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Original Research Article

Comparative analysis of direct laryngoscopy and video laryngoscopy performance by medical students in simulated airway management scenarios

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ABSTRACT

Aim: This study aims to compare the effectiveness of video laryngoscopes and Macintosh laryngoscopes for intubation by novices in a mannequin model.

Materials and Methods: This study was conducted at our institution - Karuna Medical College, Hospital. A total of 50 house surgeons were included in this study. All 50 participants intubated on the airway trainer using a video laryngoscope and a conventional method using a Macintosh laryngoscope. Group A: Video laryngoscopy, Group B: Conventional Laryngoscopy. The following parameters such as – time taken to visualize vocal cords, time taken to intubate, POGO scoring, ease of intubation, etc. were recorded.

Results: Video laryngoscope performed better in terms of time-related metrics, glottis visibility, and injury prevention to lip and teeth. Both devices had a similar ease of intubation and number of attempts. The results provide evidence supporting the advantages of the video laryngoscope in certain aspects of intubation procedures.

Conclusion: The video laryngoscope had several benefits over the Macintosh laryngoscope, such as top quality visualization of airway structures and an easier intubation process for novices. The video laryngoscope provides superior visualization of the larynx, requires fewer external adjustments, and reduces the number of intubation attempts compared to direct laryngoscopy using a Macintosh blade.

1. Introduction

In the field of medical education, the acquisition and honing of essential skills is of utmost importance.

Airway management is a critical skill that serves as a cornerstone in the fields of anesthesiology, resuscitation, critical care, and emergency medicine. Maintaining an unobstructed airway during general anesthesia primarily involves the insertion of a tube into the trachea through the mouth or nose, a procedure known as endotracheal intubation. Intubation separates the respiratory tract from the digestive tract, enabling control of breathing and facilitating the delivery of oxygen, anesthetic gases, and medications. Proper visualization of the glottis, achieved through either direct or indirect laryngoscopy, is essential for successful intubation. An optimal laryngoscopy should offer clear visualization of the glottis, allowing for the accurate placement of the endotracheal tube with minimal effort, reduced time, and minimal risk of patient injury.

Intubation is an universal procedure performed in emergency and critical care settings, and its success rate is directly related to patient outcomes.

2. Introduction

In medical education, learners must acquire and refine essential skills.[1] Intubation, a technique used to establish and secure an airway, is one such skill that requires

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proficiency. Intubation is a critical procedure in medical practice and requires proper training to ensure its successful execution. Intubation is a procedure used to establish an airway in patients who are unable to breathe adequately on their own. Traditionally, intubation has been performed using the Macintosh laryngoscope, which requires direct visualization of the vocal cords.

However, with advancements in technology, the video laryngoscope has emerged as an alternative tool for intubation. The video laryngoscope provides a clear view of the airway structures, making intubation easier for novices. To assess the effectiveness of the video laryngoscope compared to the traditional Macintosh laryngoscope, a mannequin study was conducted. The study aimed to evaluate the performance of novices in intubation using both the video laryngoscope and the Macintosh laryngoscope as well as to determine the advantages and disadvantages of each technique.

This study is unique in that it specifically examines intubation techniques using the video laryngoscope and the Macintosh laryngoscope among novice practitioners. By focusing on this specific group, the study aims to shed light on the effectiveness and ease of use of these devices in a controlled setting, which can help inform training programs and improve patient care. Additionally, the use of a mannequin allows for standardized conditions, ensuring that any differences observed between the two techniques are due to the devices themselves and not external factors. Overall, this study has the potential to advance our understanding of intubation practices and improve training methods for medical professionals.

The novelty of this study lies in its focus on addressing the existing gaps in the literature regarding intubation techniques, particularly among novices. By conducting a mannequin study comparing intubation with the video laryngoscope and the Macintosh laryngoscope, this research aims to contribute valuable insights to the field.

This study also stems from its direct comparison of intubation techniques between the video laryngoscope and the Macintosh laryngoscope. While both devices are commonly used in clinical practice, their performance among novice practitioners has not been extensively studied. By conducting this comparison, the study aims to provide valuable insights into the relative efficacy, safety, and ease of use of these devices in a simulated setting. This information can be instrumental in guiding the selection of intubation equipment and training protocols, ultimately leading to improved patient outcomes.

Furthermore, this study fills a gap in the literature by focusing on intubation practices among novice practitioners. While experienced clinicians often serve as the benchmark for device performance, understanding how these devices perform in the hands of novices is crucial. Novices may have different challenges and learning curves compared to experienced practitioners, which could impact the effectiveness of the devices. By including this population in the study, the research provides a more comprehensive understanding of device performance across different skill levels.

Moreover, this study's novelty lies in its examination of intubation techniques by novices, a population often underrepresented in such research. By including novices, the study can provide insights into the challenges faced by those learning intubation and the potential benefits of using either the video laryngoscope or the Macintosh laryngoscope in their training. This aspect of the study is particularly relevant for medical education and training programs, as it can help tailor instructional methods and equipment choices to optimize learning and patient care outcomes. Overall, this study's focus on novices adds a unique perspective to the existing literature on intubation techniques.

Additionally, this study's innovative approach involves using a mannequin to simulate intubation scenarios. While mannequin studies are commonly used in medical research, their application in comparing intubation techniques among novices adds a new dimension to the research. This method allows for controlled and standardized conditions, ensuring that any differences observed between the two techniques are attributable to the devices themselves and not external factors. By using a mannequin, the study can provide valuable insights into the performance of the video laryngoscope and the Macintosh laryngoscope in a safe and controlled environment, which is especially important when studying novice practitioners.

Furthermore, this study's design enables a direct comparison of intubation outcomes between the video laryngoscope and the Macintosh laryngoscope. By including both devices in the study, the research can evaluate their relative effectiveness in achieving successful intubation among novices. This comparative analysis is crucial for informing clinical practice and device selection, as it provides evidence-based insights into which device may be more suitable for use by novices. Additionally, the study's focus on intubation success rates, time taken for intubation, and ease of use of the devices can provide nuanced insights into their performance characteristics, which can further guide decision-making in clinical settings.

Moreover, this study aims to address a gap in the literature regarding intubation techniques among novices by providing a detailed analysis of the challenges and successes encountered with both the video laryngoscope and the Macintosh laryngoscope. By examining factors such as intubation success rates, time taken for intubation, and participant feedback, the study can offer valuable insights into the learning curve associated with these devices. This information is essential for developing effective

training programs that adequately prepare novices for real-world intubation scenarios. Additionally, by identifying the advantages and disadvantages of each device, the study can help clinicians make informed decisions regarding device selection based on individual skill levels and patient needs.

3. Materials and Methods

This prospective study was conducted, following approval from the ethical committee. Fifty medical students with limited experience in laryngoscopy and intubation were recruited as novice users. They were selected to perform the procedure on mannequins and practiced intubation six times each on the same mannequin. The study adhered to the declaration of Helsinki, and informed consent was obtained from all part icipants.

The primary objective was to compare the effectiveness, efficiency, and success rates of direct laryngoscopy and video laryngoscopy in simulated airway management scenarios, focusing on medical student performance and learning outcomes.

The sample size was determined based on a previous study by Narang, Aneesh T. et al,[2] requiring a minimum of 50 participants to achieve a power of 80% and an alpha error of 10% at a 95% confidence interval. The sample size, denoted as 'N,' was determined through the application of the following formula:

$$N = \left(\frac{Z_{\alpha/2}+Z_{\beta}}{2}\right)^2 \times \left(\frac{S_1^2+S_2^2}{\mu_1-\mu_2}\right)^2$$

where:

N is the required sample size per group

$Z_{\alpha/2}$is the critical value for a two-tailed test at significance level α

Z_{β} is the critical value for the desired power $(1-\beta)$

$S_1{}^2$and $S_2{}^2$are the variances of the two groups

$\mu 1$and $\mu 2$are the means of the two groups

The participants were divided into two groups of 50 each: Group A underwent video laryngoscopy (Hugemed), and Group B underwent direct laryngoscopy (Macintosh blade).

An airway trainer and mannequin were used for the study, with participants trained on both direct and video laryngoscopy techniques. Evaluation was conducted by observing participants' performance using a stopwatch and video monitor. Outcome measures included time to vocal cord visualization, time to intubation, vision quality at intubation, and intubation success or failure.

Data collection was anonymous, with only the level of training of participating residents recorded. Statistical analysis was performed using IBM SPSS Version 26 and GraphPad Software, with a significance level of $p < 0.05$. Inclusion criteria included participant's informed consent, while exclusion criteria included unwillingness to participate or withdrawal. Participants were adequately trained with both devices before the study. All participants were volunteers with the option to decline participation, withdraw at any point, and remain anonymous in the collected data. Data were gathered using paper forms and subsequently inputted into an Excel sheet.

The evaluation procedures were conducted systematically. A co-investigator observed the video laryngoscopy assessment and recorded the time taken by participants to visualize and intubate the vocal cords using a stopwatch. The timing started when the participant held the laryngoscope and ended when they indicated successful intubation. Successful intubation was confirmed by attempting ventilation with a bag-mask valve and visually confirming the passage through the mannequin's vocal cords. Outcome measures included time to vocal cord visualization, time to intubation, vision quality at intubation, and intubation success or failure, with a maximum time limit of 5 minutes per scenario. Data collection was anonymous, with only the level of training of participants recorded.

The methodology was structured into three steps:

Training: Participants received standardized training on both direct and video laryngoscopy techniques before the study. Scenario Setup: Each participant performed intubation attempts on the airway trainer, simulating various airway management scenarios. Procedure: a. Participants held the assigned laryngoscope and positioned themselves for intubation. b. Timing began when participants were ready to begin the intubation procedure. c. Participants attempted to visualize the vocal cords and pass the endotracheal tube through the airway trainer's airway. d. Each attempt was documented with one of three possible outcomes: 1) successful tracheal intubation (no additional attempts required), 2) inability to intubate (additional attempt(s) required), or 3) inadvertent esophageal intubation (additional attempt(s) required). e. Timing ceased when participants indicated successful intubation. f. A co-investigator verified successful intubation using the bag-mask valve and visual confirmation on the airway trainer. g. Intubation attempts were limited to a maximum of 300 seconds per scenario.

Participants were required to perform tracheal intubation using each device under standard airway conditions. An intubation attempt was defined as insertion of the laryngoscope blade into the oropharynx, and outcomes were categorized as successful tracheal intubation, inability to intubate, or inadvertent oesophageal intubation. Successful intubation was confirmed by a glowing visual indicator. First attempt success and ultimate success were also defined to assess participants' performance.

3.1. Statistical analysis

The parameters were contrasted between the two study groups, with categorical variables analyzed and mean values with standard deviation calculated for quantitative variables. Statistical significance was evaluated using an

independent sample Student's t-test. IBM SPSS Version 26 and GraphPad Software © 2018 were utilized for statistical analysis.

4. Results

This study comprised of 50 medical interns as participants.

Table 1: Time-related metrics

	Vl	(n=50)	Mac	(n=50)	t-value	p-value
	Mean	SD	Mean	SD		
Time to visualize vocal cords (time in seconds)	5.04	1.01	5.78	1.87	2.46	<0.016**
Time to declare intubation (time in seconds)	9.72	2.85	14.52	6.73	4.64	<0.001**

Vl- Video laryngoscope, Mac- Macintosh laryngoscope

4.1. Time to visualize vocal cords

Video laryngoscope took significantly less time (mean 5.04s) compared to Macintosh Laryngoscope (mean 5.78s). With a t-value of 2.46, and a p-value of 0.016, overall indicating a statistically significant value.

4.2. Time to declared intubation

Video laryngoscope showed a significantly lower time (mean 9.72s) compared to Macintosh Laryngoscope (mean 14.52s). With a t-value of 4.64, and a p-value re less than 0.001, indicating a highly significant statistical difference.

The study found that the video laryngoscope significantly reduced the time required to visualize the vocal cords compared to the Macintosh laryngoscope. Specifically, the mean time to visualize the vocal cords was 5.04 seconds with the video laryngoscope compared to 5.78 seconds with the Macintosh laryngoscope. This difference was statistically significant, with a t-value of 2.46 and a p-value of 0.016. Additionally, the study observed a significant difference in the time to achieve intubation between the two devices. The video laryngoscope demonstrated a mean time to intubation of 9.72 seconds, whereas the Macintosh laryngoscope had a mean time of 14.52 seconds. This difference was highly significant, with a t-value of 4.64 and a p-value of less than 0.001. These findings suggest that the video laryngoscope offers advantages over the Macintosh laryngoscope in terms of both visualization of the vocal cords and time to intubation. These results are consistent with previous research highlighting the benefits of video laryngoscopy in improving intubation success rates and reducing the time required for intubation, especially in challenging airway scenarios.

Table 2: POGO scoring

POGO Scoring	Group	
	Video laryngoscope	Macintosh Laryngoscope
75 to 100%	50 (100%)	39 (78%)
50 to 75%	0 (0%)	10(20%)
25 to 50%	0 (0%)	1 (2%)
Chi square value	16.61	
p-value	<0.001	

POGO scoring, which assesses the percentage of glottic opening visibility, showed a statistically significant difference present among the two groups (Chisquare value 16.61, p-value < 0.001). Video laryngoscope had higher percentages across all categories.

Specifically, the video laryngoscope consistently achieved higher POGO scores across all categories compared to the Macintosh laryngoscope. This indicates that the video laryngoscope provided better visibility of the glottic opening during intubation attempts, which is crucial for successful and safe placement of the endotracheal tube. The higher POGO scores observed with the video laryngoscope are likely attributed to its superior imaging capabilities, which allow for a clearer view of the glottis compared to the Macintosh laryngoscope. This finding is consistent with previous studies that have demonstrated the advantages of video laryngoscopy in improving glottic visualization and intubation success rates, particularly in cases of difficult airways. Overall, the study's results suggest that the video laryngoscope offers benefits over the Macintosh laryngoscope in terms of glottic visualization, as indicated by higher POGO scores, which may contribute to improved intubation outcomes.

Table 3: Ease of Intubation

Group	Ease of Intubation	
	Easy	Satisfactory
Video laryngoscope	50 (100%)	0 (0%)
Macintosh Laryngoscope	48 (96%)	2(4%)
Chi square value	0.541	
p-value	0.495	

The ease of intubation, showed no significant difference between the two groups. Both video laryngoscope and Macintosh Laryngoscope had a high percentage of cases categorized as "Easy."

The study evaluated the ease of intubation using two different devices, the video laryngoscope and the Macintosh laryngoscope, and categorized the intubation attempts as either "Easy" or "Satisfactory." The results showed that all intubation attempts with the video laryngoscope were categorized as "Easy," while 96% of attempts with the

Macintosh laryngoscope were categorized as "Easy" and 4% as "Satisfactory". The Chi-square value for this comparison was 0.541, and the p-value was 0.495, indicating that there was no statistically significant difference in the ease of intubation between the two groups. Both devices were associated with a high percentage of cases categorized as "Easy," suggesting that both the video laryngoscope and the Macintosh laryngoscope are effective in facilitating intubation, at least in the context of this study. These findings suggest that, while there may be differences in specific aspects of intubation performance between the two devices, such as glottic visualization and time to intubation, the overall ease of intubation was comparable between the video laryngoscope and the Macintosh laryngoscope in this study population.

Table 4: Number of attempts

Group	Number of attempts	
	1	2
Video laryngoscope	49 (98%)	1 (2%)
Macintosh Laryngoscope	46 (92%)	4(8%)
Chisquare value	0.842	
p-value	0.359	

The number of attempts for intubation, showed no significant difference between the two data groups (Chi-square value 0.842, p-value 0.359).

Table 5: Injury to lip and teeth

Group	Injury to lip and teeth	
	1	2
Video laryngoscope	50 (100%)	0 (0%)
Macintosh Laryngoscope	40 (80%)	10(20%)
Chisquare value	9.0	
p-value	0.001	

The study also assessed the number of attempts required for successful intubation using the video laryngoscope and the Macintosh laryngoscope. The results showed that 98% of intubation attempts with the video laryngoscope required only one attempt, while 2% required two attempts. In comparison, 92% of intubation attempts with the Macintosh laryngoscope required only one attempt, and 8% required two attempts. The Chi-square value for this comparison was 0.842, and the p-value was 0.359, indicating that there was no statistically significant difference in the number of attempts required for intubation between the two groups. Both devices had high percentages of cases that were successfully intubated on the first attempt, suggesting that both the video laryngoscope and the Macintosh laryngoscope are effective in achieving successful intubation with a minimal number of attempts in this study population. These findings suggest that, while there may be differences in specific aspects of intubation performance between the two devices, such as glottic visualization and time to intubation, the overall number of attempts required for successful intubation was comparable between the video laryngoscope and the Macintosh laryngoscope in this study population.

Significant difference in the occurrence of injury to lips and teeth between the two groups (Chi square value 9.0, p-value 0.001). Video laryngoscope resulted in no injuries, while Macintosh Laryngoscope had some cases.

The study also evaluated the occurrence of injury to the lips and teeth during intubation using the video laryngoscope and the Macintosh laryngoscope. The results showed that none of the intubation attempts with the video laryngoscope resulted in injury to the lips and teeth, whereas 80% of attempts with the Macintosh laryngoscope resulted in injury to the lips and teeth, with 20% resulting in no injury. The Chi-square value for this comparison was 9.0, and the p-value was 0.001, indicating a statistically significant difference in the occurrence of injury to the lips and teeth between the two groups. These findings suggest that the video laryngoscope may be associated with a lower risk of injury to the lips and teeth compared to the Macintosh laryngoscope.

Table 6: Intubation into the esophagus

Group	Into Esophagus	
	1	2
Video laryngoscope	49 (98%)	1 (2%)
Macintosh Laryngoscope	48 (96%)	2(4%)
Chisquare value	0.344	
p-value	0.558	

The occurrence of intubation into the esophagus did not demonstrate a significant distinction between the two groups (Chi-square value 0.344, p-value 0.558).

The study also examined the occurrence of intubation into the oesophagus using the video laryngoscope and the Macintosh laryngoscope. The results showed that 98% of intubation attempts with the video laryngoscope were successful in avoiding intubation into the esophagus, while 2% resulted in intubation into the esophagus. Similarly, 96% of intubation attempts with the Macintosh laryngoscope were successful in avoiding intubation into the esophagus, while 4% resulted in intubation into the esophagus. The Chi-square value for this comparison was 0.344, and the p-value was 0.558, indicating that there was no statistically significant difference in the occurrence of intubation into the esophagus between the two groups. These findings suggest that both the video laryngoscope and the Macintosh laryngoscope are effective in avoiding intubation into the esophagus, with similar success rates observed between the two devices. It is important to note that while the study did not find a significant difference in the occurrence of intubation into the esophagus between the two devices, proper training and technique are essential to minimize the risk of this complication during intubation. It is important to

note that while the video laryngoscope showed a lower risk of injury in this study, further research is needed to confirm these findings and determine the factors contributing to the differences in injury rates between the two devices.

The study compared the performance of the video laryngoscope and the Macintosh laryngoscope in various parameters related to intubation.

4.3. Overall elaboration of the results

4.3.1. Time to visualize vocal cords

The video laryngoscope showed a significantly shorter time (mean 5.04s) compared to the Macintosh laryngoscope (mean 5.78s) in visualizing the vocal cords, indicating better efficiency in glottic visualization.

4.3.2. Time to declared intubation

Intubation with the video laryngoscope took significantly less time (mean 9.72s) compared to the Macintosh laryngoscope (mean 14.52s), demonstrating quicker intubation with the video laryngoscope.

4.3.3. Percentage of glottic opening (POGO) score

The video laryngoscope achieved higher POGO scores across all categories compared to the Macintosh laryngoscope, indicating better visibility of the glottic opening with the video laryngoscope.

4.3.4. Ease of intubation

Both devices had high percentages of cases categorized as "Easy," with no significant difference between the two groups. This suggests that both devices were similarly easy to use for intubation.

4.3.5. Number of attempts

The video laryngoscope and the Macintosh laryngoscope had comparable rates of successful intubation on the first attempt, with no significant difference between the two groups.

4.3.6. Injury to lip and teeth

The video laryngoscope resulted in no injuries to the lips and teeth, while the Macintosh laryngoscope had a higher rate of injury (20%). This indicates a lower risk of injury with the video laryngoscope.

4.3.7. Intubation into the esophagus

Both devices had similar rates of successful intubation without entering the esophagus, with no significant difference between the two groups.

Overall, the study suggests that the video laryngoscope offers several advantages over the Macintosh laryngoscope, including quicker visualization of the vocal cords, faster intubation times, better glottic visibility, and a lower risk of injury to the lips and teeth. However, both devices were similarly effective in terms of ease of intubation, number of attempts, and avoiding intubation into the esophagus.

Video laryngoscope performed better in terms of time-related metrics, glottic visibility, and injury prevention to lips and teeth. Both devices had a similar ease of intubation and number of attempts. The results provide evidence supporting the advantages of the video laryngoscope in certain aspects of intubation procedures.

Figure 1:

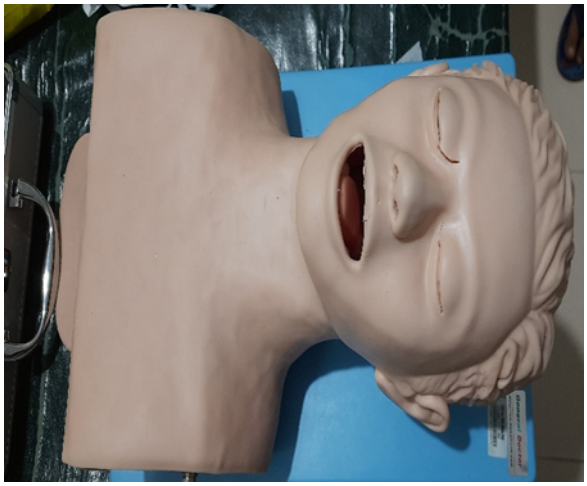

Figure 2:

5. Discussion

The discussion on video laryngoscope advantages focuses on its clear visualization of airway structures, which can make intubation easier for novices. Additionally, the

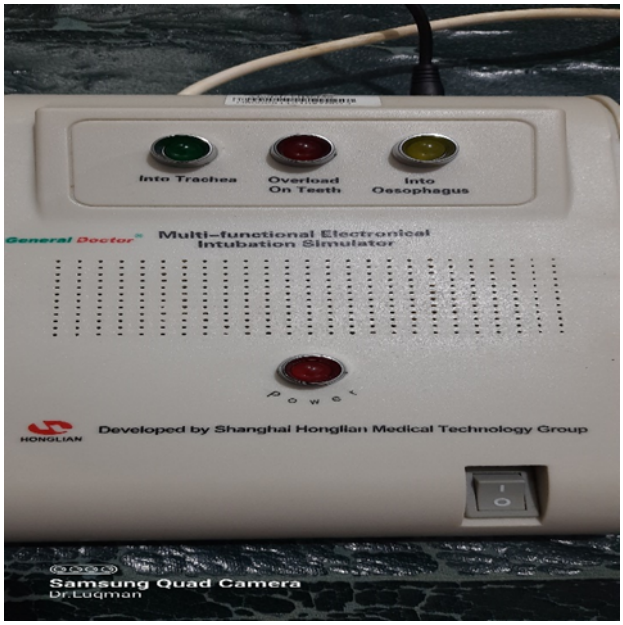

Figure 3:

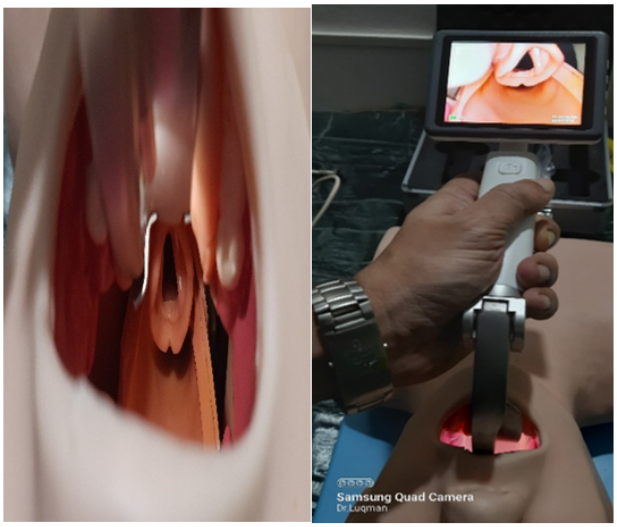

Figure 4:

video laryngoscope may reduce the risk of complications associated with intubation, such as dental damage or soft tissue trauma. Furthermore, the video laryngoscope allows for better visualization of difficult airways and can potentially improve the success rate of intubation.

The discussion on Macintosh laryngoscope advantages may highlight its familiarity and widespread use among healthcare professionals, as well as its lower cost compared to video laryngoscopes. Additionally, the Macintosh laryngoscope does not require additional equipment or technology, making it more accessible in resource-limited settings.

Airway management is one of the basic and important skills of anaesthetic practice. It remains a cornerstone of anaesthetic practice and the emergency department. It ensures securing an airway for oxygenation and ventilation. Tracheal intubation stands as the benchmark for airway management, ensuring a secure airway, minimizing the risk of aspirating gastric contents, and enabling positive pressure ventilation with greater airway pressure compared to using a face mask or supraglottic device. Typically, tracheal intubation is facilitated through direct laryngoscopy. However, in cases of difficulty, a wide array of alternative intubation devices and techniques have been devised.

Direct laryngoscopy (DL) and Endotracheal intubation (ETI) an essential skills for healthcare practitioners. Even though DL is a well-known reliable technic in the hands of experienced healthcare professionals, it may be disastrous in the hands of emergency healthcare providers who may not be well-versed in handling such situations. The occurrence of challenging or unsuccessful tracheal intubation is reported to be approximately 15% outside the operating room, in contrast to around nine percent in elective surgical settings. Additionally, outside the operating theatre, such instances are more prone to result in substantial morbidity and mortality.[3,4]

Video laryngoscopy, a comparatively recent innovation, aims to enhance the efficacy of tracheal intubation. Utilizing higher-resolution micro cameras and compact, portable flat-screen monitors, this technique strives to enhance the visual field and success rates compared to direct laryngoscopy.[5]

A similar study by Hodd JA et al.[6] concluded that - Intubation times were comparable between the APA and Macintosh laryngoscopes in mannequins with normal airways. However, intubation with the APA was notably swifter than with the GlideScope in simulated scenarios involving difficult airways.

A study by Narang AT et al.[2] showed the following results. Attendees achieved a faster intubation of the mannequin using the Macintosh blade in both normal and neck immobility scenarios (9.4 seconds faster, 95% CI 3.2-15.7, P = 0.004; 16.1 seconds faster, 95% CI 3.6-28.7, P = 0.01). However, in the tongue edema scenario, video laryngoscopy offered superior cord visibility, a higher success rate of cord visualization at the time of intubation (50% vs. 12%), and a greater rate of successful intubations (83% vs. 23%).[2] They came to a conclusion that in the most challenging airway scenario, tongue edema, the video laryngoscope offered an improved visualization of the vocal cords with reduced time, higher success rates in intubation, and shorter intubation duration.

Video-assisted intubation systems have demonstrated greater efficacy compared to direct laryngoscopy in managing challenging airways.[7–9] However, adopting these systems often necessitates acquiring a new intubation method, which serves as a hurdle to their initial adoption.

Clinicians are then required to become proficient in both techniques, further complicating the process. This challenge is compounded by the scarcity of opportunities for clinical trainees to experience challenging intubation cases.[10]

Medical students required a notably higher number of attempts when utilizing the traditional Macintosh laryngoscope. This mirrors findings from prior research, where a mean of 57 trials was necessary to attain a success rate of 90% intubation using conventional or direct laryngoscopy.

Paramedic personnel have been extensively documented to experience a gradual learning curve[11,12] when it comes to intubation using the Macintosh blade, primarily due to infrequent exposure to this technique. As a result, there has been a rising trend in utilizing supraglottic airway devices such as the Combitube®, Laryngeal Tube®, and Laryngeal Mask Airway® for airway management in these situations,[13–15] as they offer quicker learning curves.[16,17] However, it's important to note that there remains a notable risk of airway trauma and/or aspiration injury in patients when using these devices.

The mannequin study observed the performance of novices in intubation using both the video laryngoscope and the Macintosh laryngoscope. The results showed that the video laryngoscope possessed numerous benefits over the Macintosh laryngoscope, including a clear cut visualization of airway structures and an easier intubation process for novices. It is recommended that further studies be conducted to validate these findings and determine the impact of training novices in airway management using virtual reality simulation.

Considering the significance of the matter, it was proposed that further research be conducted on the training of medical professionals using virtual reality to ascertain its influence on their performance and effectiveness, including the type and degree of impact.[18] Virtual reality training should be considered as a supplement to conventional teaching methods to improve knowledge acquisition.[18] Virtual reality simulations should be incorporated into the curriculum for medical students and residents to enhance their skills in various procedures, including intubation.[18]

6. Conclusion

Based on our prospective study, we have determined that the video laryngoscope provides a superior POGO view, minimal external interference, and requires fewer intubation attempts compared to direct laryngoscopy using the Macintosh blade.

7. Source of Funding

None.

8. Conflict of Interest

None.

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