



## Video laryngoscopy versus direct laryngoscopy on time of orotracheal intubation in normal adult in elective surgeries

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### ABSTRACT

*Objective:* to compare the time and ease of intubation in suspected non-difficult intubation during airway management by the two laryngoscopes. *Methods:* A prospective randomized study was done on 100 patients, their age was 18 to 65 years old, comparing McGrath video-laryngoscope and Macintosh laryngoscope divided into two equal groups each of 50 patients, patients given the same technique of anesthesia. *Results:* In comparison between study groups by duration of intubation, we noticed that the mean duration of intubation by using McGRATH™ MAC video laryngoscope was significantly lower than that of using Macintosh Laryngoscope (14.8 versus 17.88 seconds,  $P= 0.001$ ). *Conclusions:* Intubation by video laryngoscope is faster than direct laryngoscope and easy to use.

**Keywords:** MAC, Laryngoscope, video laryngoscope

### 1. INTRODUCTION

Video-laryngoscopy is becoming a widely accepted airway management technique. It can offer better views of the glottis when compared with standard direct laryngoscopy for the management of both normal and difficult airways (Chemsian *et al.*, 2014, van Zundert *et al.*, 2012). The McGrath Series 3 video-laryngoscope (Aircraft Medical, Edinburgh, Scotland) is a novel, self-contained video-laryngoscope, containing a sterile, transparent, acrylic single-use blade with a 45° angle (110 mm × 12 mm × 15 mm). It has a tiny camera and a light source at the tip of the blade powered by a battery contained within the handle and therefore offers advantages as a stand-alone unit, without separate power units, screens, or cables. The McGrath offers a clear view of the glottis, vocal cords and surrounding airway anatomy on an LCD screen attached to the handle without requiring alignment of the oral, pharyngeal and laryngeal axes in patients with both normal and potential difficult airways (Taylor *et al.*, 2013, Ng *et al.*, 2012). It is

also used in management of failed tracheal intubation by Macintosh and other laryngoscopy (Hyuga *et al.*, 2012, Noppens *et al.*, 2010).

However, information about its use by inexperienced anesthetists is limited. The McGrath was similar with Macintosh in blade structure and shape and may be easy to grasp for beginners. Moreover, the superior anesthetists could observe and direct the real intubation process from the screen (Paolini *et al.*, 2013, Yanik *et al.*, 2014, Herbstreit *et al.*, 2011, Saeed and Fawzi, 2020). So, it appears to be a good teaching tool and would potentially be safer and easier intubation instrument for less experienced anesthetists.

## 2. PATIENTS AND METHODS

### Study design and setting

It was a randomized clinical trial; the study was carried out from 1<sup>st</sup> April to 31<sup>th</sup> December, 2018. We enrolled 100 patients' ages 18 – 65 year, with ASA classification 1 to 2 undergoing elective surgery under general anesthesia requiring routine orotracheal intubation at Baghdad Teaching Medical city Hospital.

### Exclusion criteria

Patient refusal

Any expected patient with difficult intubation

### Inclusion criteria

ASA 1 and 2

Age between 18 – 68 years old

Elective surgeries

### Standard general anesthetic management

Data were collected before operation, after admission to the operation room, an intravenous cannula was inserted. Routine monitoring was established before induction of anesthesia, including electrocardiography, noninvasive blood pressure monitoring, fingertip oximetry, and capnography. After adequate preoxygenation with 100% oxygen and end-tidal oxygen concentration  $\geq 70\%$  ensured, induction drugs were administered same agents for all patients and it was as follows: midazolam 1 mg, fentanyl 50 microgram, ketamine 0.5mg/kg, Propofol 1-2 mg/kg, muscle relaxant used rocuronium 0.5 mg/kg.

Patients positioned in "sniffing" position and received bag-and-mask ventilation with 100% oxygen until muscle relaxation was achieved completely. Thereafter, laryngoscopy was performed with either McGrath or Macintosh (blade size 3 or 4) according to the research randomization allocation. A standard oral tracheal tube was used of appropriate size. The use of a stylet was at the decision of the anesthetist. If the operator removed the laryngoscope from mouth, this was counted as a additional attempt at intubation.

### Mc Grath Laryngoscope

The anterior camera is designed to improve grade of view, provide better visual confirmation of tube placement, and reduce tunnel vision experienced with direct laryngoscopy minimal change in intubation technique.

### Proprietary Macintosh type blade

Used like a traditional laryngoscope

### Statistical Analysis

Data analyzed using Statistical Package for Social Sciences (SPSS) version 25. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Independent t-test (two tailed) was used to compare the continuous variables among study groups accordingly. Z-test was used to compare the categorical variables among study groups accordingly. A level of P – value less than 0.05 was considered significant

## 3. RESULTS

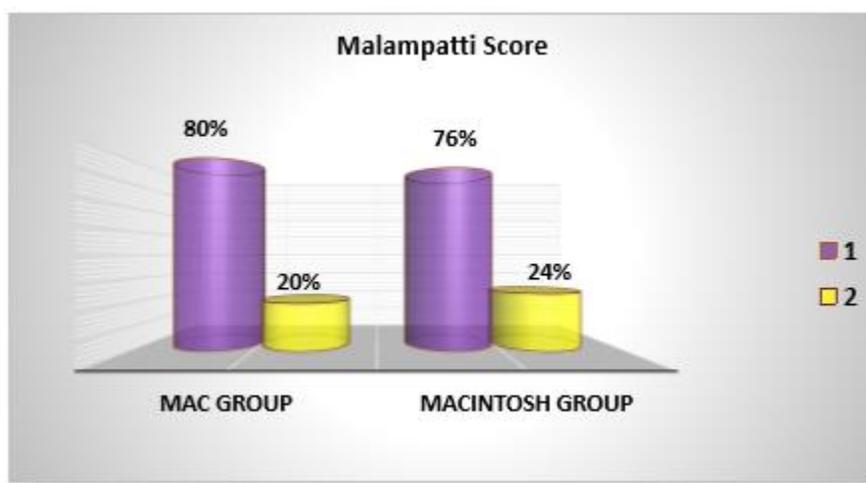
The total numbers of studied patients were 100. All of them were undergone surgical operation under general anesthesia. They were divided into two groups, first group included 50 patients intubated by using the McGrATH™ MAC video laryngoscope and second group included the other 50 patients intubated by using Macintosh Laryngoscope

Study patient's age was ranging from 18 to 60 years with a mean of 30.56 years and standard deviation (SD) of  $\pm 11.0$  years. The highest proportion of study patients were aged < 30 years (54%). Regarding gender, proportion of males was higher than females (62% versus 38%) with a male to female ratio of 1.63:1. Concerning BMI level, half of studied patients had normal BMI and the other half were overweighted. The proportion of patients with malampatti score one was higher than those with malampatti score two in both study groups (80% versus 20% and 76% versus 24% in MAC and Macintosh groups respectively). Concerning thyromental distance, no significant difference ( $P = 0.455$ ) in means of thyromental distance between study groups.

In this study, we didn't need to use of stylet or any other maneuvers in 88% of patients in MAC group and in 76% of patients in Macintosh group. Regarding failure of intubation, there was no failure occurred in all patients in MAC and in Macintosh groups. Regarding number of trials, all study patients had one trial. Concerning complication, all study patients had no complication. In comparison between study groups by ease of intubation scale, it was obvious that there was no significant difference ( $P= 0.118$ ) in this scale between study groups. In comparison between study group by SPO<sub>2</sub>, we noticed that there was no significant difference ( $P = 0.4$ ) in preoperative SPO<sub>2</sub> between study groups (table 1, figure 1 & 2).

**Table 1** assessment of demographic and clinical data

Variables	MAC	Macintosh	p-value
Number	50	50	-
Age (years), mean $\pm$ SD	31.96 $\pm$ 11.19	29.16 $\pm$ 10.73	0.205
BMI (kg/m <sup>2</sup> ), mean $\pm$ SD	25.38 $\pm$ 4.01	23.93 $\pm$ 4.63	0.097
Gender, n (%)			0.216
Male	34 (68%)	28 (56%)	
Female	16 (32%)	22 (44%)	
Thyromental Distance (cm), mean $\pm$ SD	8.56 $\pm$ 0.57	8.64 $\pm$ 0.48	0.455
Ease of intubation	1.88 $\pm$ 0.32	1.76 $\pm$ 0.43	0.118
Preoperative SPO <sub>2</sub> (%)	96.6 $\pm$ 1.03	96.44 $\pm$ 0.86	0.400
Duration of intubation (sec)	14.8 $\pm$ 1.64	17.88 $\pm$ 2.44	0.001

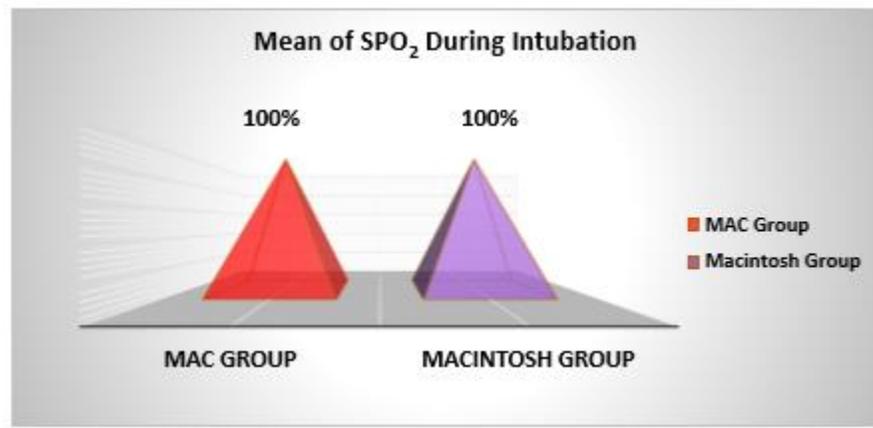


**Figure 1** Distribution of study groups by malampatti score

#### 4. DISCUSSION

In the current study, the mean duration of intubation by using McGRATH™ MAC video laryngoscope was significantly lower than that by using Macintosh Laryngoscope (14.8 versus 17.88 seconds,  $P= 0.001$ ). In comparison to other studies, disagreement noticed in Hoshijima et al. study in 2018, in which observed that McGrath required longer intubation time (mean difference, 10.1 second; CI, 2.74-17.5) and suggest that intubation time is significantly prolonged with the McGrath (Hoshijima *et al.*, 2018). Disagreement also found in Taylor et al. study in 2013, in which the mean time for successful intubation was significantly longer with the McGrath video-laryngoscope compared with the Macintosh laryngoscope direct laryngoscopy (35.8 second vs. (21.7 second,  $P< 0.0001$ ) (Taylor *et al.*, 2013). From the big difference between time to intubate (TTI) in our study and this study it shows there is big

difference between the doctors' experience in using laryngoscopes. Previous study was in consistence to Walker et al. study 2009, in which TTI was significantly longer in the McGrath group [47.0 vs 29.5 seconds, ( $P < 0.001$ )] and suggested that no advantages in using the McGrath laryngoscope for uncomplicated tracheal intubation and it should not be used as a first-line laryngoscope instrument by inexperienced anesthetist (Walker *et al.*, 2009).



**Figure 2** mean of SPO<sub>2</sub> during intubation of study groups

Another disagreement noticed in Liu et al 2016, as noticed that median time taken to achieve successful intubation was slightly longer in McGrath group compared with the Macintosh group, in which a non-significant difference existed (median 28 vs 25s,  $P = 0.46$ ) (Liu *et al.*, 2016). Differences observed among the above mentioned studies are multifactorial; among the commonest was the sample size of each study and variations in the design of the original studies, such as involving various patient populations, varying proficiency levels of the operators, and different methods of anesthesia. The experience of the operator had an important role, since the experienced operators were skilled in intubation with the Macintosh but not with the McGrath. Increased proficiency with the McGrath, which was similar to that with the Macintosh among the experienced operators, could result in outcomes different from that observed in the current study. Additionally, types of the McGrath (McGrath Series 5 or McGrath MAC), since these laryngoscopes do not have the exact same structure, this may increase bias and heterogeneity. Finally, time for manipulation of the device, the styletted tracheal tube in case the glottic view is poor, could explained the discrepancies in time observed.

In 2019 Sumitra G Bakshi show in study done on 74 patients that no difference in TTI between mcgrath video laryngoscope (MVL) and direct macintosh laryngoscope in double lumen DL insertion by 11 anesthesiologist non experienced with video DL insertion. Also the study show MVL was associated with better glottis visualization, reduced need of external laryngeal manipulation and fewer complications (Bakshi *et al.*, 2019). At 2019 Kreutziger et al compared the McGrath Mac Video Laryngoscope and Direct Laryngoscopy for Prehospital Emergency Intubation in Air Rescue Patients in 514 patient and show that both devices are equivalently well suited for use in prehospital emergency tracheal intubation of adult patients (Kreutziger *et al.*, 2019). The different levels of experience may be the reason of that differences in results showed by different trials. In randomized comparison of McGrath MAC video laryngoscope, Pentax Airway Scope, and Macintosh direct laryngoscope for nasotracheal intubation in patients with manual in-line stabilization, Go un roh et al. showed in 2019 that MVL provided better visualization of the glottis and easier intubation, with less additional manipulation than direct laryngoscopy DL during nasotracheal intubation in simulated difficult airways. Additionally, use of the MVL is significantly shortened TTI compared with the DL. This result is matched with our study with difference of being nasotracheal intubation (Roh *et al.*, 2019).

## 5. CONCLUSION

We conclude from our work that intubation by video laryngoscopes faster than direct laryngoscope and easier to use. More and larger studies are recommended for more precise conclusions regarding this type of laryngoscopes and intubation procedures.

### Author contribution

Iyad Abbas Salman: Conception and design of the work, the acquisition, analysis, and interpretation of data for the work, and Drafting the work.

Haider Abbass Hassen: Conception and design of the work, interpretation of data for the work, and revising it critically for important intellectual content

Sura Janan Fadeel: Conception and design of the work, and Drafting the work and finally revising it critically for important intellectual content

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### Conflict of Interest

The authors declare that they have no conflict of interest.

### Informed consent

Written informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

### Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards (Code: 2019/B023).

## REFERENCES AND NOTES

- Bakshi, S., Gawri, A. & Divatia, J. McGrath MAC video laryngoscope versus direct laryngoscopy for the placement of double-lumen tubes: A randomised control trial. *Indian Journal of Anaesthesia* 2019; 63: 456-461.
- Chemsian, R., Bhananker, S. & Ramaiah, R. Videolaryngoscopy. *Int J Crit Illn Inj Sci* 2014; 4: 35-41.
- Herbstreit, F., Fassbender, P., Haberl, H., et al. Learning endotracheal intubation using a novel videolaryngoscope improves intubation skills of medical students. *Anesth Analg* 2011; 113: 586-90.
- Hoshijima, H., Mihara, T., Maruyama, K., et al. McGrath videolaryngoscope versus Macintosh laryngoscope for tracheal intubation: A systematic review and meta-analysis with trial sequential analysis. *J Clin Anesth* 2018; 46: 25-32.
- Hyuga, S., Sekiguchi, T., Ishida, T., et al. Successful tracheal intubation with the McGrath(®) MAC video laryngoscope after failure with the Pentax-AWS™ in a patient with cervical spine immobilization. *Can J Anaesth* 2012; 59: 1154-5.
- Kreutziger, J., Hornung, S., Harrer, C., et al. Comparing the McGrath Mac Video Laryngoscope and Direct Laryngoscopy for Prehospital Emergency Intubation in Air Rescue Patients: A Multicenter, Randomized, Controlled Trial. *Critical Care Medicine* 2019; 47: 1362-1370.
- Liu, Z. J., Yi, J., Guo, W. J., et al. Comparison of McGrath Series 3 and Macintosh Laryngoscopes for Tracheal Intubation in Patients With Normal Airway by Inexperienced Anesthetists: A Randomized Study. *Medicine (Baltimore)* 2016; 95: e2514.
- Ng, I., Hill, A. L., Williams, D. L., et al. Randomized controlled trial comparing the McGrath videolaryngoscope with the C-MAC videolaryngoscope in intubating adult patients with potential difficult airways. *Br J Anaesth* 2012; 109: 439-43.
- Noppens, R. R., Möbus, S., Heid, F., et al. Evaluation of the McGrath Series 5 videolaryngoscope after failed direct laryngoscopy. *Anaesthesia* 2010; 65: 716-20.
- Paolini, J. B., Donati, F. & Drolet, P. Review article: videolaryngoscopy: another tool for difficult intubation or a new paradigm in airway management? *Can J Anaesth* 2013; 60: 184-91.
- Roh, G. U., Kwak, H. J., Lee, K. C., et al. Randomized comparison of McGrath MAC videolaryngoscope, Pentax Airway Scope, and Macintosh direct laryngoscope for nasotracheal intubation in patients with manual in-line stabilization. *Canadian Journal of Anesthesia/Journal canadien d'anesthésie* 2019; 66: 1213-1220.
- Saeed, I. H. & Fawzi, H. A. Assessment of the cardiovascular response of Propranolol and lignocaine to endotracheal intubation. *Medical Science* 2020; 24: 415-420.
- Taylor, A. M., Peck, M., Launcelott, S., et al. The McGrath® Series 5 videolaryngoscope vs the Macintosh laryngoscope: a randomised, controlled trial in patients with a simulated difficult airway. *Anaesthesia* 2013; 68: 142-7.
- Van Zundert, A., Pieters, B., Doerges, V., et al. Videolaryngoscopy allows a better view of the pharynx and larynx than classic laryngoscopy. *Br J Anaesth* 2012; 109: 1014-5.
- Walker, L., Brampton, W., Halai, M., et al. Randomized controlled trial of intubation with the McGrath Series 5 videolaryngoscope by inexperienced anaesthetists. *Br J Anaesth* 2009; 103: 440-5.
- Yanik, B. G., Yolcu, S., Aydinok, G., et al. The quickest and easiest endotracheal intubation device in difficult airway for emergency residents: video laryngoscope, the easiest

laryngoscope for emergency residents. Am J Emerg Med 2014; 32: 807-9.

#### Data and materials Availability

All data associated with this study are present in the paper.

#### Peer-review

External peer-review was done through double-blind method.

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