis seen.
Grade 3: No glottis visible, but epiglottis can be seen.
Grade 4: Neither glottis nor the epiglottis can be seen.

Modified Cormack and Lehane Grading

Grade 1:Full view of glottis seen.
Grade2a:Partial view of glottis seen.
Grade2b: Only the posterior extremity of the glottis seen.
Grade3:Only epiglottis seen.
Grade4:Neither glottis nor epiglottis seen.

OBSERVATIONS AND RESULTS

This study was conducted on 200 healthy adult patients of ASA grade I and II of either sex aged 20-50 years, scheduled for elective surgery under general anaesthesia. The patients were randomly divided in two groups of 100 each:

GROUP I (n=100). Laryngoscopy was done in sniffing position
GROUP II (n=100). Larynoscopy was done in simple head extension.

Following, observations were made:

Physical Status: All the patients in our study were of ASA grade I in both the groups.

No complications like fall of peripheral oxygen saturation and dysrhythmias were observed during larynuoscopy and endotracheal intubation in any of the patients of both the groups.

On comparing both the groups the difference was statistically significant ($p<0.05$) With regard to Modified Cormack and Lehanc grading. There by indicating that sniffing position was better for alottic visualization and tracheal intubation.

SUMMARY AND CONCLUSION

The present study was, carried out to evaluate intubating conditions during direct laryngoscopy in sniffing position and simple head extension. The study population consisted of 200 patients of ASA physical grade l& II of either sex, aged 20-50 years scheduled for elective surgery surgery under general anaesthesia admitted at MMIMSR, Muliana, Ambala. Written informed consent was taken from all the patients. Airway assessment was done and following parameters were taken into account:

Inter-incisor distance.
Modified Mallampati Grading.
Thyromental distance.
Atlanto-occipital joint movement.

Temporomandibular joint movement.

All the patients included were without any predicted airway difficulty so that the only difference in glottic visualization and intubating conditions was due to the position the patient's head was placed in.

All the patients were kept fasting overnight and given tab ranitidine 150 mg and tab alprazolam 0.25 mg on the previous night and repeated at 6am on the day of surgery.

In the operatio theatre_intravenous line was secured and routine monitoring namely SBP, DBP was done and SPO2, & ECG were continuously monitored.All the patients were given intravenous in midazolam 0.03mg/kg .i. (glycopyrolate 0.2 mu and inj. Nalbuphine 0.1mu/ku. Patients were randomly divided in two groups of 100 each:

Group I (Sniffing position).Patients were placed supine with the head on a non-compressible cushioned pillow of 8 cm height.

Group II (Simple head extension). Patients were placed supine without pillow.

Following pre oxygenation with 100% oxygen for three minutes. all the patients were induced with injection propofol titrated to loss of response to verbal commands followed by injection vecuronium 0.1mgKg. Larynuoscopy was performed in all the patients using Macintosh laryngoscope. Glottis was visualized and intubatinu conditions were noted as per

Cormack and Lehanc Grading. Modified Cormack and Lehanc Grading. Intubation Difficulty Scale.

Anaesthesia was maintained with nitrous oxide (60%). oxygen (40%) and isoflurane. At the end of surgical procedures. the residual effect of neuromuscular blocking agent was reversed with inj. neostiumine 0.05mg/kg and inj. gycopyrolate 0.01mg/kg body weight. All the patients were extubated after they responded to verbal commands and had adequate spontaneous respiration and shifted to post anaesthesia care unit. Following observations were made on the basis of data collected:

- Both the groups were comparable with regard to demographic data and hemodynamic parameters ($p>0.05$).
- Complete glottic view (grade 1) was much better (62%) in sniffing position as compared to only 40% in simple head extension. The difference was statistically significant ($p<0.05$).
- Partial glottic view (grade 2) was observed in much higher number of patients (50%) in simple head extension as compared to lesser number of patients (33%) in sniffing position. This difference was also significant statistically ($p<0.05$).
- Poor glottic view (grade 3) was seen in more number of patients (10%) in simple head extension as compared to lesser number of patients (5%) in sniffing, position. This difference was also statistically significant ($p<0.05$).
- Alternate intubation technique (stylet) was required in more number of patients in simple head extension (12%) as compared to 5% in sniffing position.
- Increased lifting force for glottic visualization was

required in more number of patients (46%) in simple head extension as compared to only 11%) in sniffing position and this difference was statistically highly significant (p<0.001).

•External laryngeal manipulation was required in only 9% of patients in sniffing position as compared to 19% in simple head extension.

•Total IDS score 0(easy intubation) which denotes better intubating conditions was observed in more number of patients (62%)in sniffing position as compared to only 38% of patients in simple head extension and the difference was statistically significant (p<0.05).

•Mild difficulty in intubation (IDS score 1-5) was observed in35% of patientsin sniffing position as compared to 62% of patients in simple head extension and the difference was statistically significant (p<0.05).

- IDS>5 (moderate to severe difficulty in intubation) was not seen in any patient of the either group.
- No complications like desaturation. hypertension and dysrhythmias were observed in any patient of the either group.

CONCLUSION

From the present study, it is concluded that: The sniffing position provides better glottic visualization and ease of intubation as compared to simple head extension during direct larynwscopy and endotracheal intubation.

Hence, it should still be regarded as the gold standard head position during. direct laryngoscopy and tracheal intubation.

References

1. Adnet F. Borrow SW. Dumas JL. [apostolic F. Cupa M. Lapundry C. Stud of' the sniffing position by magnetic resonance imaging. Anesthesiology. 2001:94:83-6.
2. Adnet F. Baillard C. Borron SW. Denantes C. Lefebvre L. Galinski M. et al. Randomized study comparing sniffing position with simple head extension for laryngoscopic view in elective surgery patients. Anesthesiology. 2001; 95:836- 41..
3. Mace^{y}en W: Clinical observations on the introduction of tracheal tubes by the mouth instead of performing tracheotomy or laryngotomy. BMJ. 1880:2:122-24,163-165.
4. Caplan RA. The Closed Claimed Project: Looking Back. looking Forward: ASA Newsletter. 1999; 63:7-9.
5. Domino KB. Posner KL, Caplan RA, Chene^{y} FW. Airway injury during - anesthesia: a closed claims analysis. Anesthesiology. 1999:91:1703-11.
6. Rose DK. Cohen MM. The airway: problems and predictions in 18.500 patients. *Can J Anaesth*. 1994; 41:372-83.
7. Practice Guidelines for Management of the Difficult Airway. An updated report b^{y} the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiolog^{y}. 2003; 98:1269-77.
8. Bannister M. Macbeth RG. Direct larymwscopy and tracheal intubation. Lancet. 1944; 2:651-4.
9. Greenland KB, Eley V. Edwards MJ, Allen P. Irwin MG. The origins of the sniffing position and the Three Axes Alignment Theory for direct laryngoscopy. Anaesthesia & Intensive Care. 2008:36:23-7.
10. Mae] IW. Endotracheal anesthesia. Am .1 Surg. 1936:34:450-5.
11. Adnet F. Borron SW. Lapostolle F. Lapandry C. The three axes alignment theory and the sniffing position: perpetuation of an anatomic myth. Anesthesiology. 199991:1964-65.
12. Sawin PD. Todd MM, Traynelis VC. Cervical spine motion with direct larynaoscopy and orotracheal intubation. An in vivo cinefluoroscopic study of subjects without cervical abnormality. Anesthesiolo^{g}y. 1996:85:26-36.
13. Calder I. Picard .1, Chapman M. O'Sullivan C. Crockard HA. Mouth opening: a new angle. Anesthesiology. 200399:799-801.
14. Urakami Y. Takenaka I. Nakamura M. Fukuyama H. Aoyarna K. KadOya T. The reliability of the Bellhouse test for evaluating extension capacity of the occipitoatlantoaxial complex. Anesth Anal^{g}. 2002; 95:1437-41.
15. Crosby ET. Airway management in adults after cervical spine trauma. Anesthesiology. 2006; 104:1293-1318.
16. Horton WA, Fahy L. Charters P. Defining a standard intubating position using (J, angle finder. *Br J Anaesth*. 1989:62:6-12.
17. Kitamura Y. Isono S. Suzuki N. Sato Y. Nishino T. Dynamic interaction of craniofacial structures during head positioning and direct laryngoscopy in anesthetized patients with and without difficult laryngoscopy. Anesthesiology. 2007...107:875-83.
18. Hochman II. Zeitels SM. Heaton FF. Analysis of the forces and position required for direct laryn^{g}oscopic exposure of the anterior vocal folds. Ann Otol Rhinol Laryn^{g}ol. 1999:108:715-24.
19. Chou 1-IC. Rethinking the three axes alignment theory for direct laryngoscopy. Acta Anaesthesiol Scand. 2001; 45:261-4.