



EVALUATION OF THE MCGRATH MAC VIDEOLARYNGOSCOPE FOR INTUBATION IN ADULT PATIENTS WITH NORMAL AIRWAY.

Anaesthesiology

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ABSTRACT

Background: Difficult airway guideline for unanticipated difficult airway suggest that “all anaesthetist should be trained to use and have immediate access to videolaryngoscope”. Difficult intubation can be anticipated or unanticipated. Videolaryngoscope can be life saving in this situation. McGrath MAC videolaryngoscope having Macintosh type blade and it can be used for both direct and indirect laryngoscopy so this study was planned to assess success rate of intubation and compared when done by consultant and trainee anaesthesiologist. **Method:** We included total 80 patients of ASA grade I/II/III, 18-60 years of age posted for general anaesthesia with EGRI score ≤ 7 . First 40 patients were intubated by consultant anaesthesiologist and the next 40 patients were intubated by trainee anaesthesiologist. Patients were intubated with standard anaesthesia protocol. During intubation, Cormack-lehane grading and POGO score were observed. After intubation, vital parameters were recorded for 5 minutes and complications were observed up to 24 hours. **Results:** The mean intubation time was 29.21 ± 10.76 seconds. 78 patients were intubated at first attempt and 2 patients required 2nd attempts. Cormack-lehane grade 1 was in 90% patients and grade 2a in 10% patients. 77 patients had 100% POGO score and 3 patients had 33% POGO score. When compared to baseline value, rise in heart rate was only 4 – 9 % which was statistically significant but clinically might not be significant, while SBP, DBP and MAP were significant less at 3 minute and 5 minutes after intubation. Only 5 patients had complication like sore throat. **Conclusion:** The McGrath has high success rate at 1st attempt with good laryngeal view and short intubation time. The success rate for trainee anaesthesiologist was 100% also thus it suggests that it is easily learned device. The hemodynamic changes and complications are negligible. So it can be suggested that it can be a videolaryngoscope of 1st choice in difficult intubation cart.

KEYWORDS

Videolaryngoscope, Normal airway, General anaesthesia.

INTRODUCTION:

Securing the airway is the most basic skill to be mastered by an anaesthesiologist. Accurate knowledge of anatomy of airway is required for successful airway management by anaesthesiologist. The primary goal of airway management is to provide unobstructed airway and maintain oxygenation. Failure to provide oxygenation is associated with severe morbidity and mortality.⁽¹⁾

Conventional rigid direct laryngoscopy aids tracheal intubation in 98.1% of the cases. However, even the most experienced operator may encounter difficulties with the rigid laryngoscope so alternative technique and equipment for endotracheal intubation must be readily available for the remaining 1.9% cases.⁽²⁾

Videolaryngoscope has camera on the tip of the blade that is 2 to 3 cm proximal to larynx. So target is better visualized and magnified. The relationship of the surrounding structure is also appreciated that helps in assisting and teaching in intubation. There are various types of videolaryngoscope like with standard Macintosh blades, angulated blade, integrated tube channel and without integrated tube channel. Different types of videolaryngoscope have a different technique for use, so videolaryngoscope require additional training to develop skill for using it.

Difficult intubation can be anticipated or unanticipated. Sometimes preoperative assessment of airway fails to detect certain patients with difficult airways. In situation of an unanticipated difficult intubation, Fiber-optic is not useful because it requires set up which takes time which may not be available in all hospital due to its cost. Videolaryngoscope can be very useful in this situation.⁽³⁾ We need a videolaryngoscope with smallest learning curve. So all anaesthesiologist with variable experience can use it effectively during emergency situation.

The McGrath MAC videolaryngoscope is having camera mounted on camera stick with curvature and shape of Macintosh laryngoscope on which various size and type of disposable blade can be attached. Even hyper-angulated blade can be attached on the camera stick. The design is more or less near to conventional laryngoscope makes it more familiar to anaesthesiologists. The literature search also says that McGrath MAC videolaryngoscope has an almost 98% success rate in different situation.

So this study was planned to assess the efficacy of McGrath MAC

videolaryngoscope as an intubation device in a normal airway and we also plan to compare it when used by consultant and trainee anaesthesiologists.

MATERIAL AND METHOD:-

After approval from ethical committee, an observation study about an evaluation of the McGrath MAC videolaryngoscope for intubation in patients with normal airway was done in 80 patients at tertiary care hospital of south Gujarat.

Total 80 patients were included who were undergoing tracheal intubation of age 18-60 years with ASA class I-III. Patients with BMI > 30, EGRI > 7 and MP > 3 were excluded from this study.

First 40 patients were intubated by consultant anaesthesiologist (CA group) and trainee anaesthesiologist (TA group) assisted and observed all 40 intubation done by consultant anaesthesiologist. The next 40 patients were intubated by trainee anaesthesiologist under supervision of consultant anaesthesiologist. This trainee anaesthesiologist was who had done at least 50 intubations with Macintosh laryngoscope in normal airway.

The intubation protocol was premedication with inj. Midazolam 0.02 mg/kg and inj. Glycopyrrolate 0.005 mg/kg iv followed by induction with 100% oxygen for 3 minutes with inj. fentanyl 2 µgm/kg, inj. propofol 2-3 mg/kg and inj. vecuronium 0.12 mg/kg. Intubation was attempted after 3 minute of mask ventilation.

The intubation time was noted by assistant from the time blade was introduced into the mouth between incisors to successful tracheal intubation. During intubation, Cormack-lehane grading and POGO score were observed. After intubation, patient's vital parameters like pulse, blood pressure and oxygen saturation for 5 minutes were recorded. Other data were recorded during intubation like total numbers of attempts, external manoeuvre or adjustment during intubation.

Complications of intubation like hypoxia, hypertension, hypotension, tachycardia, bradycardia, lip injury and mucosal trauma were evaluated during intubation or just after intubation. Post-operatively up to 24 hours after surgery, complications of intubation like sore throat, hoarseness of voice and coughing were checked. We also compared these data between consultant anaesthesiologist and trainee anaesthesiologist.

Statistical Analysis :

Our sample size was calculated based on previous study (4,5) in which standard deviation of the time to intubation were estimated as 8 and 13.7 seconds. When the intergroup difference of 10 seconds in the time to intubation was assumed to be clinically important. 40 patients were required in each group for an α error of 0.05 and a power of 0.8. So we finalized 40 patients in each group.

OBSERVATION AND RESULTS:

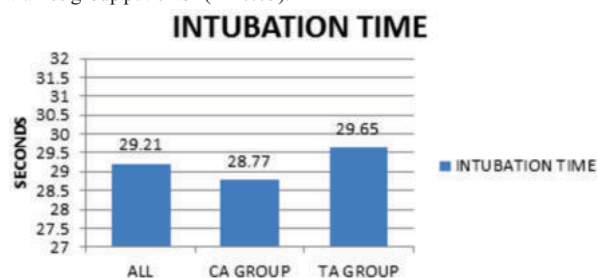
This study was done in 80 patients who were planned to receive general anaesthesia for elective surgery for evaluation of McGrath MAC videolaryngoscope. Data collected was analyzed by using Microsoft excel sheet. The mean and SD were calculated by using Microsoft excel.

The patient's characteristics are describe in table 1.

Table 1 : patient's characteristics.

Age(yrs)	34.4 ± 11.16
Wt(kg)	57.07 ± 10.61
Sex(M/F)	39/41
ASA(CLASS II/III)	45/35
MP(2/3)	73/7
EGRI(1/2/3)	69/9/1

The mean intubation time was 29.21 ± 10.76 seconds. The mean intubation time in CA group was 28.77 ± 10.34 seconds whereas in TA group, it was 29.65 ± 11.27 seconds which was shown in graph 1. There was no statistical difference in intubation time between consultant and trainee group patients ($P > 0.05$).

**Graph 1: Mean Intubation Time**

When intubation attempts were looked for total patients (n=80), 78 patients (97.5%) were intubated at first attempt and 2 patients (2.5%) required 2 attempts. When looking at intubation attempts in CA group, 38 patients (95%) were intubated at first attempt and 2 patients (5%) at second attempt. In TA group, all patients were intubated at first attempt. We found no statistical difference between CA group and TA group when intubation attempts and external laryngeal manipulation were compared ($P > 0.05$).

Glottic view on McGrath MAC videolaryngoscope monitor was graded as per Cormack-lehane grading POGO score. There was no statistical difference in CL grading and POGO score between CA group and TA group ($P = 0.05$) shown in table 2.

Table 2 : Grading Of Patients According To Glottic View :

	All (n=80)		CA Group(n=40)		TA Group (n=40)		P Value
Cormack-lehane grades(%)	Frequ	%	Frequ	%	Frequ	%	
1	72	90%	37	92.5%	35	87.5%	0.45
2a	8	10%	3	7.5%	5	12.5%	
2b	0	0	0	0	0	0	
3	0	0	0	0	0	0	
4	0	0	0	0	0	0	0.55
POGO Score(%)							
100%	77	96.25	39	97.5%	38	95%	
33%	3	3.75%	1	2.5%	2	5%	
0%	0	0	0	0	0	0	

Hemodynamic parameters at intubation, 1 minute, 3 minutes and 5 minutes after intubation were compared with baseline parameters. The rise in heart rate was statistically significant but it was only 4 – 9 % which was clinically not significant.

When mean baseline SBP, DBP and MAP were compared, it was statistically significant less at 3 minute and 5 minutes after intubation. Only 5 patients had post-op complication of sore throat which was treated by warm water gargles.

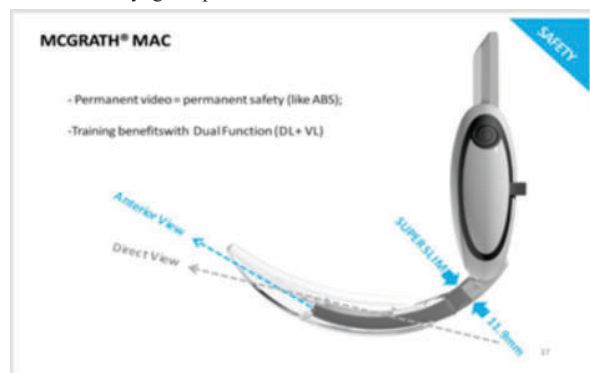
DISCUSSION:

Videolaryngoscope have become increasingly popular in recent years for use in both normal and difficult airways.

Geriatric patients have age related challenges of intubation like absence of teeth, denture, loss of buccal pad and fat etc. Obese patients also having difficult intubation as there is an increase in pharyngeal airway tissue and large tongue reducing the space in oral cavity. So we excluded these patients from our study.

We have 100% success rate in both group. **Jolin Wong (2016)**⁽⁶⁾ et al had analyzed intubation with McGrath MAC VL in tertiary care hospital with 100% success rate in trainee anaesthesiologist and 98.2% in senior anaesthesiologist.

Videolaryngoscope is designed such that camera which is attached to the laryngoscope blade allow superior viewing angle which transmit image to monitor. The McGrath MAC videolaryngoscope having Macintosh type blade. The McGrath MAC videolaryngoscope also provide direct view. The angle between direct view and monitor view is small. The technique of intubation is familiar to anaesthesiologist.⁽⁷⁾ The height of the blade is just 11.9 mm which is compatible with restricted mouth opening also. The higher success rate with McGrath MAC videolaryngoscope is attributed to above features.

**Figure 1 : Mcgrath Mac With Direct And Indirect View.**

We found Cormack-lehane grade 1 in 90% patients and grade 2a in 10% patients while POGO score 100% in 96.25% and POGO score 33% in 3.75% in our study. **A.M.Taylor (2012)**⁽⁸⁾ et al observed Cormack-lehane grade 1 and 2 view in all patients in McGrath group whereas in Macintosh group, it was in 45 patients (51%). The POGO score was 82% using McGrath compared with 13% in Macintosh group.

In this study, obese patients with EGRI score > 7 and mallampati grade > 3 were excluded. All patients were supposed to have normal airway thus possibility of Cormack-lehane grade 1 and 2 are more which was observed by us in this study. The monitor of McGrath MAC videolaryngoscope has portrait orientation allowing the complete view of the larynx⁽⁹⁾ and so the POGO score was 100% in 77 patients in our study. The intubation by trainee anaesthesiologist was done under supervision of consultant anaesthesiologist. Thus trainee and consultant's guidance in achieving adequate laryngoscopic view.

The mean intubation time was 29.21 ± 10.76 seconds for all patients in our study and the difference between consultant and trainee group was not significant. **A.M.Taylor (2012)**⁽⁸⁾ et al had done study between McGrath series 5 vs the Macintosh laryngoscope. The mean intubation time was 35.8 ± 20.4 seconds in McGrath group whereas 21.7 ± 9.4 seconds in Macintosh group.

Intubation time is less in our study than other study because the consultant has used channeled videolaryngoscope airtraq, king vision and non-channeled blade of king vision. Videolaryngoscope is effective in teaching as well as learning the intubation technique. So the trainee anaesthesiologist who observed 40 intubations done by consultant anaesthesiologist help him to develop proficiency.

Hypertension and tachycardia often occur after tracheal intubation in general anesthesia. Intubation with Macintosh laryngoscope is said to be responsible for high incidence of hypertension, because it requires forced alignment of the oral and pharyngeal axes in order to view the glottis and it stimulates supra-glottic sympathetic system.⁽¹⁰⁾ It is also affected by various factors such as patient characteristics, dose of opioid administered at intubation and type of intubation device used.

Videolaryngoscope (McGrath MAC) does not require alignment of oral, pharyngeal and laryngeal axis as the camera and light placed on tip of the blade gives view of larynx facilitating intubation. Intubation time is major factor deciding the hemodynamic response to laryngoscopy and intubation. In this study, mean intubation time was 28.21 ± 10.76 seconds that is within the acceptable limit leading to nominal hemodynamic changes during intubation.

The decrease in SBP, DBP and MAP at 3 minute and at 5 minute might be due to cumulative effect of inj. fentanyl $2 \mu\text{g}/\text{kg}$ with induction agent inj. propofol $2-3 \text{ mg}/\text{kg}$. So the hemodynamic response during intubation with videolaryngoscope is not significant.

We have observed complications like hypoxia, lip injury, mucosal injury, hypertension, hypotension, tachycardia and bradycardia during intubation in all patients. None of the patients had any intra-op complication. 5 patients had post-operative complication like sore throat which was treated with warm water gargles. **I. Ng (2012)⁽¹¹⁾** et al compared McGrath with C-MAC videolaryngoscope. In McGrath group, 6 patients had minor oro-pharyngeal mucosal injury and in C-MAC group, only one patient had injury.

The McGrath MAC videolaryngoscope has small blind spot due to portrait orientation which show the tube entry in oropharynx preventing trauma to the structures.⁽¹²⁾

CONCLUSION:

It can be stated from this study that McGrath MAC videolaryngoscope having high success rate and short intubation time and almost nil complication is suitable device for patients with normal airway irrespective of experience of anaesthesiologist. So it can be suggested that McGrath MAC videolaryngoscope with short learning curve can be a videolaryngoscope of 1st choice in difficult intubation cart.

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