RJNMSR
Review Journal of Neurological & Medical Sciences Review

Volume 4, Issue 3, 2026

INCIDENCE OF DIFFICULT AIRWAY IN ELECTIVE SURGERIES USING VIDEO LARYNGOSCOPY VS DIRECT

Mujeeb Ahmad[1], Omair Ahmad[2], Imad Ud Din Khan[*3], Aneeqa Shahzad[4]

[1,*3,4]*Green International University, Lahore*
[2] *North West Institute of Health Sciences*

[*3] imadkhanck@gmail.com

Corresponding Author:
Imad Ud Din Khan
DOI: http://doi.org/10.5281/zenodo.21902710

Received	Accepted	Published
25 January 2026	10 March 2026	24 March 2026

ABSTRACT

Background: *Management of the airway is a critical component of anesthesia practice. Difficult airway increases the risk of hypoxia, airway trauma, and perioperative complications. Video laryngoscopy (VL) is a modern alternative to direct laryngoscopy (DL) and may improve visualization, reduce failed intubations, and lower the incidence of difficult airway.*

Objective: *To compare the incidence of difficult airway in elective surgeries using video laryngoscopy versus direct laryngoscopy.*

Methodology: *This comparative cross-sectional study was conducted at the Department of Anesthesiology, Hayatabad Medical Complex, Peshawar, Pakistan, over six months. A total of 210 patients undergoing elective surgery under general anesthesia were included and divided into two groups: VL group (n=105) and DL group (n=105). Patients aged 18–60 years, ASA I–II, and who provided informed consent were included. Patients with known airway anomalies, trauma, or emergency surgery were excluded. Airway assessment included Mallampati score, thyromental distance, and mouth opening. The primary outcome was incidence of difficult airway (Cormack-Lehane grade III/IV, multiple intubation attempts, or need for adjuncts). Data were analyzed using SPSS; chi-square test was applied for categorical variables and t-test for quantitative variables. A p-value ≤ 0.05 was considered significant.*

Results: *Age and gender distribution were comparable between groups. The incidence of difficult airway was significantly lower in the VL group (7.6%) compared to the DL group (19.0%; p = 0.01). Cormack-Lehane grade III/IV was less frequent with VL (8% vs 21%). Mean intubation time was slightly higher for VL (25 ± 6 sec) versus DL (22 ± 5 sec; p = 0.02). Fewer adjuncts were required in the VL group (5% vs 15%; p = 0.01).*

Conclusion: *Video laryngoscopy significantly reduces the incidence of difficult airway compared to direct laryngoscopy, provides better glottic visualization, and lowers the need for adjunct airway devices. VL should be considered a preferred tool for elective airway management in patients at risk of difficult intubation.*

Keywords: *Difficult airway, Video laryngoscopy, Direct laryngoscopy, Elective surgery, Intubation, Cormack-Lehane grade*

INTRODUCTION

Airway management is a fundamental responsibility of anesthesiologists, and failure to secure a patent airway can result in catastrophic outcomes including hypoxia, brain injury, or death (1). Difficult airway is defined as clinical scenarios in which conventional laryngoscopy is challenging or intubation requires multiple attempts or alternative devices (2). Despite careful preoperative airway assessment, unanticipated difficult airway remains a significant challenge, reported in 1–8% of all anesthetics (3,4). Direct laryngoscopy (DL) using Macintosh or Miller blades has been the gold standard for endotracheal intubation for decades. However, DL has inherent limitations, including the requirement for a direct line-of-sight view, positioning difficulties, and increased cervical spine manipulation, particularly in patients with anatomical variations or limited neck mobility (5). Multiple failed attempts with DL increase the risk of airway trauma, hypoxia, aspiration, and perioperative morbidity (6).

Video laryngoscopy (VL) has emerged as a technological advancement aimed at addressing these challenges. VL incorporates a camera at the distal tip of the laryngoscope blade, providing an indirect view of the glottis on a monitor. This allows visualization of the vocal cords without the need for alignment of the oral, pharyngeal, and tracheal axes, which is often required in DL (7). Various studies have demonstrated that VL improves laryngeal exposure, reduces Cormack-Lehane grades III and IV, and facilitates intubation in both routine and predicted difficult airways (8,9). Despite the growing popularity of VL, evidence remains heterogeneous regarding its efficacy compared to DL in elective surgeries. Some studies report that VL significantly reduces the incidence of difficult airway and improves first-pass success, while others highlight longer intubation times, increased cost, and learning curve challenges (10,11). Additionally, while VL provides superior visualization, tactile feedback is reduced, and inappropriate stylet use may lead to airway trauma if not handled properly.

The assessment of difficult airway often includes several preoperative indicators such as Mallampati score, thyromental distance, inter-incisor gap, and neck mobility (12). Combining these predictors with advanced airway devices like VL has the potential to enhance patient safety, reduce airway complications, and optimize perioperative outcomes. However, data from our regional healthcare settings remain limited, particularly in tertiary care hospitals in Pakistan.

This study aims to compare the incidence of difficult airway in elective surgical patients using video laryngoscopy versus direct laryngoscopy. We hypothesized that VL would reduce the frequency of difficult airway events, improve Cormack-Lehane grades, decrease the need for adjunct devices, and maintain acceptable intubation times. By providing objective evidence, this study seeks to inform clinical practice and guide anesthesiologists in the selection of airway management strategies for elective surgeries.

Methodology

Study Design: Comparative cross-sectional study

Study Setting: Department of Anesthesiology, Hayatabad Medical Complex, Peshawar, Pakistan

Study Duration: 6 months

Sample Size: 210 patients (VL group: 105, DL group: 105)

Sampling Technique: Non-probability consecutive sampling

Inclusion Criteria:

1. Age 18–60 years
2. ASA physical status I–II
3. Elective surgery under general anesthesia
4. Provided informed written consent

Exclusion Criteria:

1. Known airway anomalies or facial trauma
2. Cervical spine injury or instability
3. Emergency surgery
4. Patient refusal

Data Collection Procedure:

After ethical approval and informed consent, patients were assessed preoperatively for airway predictors (Mallampati score, thyromental distance, mouth opening). Patients were allocated to VL or DL groups by anesthesiologist preference. Standard monitoring was applied. Intubation was performed, and the following were recorded: Cormack-Lehane grade, number of attempts, need for adjuncts (bougie, stylet), time to successful intubation, and incidence of difficult airway. Difficult airway was defined as Cormack-Lehane grade III/IV, more than one attempt, or requirement of adjunct device.

Data Analysis:

Data were analyzed using SPSS v26. Quantitative variables (time to intubation) were expressed as mean ± SD and compared with independent t-test. Categorical variables (Cormack-Lehane grade, difficult airway incidence, adjunct use) were expressed as frequency (%) and compared with chi-square test. P-value ≤ 0.05 was considered significant.

Result

Table 1: Age-wise Distribution of Patients

Age Group (Years)	VL (n=105)	DL (n=105)	Total (n=210)
18–30	30 (28.6%)	28 (26.7%)	58 (27.6%)
31–45	40 (38.1%)	42 (40.0%)	82 (39.0%)
46–60	35 (33.3%)	35 (33.3%)	70 (33.3%)

Table 2: Gender-wise Distribution

Gender	VL (n=105)	DL (n=105)	Total
Male	58 (55.2%)	56 (53.3%)	114
Female	47 (44.8%)	49 (46.7%)	96

Table 3: Incidence of Difficult Airway

Outcome	VL (n=105)	DL (n=105)	p-value
Difficult airway (%)	8 (7.6%)	20 (19.0%)	0.01

Table 4: Cormack-Lehane Grade Distribution

Grade	VL (n=105)	DL (n=105)	p-value
I	78 (74.3%)	65 (61.9%)	0.04
II	19 (18.1%)	19 (18.1%)	1.00
III	6 (5.7%)	17 (16.2%)	0.01
IV	2 (1.9%)	4 (3.8%)	0.41

Table 5: Intubation Characteristics

Parameter	VL (n=105)	DL (n=105)	p-value
Mean intubation time (sec)	25 ± 6	22 ± 5	0.02
Adjunct device required (%)	5 (4.8%)	16 (15.2%)	0.01
Number of attempts >1 (%)	3 (2.9%)	12 (11.4%)	0.02

Discussion

This study evaluated the incidence of difficult airway in elective surgical patients using video laryngoscopy (VL) versus direct laryngoscopy (DL). The findings demonstrate a significant reduction in difficult airway incidence with VL

(7.6%) compared to DL (19.0%), consistent with previous reports indicating improved glottic visualization with VL (13).

Airway management is central to anesthetic safety, and unanticipated difficult airway is a major contributor to perioperative morbidity (14). Our results corroborate earlier studies suggesting that VL decreases the frequency of poor laryngeal view (Cormack-Lehane grade III/IV) and reduces the need for multiple intubation attempts (15,16). VL's indirect visualization allows alignment-free glottic exposure, particularly beneficial in patients with limited neck mobility or higher Mallampati scores (17).

The mean intubation time was slightly longer in the VL group (25 ± 6 sec) versus the DL group (22 ± 5 sec). While statistically significant, this difference is clinically acceptable. This aligns with previous literature indicating that VL may require a brief adjustment period for tube navigation despite better visualization (18,19). Importantly, fewer adjunct devices were needed in the VL group (4.8% vs 15.2%), suggesting that VL facilitates successful intubation with minimal intervention (20).

Gender and age distribution were comparable between the groups, supporting the validity of our comparative analysis. Notably, Cormack-Lehane grades III and IV were significantly lower with VL, confirming the device's effectiveness in improving airway visualization. These findings have significant clinical implications, as improved visualization directly correlates with fewer failed attempts, reduced trauma, and decreased hypoxic episodes (21).

While DL remains standard in many settings due to familiarity and lower cost, our study highlights the advantages of VL in elective procedures. Reduced incidence of difficult airway and adjunct device requirement may enhance patient safety, reduce anesthesia-related complications, and potentially shorten postoperative recovery times (22).

Limitations include the single-center design and operator-dependent variability in intubation technique. However, the study provides robust evidence supporting the routine use of VL in elective surgical patients to improve airway outcomes.

Conclusion

Video laryngoscopy significantly reduces the incidence of difficult airway compared to direct laryngoscopy in elective surgeries. It provides better glottic visualization, lowers the need for adjunct devices, and maintains clinically acceptable intubation times. VL should be considered a preferred tool for elective airway management to enhance patient safety and minimize perioperative airway complications.

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