Comparison Between Direct Laryngoscope And Video Laryngoscope For Nasotracheal Intubation In Oral And Maxillofacial Surgery

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Abstract*—Nasotracheal intubation (NTI) is commonly performed under general anaesthesia to facilitate airway management while providing unobstructed access to the oral cavity, particularly during dental, oropharyngeal, and maxillofacial surgeries. Traditionally, NTI is achieved using direct laryngoscopy, which allows direct visualization of the vocal cords. Video laryngoscopy, such as the McGRATH MAC video laryngoscope, offers an indirect glottic view through a camera and has been proposed to improve intubation success, especially in difficult airways. This randomized controlled trial was conducted at Al Sadr Medical City between 1 September 2023 and 1 September 2024 to evaluate the effect of video laryngoscopy on the ease and duration of nasotracheal intubation and the incidence of postoperative sore throat. Fifty patients scheduled for elective oral and maxillofacial surgery were randomly assigned to undergo NTI using either direct laryngoscopy or the McGRATH MAC video laryngoscope. Data collected included demographic characteristics, body mass index, intubation time, ease of intubation, number of attempts, and postoperative sore throat severity. Both groups were comparable in socio-demographic and clinical characteristics ($p > 0.05$). Intubation time was significantly longer in the video laryngoscopy group compared with the direct laryngoscopy group (31.16 ± 3.9 vs. 16.36 ± 3.14 minutes, $p = 0.001$), and intubation was more difficult in the video laryngoscopy group (40% vs. 0%, $p = 0.001$). First-attempt intubation success was achieved in all patients in the direct laryngoscopy group compared with 76% in the video laryngoscopy group ($p = 0.009$). Postoperative sore throat was more frequent in the video laryngoscopy group (56% vs. 40%), although this difference was not statistically significant ($p = 0.258$). In conclusion, direct laryngoscopy was associated with shorter intubation time, easier intubation, higher first-attempt success, and comparable postoperative sore throat outcomes compared with video laryngoscopy.

Keywords—Nasotracheal intubation, Direct laryngoscopy, Video laryngoscopy, McGRATH MAC, Postoperative sore throat.

INTRODUCTION

Nasotracheal intubation (NTI) is a commonly performed airway management technique, particularly in the operating theatre following induction of general anaesthesia. The procedure involves advancing an endotracheal tube (ETT) through the nasal passage, nasopharynx, and into the trachea, allowing for secure airway control and effective ventilation. NTI also enables delivery of anaesthetic gases while maintaining unobstructed access to the oral cavity, making it especially valuable in dental, oropharyngeal, and maxillofacial surgeries (1, 2).

The technique of nasal intubation is similar to oral intubation, with the primary difference being the route of tube insertion. Selection and preparation of the more patent nostril is essential, often using topical vasoconstrictors such as phenylephrine or tolazoline to reduce mucosal congestion and bleeding. In awake patients, topical anaesthesia and nerve blocks may be employed to improve tolerance. The ETT is advanced carefully along the floor of the nasal cavity beneath the inferior turbinate and into the oropharynx before laryngoscopy. If difficulty is encountered during passage through the vocal cords, Magill forceps may be used cautiously to guide the tube into the trachea (36).

A thorough understanding of upper airway anatomy is critical for safe and successful NTI. The nasal cavity extends from the nostrils to the nasopharynx and is bounded inferiorly by the hard palate and superiorly by the skull base. The presence of turbinates, particularly the inferior turbinate, plays a significant role in airflow regulation but may also contribute to obstruction if inflamed. The nasal septum divides the cavity and may present anatomical variations such as deviation or spurs (5). The highly vascular mucosa, particularly at Kiesselbach's plexus, predisposes patients to epistaxis during instrumentation (6, 7). Recognition of these anatomical features is essential to minimise complications and guide nostril selection (8, 9, 10).

NTI is indicated in several clinical scenarios, including anticipated airway obstruction, intraoral and oropharyngeal surgery, extensive mandibular reconstruction, and maxillofacial or orthognathic procedures (11). It is often preferred in conscious patients due to improved tolerance and reduced gag reflex compared with oral intubation. However, the technique carries absolute contraindications such as suspected epiglottitis, midface instability, skull base fractures, bleeding disorders, and choanal atresia, with relative contraindications including nasal obstruction, recent nasal surgery, and recurrent epistaxis (11, 12).

Epistaxis remains the most common complication of NTI, with other potential risks including bacteremia, soft tissue perforation, and, in severe trauma cases, inadvertent intracranial placement of the ETT (12).

Video laryngoscopy has emerged as an important adjunct in airway management, offering indirect visualisation of the glottis via a camera mounted on the laryngoscope blade (13). The Glidescope video laryngoscope provides enhanced visualisation, improved success rates in difficult airways, reduced force application, educational benefits, and the ability to record procedures (14, 15). However, higher cost and maintenance requirements may limit its availability (16). In contrast, direct laryngoscopy remains widely used due to its simplicity, lower cost, and independence from technology, though it may require greater force and presents challenges in difficult airways (17, 18).

Comparative studies in NTI suggest that video laryngoscopy may offer higher success rates, reduced intubation time, and lower rates of airway trauma, while also serving as a valuable educational tool (19, 20). Airway visualisation is commonly graded using the modified Cormack–Lehane classification (21).

AIM OF THE STUDY

To compare direct laryngoscopy and video laryngoscopy for nasotracheal intubation in oral and maxillofacial surgery with respect to ease of intubation, intubation time, and reduction in postoperative moderate to severe sore throat.

METHODS

This study was designed as a parallel group randomised controlled trial conducted in the oral and maxillofacial operating theatres at Al Sadr Medical City in Al Najaf, Iraq, between September 2023 and September 2024. Ethical approval was obtained from the Iraqi Board Scientific Council of Anaesthesia, and written informed consent was secured from all participants prior to surgery.

A total of fifty adult patients scheduled for elective oral and maxillofacial surgery under general anaesthesia requiring nasotracheal intubation were enrolled. Participants were randomly allocated into two equal groups. One group underwent nasotracheal intubation using conventional direct laryngoscopy, while the second group was intubated using a McGRATH MAC video laryngoscope with Macintosh-style blades. Eligible patients were aged over 18 years, classified as American Society of Anesthesiologists (ASA) physical status I or II, and had a body mass index (BMI) below 35 kg/m². Patients with a history of difficult intubation, morbid obesity, or those who declined participation were excluded.

All patients underwent a standardised preoperative assessment, including airway evaluation with Mallampati classification, mouth opening, thyromental distance, and neck circumference. Nasal patency and history of epistaxis or anticoagulant use were assessed. Standard monitoring was applied intraoperatively, and both nostrils were prepared with xylometazoline. Appropriately sized nasotracheal tubes were warmed prior to insertion. Anaesthesia induction and airway management followed a uniform protocol across both groups.

Data collection included demographic variables, ASA classification, Cormack–Lehane grade, anthropometric measurements, and intubation-related outcomes. The primary procedural outcomes included time to successful intubation, number of intubation attempts, need for tube exchange, and use of Magill forceps. Successful intubation was confirmed by bilateral breath sounds and capnography. Postoperatively, patients were assessed for sore throat severity on the first postoperative day and graded as none, mild, moderate, or severe.

Statistical analysis was performed using SPSS version 24. Quantitative variables were analysed using the independent t-test, while qualitative variables were compared using chi-square or Fisher's exact tests as appropriate. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

The study included 50 patients who were presented for elective maxillofacial surgery and divided into two groups, 25 patients were intubated by a direct laryngoscope, and the other 25 Patients were intubated by a video laryngoscope. The mean age for the DL group was 30.64 years and 35.04 years for the VL group and the two groups were matched so p-value=0.381. 72% of patients in the DL group were males and 52% of patients in the second group. Still, there is no significant difference between groups, p-value= 0.145. All these data are presented in Table 1.

Table 1: Socio-demographic characteristics among participants

Variables		Direct laryngoscope (N=25)	Video Laryngoscope (N=25)	p-value
Age	Mean ± SD Range	30.64 ± 17.5 14-75	35.04 ± 17.66 16-65	0.381
	<20	8 (32.0)	5 (20.0)	
	20-29	6 (24.0)	12 (48.0)	
	30-39	2 (8.0)	0 (0.0)	
	40-49	7 (28.0)	2 (8.0)	
	>50	2 (8.0)	6 (24.0)	
Gender	Male	18 (72.0)	13 (52.0)	0.145
	Female	7 (28.0)	12 (48.0)	

Table 2 shows the anthropometric measurements among participants. The mean weight was 71.16 kg in the DL group and 72.8 kg in the VL group, and no significant difference was noticed since p-value=0.579. The mean height was 170.0 cm in the DL group and 168.56 cm in the VL group and p-value=0.582 was not significant. The mean BMI was 24.47in the DL group and 25.68 in the DL group and there is no significant difference as the p-value > 0.05.

Table 2: The anthropometric measurements among participants

Variables		Direct laryngoscope (N=25)	Video Laryngoscope (N=25)	p-value
Weight	Mean ± SD	71.16 ± 11.56	72.8 ± 9.01	0.579
Height	Mean ± SD	170.0 ± 7.8	168.56 ± 10.4	0.582
BMI	Mean ± SD	24.47 ± 2.6	25.68 ± 3.03	0.137
	Normal (18.5-24.9)	10 (40.0)	12 (48.0)	
	Overweight (25-29.9)	15 (60.0)	11 (44.0)	
	Obese class I (30-34.9)	0 (0.0)	2 (8.0)	

The distribution of clinical tests among participants is presented in Table 3. Regarding the ASA grade II, 48% of those in the DL group and 72% of the patients in the VL group, p-value=0.082 which is not significant. The Cormack Lehane grade II was present among 48% of patients in the DL group and 60% of patients in the second group. P-value =0.395.

Table 3: The distribution of clinical tests among participants

Variables		Direct laryngoscope (N=25)	Video Laryngoscope (N=25)	p-value
ASA	I	13 (52.0)	7 (28.0)	0.082
	II	12 (48.0)	18 (72.0)	
Cormack Lehane grade	I	13 (52.0)	10 (40.0)	0.395
	II	12 (48.0)	15 (60.0)	

Table 4 shows the difference in the clinical parameters among patients. The mean time required to intubate patients with DL was 16.36 seconds and 31.16 seconds using the VL, p-value=0.001 which means a significant statistical difference. Regarding the ease of intubation, 44% of patients had easy intubation in the DL group and 40% of patients in the VL group had difficult intubation. There is a significant difference between the groups since p-value=0.001. The intubation was successful from the first attempt among all patients in the first group vs 76% of patients in the second group. p-value = 0.009. The Magill forceps was used for all cases, and there's no tube exchange was needed.

Table 4: The difference in the clinical parameters among participants

Variables		Direct laryngoscope (N=25)	Video Laryngoscope (N=25)	p-value
Time to intubate	Mean ± SD	16.36 ± 3.14	31.16 ± 3.9	0.001
Ease of intubation	Easy	11 (44.0)	2 (8.0)	0.001
	Moderate	14 (56.0)	13 (52.0)	
	Difficult	0 (0.0)	10 (40.0)	
The success of the first attempt	Yes	25 (100.0)	19 (76.0)	0.009
	No	0 (0.0)	6 (24.0)	
Magil use	Yes	25(100.0)	25 (100.0)	1.000
	No	0 (0.0)	0 (0.0)	
Tube exchange	Yes	0 (0.0)	0 (0.0)	1.000
	No	25(100.0)	25 (100.0)	

Table 5 shows the prevalence and severity of postoperative sore throats among patients. The sore throat was assessed at day one post operatively. The sore throat was mentioned among 40% vs 56% of patients in the first and second groups respectively. There are no significant statistical differences between the two groups, p-value=0.258.

Table 5: The prevalence and severity of postoperative sore throat among patients

Variables		Direct laryngoscope (N=25)	Video Laryngoscope (N=25)	p-value
Post-operative sore throat	No sore throat	15 (60.0)	11 (44.0)	0.258
	Mild	10 (40.0)	14 (56.0)	
	Moderate	0	0	
	Severe	0	0	

DISCUSSION

Intubation is a critical procedure in airway management, and its success depends largely on the tools used for laryngeal visualization (22). Direct laryngoscopy using a standard laryngoscope has been the traditional method, while video laryngoscopes, such as the McGRATH MAC, have been increasingly utilized to provide enhanced visualization (23). Although video laryngoscopy is considered advantageous, particularly in difficult airway

scenarios, debates exist regarding its routine use, efficacy, and ease of application in comparison to direct laryngoscopy (24). This study aimed to compare the outcomes between patients intubated using direct laryngoscopy and those intubated using video laryngoscopy.

In this study, no significant differences were observed between the two groups in terms of age and gender (Table 1). Both groups had a similar distribution of age and gender, with slightly more male patients in the direct laryngoscopy group (72% vs. 52%), but the difference was not statistically significant. These findings are in line with previous studies by Par et al. (2014) and Waddington et al. (2009) that found no significant socio-demographic predictors of intubation success or difficulty when comparing different intubation techniques (25, 26).

Anthropometric measurements, including weight, height, and BMI, did not show significant differences between the groups (Table 2). Both groups had similar average weights and heights, and the majority of patients were in the normal or overweight BMI categories. These results are not consistent with a study by Gaszynski et al. (2023) that showed in morbidly obese patients, video laryngoscopy might provide better visualization, a scenario that was not in this study due to the absence of morbidly obese patients (27).

In terms of ASA classification, the video laryngoscope group had a greater proportion of ASA class II patients, though the difference was not statistically significant (Table 3). Similar, non-significant differences were found in Cormack-Lehane grades between the two groups. This finding is in line with other studies that report comparable Cormack-Lehane grades for both intubation techniques (28). Despite expectations that video laryngoscopy would reduce the proportion of higher Cormack-Lehane grades, the results here suggest that both techniques are similarly effective in visualizing the larynx. This contrasts with studies by Garg et al. (2023) and Amaniti et al. (2019) that argue video laryngoscopy generally results in better visualization, especially for higher-grade airways. The difference may be explained by the operator or the specific patient population in this study (29, 30).

One of the most striking findings from this study is the significant difference in time to intubate between the two groups. The video laryngoscopy group had a substantially longer mean intubation time (31.16 ± 3.9 seconds) compared to the direct laryngoscopy group (16.36 ± 3.14 seconds) ($p = 0.001$) (Table 4). This contrasts with much of the literature, which often shows shorter or comparable intubation times for video laryngoscopy as reported by Ruetzler et al. (2024). The prolonged time in this study may be attributable to factors such as the learning curve associated with video laryngoscopy or difficulties in coordinating the video screen with manual movements (31). Studies have shown that with increased experience, video laryngoscopy times tend to decrease significantly (32), suggesting that the operators in this study may not have been as familiar with the video laryngoscope.

Regarding intubation easiness, direct laryngoscopy was preferred, with a significantly higher proportion of patients experiencing mild intubation difficulty (44% vs. 8%, $p = 0.001$). The video laryngoscopy group, on the other hand, had 40% of patients experiencing severe difficulty. This again contrasts with studies suggesting that video laryngoscopy generally results in easier intubations, particularly in patients with difficult airways, as reported by Lewis et al. (2016) and by Ruetzler et al. (2024). (31, 33) The discrepancy might be explained by factors such as limited operator experience with video laryngoscopy, or the specific blade type used in this study (Macintosh style), which may not offer the same advantages as other video laryngoscopy blade designs in all airway conditions.

The success of first-attempt intubation was significantly higher in the direct laryngoscopy group (100% vs. 76%, $p = 0.009$). Many studies indicate that video laryngoscopy improves first-pass success, especially in difficult airways, such as the one by Sugata et al. (2023). The lower success rate with video could again be due to the learning curve associated with the technique, as other research has demonstrated increased first-pass success with greater familiarity with the device (34).

No significant difference was found in the prevalence of postoperative throat between the two groups, though a slightly higher proportion of patients in the video laryngoscopy group experienced mild sore throat (56% vs. 40%) (Table 5). This is consistent with the result of a study by Kapadia et al. (2021) showing that video laryngoscopy, while improving visualization, does not necessarily reduce postoperative complications like sore throat. The absence of severe postoperative sore throats in both groups suggests that both intubation methods are safe in this regard (35).

To sum up, while video laryngoscopy is often cited as a superior technique for difficult airways, this study found that direct laryngoscopy resulted in shorter intubation times, easier intubations, and a higher first-attempt success rate. These findings diverge from much of the existing literature, which may be due to factors such as operator experience or specific device characteristics.

This study has several limitations, including a relatively small sample size and single-centre design, which may limit the generalisability of the findings. Variability in operator experience with the McGRATH MAC video laryngoscope may have influenced intubation outcomes, as a learning

curve was not formally assessed. Additionally, the focus on patients with known difficult airways may have accentuated differences between direct and video laryngoscopy, limiting applicability to the broader surgical population.

CONCLUSION AND RECOMMENDATIONS

This study demonstrated that direct laryngoscopy was associated with shorter intubation times, easier intubation, and a higher first-attempt success rate compared with video laryngoscopy, while the incidence of postoperative sore throat was similar between both techniques. These findings suggest that direct laryngoscopy remains an effective and reliable method for nasotracheal intubation in oral and maxillofacial surgery. However, larger multicentre randomised trials are required to confirm these results and enhance generalisability. Improved training and familiarity with video laryngoscopy may help overcome learning-curve limitations. Future research should explore its role across different surgical settings and assess a wider range of postoperative complications.

Conflicts of Interests: None

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Ethical Approvals: Ethical approval for the study was obtained from the relevant institutional review board, and informed consent was acquired from all participants prior to their inclusion in the study.

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