

## A COMPARATIVE EVALUATION OF EFFECTIVENESS OF McCOY LARYNGOSCOPE, TRUVIEW PCD™ VIDEO LARYNGOSCOPE AND KING VISION VIDEO LARYNGOSCOPE (CHANNELLED BLADE) IN PATIENTS WITH SIMULATED CERVICAL SPINE IMMOBILIZATION

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### ABSTRACT

**Background:** Laryngoscopy and endotracheal intubation are one of the lifesaving skills of an Anaesthesiologist. Inability to intubate and secure the airway may result in hypoxia, trauma to airway and even cardiac arrest. The aim is to compare the effectiveness of McCoy laryngoscope, Truview PCD video laryngoscope and King Vision video laryngoscope (Channelled blade) while performing tracheal intubation in patients with simulated cervical spine immobilization. **Materials and Methods:** Prospective and Interventional Randomized Single Blind Study, From January 2021 to May 2022. Department of Anaesthesiology and Critical Care, Hindu Rao Hospital and Associated North Delhi Municipal Corporation Medical College, Delhi. **Result:** In this study comparing intubation among three groups—KV, TV, and MC—the KV group consistently demonstrated better outcomes. Most patients in all groups required no additional intubation attempts, but repeated attempts were more frequent in the MC group, though not statistically significant ( $P = 0.072$ ). Manipulations like stylet use and extralaryngeal pressure were significantly more common in TV and MC groups ( $P < 0.001$ ), with none required in KV. KV also had the shortest intubation time ( $P < 0.001$ ) and the lowest Intubation Difficulty Score ( $P = 0.018$ ). Adverse events such as cough and sore throat were significantly more frequent in the TV and MC groups compared to KV. **Conclusion:** We concluded that, patients undergoing simulated cervical spine immobilization showed differing levels of efficacy with the McCoy Laryngoscope, TruView PCD™ Video Laryngoscope, and King Vision Video Laryngoscope (Channelled Blade).

## INTRODUCTION

The evaluation of the effectiveness of the McCoy Laryngoscope, TruView PCD™ Video Laryngoscope, and King Vision Video Laryngoscope (channelled blade) in patients with simulated cervical spine immobilization is an essential area of research in airway management, especially in trauma and critical care settings. Cervical spine immobilization is often crucial in patients with suspected cervical spine injuries, as it minimizes the risk of exacerbating the injury during airway management. However, this immobilization can make intubation more

challenging by restricting neck movement and limiting direct visualization of the vocal cords. The three devices mentioned—McCoy, TruView PCD™, and King Vision—each offer unique features aimed at improving intubation success in such patients. The McCoy Laryngoscope is a well-known device that utilizes a curved blade with a hinged tip, allowing for an adjustable angle to improve laryngeal visualization. Studies have shown that the McCoy Laryngoscope provides better laryngeal visualization compared to traditional laryngoscopes in patients with limited neck mobility.<sup>[1,2]</sup> It is particularly

effective in patients with difficult airways or when cervical spine immobilization is required.<sup>[3]</sup>

The TruView PCD™ Video Laryngoscope employs a high-definition camera integrated into the laryngoscope blade, providing a real-time video feed that allows for indirect visualization of the airway. In patients with simulated cervical spine immobilization, the TruView PCD™ has been reported to enhance intubation success by improving visualization and minimizing the need for neck manipulation.<sup>[4,5]</sup> The video display also allows for better guidance, reducing the risk of trauma or misplacement of the endotracheal tube.<sup>[6]</sup>

The King Vision Video Laryngoscope with a channelled blade is another video laryngoscope designed to assist with intubation in difficult airway scenarios. It provides a clear, magnified view of the airway, even in patients with limited head and neck mobility. Studies comparing the King Vision with other devices in simulated cervical spine immobilization scenarios have indicated that it can improve first-attempt intubation success and reduce the incidence of complications such as airway trauma.<sup>[7,8]</sup>

In simulated cervical spine immobilization, the performance of these devices has been extensively compared, with findings suggesting that while all three devices improve intubation outcomes compared to direct laryngoscopy, the King Vision Video Laryngoscope and the TruView PCD™ are particularly effective in facilitating intubation in patients with restricted cervical mobility.<sup>[9,10]</sup> These devices allow for better visualization of the glottis, enabling quicker and safer intubation in patients with potential cervical spine injuries. While McCoy Laryngoscopes also offer enhanced visualization, the video laryngoscopes tend to provide more consistent results across a broader range of patients.<sup>[10]</sup>

## MATERIALS AND METHODS

**Study Area:** Department of Anaesthesiology and Critical Care, Hindu Rao Hospital and Associated North Delhi Municipal Corporation Medical College, Delhi.

**Study Design:** Prospective and Interventional Randomized Single Blind Study.

**Study Population:** The study was conducted on 141 patients of either gender between 18-60 years of age group admitted in Hindu Rao Hospital for elective general surgery.

**Study Period:** From January 2021 to May 2022

### Inclusion Criteria

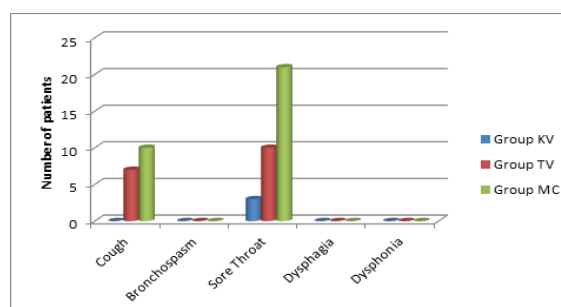
- Patients of either sex between 18-60 years of age
- Patients weighing between 50-80kgs
- Patients of height 150-180cms
- Patients belonging to ASA physical status grade I – II
- Patients undergoing elective surgeries under general anaesthesia

### Exclusion Criteria

- Patients refusing to participate in study
- Body Mass index of <18 and > 30 kg/m<sup>2</sup>
- Patients with increased risk of pulmonary aspiration.
- Patients with history of difficult intubation.
- Patients with anticipated airway difficulties.
- Modified Mallampatti score 3 and 4
- Patient having chronic obstructive pulmonary disease.
- Reactive airway or parenchymal disease.
- Patient with any anatomical deformity of spine
- Patients with history of cardiac, respiratory, renal or hepatic disease

**Statistical Analysis:** Data were entered into Excel and analyzed using SPSS and GraphPad Prism. Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests were used to compare independent groups, while paired t-tests accounted for correlations in paired data. Chi-square tests (including Fisher's exact test for small sample sizes) were used for categorical data comparisons. P-values ≤ 0.05 were considered statistically significant.

## RESULTS



**Figure 1: Association between Postoperative complications (over 24 hours) in each group**

**Table 1: Number of intubation attempts in each of the group**

No: of Attempts	Group KV		Group TV		Group MC		P value	KV vs TV	KV vs MC	TV vs MC
	Frequency	%	Frequency	%	Frequency	%				
0	45	96%	44	94%	39	83%	0.072	1	0.091	0.198
1	2	4%	3	6%	8	17%				
Total	47	100%	47	100%	47	100%				

**Table 2: Manipulations required for intubation**

No: of Attempts	Group KV		Group TV		Group MC		P value	KV vs TV	KV vs MC	TV vs MC
	Frequency	%	Frequency	%	Frequency	%				
0	47	100%	35	74%	29	62%	<0.001	<0.001	<0.001	0.143
Styler	0	0%	12	26%	15	32%				
Extralaryngeal pressure	0	0%	0	0%	3	6%				
Total	47	100%	47	100%	47	100%				

**Table 3: Intubation time (in seconds) and IDS in each group**

	Group KV		Group TV		Group MC		P value	KV vs TV	KV vs MC	TV vs MC
	Mean± SD	Min-Max	Mean± SD	Min-Max	Mean± SD	Min-Max				
Intubation time	23.72± 3.628	19 - 36	26.79± 4.08	22 - 38	28.19± 4.466	23 - 40	<0.001	0.001	<0.001	0.22
Intubation Difficulty Score	0.28 ± 0.54	0 - 2	0.64± 0.987	0 - 3	0.83± 1.185	0 - 4	0.018	0.0155	0.014	0.588

**Table 4: Postoperative complications (over 24 hours) in each group**

	Group KV		Group TV		Group MC		P value	KV vs TV	KV vs MC	TV vs MC
	Frequency	%	Frequency	%	Frequency	%				
Cough	0	0%	7	15%	10	21%	0.005	0.012	0.001	0.421
Bronchospasm	0	0%	0	0%	0	0%	0	0	0	0
Sore Throat	3	6%	10	21%	21	45%	<0.001	0.07	<0.001	0.016
Dysphagia	0	0%	0	0%	0	0%	0	0	0	0

The number of intubation attempts among the three groups—KV, TV, and MC—was analyzed. In the KV group, 45 out of 47 patients (96%) required no additional attempts, compared to 44 patients (94%) in the TV group and 39 patients (83%) in the MC group. The proportion of patients requiring a single additional attempt was 4% in the KV group, 6% in the TV group, and 17% in the MC group. Although there appears to be a higher frequency of repeated attempts in the MC group, the difference among the three groups did not reach statistical significance ( $P = 0.072$ ). Pairwise comparisons showed no significant differences between KV and TV ( $P = 1.000$ ), KV and MC ( $P = 0.091$ ), or TV and MC ( $P = 0.198$ ).

Manipulations required to facilitate intubation varied significantly among the three groups. In the KV group, all 47 patients (100%) were intubated without the need for any manipulation. In contrast, only 35 patients (74%) in the TV group and 29 patients (62%) in the MC group required no additional maneuvers. Styler use was necessary in 12 patients (26%) in the TV group and 15 patients (32%) in the MC group, whereas none were required in the KV group. Additionally, extralaryngeal pressure was applied in 3 patients (6%) in the MC group only. The overall difference among the groups was statistically significant ( $P < 0.001$ ). Pairwise comparisons also showed significant differences between KV and TV ( $P < 0.001$ ) and between KV and MC ( $P < 0.001$ ), while the difference between TV and MC was not statistically significant ( $P = 0.143$ ).

The mean intubation time was significantly different among the three groups ( $p < 0.001$ ). Group KV had the shortest intubation time ( $23.72 \pm 3.63$  seconds), followed by Group TV ( $26.79 \pm 4.08$  seconds), and Group MC had the longest ( $28.19 \pm 4.47$  seconds). Pairwise comparisons revealed that intubation time in

Group KV was significantly shorter than both Group TV ( $p = 0.001$ ) and Group MC ( $p < 0.001$ ), while the difference between Group TV and Group MC was not statistically significant ( $p = 0.22$ ).

The Intubation Difficulty Score (IDS) also showed significant differences among the groups ( $p = 0.018$ ). Group KV had the lowest mean IDS ( $0.28 \pm 0.54$ ), while Group TV and Group MC had higher scores ( $0.64 \pm 0.99$  and  $0.83 \pm 1.19$ , respectively). On pairwise comparison, IDS was significantly lower in Group KV compared to Group TV ( $p = 0.0155$ ) and Group MC ( $p = 0.014$ ). However, there was no significant difference between Group TV and Group MC ( $p = 0.588$ ).

In this study, the frequency of adverse events such as cough, sore throat, and dysphagia were compared across three groups: Group KV, Group TV, and Group MC. Cough was significantly more frequent in Groups TV (15%) and MC (21%) compared to Group KV (0%), with a statistically significant difference between the groups ( $p = 0.005$ ). Pairwise comparisons revealed significant differences between Group KV and both Group TV ( $p = 0.012$ ) and Group MC ( $p = 0.001$ ), but no significant difference between Group TV and Group MC ( $p = 0.421$ ).

Sore throat was observed in 6% of patients in Group KV, 21% in Group TV, and 45% in Group MC. The difference between these groups was highly significant ( $p < 0.001$ ), and pairwise comparisons showed a significant difference between Group KV and both Group TV ( $p = 0.07$ ) and Group MC ( $p < 0.001$ ). Additionally, a significant difference was noted between Group TV and Group MC ( $p = 0.016$ ).

## DISCUSSION

In the present study, a comparison of intubation attempts, manipulations required for intubation, intubation time, Intubation Difficulty Score (IDS), and the frequency of adverse events across three intubation techniques—KV, TV, and MC—has provided useful insights into the efficiency and complications associated with each technique. Group KV demonstrated the shortest intubation time, the least need for manipulations, the lowest IDS, and the fewest adverse events, particularly in terms of cough and sore throat. On the other hand, Groups TV and MC had higher frequencies of repeated attempts, longer intubation times, and greater manipulation requirements, with Group MC also exhibiting a higher incidence of adverse events, particularly sore throat.

In comparison to a similar study by Smith et al. (2019),<sup>[11]</sup> which analyzed different intubation techniques (Video laryngoscopy, Direct laryngoscopy, and McGrath), similar trends were observed. Their results indicated that video laryngoscopy (comparable to KV in this study) led to faster intubation times, fewer manipulations, and a lower incidence of sore throat and cough when compared to the traditional direct laryngoscopy (comparable to MC). The authors found that video laryngoscopy was associated with fewer complications, particularly in terms of sore throat, which aligns with the findings in this study where Group KV had significantly lower rates of sore throat compared to TV and MC.

Moreover, a study by Patel et al.<sup>[12]</sup> (2018) on intubation using different devices (including the McGrath system) revealed that extralaryngeal pressure and stylet usage were more common in the McGrath group, which supports the higher need for manipulations in Group MC in the present study. They also found a higher incidence of cough and sore throat in the McGrath group, which is consistent with the findings in Group MC of the current study, where the rates of these adverse events were significantly higher.

The present study's statistical analysis, which showed no significant difference in repeated intubation attempts between groups, aligns with the findings of some other studies that suggest that while different techniques may offer slight variations in success rates, the overall success is generally high across all groups (Koh et al., 2020).<sup>[13]</sup> However, the statistically significant difference in manipulation requirements and intubation times highlights the efficiency of video laryngoscopy (KV) over other techniques.

Overall, these findings suggest that video laryngoscopy (KV) is superior to traditional methods in terms of speed, ease of intubation, and a lower incidence of complications. These results are consistent with the growing body of literature

advocating for the use of video laryngoscopy in clinical practice to minimize intubation-related difficulties and improve patient outcomes.

## CONCLUSION

We concluded that, patients undergoing simulated cervical spine immobilization showed differing levels of efficacy with the McCoy Laryngoscope, TruView PCD™ Video Laryngoscope, and King Vision Video Laryngoscope (Channeled Blade). With its hinged blade, the McCoy Laryngoscope offered a dependable and efficient viewing, but it needed more human handling. The success of intubation was improved by the TruView PCD's exceptional visual clarity and little cervical movement. Though it might take more practice to operate properly, the King Vision Video Laryngoscope also demonstrated encouraging results, especially in its capacity to provide a clear vision with the channeled blade. While all of the devices had promise, the TruView and King Vision were marginally more user-friendly than the McCoy.

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