



A COMPARATIVE CLINICAL STUDY TO EVALUATE INTUBATING CONDITIONS BETWEEN MEDIMINERS VIDEO LARYNGOSCOPE AND MCCOY BLADE IN DIFFICULT INTUBATION : A RANDOMISED CONTROLLED SINGLE BLINDED TRAIL

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Abstract

Background

Effective airway management remains one of the most important responsibilities of the anesthesiologist, particularly in patients with anticipated difficult airways. Although the McCoy laryngoscope has been widely used to improve glottic visualization through its hinged levering tip, successful intubation still depends on optimal alignment of the oral, pharyngeal, and laryngeal axes. Video laryngoscopes have revolutionized airway management by providing an indirect view of the glottis, thereby facilitating tracheal intubation with minimal airway manipulation. The mediminers video laryngoscope is a recently introduced, cost-effective video laryngoscope with limited published clinical evidence. The present study was undertaken to compare the mediminers video laryngoscope with the McCoy laryngoscope in patients with anticipated difficult airways.

Methods

This prospective randomized controlled single-blinded study included 90 adult patients (ASA physical status I–II) (American society anesthesiologist) aged 18–55 years with anticipated difficult airway (Modified Mallampati Grade III or IV) or cervical spine instability undergoing elective surgery under general anesthesia requiring endotracheal intubation. Patients were randomly allocated into two groups of 45 each: Group V (mediminers video laryngoscope) and Group M (McCoy laryngoscope). The primary outcome was the Intubation Difficulty Scale (IDS) score. Secondary outcomes included Cormack–Lehane grade, time to glottic visualization, total intubation time, ease of intubation, requirement for external laryngeal manipulation, first-pass success, and hemodynamic responses.

Results

The mediminers video laryngoscope demonstrated significantly lower IDS scores compared with the McCoy laryngoscope (median 1 vs. 4, $p < 0.001$). Patients in the mediminers group achieved superior glottic visualization, shorter laryngoscopy and intubation times, higher first-pass success rates, improved ease of intubation, and significantly fewer optimization maneuvers. Hemodynamic

responses following laryngoscopy and tracheal intubation were also significantly attenuated in the mediminers group.

Conclusion

The mediminers video laryngoscope provided superior intubating conditions compared with the McCoy laryngoscope in patients with anticipated difficult airways. Improved glottic visualization, reduced intubation difficulty, shorter procedural duration, and better hemodynamic stability suggest that the mediminers video laryngoscope is an effective alternative for the management of anticipated difficult airway.

Key Words: mediminers video laryngoscope, McCoy laryngoscope, difficult airway, videolaryngoscopy, Intubation Difficulty Scale, Cormack–Lehane grade, airway management.

Introduction

- Securing the airway through endotracheal intubation is a fundamental responsibility of the anesthesiologist, and failure to achieve timely intubation remains a major cause of anesthesia-related morbidity and mortality. Anticipated difficult airways, particularly in patients with high Mallampati grades or restricted cervical spine movement, demand airway devices that maximize first-pass success while minimizing airway trauma and physiological stress(1)
- The McCoy laryngoscope, with its hinged levering tip, was developed to improve glottic exposure by facilitating indirect elevation of the epiglottis without excessive force. Although it has shown advantages over the conventional Macintosh blade in selected difficult airways, successful intubation still depends on adequate alignment of the oral, pharyngeal, and laryngeal axes.(2)
- Video laryngoscopy has transformed airway management by providing an indirect, magnified view of the glottis, thereby improving visualization without the need for complete airway axis alignment. These devices have demonstrated higher
- first-attempt success rates, improved Cormack–Lehane grades, and reduced airway manipulation in patients with anticipated difficult intubation. Among the newer video laryngoscopes, the mediminers Video Laryngoscope combines an ergonomically designed blade with an integrated high-resolution imaging system, offering enhanced glottic visualization while maintaining a familiar laryngoscopy technique.
- Its cost-effectiveness and ease of use make it a promising alternative in resource-limited settings.
- Despite the increasing availability of video laryngoscopes, evidence comparing the MediMiners VideoLaryngoscope with the McCoy blade in anticipated difficult airway management remains limited. Therefore, this randomized controlled study was undertaken to compare these two devices with respect to intubation time, laryngoscopic view, first-pass success, number of intubation attempts, and hemodynamic responses, with the aim of identifying the more effective device for managing anticipated difficult airways(3)

Methods

Study Design and Ethical Approval

This prospective randomized controlled single-blinded study was conducted in the Department of Anaesthesiology at Narayana Medical College and Hospital after obtaining approval from the Institutional Ethics Committee (IEC/NMC/10 July 2025/08). The study was carried out between August 2025 and January 2026 in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from all participants before enrolment.

Study Population

Ninety adult patients aged 18–55 years belonging to the American Society of Anesthesiologists (ASA) physical status I and II who were scheduled to undergo elective surgery under general anesthesia requiring endotracheal intubation were included in the study. Patients were selected if they had an anticipated difficult airway, defined by Modified Mallampati Grade III or IV and/or cervical spine instability.

Sample Size and Randomization

A total of 90 patients were randomly allocated into two equal groups (45 patients each) using the sealed opaque envelope method.

Group V (n = 45): Tracheal intubation using the mediminers video laryngoscope.

Group M (n = 45): Tracheal intubation using the McCoy laryngoscope.

Allocation concealment was maintained until immediately before induction of anesthesia.

Inclusion Criteria

- Age between 18 and 55 years.
- ASA physical status I or II.
- Elective surgery under general anesthesia requiring endotracheal intubation.
- Anticipated difficult airway (Modified Mallampati Grade III or IV).
- Cervical spine instability.
- Written informed consent.

Exclusion Criteria

- Patient refusal.
- Risk of aspiration.
- Emergency surgery.
- Uncontrolled hypertension.
- Patients receiving antihypertensive medications.
- Intubation time exceeding 120 seconds.
- Patients requiring an alternative airway technique

Anesthetic Protocol

All patients underwent a detailed preoperative assessment, including airway evaluation by an anesthesiologist who was blinded to the group allocation. Standard fasting guidelines were followed, and all patients remained nil per oral for at least 8 hours before surgery.

On arrival in the operating room, standard American Society of Anesthesiologists (ASA) monitoring was instituted, including continuous electrocardiography (ECG), pulse oximetry (SpO₂), non-invasive blood pressure (NIBP), and heart rate (HR). Baseline hemodynamic parameters were recorded before induction of anesthesia.

Patients were preoxygenated with 100% oxygen for three minutes using a face mask. General anesthesia was induced with intravenous midazolam (0.05 mg/kg), fentanyl (2 µg/kg), and propofol (2–3 mg/kg). Following confirmation of adequate mask ventilation, cisatracurium (0.2 mg/kg) was administered intravenously to facilitate neuromuscular relaxation. After three minutes of manual ventilation with oxygen, tracheal intubation was performed using the allocated laryngoscopic device.

All intubations were performed by experienced consultant anesthesiologists familiar with both devices to minimize operator-related variability. Anaesthesia was maintained with sevoflurane in a mixture of oxygen and air (40:60), and additional doses of muscle relaxant were administered as required.

Intubation Technique

Patients assigned to Group V underwent laryngoscopy using the mediminers video laryngoscope, whereas patients assigned to Group M were intubated using the McCoy laryngoscope.

For the McCoy group, intubation was performed according to the standard direct laryngoscopy technique. The levering mechanism of the McCoy blade was activated whenever necessary to improve visualization of the laryngeal inlet.

For the mediminers group, the blade was introduced through the midline of the oral cavity. Once the blade tip passed the base of the tongue, the glottic structures were visualized on the integrated video display. A styletted cuffed polyvinyl chloride endotracheal tube (7.0 mm internal diameter for females and 8.0 mm for males) was advanced under continuous video guidance through the vocal cords until correct placement was confirmed. Visualizing the glottic aperture, the curved ETT mounted on a stylet was guided through the vocal cords. Anesthesia was maintained with air and Oxygen (60:40) and sevoflurane. The primary outcome was the Intubation Difficulty Scale (IDS) score described by Adnet et al.[4] [Annexure 1].

ANNEXURE 1

ADENT'S INTUBATION DIFFICULTY SCORE (IDS)

The IDS score is the sum of the following seven variable :

N1	Number of intubation attempts >1
N2	The number of operations >1
N3	The number of alternative techniques used
N4	Glottic exposure(cormack and lehane grade 1)
N5	Lifting force required during laryngoscopy (0= normal; 1= increased)
N6	Necessity for laryngeal pressure (0= not applied,1= applied)
N7	Vocal cord mobility (abduction=0; adduction+1

Total IDS = SUM OF SCORES

OUTCOME MEASURES

Primary Outcome

The primary outcome measure was the Intubation Difficulty Scale (IDS) described by Adnet et al. The IDS is a validated composite score incorporating multiple variables related to tracheal intubation, including the number of attempts, additional operators, alternative techniques, Cormack–Lehane grade, lifting force, external laryngeal manipulation, and vocal cord mobility. Lower IDS scores indicate easier intubation.

Modified Cormack–Lehane (MCL) grade

Secondary Outcomes

Secondary outcome measures included:

- Modified Cormack–Lehane (MCL) grade
- Time to glottic visualization
- Time required for endotracheal intubation
- Total intubation time
- Ease of intubation
- Hemodynamic responses

Definitions of Time Intervals

Time to glottic visualization was defined as the interval between insertion of the laryngoscope blade into the oral cavity and visualization of the best glottic view.

Time to intubation was defined as the interval from visualization of the glottis until successful passage of the endotracheal tube through the vocal cords.

Total intubation time was calculated as the interval from insertion of the laryngoscope blade into the mouth until successful placement of the endotracheal tube.

Ease of intubation was categorized by the anesthesiologist performing the procedure as easy or difficult based on the need for optimization maneuvers or additional attempts.

Hemodynamic Assessment

Heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) were recorded at the following predefined intervals:

- Baseline
- Post induction
- Pre-intubation
- Immediately after intubation
- Three minutes after intubation
- Five minutes after intubation

Statistical Analysis

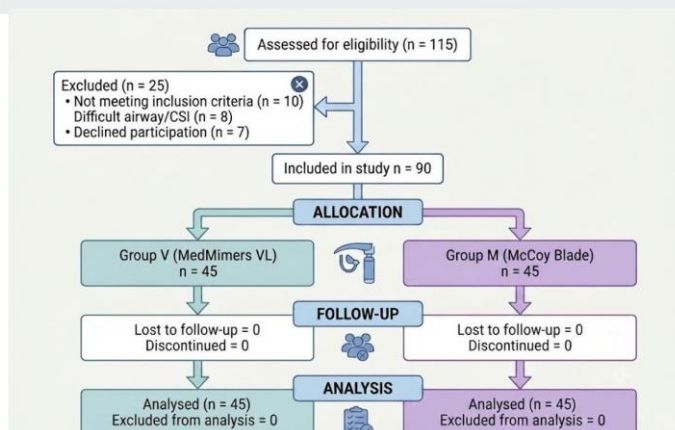
Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM Corp., Armonk, NY, USA).

Continuous variables were expressed as mean $\pm$ standard deviation (SD) or median (interquartile range) depending on data distribution, whereas categorical variables were presented as frequencies and percentages.

Continuous variables were compared using the independent samples t-test, while categorical variables were analyzed using the Chi-square test or Fisher's exact test, wherever appropriate.

The Intubation Difficulty Scale score, being non-parametric, was expressed as median with interquartile range and compared using the Mann–Whitney U test.

A two-tailed p value <0.05 was considered statistically significant



Results

Parameter	Group-V (n=45)	Group-M (n=45)	P value	Result
IDS Score (Median, IQR)	1 (0–1)	4 (3–6)	<0.001	Significant
Total Intubation Time (sec)	18.9 ± 3.5	21.4 ± 4.2	<0.004	Significant
Time to Glottic View (sec)	4.8 ± 1.2	7.2 ± 1.8	<0.001	Significant
Time to Intubation (sec)	4.1 ± 2.8	16.2 ± 3.3	0.006	Significant

Patient Characteristics

A total of 90 patients fulfilling the eligibility criteria were enrolled and randomized equally into two groups. All randomized patients completed the study and were included in the final statistical analysis. No patient required exclusion after randomization, and there were no protocol deviations. The demographic characteristics of the two groups were comparable with respect to age, gender distribution, body weight, height, body mass index, ASA physical status, and airway assessment parameters. No statistically significant differences were observed between the two groups ($p > 0.05$), indicating successful randomization.

(Table 1: Baseline demographic characteristics)

Parameter	Group-V (n=45)	Group-M (n=45)	P value	Result
Cormack-Lehane Grade I	42 (93.3%)	29 (64.4%)	0.001	Significant
Ease of Intubation (Easy)	43 (95.6%)	34 (75.6%)	0.009	Significant

Intubation Parameters

The mediminers video laryngoscope demonstrated significantly superior intubating conditions compared with the McCoy laryngoscope.

The median IDS score was significantly lower in Group V than in Group M [1 (IQR 0–1) vs. 4 (IQR 3–6); $p < 0.001$], indicating easier tracheal intubation.

Similarly, total intubation time was significantly shorter in the mediminers group (18.9 ± 3.5 seconds) compared with the McCoy group (21.4 ± 4.2 seconds; $p=0.004$).

Patients intubated using the mediminers video laryngoscope also demonstrated significantly shorter time to glottic visualization (4.8 ± 1.2 seconds vs. 7.2 ± 1.8 seconds; $p<0.001$) and significantly shorter time required for passage of the endotracheal tube (4.1 ± 2.8 seconds vs. 16.2 ± 3.3 seconds; $p=0.006$).

These findings indicate that the mediminers video laryngoscope simplified airway management and facilitated faster completion of tracheal intubation.

(Table 2: Comparison of Intubation Parameters)

Time Point	HR Mediminers	HR Mccoy	SBP Mediminers	SBP Mccoy	P value
Baseline	82.3 ± 7.6	81.9 ± 7.8	122.1 ± 9.2	121.8 ± 8.9	>0.05
Post-induction	77.6 ± 7.2	77.1 ± 7.5	116.4 ± 8.5	115.9 ± 8.8	>0.05
Pre-intubation	79.2 ± 7.3	78.7 ± 7.4	118.2 ± 8.7	117.4 ± 8.5	>0.05
Post-intubation	87.4 ± 8.1	93.8 ± 8.9	126.8 ± 9.4	133.9 ± 10.2	<0.001
3 minutes	84.1 ± 7.8	87.6 ± 8.1	123.4 ± 8.9	126.8 ± 9.3	0.02
5 minutes	82.7 ± 7.5	84.3 ± 7.7	121.5 ± 8.8	123.2 ± 8.9	>0.05

Laryngoscopic View and Ease of Intubation

Grade I Modified Cormack–Lehane view was achieved in 93.3% of patients in the mediminers group compared with 64.4% in the McCoy group ($p=0.001$).

Easy intubation was achieved in 95.6% of patients intubated with the mediminers video laryngoscope compared with 75.6% of patients intubated using the McCoy laryngoscope ($p=0.009$).

These findings demonstrate superior glottic visualization and improved ease of tracheal intubation with the mediminers video laryngoscope.

(Table 3: Laryngoscopic View and Ease of Intubation)

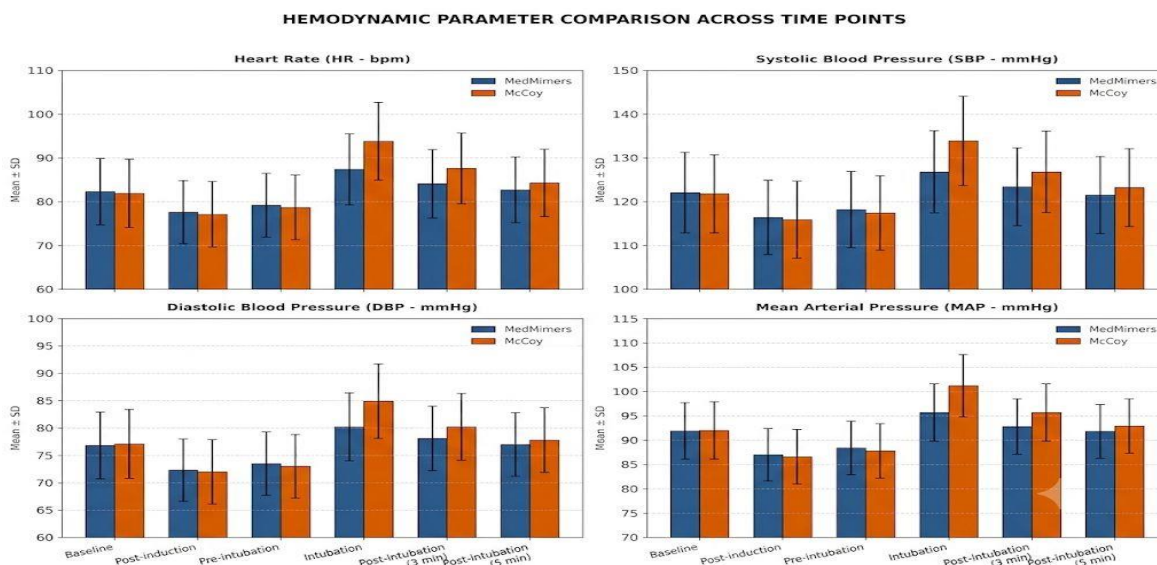
Time Point	DBP Mediminers	DBP Mccoy	MAP Mediminers	MAP Mccoy	P value
Baseline	76.8 ± 6.1	77.1 ± 6.3	91.9 ± 5.8	92.0 ± 5.9	>0.05
Post-induction	72.3 ± 5.7	72.0 ± 5.9	87.0 ± 5.4	86.6 ± 5.6	>0.05
Pre-intubation	73.5 ± 5.8	73.0 ± 5.8	88.4 ± 5.5	87.8 ± 5.6	>0.05
Post-intubation	80.2 ± 6.2	84.9 ± 6.8	95.7 ± 5.9	101.2 ± 6.4	<0.001
3 minutes	78.1 ± 5.9	80.2 ± 6.1	92.8 ± 5.7	95.7 ± 5.9	0.02
5 minutes	77.0 ± 5.8	77.8 ± 5.9	91.8 ± 5.5	92.9 ± 5.6	>0.05

Hemodynamic Parameters

The hemodynamic profiles of both groups were comparable at baseline, after induction of anesthesia, and immediately before tracheal intubation, with no statistically significant differences observed between the groups ($p>0.05$).

Following laryngoscopy and endotracheal intubation, both groups demonstrated the expected sympathetic response characterized by transient increases in heart rate and arterial blood pressure. However, the magnitude of this response was significantly lower in the mediminers group.

Immediately after intubation, patients intubated with the mediminers video laryngoscope demonstrated significantly lower heart rate (87.4 ± 8.1 vs. 93.8 ± 8.9 beats/min; $p<0.001$), systolic blood pressure (126.8 ± 9.4 vs. 133.9 ± 10.2 mmHg; $p<0.001$), diastolic blood pressure (80.2 ± 6.2 vs. 84.9 ± 6.8 mmHg; $p<0.001$), and mean arterial pressure (95.7 ± 5.9 vs. 101.2 ± 6.4 mmHg; $p<0.001$) compared with the McCoy group.



At three minutes after intubation, heart rate and blood pressure remained significantly lower in the mediminers group, although the differences were less pronounced than those observed immediately after intubation.

By five minutes after intubation, the hemodynamic parameters in both groups had returned close to baseline values, with no statistically significant differences between the two groups.

These findings suggest that the mediminers video laryngoscope is associated with a significantly attenuated cardiovascular response to laryngoscopy and tracheal intubation.

(Table 4. Comparison of Hemodynamic Parameters)

Discussion

- In the present randomized controlled study, the mediminers videolaryngoscope demonstrated superior overall performance compared with the McCoy laryngoscope.
- Patients intubated using the MediMiners device exhibited significantly lower Intubation Difficulty Scale (IDS) scores, shorter laryngoscopy and intubation times, improved Cormack–Lehane grades, greater ease of intubation, and a smaller hemodynamic response following airway instrumentation.
- These findings suggest that the mediminers videolaryngoscope provides meaningful clinical advantages during the management of anticipated difficult airways (1-3)
- The Intubation Difficulty Scale was chosen as the primary outcome because it objectively reflects the overall complexity of tracheal intubation by incorporating multiple procedural variables rather than relying on a single parameter
- In the present study, the significantly lower IDS score observed with the mediminers videolaryngoscope indicates that tracheal intubation was accomplished with fewer technical difficulties and less need for optimization maneuvers
- This finding is clinically important because the IDS provides a comprehensive assessment of intubation performance, encompassing glottic exposure, lifting force, external laryngeal pressure, alternative techniques, and the number of intubation attempts.
- Therefore, the lower IDS score observed in our study reflects an overall simplification of airway management rather than an isolated improvement in visualization alone(4,5).
- The quality of laryngeal exposure remains a key determinant of successful endotracheal intubation. In the present study, Grade I Cormack–Lehane view was obtained in 93.3% of patients intubated with the mediminers videolaryngoscope compared with 64.4% in the McCoy group

- The integrated high-definition camera of the mediminers device enables continuous visualization of the glottic aperture without requiring complete alignment of the oral, pharyngeal, and laryngeal axes.
- This combination of indirect visualization and conventional blade geometry may explain the superior laryngoscopic view observed in our study(6,7)
- Efficient completion of tracheal intubation is particularly important in patients with anticipated difficult airways, as prolonged airway instrumentation increases the duration of apnea and may predispose patients to hypoxemia.
- We observed that the mediminers videolaryngoscope significantly reduced laryngoscopy time, glottic visualization time, and total intubation time compared with the McCoy laryngoscope.
- These findings suggest that once the glottis is identified, advancement of the endotracheal tube can be accomplished more smoothly, thereby reducing the overall duration of the procedure. Furthermore, a significantly greater proportion of patients in the mediminers group experienced easy intubation, emphasizing the practical advantages of the device during routine clinical use (8)
- Laryngoscopy and endotracheal intubation are well-recognized stimuli for sympathetic activation, resulting in transient increases in heart rate and arterial blood pressure.
- Although both study groups demonstrated this expected physiological response, the magnitude of increase was consistently smaller in the mediminers group. The shorter duration of airway instrumentation and reduced need for repeated manipulations may have contributed to the attenuation of the cardiovascular response observed with the videolaryngoscope. This finding assumes greater clinical importance in patients with cardiovascular or cerebrovascular disease, in whom excessive hemodynamic fluctuations may increase perioperative risk (9,10)
- The findings of the present study are consistent with previous investigations comparing videolaryngoscopes with the McCoy laryngoscope. Jain et al. demonstrated that the CMAC videolaryngoscope achieved superior glottic visualization and lower IDS scores than the McCoy laryngoscope in patients with simulated cervical spine injury (11).
- Similarly, Joseph et al. reported improved intubating conditions and reduced hemodynamic responses using the TruView EVO2 videolaryngoscope compared with the McCoy blade (12). While these studies evaluated different videolaryngoscopic systems, the overall trend remains consistent with our findings, highlighting the advantages of video-assisted laryngoscopy over conventional direct laryngoscopy in difficult airway management.
- Furthermore, a recent systematic review and meta-analysis by Lewis et al. also concluded that videolaryngoscopes improve glottic visualization and increase first-attempt intubation success in patients with difficult airways(13)
- However, our study differs from previous reports in several important aspects. First, we evaluated the MediMiners videolaryngoscope, a relatively newer device with limited published clinical evidence. Second, unlike previous studies focusing predominantly on simulated cervical spine immobilization, our study included patients with anticipated difficult airways, including higher Mallampati grades and cervical spine instability.
- Third, besides assessing glottic visualization, we comprehensively evaluated procedural efficiency, ease of intubation, IDS score, and hemodynamic responses. These differences broaden the available evidence supporting the clinical application of the mediminers videolaryngoscope in a wider spectrum of difficult airway scenarios.
- The strengths of the present study include its randomized controlled design, standardized anesthetic protocol, and objective assessment using validated outcome measures such as the Intubation Difficulty Scale and Cormack–Lehane grading. All intubations were performed by experienced anesthesiologists, thereby minimizing variability attributable to operator skill.

- Nevertheless, certain limitations should be acknowledged. Blinding of the anesthesiologist performing laryngoscopy was not feasible because of the obvious differences between the devices. The study was conducted at a single tertiary care center, and postoperative airway complications such as sore throat, hoarseness, or mucosal trauma were not systematically evaluated. Future multicenter studies with larger sample sizes and inclusion of operators with varying levels of experience would further validate the role of the mediminers videolaryngoscope in difficult airway management (13,14).

Strengths

The strengths of the present study include its randomized controlled design, standardized anesthetic technique, objective assessment using validated outcome measures, and performance of all intubations by experienced anesthesiologists, thereby minimizing operator-related variability.

Limitations

Certain limitations should be acknowledged. The study was conducted at a single tertiary care center with a relatively small sample size, which may limit the generalizability of the findings. Blinding of the anesthesiologist performing laryngoscopy was not feasible because of the obvious differences between the airway devices. In addition, postoperative airway complications such as sore throat, hoarseness, mucosal trauma, and patient satisfaction were not systematically evaluated. Future multicenter studies involving larger patient populations and anesthesiologists with varying levels of experience are warranted to further validate these findings.

Conclusion

The present study demonstrates that the mediminers video laryngoscope provides significantly superior intubating conditions compared with the McCoy laryngoscope in patients with anticipated difficult airways. The mediminers device was associated with lower Intubation Difficulty Scale scores, superior glottic visualization, shorter laryngoscopy and intubation times, greater ease of intubation, and significantly attenuated hemodynamic responses following tracheal intubation. These findings support the mediminers video laryngoscope as a safe, effective, and reliable alternative to the McCoy laryngoscope for the management of anticipated difficult airways.

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Conflict Of Interest

The authors declare that there are no conflicts of interest related to this study.

Author Contributions

Dr. M. Leela Gopala Krishna : Conceptualization, patient recruitment, data collection, statistical analysis, manuscript preparation.

Dr. Venkateswara rao.v : Study supervision, methodology, critical revision of the manuscript, and final approval of the version submitted for publication.

Ethical Approval

The study was approved by the Institutional Ethics Committee of Narayana Medical College, Nellore, Andhra Pradesh, India. Written informed consent was obtained from all participants prior to enrolment. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Data Availability Statement

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.