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ORIGINAL ARTICLE

A COMPARISON OF McCOY LARYNGOSCOPE AND MCGRATH VIDEO LARYNGOSCOPES FOR TRACHEAL INTUBATION IN PATIENTS WITH IMMOBILIZED CERVICAL SPINE

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ABSTRACT: INTRODUCTION: Expert airway management is the most essential requirement of an anesthesiologist. Difficult and failed intubation is the leading causes of anesthetic related morbidity and mortality. **AIM OF STUDY:** The purpose of this study was to compare the effectiveness of McCoy laryngoscope and McGrath video laryngoscope in tracheal intubation in patients using Manual in-line stabilization (MILS) for cervical spine injury. **MATERIALS AND METHODS:** This study was conducted in King George Hospital, Visakhapatnam, Andhra Pradesh on 60 patients aged 20–70, of American Society of Anesthesiologists physical status I–III, posted for elective surgery for cervical spine injury under general anesthesia. The patients were assigned to two groups. One group was named as MC where McCoy laryngoscope was used, other group named as MG, where McGrath video laryngoscope was used for laryngoscopy during tracheal intubation. Two groups were compared on the basis of demographic data, airway examination, comparison of visualization of vocal cords with McCoy laryngoscope and video laryngoscope and comparison of laryngoscope time. **RESULTS:** There was no significant difference between male and female sex. Most of the patients falls into Mallampati score I (60%), followed by score II and III (25 and 14% respectively). Statistically highly significant improvement in laryngoscope view was noted with video laryngoscope than with McCoy laryngoscope with Chi-square value=49.52; DF=10; p-value=0.000(highly significant). Statistically highly significant difference was seen in effective laryngoscopy time of McCoy and Video laryngoscope. **CONCLUSION:** We conclude McGrath video laryngoscope is superior to McCoy laryngoscope in terms of providing better intubating conditions in patients requiring MILS, though there is a little prolongation of effective laryngoscope time.

KEY WORDS: McCoy Laryngoscope – McGrath video laryngoscope – Cervical spine injury – MILS – Manual inline stabilization - Intubation time - Cormack and Lehane classification.

INTRODUCTION: Expert airway management is the most essential requirement of an anesthesiologist. Difficult and failed intubations are the leading causes of anesthetic related morbidity and mortality.

AIM OF STUDY: The purpose of this study was to compare the effectiveness of McCoy laryngoscope and McGrath video laryngoscope in tracheal intubation in patients using Manual in-line stabilization (MILS) for cervical spine injury.(1)

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MATERIALS AND METHODS: This study was conducted in King George Hospital, Visakhapatnam, Andhra Pradesh, affiliated to Andhra Medical College, Visakhapatnam, Andhra Pradesh. After obtaining approval from the institutional ethical committee, written informed consent was taken from 60 patients aged 20–70, of American Society of Anesthesiologists physical status I–III, posted for elective surgery for cervical spine injury under general anesthesia. Patients with gastro esophageal reflux disease, difficult intubation, and patients with body mass index >35 kg/m^2 were excluded from the study.

The patients were randomly assigned to two groups based on the device used for laryngoscopy. One group was named as MC where McCoy laryngoscope was used, other group named as MG, where McGrath video laryngoscope was used for laryngoscopy during tracheal intubation.

Standard monitoring included ECG, non-invasive blood pressure, SpO2, and measurement of end-tidal carbon dioxide and levels volatile anesthetics. The patient's head positioned on the operating table without any occipital support.

All the patients were premeditated with Glycopyrrolate 0.2mg, midazolam 0.02mg/kg, and fentanyl 2mcg/kg intravenously and preoxygenated with 6L/min of 100% 0_2 for 3minutes. Induction was done with thiopentone sodium 5mg/kg and loxicard 1.5mg/kg. After adequate ventilation with face mask, vecuronium (0.1mg/kg) was administered. Manual inline stabilization (MILS).[2,3,4] by holding the sides of the neck and the mastoid processes was done by Neurosurgeon, in order to stabilize and prevent movement of cervical spine during laryngoscopy and intubation. The cervical collar.[5] was loosened at its anterior portion,[2] temporarily to facilitate mouth opening and application of cricoids pressure.

Direct laryngoscopy was carried out in both groups while maintaining MILS, first with a McCoy laryngoscope and best Cormack and Lehane grade of glottis view was noted. The patients were then ventilated using face mask and laryngoscopy was performed using McGrath video laryngoscope. The video laryngoscopy view was graded with the Cormack and Lehane scale.[3] Duration of intubation was noted during both the situations. Blood pressure, Heart rate, and Oxygen saturation were monitored throughout the laryngoscopy period.

RESULTS: DEMOGRAPHIC DATA: Age group of the patients between 18-70 years was included in this study with mean age group being 32.41±10.14. Most patients (n=90) were in the age group of 20-30years. There was no significant difference between male and female sex (male=33.57±10.14, female=31.12±10.02); mean BMI=23.92±3.48 most patients were in the group of 20-25.

AIRWAY EXAMINATION: Most of the patients falls into Mallampati score I (60%), followed by score II and III (25 and 14% respectively).

COMPARISON OF VISUALISATION OF VOCAL CORDS: McCoy LARYNGOSCOPE VERSUS VIDEOLARYNGOSCOPE:

Grade I Cormak & Lehane grading was seen in 60.4% patients with McCoy laryngoscope and in 96.4% patients with video laryngoscope.

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Grade II Cormak & Lehane grading was seen in 38.4% patients with McCoy laryngoscope and in 3.6% patients with video laryngoscope. Among grade II, Cormak & Lehane grading grade IIA was seen in 28.4% and grade IIB was seen in 10% with McCoy laryngoscope. With video laryngoscope grade IIA was seen in 3.2% and grade IIB seen in 0.4% of patients.

Grade IIIA Cormak & Lehane grading was seen in 1.2% of patients with McCoy laryngoscope. No patients had grade IIIB, grade IV grading with McCoy laryngoscope. No patients had grade III, grade IV grading with video laryngoscope.

Inference: Statistically highly significant improvement in laryngoscope view was noted with video laryngoscope than with McCoy laryngoscope with Chi-square value=49.52; DF=10; p-value=0.000(highly significant)

COMPARISION OF LARYNGOSCOPE TIME Mean laryngoscopy time for McCOY-10.45±0.96s. Mean laryngoscopy time for video laryngoscope-13.34±1.88s. P-value 0.000 highly significant Inference statistically highly significant difference was seen in effective laryngoscopy time of McCOY and Video laryngoscope.

DISCUSSION: Expert airway management is an essential skill of an anesthesiologist. Leading cause of anesthetic related morbidity and mortality are the complications from difficult and failed intubation. Most commonly difficulty in intubation is due to difficulty in visualisation of vocal cords. Many criteria have been developed to predict the difficult airway, but none is totally reliable in predicting the difficult intubations. Unanticipated difficult intubation can lead to complications especially in those patients who are difficult to ventilate by bag and mask or who have limited cardiopulmonary reserve.

In a supine patient with head in neutral position the laryngeal axis is almost horizontal. The pharyngeal axis makes approx 30-45 degree angle from the horizontal axis and oral axis is perpendicular to laryngeal axis. Successful direct laryngoscopy requires alignment of oral, pharyngeal, and laryngeal axes.[6] Head elevation of about 10cm with pad below occiput align laryngeal and pharyngeal axis. Neck extension at atlanto occipital joint creates the shortest distance; and most nearly straight line from the incisor teeth to glottis opening.

Head extension of 75 to 85 degree and neck flexion of about 20 to 30 degrees can facilitate intubation. Intubation may be difficult with ordinary methods in patients with Rheumatoid arthritis, Ankylosing spondylitis, cervical spondylosis, scleroderma cervical spine injury, and burns contracture of the neck. In cervical spine injury patients due to Manual In Line Stabilization (MILS).[2,3,4] which restrict neck movement, direct laryngoscopy is very difficult by routine conventional methods.

The Cormack and Lehane classification (1984) is the original, and most widely used classification of laryngeal view and is shown below:

Grade 1	Visualization of the entire glottic aperture
Grade2a	Visualization of parts of the laryngeal aperture

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Grade 2b	Visualization of only the arytenoids or at least parts of the laryngeal aperture
Grade 3	Visualization of the tip of the epiglottis
Grade 4	No visualization of the epiglottis or larynx

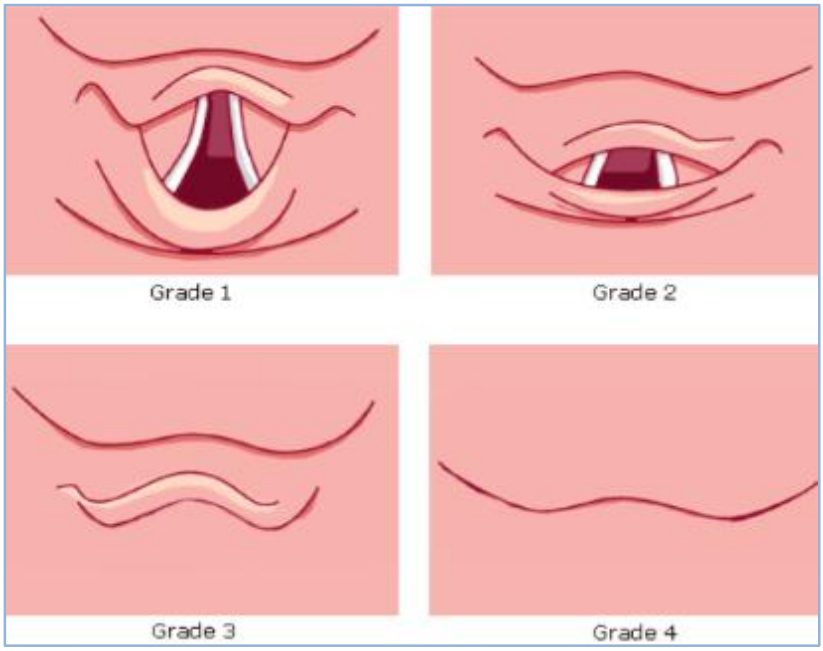

Fig. 1: Cormack and Lehane Classification

Manual in-line stabilisation (MILS) of the cervical spine is a technique to immobilize.[5] The cervical spine. In this technique with the head on a firm surface the head is held firmly on either side and traction is not applied. The aim is to prevent flexion or rotation of cervical spine during laryngoscopy. The assistant has to crouch by the trolley slightly to one side during intubation. Anterior portion of the cervical collar is loosened for opening the mouth and for cricoids pressure application.

The duration of the intubation was defined "as the time taken from insertion of the blade between the teeth until the ETT was placed through the vocal cords, as evidenced by visual confirmation by the anesthetist". In patients in whom the endotracheal tube was not directly passed through the vocal cords under direct vision, the intubation attempt was said to be complete until the evidence obtained of the presence of carbon dioxide in the exhaled breath. An attempt in which the trachea was not intubated, or which required 60 seconds time to perform will be called as failed intubation. A maximum of 3 intubation attempts were permitted.

The duration of the first tracheal intubation attempt, and if not successful, duration of the successful attempt was recorded. Additional endpoints like the number of intubation attempts, number of manoeuvres required (second assistant required, use of a bougie, cricoid pressure), the Cormack and Lehane grade at laryngoscopy all were recorded.

Some devices like McCOY laryngoscope, Airtraq laryngoscope,[2,7,8] Glide scope video laryngoscope,[6,4,9] Truview PCD laryngoscope,[10,7,3] were developed to overcome the difficulty of difficult intubation situations. Many endoscopic intubation laryngoscopes visualize the vocal cords

that overcome the anatomical axis by prism or mirror. Recent introduction of Video assisted laryngoscopic devices.[2] use fibro optic principle to provide better view of more anteriorly situated structures. They are useful in where conventional laryngoscopy fails.

McGrath MAC Video laryngoscope: The McGrath video laryngoscope.[11] was introduced in 2010. It has a fixed length metal alloy camera and comes with plastic disposable blade. The blades come in three sizes: 2, 3, and 4. with a height of 11.9 mm. The blade has vertically aligned optics that that presumed to reduce the "blind spot". It has 2.5-inch handle mounted screen. It has anti fog system, hydrophilic optical surface coating to avoid condensation on the light source The McGrath MAC is a very portable video laryngoscope. Technique involves insertion of McGrath MAC into the mouth and when the tip of the blade is in the vallecula the image of the larynx should be positioned in the middle upper third of the video-display.

The advantages of video laryngoscope are high success rate in difficult airway conditions, better portability, less force is used than in direct laryngoscopy, less hemodynamic disturbance during intubation, useful in conditions of altered anatomy, useful in conditions where Magill's position is contraindicated Movements of cervical spine is less during the procedure, magnified image of the anatomy visualized, facilitated manipulation of airway devices, the operator and assistant can coordinate their movements as both see the same image on video monitor.

Disadvantages of video laryngoscope are expensive, difficult learning curve, obscured View due to fogging and secretions, loss of depth perception, difficulty in conditions like limited mouth opening.

CONCLUSION: We conclude McGrath video laryngoscope is superior to McCoy laryngoscope in terms of providing better intubating conditions in patients requiring MILS, though there is a little prolongation of effective laryngoscope time.

REFERENCES:

1. Dr. Patrick Cowie and Professor Peter Andrews: The unstable cervical spine", Anesthesia tutorial of the week 292, 9th September 2013 of the World federation of Society of Anesthesiologists.
2. Anne K K, Durga P, Kaniti G, Padhy N, Ramachandran G, Yendrapati C: Effect of rigid cervical collar on tracheal intubation using Airtraq®. Indian Journal of Anesthesia, July-August, 2014;58(4):416-422.
3. Sourav Kr Bag, V. R. Hemanth Kumar, N. Krishnaveni, M. Ravishankar, J. Velraj, M. Aruloli: A comparative study between Truview PCD laryngoscope and Macintosh laryngoscope in viewing glottic opening and ease of intubation: A crossover study, Anesthesia: Essays and Researches.
4. Bhardwaj N, Jain K, Rao M, Mandal AK. Assessment of cervical spine movement during laryngoscopy with Macintosh and Truview laryngoscopes. J Anaesthesiol Clin Pharmacol 2013; 29:308-12.
5. Podolsky S, Baraff LJ, Simon RR, Hoffman JR, Larmon B, Ablon W: Efficacy of cervical spine immobilization methods. J Trauma. 1983 Jun; 23(6):461-5, PMID:6864837.

6. K. Maruyama, T. Yamada, R. Kawakami, T. Kamata, M. Yokochi and K. Hara: Upper cervical spine movement during intubation: fluoroscopic comparison of the AirWay Scope, McCoy laryngoscope, and Macintosh laryngoscope, British Journal of Anaesthesia 100 (1): 120–4 (2008).
7. M. A. Malik, C. H. Maharaj, B. H. Harte and J. G. Laffey Comparison of Macintosh, Truview EVO2w, Glidescopew, and Airwayscope laryngoscope use in patients with cervical spine immobilization, British Journal of Anesthesia 101 (5): 723–30 (2008) doi:10.1093/bja/aen231 Advance Access publication September 9, 2008.
8. Kill C, Risse J, Wallot P, Seidl P, Steinfeldt T, Wulf H: Video laryngoscopy with glide scope reduces cervical spine movement in patients with unsecured cervical spine. J Emerg Med. 2013 Apr; 44(4):750-6. doi: 0.1016/j.jemermed.2012.07.080. Epub 2013 Jan 22.
9. Donald E.G. Griesdale, MD • David Liu, MD •James McKinney, MD • Peter T. Choi, MD: Glidescope video-laryngoscopy versus direct laryngoscopy for endotracheal intubation: a systematic review and meta-analysis, Can J Anesth/J Can Anesth (2012) 59:41–52, DOI 10.1007/s12630-011-9620-5.
10. R. Krage, C. van Rijn, D. van Groeningen, S. A. Loer, L. A. Schwarte and P. Schober*: Cormack–Lehane classification revisited. Oxford Journals Medicine & Health BJA Volume 105, Issue 2 Pp. 220-227.
11. Karalapillai D, Darvall J, Mandeville J, Ellard L, Graham J, Weinberg L. A review of video laryngoscopes relevant to the intensive care unit. Indian J Crit Care Med 2014; 18:442-452.

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