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Original Research Paper

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GLOTTIC VIEW COMPARISON BETWEEN MCGRATH MAC VIDEO AND MACINTOSH LARYNGOSCOPES

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ABSTRACT The purpose of the study was to compare the efficacy of the McGrath MAC videolaryngoscope and the Macintosh laryngoscope in tracheal intubation procedures. The study was conducted on 70 patients who were undergoing elective surgery and classified as ASA I or II. The patients were intubated by an anaesthesia trainee under the supervision of a senior anaesthetist. The primary outcome of the study was the improvement in the glottic view, which was assessed using the Cormack-Lehane (C-L) grading system. The results of the study indicated that the McGrath MAC videolaryngoscope provided a significantly better glottic view compared to the Macintosh laryngoscope. 67.1% of the cases were found to have a C-L grade I view when assessed with the McGrath MAC, compared to 42.9% with the Macintosh. Furthermore, 17% of the cases showed an improvement in the glottic view to C-L grade I when assessed with the McGrath MAC. In addition to the improvement in glottic view, the study found that the McGrath MAC videolaryngoscope was easier to use and improved the self-confidence of the anaesthesia trainee. This is of particular significance in difficult airway situations where a quick and accurate intubation is of utmost importance. In conclusion, the study suggests that the McGrath MAC videolaryngoscope can be used as a safe and effective alternative airway device, providing a superior glottic view and ease of intubation in normal airway patients. The use of this device can also enhance the self-confidence of anaesthetists in training, making tracheal intubation more secure and effortless in challenging circumstances.

KEYWORDS :

INTRODUCTION

Difficulty or failure to ventilate and intubate is a nightmare for any anaesthesiologist, which can come unexpectedly even after a thorough preoperative assessment. Lack of experienced hands and specialized equipment can make it worse. The video laryngoscope offers better views than direct laryngoscopy and increasingly used for both routine and difficult intubations[1]. It must be regularly used to develop familiarity and competence. The McGrath MAC is similar with Macintosh blade and a teaching tool to train inexperienced anaesthesiologists, while observing the process of intubation on the screen[2]. A learning curve is expected to develop hand-eye coordination whilst intubating and simultaneously visualizing the larynx on the screen of the laryngoscope which are determined by factors such as tube channel, position of the laryngoscope in relation to the glottic opening and curvature of the endotracheal tube prior to passage between the vocal cords[3]. This study was conducted to compare the glottic view using McGrath MAC video laryngoscope in comparison with Macintosh laryngoscope on patients undergoing elective surgeries.

METHODS

After ethical approval this study was done in a single centre tertiary care teaching, randomized controlled trial consisting of 70 patients aged 18-60 years of ASA I and II status undergoing elective surgery under general anaesthesia requiring orotracheal intubation was conducted. Patients with sensitivity and contraindications to drugs, history of significant cardiac, respiratory, renal, hepatic or central nervous system disease (ASA III and above), unstable cervical spine, pregnancy and severely restricted mouth opening where introduction of laryngoscope blade was not possible were excluded.

Written informed consent was obtained and all the patients were kept fasting for 8 hours, pre-medicated with oral pantoprazole 40 mg on the previous night and 2 hours prior to surgery. After shifting the patient to the operating room, intravenous access was secured. Preoperative baseline values of Heart rate, Blood pressure and Oxygen saturation was recorded and crystalloid infusion was started. Induction of anaesthesia was done intravenously with Inj. Propofol 2mg/kg and Inj. Fentanyl 2 g/kg which was given over 30 seconds after preoxygenation with 100% Oxygen for 5 minutes and Inj. Propofol 2 mg/kg with preservative free Lignocaine (2%) 1ml added. Neuromuscular blockade was achieved with Inj. Rocuronium 1 mg/kg IV and ventilation was done for a minute.

Direct laryngoscopy was done by a trainee under the guidance of senior anaesthesiologist using Macintosh laryngoscope size 3 blade without any external laryngeal manipulation after placement in sniffing position[4]. The laryngoscopic view was graded by an experienced anaesthesiologist using Cormack and Lehane grading[5] who was blinded to preoperative airway assessment data and the laryngoscope was then removed. Once again, intermittent positive pressure ventilation was provided for 30 seconds. McGrath MAC laryngoscope with the adult blade was then inserted and corresponding Cormack and Lehane grade noted using the view obtained on the LCD screen[6]. Trachea was then intubated with appropriate size endotracheal tube and anaesthesia maintained. Intubation time was noted from the time of introduction of McGrath MAC laryngoscope into the mouth to the time it was taken out and number of attempts for intubation were recorded. Failure to intubate with McGrath MAC laryngoscope even after two attempts was considered as failed intubation and alternate method for intubation was used[7]. Heart rate, Blood pressure and Oxygen saturation were monitored continuously and recorded. After intubation, anaesthesia was maintained with Nitrous oxide in Oxygen with a 50:50 ratio and Isoflurane at 1 MAC and intermittent doses of Rocuronium. Data were recorded according to

protocol and analysed statistically at the end of the study. The primary aim of the study was glottic view assessment with these two laryngoscopes using C-L Grading in the same patient and time to intubation, failures and hemodynamic instability were studied additionally. Statistical analysis was performed with categorical data presented as numbers(percentages) and continuous variables presented as the mean and standard deviation(SD) or the median and interquartile range, depending on the type of distribution. The Mann-Whitney U test was used to analyze the time taken for intubation. Categorical data were analyzed with chi-square test to examine the Cormack-Lehane grade in each study group. Hemodynamic changes during the intubations were assessed with the t test. SPSS 16.0 (SPSS `Inc., Chicago, IL) software was used to perform statistical analysis. The 2-tailed P value of <0.05 was considered statistically significant.

RESULTS

A comparative study for assessing laryngoscopic view using Cormack & Lehane grading with Macintosh and McGrath MAC laryngoscope undertaken on seventy patients posted for elective surgery under general anaesthesia, during the period of one year and these cases were taken up for the study as outlined in the methodology. The baseline data of study population with various parameters of age group in years with maximum of 69.00, minimum of 18.00 and the mean was 42.17; thyromental distance in cm with maximum of 8.50, minimum of 6.00 and the mean was 6.84; interincisor distance in cm with maximum of 6.00, minimum of 4.00 and the mean was 5.04.

Intubation time in seconds with maximum of 58.00, minimum of 18.00 and the mean was 35.02. Comparison of Cormack and Lehane grading with Macintosh and McGrath MAC laryngoscope, 30 (42.9%) in Macintosh and 47 (67.1%) in McGrath belongs to Grade 1; 40 (57.1%) in Macintosh and 23 (32.9%) in McGrath belongs to Grade 2 with a p value of 0.006. There were 17 patients of the total number of 70 patients whose CL grade improved from Grade 2 view to Grade 1 view. Chi-square test showed this difference was statistically significant. Our study had no complications like Oropharyngeal mucosal injury, dental and other trauma, postoperative sore throat, hoarseness of voice and failure to intubate any of the participants in the study[8][9].

Table 1: C-L grading of the laryngoscopic view between the two equipment.

	GRADE 1	GRADE 2
Macintosh	30 (42.9%)	40 (57.1%)
McGrath	47 (67.1%)	23 (32.9%)

Table 2: Baseline data of study population.

Parameters	Mean	SD	Min	Max
Age	42.17	14.03	18.00	69.00
Thyromental distance	6.84	0.44	6.00	8.50
Interincisor distance	5.04	0.44	4.00	6.00
Intubation time	35.02	8.27	18.00	58.00

DISCUSSION

The primary objective of this study was to see if there was an improvement in glottic view while using McGrath MAC Video laryngoscope. In this study, which was done on the same patient, to assess the glottic visualization using C-L grading obtained during McGrath MAC video laryngoscopy, 67.1% were in C-L grade I; 32.9% in grade II whereas in Macintosh laryngoscopy, 42.9% in C-L grade I; 57.1% in grade II. It was found that 17(24%) cases showed improvement in glottic view to grade I Cormack and Lehane grade when assessed with McGrath MAC among 40(57.1%) cases of Cormack and Lehane grade II by Macintosh laryngoscope. This was found to be statistically significant whilst obtaining an improved glottic visualization with McGrath MAC video laryngoscope.

The aim of this study was to determine whether the McGrath MAC video laryngoscope provides an improved glottic view. The study was conducted on the same patients and involved evaluating glottic visualization using the Cormack and Lehane (C-L) grading system. Results showed that 67.1% of patients achieved a C-L grade I view with the McGrath MAC video laryngoscope, compared to 42.9% with the Macintosh laryngoscope. Meanwhile, 32.9% of patients had a C-L grade II view with the McGrath MAC, compared to 57.1% with the Macintosh. Out of 40 cases with a C-L grade II view using the Macintosh, 17(24%) improved to a grade I view with the McGrath MAC. These results indicate a statistically significant improvement in glottic visualization using the McGrath MAC video laryngoscope.

Our study findings are in line with the results of a study conducted by Wallace et al.[10]. They compared the McGrath MAC videolaryngoscope used as a direct and indirect laryngoscope with the Macintosh laryngoscope in adult patients undergoing elective surgery. They reported that the McGrath MAC (C-L grade I-III 92/8/0%) had better glottic visualization, lower intubation difficulty scores, and fewer intubation difficulties, forces, and adjuncts used than the McGrath MAC as a direct laryngoscope (C-L grade I-III 47/49/4%) and the Macintosh laryngoscope (C-L grade I-III 68/28/4%) with a p-value <0.001. Similarly, Liu et al[2] reported that the McGrath Series 3 laryngoscope improved glottic visualization (C-L grade I of 88%, grade II of 89%) and intubation ease, with fewer complications and less hemodynamic fluctuation than the Macintosh laryngoscope (C-L grade I of 88% and grade II of 89%), which was statistically significant.

In our study, the intubation time was recorded as the time taken from the moment the McGrath MAC video laryngoscope was inserted into the mouth to the moment it was removed. The average intubation time with the McGrath MAC laryngoscope was 35.02 seconds. Other studies have also reported mean intubation times with the McGrath laryngoscope. Liu et al[2] reported a mean intubation time of 30.6 seconds, while Jungbauer et al[11] reported a mean intubation time of 40 seconds with video laryngoscopy. Wallace et al[10] reported an intubation time of 37 seconds with the McGrath video laryngoscope. When compared to these studies, the intubation time with the McGrath MAC video laryngoscope was found to be statistically significant.

While the improved view of the laryngeal inlet offered by video laryngoscopes can be beneficial, it doesn't always result in an easy or successful intubation. Although the angle of the McGrath MAC and other videolaryngoscope blades enhances the indirect view of the laryngeal inlet, it may require a more anterior redirection of the tracheal tube, making it harder to achieve successful intubation[3]. Additionally, the need to bend the styletted tracheal tube to a greater degree with video laryngoscopes compared to direct vision laryngoscopes can lead to difficulties in removing the stylet, resulting in longer intubation times. To improve intubation times with video laryngoscopes, careful preparation of the stylet and tracheal tube is essential. Another factor that can impact intubation success is hand-eye coordination, which may be impaired and increase intubation time.

In our study, the fogging of the lens on the distal end of the McGrath MAC laryngoscope blade was one of the challenges faced during intubation. However, this issue was resolved by cleaning the blade with 0.1% chlorhexidine before use. The heart rate and blood pressure changes during laryngoscopy and tracheal intubation were not statistically significant. This could be attributed to the skill and experience of the practitioners. Moreover, there were no reported incidents of airway or teeth injuries during the use of either laryngoscope.

CONCLUSION

The inadequate management of difficult tracheal intubation is a significant contributor to mortality in anaesthesia-related practice. Therefore, it is crucial for anaesthesiologists to acquire proficiency in using video laryngoscopy to facilitate intubation. The McGrath MAC video laryngoscope is a slender, user-friendly model that features an LCD screen to visualize the glottis with minimal pressure[6]. Based on our research, we have determined that the use of the McGrath MAC considerably enhances glottic visualization, shortens intubation time, and maintains hemodynamic stability. As a result, this device can be utilized safely as an alternative airway for tracheal intubation. The device is user-friendly, enhancing the safety and efficiency of tracheal intubation in patients with normal airways[12], while also enhancing the self-confidence of anaesthesia practitioners in training and improving glottic visualization in challenging situations. A limitation of this study was the absence of randomization and a parallel matched group. Future studies could be done when newer innovations and models available to further improve the success of endotracheal intubation.

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