COMPARISON BETWEEN MACINTOSH LARYNGOSCOPE AND MCGRATH VIDEO LARYNGOSCOPE FOR ENDOTRACHEAL INTUBATION IN NEUROSURGICAL PATIENTS

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ABSTRACT

This study was done on sixty patients of ASA 1 and 2, undergoing elective surgery under general anaesthesia. The patients were allocated in two groups of 30 patients each. Patients selected were allocated to two groups and without risk factors.

Direct laryngoscopy group (group 1) patients were intubated through direct laryngoscope. Video laryngoscopy group (group 2) patients were intubated through McGrath VLS. The distribution of patients according to age, sex and weight was comparable (p>.001) in both the two groups. The changes in heart rate, mean arterial pressure, oxygen saturation were not significant (p>.001) between the two groups after intubation at different time intervals. The number of attempts and intubation time was found to be significantly higher in McGrath VLS as compared to Macintosh laryngoscope. The increase in post-operative sore throat and hoarseness after 6 and 24 hrs following operation was found to be significant in group 1 compared to group 2.

So from our study, we conclude that the use of McGrath video laryngoscope has no advantage over direct laryngoscopy in attenuating the cardiovascular responses attributed to tracheal intubation in patients with normal airway. It is also associated with greater number of attempts and longer intubation time. However, with the use of stylet, number of attempts can be reduced, although the use of stylet has its own complications.

VLS has lesser incidence of post-operative sore throat and hoarseness as compared to Macintosh laryngoscopy.

KEYWORDS

Neurosurgical patients, Videolaryngoscopy, Intubation response.

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INTRODUCTION: Maintaining a clear and patent airway whatever be the method used, forms the basis of "safe anaesthesia." The first wire frame mask was introduced and developed by a Liverpool obstetrician to keep the cold lint off the patient's face in 1862. McEwen, O'Digger and Magill over the years perfected tracheal intubation and the technique was facilitated by the laryngoscope developed by the Chevalier Jackson. Magill was responsible for the wide bore soft rubber tube to allow the normal respiratory pattern.[1,2]

Expertise in airway management is one of the key skills for an anaesthetist. Recent developments in the field of anaesthesia have made the latter increasingly safe, because of which expectations from peers as well as patients are high. Although currently major complications of airway management are rare, they still continue to be among the most life-threatening in medicine.[3]

During general anaesthesia maintenance of airway and ventilation can be done in various ways. However, intubating the trachea is the gold standard in airway management because it is the safest method of protecting the airway and delivering anaesthetic gases.[4]

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There are many methods of intubating the trachea. Among them direct laryngoscopy and intubation with an endotracheal tube is done mostly. But many difficult intubations are not recognized until after induction of anaesthesia and these condition constitute a major problem for the anaesthesiologist. Such difficulties even if successfully managed, may result in multiple laryngoscopic attempt causing airway trauma and oedema and significantly managed morbidity.

The intubation response during direct laryngoscopy is harmful to patients. Laryngoscopic stimulation of pharyngeal structures is an important factor in hemodynamic stress response and airway trauma associated with it. It is even more important in cases of neurosurgical patients, where even trivial changes in haemodynamics may adversely affect the clinical failure to intubate may result in dental damage, laryngeal spasm, bronchospasm, bleeding from the upper airway, hypoxia, hypercarbia, regurgitation/vomiting, various dysrhythmias, cardiac arrest, brain damage or even fatalities.[5] It has always been a challenge for the anaesthesiologist; therefore, he should be forearmed for such situations. In pursuit of this, it became necessary to have certain tools or access to advanced airway instrumentation for better visualization of the larynx, should the encounter with the difficult airway or failed intubation occur.

Since poor glottis visualization is encountered in 1-9% of intubation attempts in recent years, the technique of video laryngoscopy has begun to play an important role in the management of patient with an anticipated difficult or failed laryngoscopic intubation.

There are many types of video laryngoscopes for intubating the trachea which offer many advantages over direct laryngoscopy and intubation. Video Laryngoscope can provide a full glottis view without the need for oral, laryngeal and pharyngeal alignment. Also, the percentage of glottic opening (POGO) score is better than the Cormack and Lehane classification of laryngeal appearance. The VL improves the Cormack Lehane grade of visualization of glottis and navigation or advancement of ETT. Thus, less or no pressure is exerted on the upper airway.

Types of Video Laryngoscopes:

- Stylets:
    - Bonfils.
    - Rigid and flexible laryngoscope (RIFL).
- **Guide channels:**
    - AirTraq.
    - Pentax AWS.
    - Res-Q-Scope II.
    - Traditional (non-guided).
    - Glide Scope.
- **Coopdech VLP-100:**
    - Storz DCI.
    - Storz C-Mac.
    - McGrath.

McGrath Video Laryngoscope, through which intubation of trachea is done, has high success rate and minimal hemodynamic response. It can be done even by novices with high success rate and even in pre-hospital settings.

The aim of the study was to compare the intubation response produced by using Macintosh laryngoscopy and McGrath video laryngoscopy, to compare number of adjustment manoeuvres, number of intubation attempts, total intubation time, intubation success rate (1st intubation within 3 min), mucosal trauma, hypoxia ($SPO2<90\%$), post-operative pharyngolaryngeal morbidity (sore throat and hoarseness). If our study shows favourable outcomes for McGrath video Laryngoscope, we may adopt this technique both for routine and for difficult cases.

MATERIAL AND METHODS: This study was conducted at the Department of Anaesthesiology, Institute of Medical Sciences, Banaras Hindu University, Varanasi. After institutional ethics committee approval and written consent, 60 ASA physical status 1 and 2 patients of both sexes undergoing elective operations under general anaesthesia were randomly but equally placed in two groups.

Group-1: Patients intubated through conventional Macintosh laryngoscopy.

Group-2: Patients intubated through McGrath Video Laryngoscopy

Patients fulfilling following criteria were included in the study:

- ASA physical status 1 and 2.
- Adult patients (15 to 60 yrs) of age.
- Mallampati class 1 and 2.
- Patients undergoing elective operations under general anaesthesia.
- Patients having no suspicion of difficult intubation like cervical injury and restricted mouth opening.
- Patients having no cardiac risk factors like ischemic heart diseases, hypertension, and cerebral insufficiency.

Airway assessment like mouth opening, Mallampati grading and neck extension of all patients was done. Preoperative (baseline) heart rate, mean arterial blood pressure, oxygen saturation were noted.

All patients were anaesthetised with standard general anaesthesia technique.

In Group 1, Patients were preoxygenated for 3 minutes. Induction of anaesthesia was done with Inj. Fentanyl 2 mcg/kg i.v., Inj. 1% Propofol (2.5 mg/kg) i.v. and Inj. Vecuronium (0.1 mg/kg) i.v. Anaesthesia was maintained with O2+N2O+isoflurane. Inj. Fentanyl 2 mcg/kg i.v. intermittently was used for intraoperative analgesia, but was given only after completion of the study. Heart rate, mean blood pressure, SPO2, were monitored. Once neuromuscular blockade was achieved, tracheal intubation was performed using direct laryngoscopy using an appropriate sized PVC endotracheal tube (7.5 mm internal diameter for females and 8.0 mm internal diameter for males). Heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure, oxygen saturation, time to intubation, number of attempts, any mucosal injury and any complication following intubation was looked for after 1,3,5,10 and 15 min.

In Group 2, the anaesthetic technique remained the same.

Insertion Technique: The McGrath video Laryngoscope unit is used in the same manner as an ordinary laryngoscope, with the exception that the blade is introduced in the midline or slightly to the left, using a gentle curving action until the glottis is identified. There is usually no need for any lifting force. Endotracheal intubation is performed with endotracheal tube without stylet first but if it got failed in 1st attempt, stylet was used.

After passage of tube through the vocal cords video laryngoscope was taken out and if stylet or bougie was used, they are removed initially and then video laryngoscope was taken out. Position of the endotracheal tube was confirmed by direct visualization of the endotracheal tube into the trachea and confirmed again by auscultation of the chest. Heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure, oxygen saturation, time to intubation, number of attempts, any mucosal injury and any complication following intubation was looked for after 1, 3, 5, 10 and 15 min.

When stylet was used it was formed in the shape of a hockey stick with a 90-degree bend.

Number of intubation attempts were counted as each approach of endotracheal tube to glottis entrance. Intubation time was measured as time between picking up the endotracheal tube and visual passage of tube until vocal cords were between the two black lines markings on the distal end of the endotracheal tube. Interim bag and mask ventilation time if needed was not included in total intubation time. More than 5 attempts or 120 sec was regarded as failure of intubation.

Attention was paid to insert and remove laryngoscopes smoothly and not to damage the oral cavity, tongue, or patient's dentition. After removal of laryngoscope, the oral cavity was inspected for any bruises, laceration, bleeding, dental damage or other possible complication.

Postoperatively, patients were asked about any complaint of sore throat and hoarseness of voice until 48 hrs.

RESULTS: This study was conducted in Department of Anaesthesiology, Sir Sunderlal Hospital, Institute of Medical Sciences, Varanasi. The study comprised of 60 patients of either sex of ASA grade 1 and 2 undergoing elective operations under general anaesthesia randomly but equally placed in 2 groups. Macintosh laryngoscopy group (group 1) included patient intubated through Macintosh laryngoscope and McGrath video laryngoscope group (group 2) included the patients intubated though McGrath video laryngoscope.

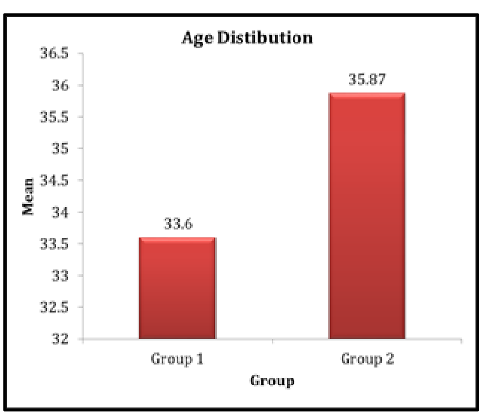
The patient's demographic data was recorded and perioperative, heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure, oxygen saturation were noted.

In all groups, the patients were between 15 to 60 years of age. The minimum age in Macintosh group 17 years and in group 2 it was 15 years. The maximum age in Macintosh is 52 years and in group 2 it is 57 years.

Age	Mean±SD	t-value	p-value
Group 1	33.60±9.398	-.885	0.380
Group 2	35.87±10.405		

Table 1: Age distribution vs. Group

As shown in Table 1, the mean ages of all the two groups ranged from 33.60±9.398 (group 1) to 35.87±10.405 (group 2). However, as shown in table 1 the mean age among different groups was comparable and statistically not significant (p>.05).



Graph 1

Sex	Group 1		Group 2	
	No.	%	No.	%
Male	18	60	17	56.7
Female	12	40	13	43.3
Total	**30**	**100**	**30**	**100**

Table 2: Sex Distribution

X2=0.069; p = 0.793.

As shown in table 2 in Macintosh group out of 30 patients, 18 are male and 12 are female. In McGrath group out of 30 patients, 17 are male and 13 are female.

Intergroup comparison between the two groups showed X2=0.069; p = 0.793 which was statistically non-significant.

ASA	Group 1		Group 2	
	No.	%	No.	%
1	30	100	27	90
2	0	0	3	10
Total	**30**	**100**	**30**	**100**

Table 3: ASA vs. Group

X2=3.158; p = 0.076.

As shown in table, the distribution of the two groups in terms of ASA was comparable and not significant (X2=3.158; p = 0.076).

Weight	Mean±SD	t-value	p-value
Group 1	61.27±13.062	0.223	0.824
Group 2	60.57±11.162		

Table 4: Weight (kilograms) vs. Group

As shown in table 4, the mean weight of both the groups ranged from 60.57±11.162 (group 2) to 61.27±13.062 (group 1). However, as shown in table 4, the mean weight among the two groups was comparable and statistically not significant (p >.05).

Height	Mean±SD	t-value	p-value
Group 1	5.580000±0.2929046	-.091	0.928
Group 2	5.586667±0.2750966		

Table 5: Height (feet)

Thus as shown in table 5 mean height in group 1 was 5.580000±0.2929 feet in group 1 and mean height in group 2 was 5.586667±0.2750966 feet in group 2. Thus the comparison of height in between the two groups was comparable and statistically not significant (p >0.05).

Group	BMI (Mean±SD)	t-value	p-value
Group 1	22.53±2.72	0.025	0.980
Group 2	22.51±3.04		

Table 6: BMI

Thus, as shown in table 6, the comparison of BMI in between the two groups was comparable and statistically not significant (p>.05)

Mallampati	Group 1		Group 2	
	No.	%	No.	%
1	19	63.3	19	63.3
2	11	36.7	11	36.7
Total	**30**	**100**	**30**	**100**

Table 7: Mallampati vs. Group

X2=0.000; p = 1.000.

In Macintosh laryngoscopy out of 30 patients, 19 had MPG 1 and 11 had MPG 2. In McGrath Videolarynogoscope also out of 30 patients, 19 had MPG grade 1 and 11 had MPG 2 and hence the comparison was statistically insignificant (p=1).

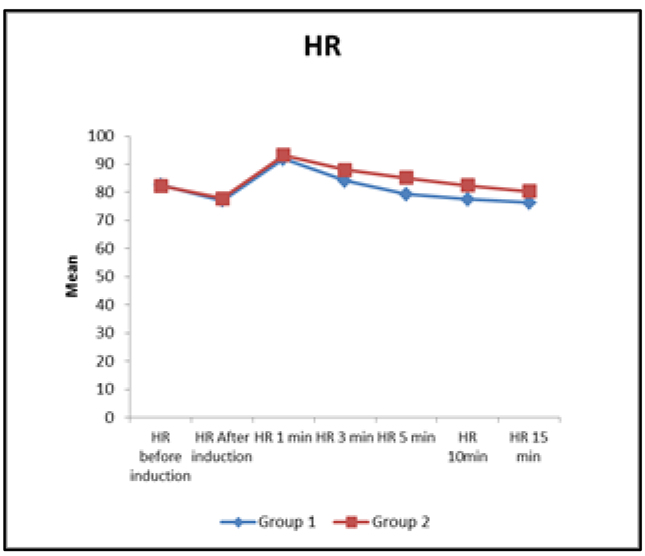
Thyromental distance	Mean±SD	t-value	p-value
Group 1	7.137±0.3327	-.461	0.646
Group 2	7.180±0.3925		

Table 8: Thyromental distance

As shown in Table 8, thyromental distance in two groups ranged from 7.137±0.3327 (group 1) to 7.180±0.3925 (group 2). However, as shown in table, mean thyromental distance in two groups was comparable and was not significant (p>.05).

Variables	Group 1	Group 2	t-value	p-value
HR_before_induction	82.63±18.971	82.30±19.898	0.066	0.947
HR_after_induction	77.10±13.674	77.83±16.539	-.187	0.852
HR_1_min	91.90±15.132	93.17±16.559	-.309	0.758
HR_3_min	84.07±15.304	87.90±15.718	-.957	0.343
HR_5_min	79.27±12.354	85.17±15.143	-1.654	0.104
HR_10 min	77.47±11.482	82.47±14.743	-1.466	0.148
HR_15_min	76.30±11.677	80.33±13.667	-1.229	0.224

Table 9: HR - Increase in Group 1



Graph 2

The patient's heart rate was observed before and after induction and at 1, 3, 5, 10 and 15 min following intubation in each group. In Macintosh laryngoscopy, group 1, the pre-induction minimum and maximum heart rates were 59 and 150 with mean of 82.63±18.971. After induction, minimum and maximum heart rate were 54 and 108 with mean of 77.10±13.674. Minimum and maximum HR, 1 min following intubation were 62 and 133 with mean of 91.90±15.132, 3 min following intubation were 54 and 126 with mean of 84.07±15.304, 5 min following intubation were 55 and 104 with mean of 79.27±12.354, 10 min following intubation were 57 and 100 with mean of 77.47±11.482, 15 min following intubation were 54 and 99 with mean of 76.30±11.677.

In McGrath videolaryngoscopy, group 2, the pre-induction minimum and maximum HR were 60 and 146 with mean of 82.30±19.898. After induction, minimum HR and maximum HR were 60 and 129 with mean of 77.83±16.539. Minimum and maximum HR 1 min following intubation were 64 and 136 with mean of 93.17±16.559, 3 min following intubation were 62 and 137 with mean of 87.90±15.718, 5 min following intubation were 62 and 136 with mean of 85.17±15.143, 10 min following intubation were 60 and 130 with mean of 82.47±14.743, 15 min following intubation were 60 and 124 with mean of 80.33±13.667.

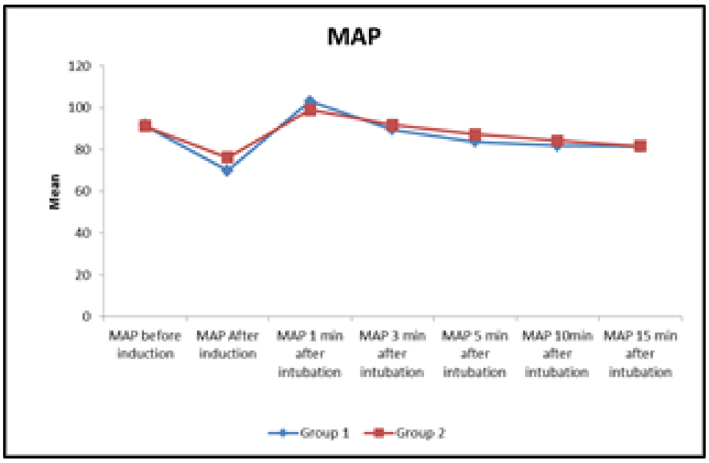
The mean change in heart rate was compared between groups using ANOVA test.

Comparison of mean HR between Macintosh laryngoscopy and McGrath videolaryngoscopy showed p value as 0.947 in pre-induction time, p value as 0.852 after induction, p value 1 min following intubation was 0.758, p value 3 min following intubation was 0.343, p value 5 min following intubation was 0.104, p value 10 min following intubation was 0.148, p value 15 min following intubation was 0.224. So p value was statistically insignificant in all the time interval studied (p>.05).

Blood Pressure:

Variables	Group 1	Group 2	t-value	p-value
MAP_before_induction	91.63±8.716	91.27±9.285	0.158	0.875
MAP_after_induction	69.77±10.728	76.10±8.531	-2.531	0.014
MAP_1_min	102.97±17.282	98.87±9.306	1.144	0.257
MAP_3_min	89.43±9.673	91.73±9.347	-.937	0.353
MAP_5_min	83.63±8.041	87.23±10.092	-1.528	0.132
MAP_10 min	81.87±7.873	84.27±8.250	-1.153	0.254
MAP_15_min	81.40±7.347	81.67±7.073	-.143	0.887

Table 10: MAP - Increase in Group 1



Graph 3

Table compares the mean changes in MAP of patients during pre-induction, post induction time and 1, 3, 5, 10 and 15 min following intubation in two groups.

Mean MAP in group 1 at the time of pre-induction was 91.63±8.716 and in group 2 it was 91.27±9.285 and p value was 0.875, hence the values were statistically insignificant($p>.05$).

Mean MAP in group 1 in post-induction time was 69.77±10.728 and in group 2 it was 76.10±8.531 and p value was 0.014 which is statistically significant ($p<.05$).

Mean MAP in group 1; 1 min, 3 min, 5 min, 10 min and 15 min after intubation was 102.97±17.282, 89.43±9.673, 83.63±8.041, 81.87±7.873 and 81.40±7.347. While mean MAP in group 2; 1 min, 3 min, 5 min, 10 min, and 15 min after intubation was 98.87±9.306, 91.73±9.347, 87.23±10.092, 84.27±8.250 and 81.67±7.073, p value was not found to be significant at any of the time ($p >.05$).

Variables	Group 1	Group 2	t-value	p-value
SPO2_before_induction	97.27±0.980	97.17±0.648	0.466	0.643
SPO2_After_induction	99.90±0.305	99.87±0.434	0.344	0.732
SPO2_1_min	99.93±0.254	99.87±0.346	0.851	0.398
SPO2_3_min	99.93±0.254	99.90±0.305	0.460	0.647
SPO2_5_min	99.93±0.254	99.90±0.305	0.460	0.647
SPO2_10 min	99.93±0.254	99.83±0.592	0.850	0.399
SPO2_15_min	99.93±0.254	99.90±0.305	0.460	0.647

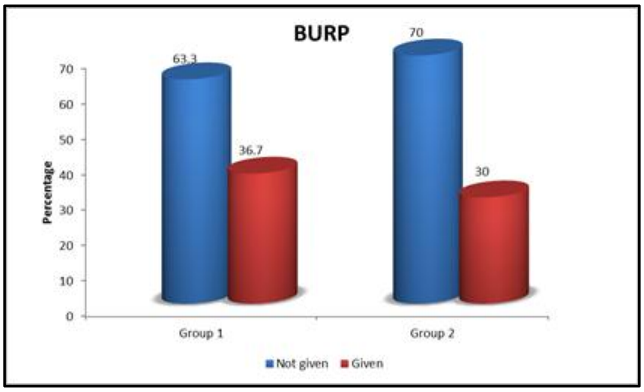
Table 11: SPO2

Table 11 showed the mean changes in oxygen saturation of patients in two groups at the time of pre-induction, post-induction and 1, 3, 5, 10 and 15 min following intubation. The comparison in between the groups at different intervals was comparable and statistically not significant ($p>0.05$).

BURP	Group 1		Group 2	
	No.	%	No.	%
Not given	19	63.3	21	70
Given	11	36.7	9	30
Total	**30**	**100**	**30**	**100**

Table 12: BURP vs. Group

$X2=0.300$; $p = 0.584$.



Graph 4

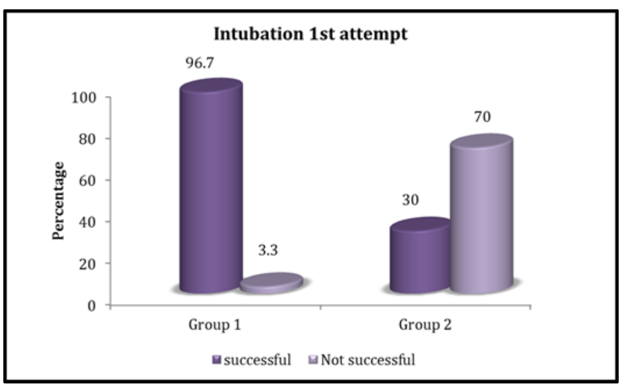
Table showed that BURP was given in 11 out of 30 patients in Macintosh Laryngoscopy group and in McGrath videolaryngoscopy group it was given in 9 out of 30 patients.

Intergroup comparison between Macintosh laryngoscopy group and McGrath videolaryngoscopy group showed X2=0.300; p = 0.584 which was statistically insignificant.

Intubation 1st attempt	Group 1		Group 2	
	No.	**%**	**No.**	**%**
Successful	29	96.7	9	30.0
Not successful	1	3.3	21	70.0
Total	30	100	30	100

Table 13: Intubation 1st vs. Group

X2=28.71; p<0.001.



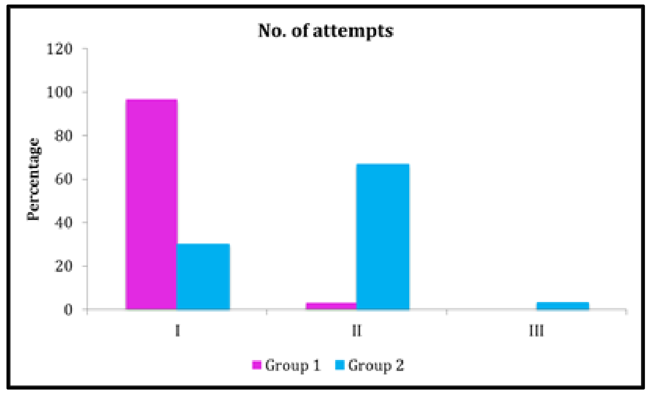
Graph 5

Table 13 showed that intubation was successful in 1st attempt in Macintosh laryngoscopy (group 1) in 29 out of 30 patients. While in McGrath videolaryngoscopy (group 2) only 9 patients were intubated in 1st attempt. Intergroup comparison between the two group showed X2=28.71; p<0.001 which was statistically significant (p<0.05).

No. of Attempts	Group 1		Group 2	
	No.	**%**	**No.**	**%**
1	29	96.7	9	30.0
2	1	3.3	20	66.66
3	0	0	1	3.33
Total	**30**	**100**	**30**	**100**

Table 14: No. of attempts vs. Group

X2=28.71; p<0.001.



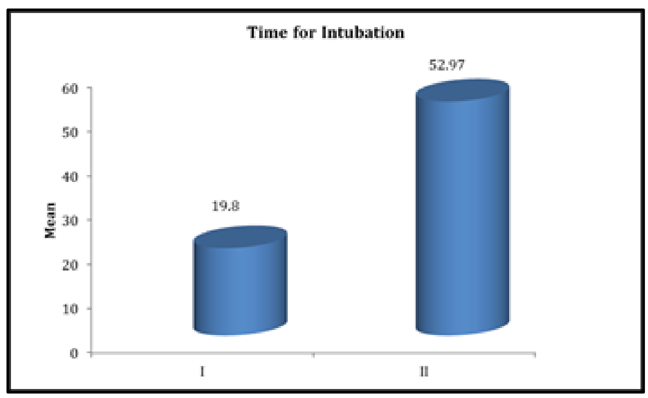
Graph 6

Table 14 showed that in Macintosh laryngoscopy group, 29 out of 30 patients got intubated in 1st attempt and 1 got intubated in 2 attempts. In McGrath videolaryngoscopy group only 9 patients got intubated in 1 attempt, 20 patients got intubated in 2 attempts and 1 patient got intubated in 3 attempts.

Intergroup comparison between the two groups showed X2=28.71; p<0.001 which was statistically highly significant.

Group	Duration (mean±SD)	t-value	p-value
1	19.80±9.75	8.241	<0.001
2	52.97±19.77		

Table 15: Time for intubation vs group



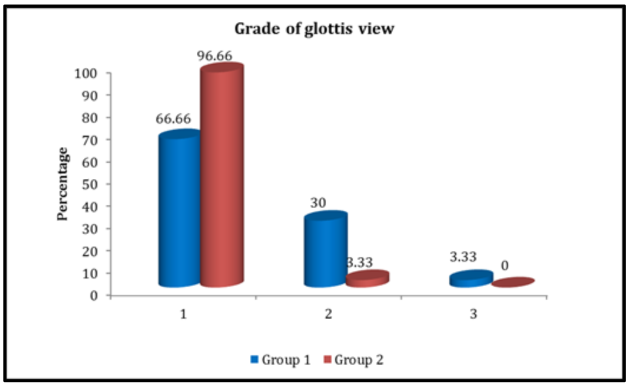
Graph 7

The mean time required for intubation in Macintosh group was 19.80±9.75 and the mean time required in McGrath group was 52.97±19.77. Intergroup comparison between the two groups showed p<.05 which was significant.

Grade of glottis view	Group 1		Group 2	
	No.	**%**	**No.**	**%**
1	20	66.66	29	96.66%
2	9	30	1	3.33%
3	1	3.33		
Total	**30**	**100**	**30**	**100**

Table 16: Grade of glottis view vs. Group

X2=9.053; p = 0.010.



Graph 8

Table 16 showed that in Macintosh group, grade 1 glottic view was visible in 66.66 % while in McGrath videolaryngoscopy group grade 1 glottic view was visible in 96.66 % patients. In Macintosh group, grade 2 glottic view was visible in 30% patients while in McGrath videolaryngoscopy group grade 2 glottic view was visible in 3.33% patients. In Macintosh group, grade 3 was seen in 3.33 % patients and in group 2 no such patient was found. Intergroup comparison between Macintosh laryngoscopy and McGrath videolaryngoscopy group showed p<.05 which was significant.

Blood on device	**Group 1**		**Group 2**	
	No.	**%**	**No.**	**%**
No	28	93.3	29	96.7
Yes	2	6.7	1	3.3
Total	30	100	30	100

Table 17: Blood on device vs. Group

X2=0.351; p = 0.554.

Table showed that there was blood on device in Macintosh laryngoscopy (group 1) in 2 out of 30 patients while in McGrath videolaryngoscopy (group 2) there was blood on device in 1 out of 30 patients.

Intergroup comparison between Macintosh laryngoscopy group and McGrath videolaryngoscopy group showed X2=0.351 and p >0.05 which was statistically significant.

Arrhythmia	**Group 1**		**Group 2**	
	No.	**%**	**No.**	**%**
No	30	100	30	96.7
Yes	0	0	0	3.3
Total	**30**	**100**	**30**	**100**

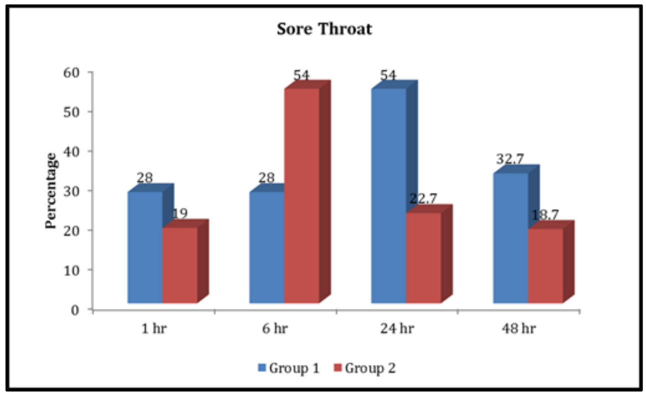
Table 18: Arrhythmia vs. Group (needs correction)

X2=1.017; p = 0.313.

Table 18 showed that there was no arrhythmia during intubation in any of the group and hence on comparing two groups p >0.05 which was statistically insignificant.

Time interval	**Group 1**		**Group 2**		**p-value**
	No.	**%**	**No.**	**%**	
1 hr	8	28.0	6	19.0	0.541
6 hr	27	28.0	16	54.0	0.001
24 hr	16	54.0	7	22.7	0.016
48 hr	10	32.7	6	18.7	0.243

Table 19: Sore Throat Vs group



Graph 9

Table 19 showed that incidence of sore throat 1 hour after extubation in Macintosh group occurred in 8 patients among 30 in Macintosh laryngoscopy group (group 1) and in 6 patients out of 30 in McGrath videolaryngoscopy group (group 2). Intergroup comparison showed p>0.05 which was statistically insignificant.

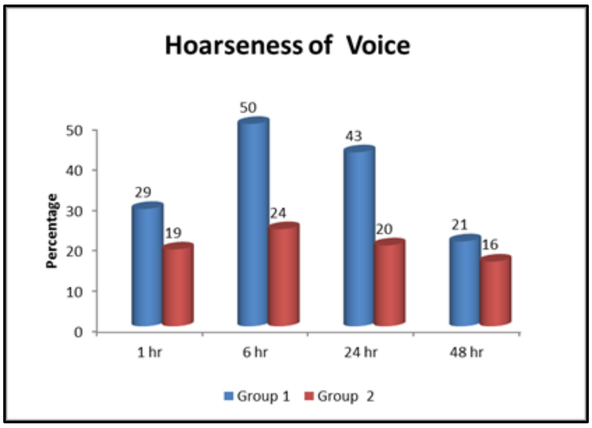
Incidence of sore throat 6 hrs following extubation in group 1 occurred in 27 patients in 30 while in group 2 it occurred in 16 patients out of 30. Intergroup comparison showed p<0.05 which was statistically highly significant.

Incidence of sore throat 24 hrs following extubation in group 1 occurred in 16 patients out of 30 in group 1, while in group 2 it occurred in 7 patients out of 30. Intergroup comparison showed p<0.05 which was statistically significant.

Incidence of sore throat 48 hrs after extubation occurred in 10 patients out of 30 in group 1, while in group 2 it occurred in 6 patients out of 30. Intergroup comparison showed p<0.05 which was statistically insignificant.

Time interval	**Group 1**		**Group 2**		**p-value**
	No.	**%**	**No.**	**%**	
1 hr	9	29.0	6	19.0	0.371
6 hr	15	50.0	7	24.0	0.032
24 hr	13	43.0	6	20.0	0.052
48 hr	6	21.0	5	16.0	0.738

Table 20: Hoarseness



Graph 10

Table 20 showed that incidence of hoarseness 1 hour after extubation in Macintosh laryngoscopy group occurred in 9 patients out of 30 and in 9 patients out of 30 in McGrath videolaryngoscopy group (group 2). Intergroup comparison showed p>0.05 which was statistically insignificant.

Incidence of hoarseness 6 hrs following extubation in group 1 occurred in 15 patients in 30, while in group 2 it occurred in 7 patients out of 30. Intergroup comparison showed p<0.05 which was statistically significant.

Incidence of hoarseness 24 hrs following extubation in group 1 occurred in 13 patients out of 30, while in group 2 it occurred in 6 patients out of 30. Intergroup comparison showed p>0.05 which was statistically not significant.

Incidence of hoarseness 48 hrs following extubation in group 1 occurred in 6 patients in 30, while in group 2 it occurred in 5 patients out of 30. Intergroup comparison showed p>0.05 which was statistically not significant.

DISCUSSION: Hemodynamic changes begin to occur within seconds of laryngoscopy because of stimuli to oropharynx, and further continue with the passage of tracheal tube due to stimuli to larynx and trachea, peaking in 1-2 minutes and lasting for 5 minutes. McGrath video laryngoscope was developed to address difficult airways and is recommended for intubation in all grades of difficulties. Because of its special blade, it can reduce the mechanical stimulus to oropharyngolaryngeal structures during orotracheal intubation, and flatter and more uniform pressure distribution is produced on the blade. Further, less neck movement is required for intubation, because of which the potential for hemodynamic stimulation is reduced. Therefore, theoretically undesirable hemodynamic responses to intubation are comparatively less in video laryngoscope than in Macintosh laryngoscope.[6]

Various video laryngoscopes have been studied to elucidate the hemodynamic changes during orotracheal intubation; however, there has been no study comparing the hemodynamic response to orotracheal intubation of the McGrath series 5 VLS and Macintosh Laryngoscope.[7-10]

Jeon et al. reported that McGrath VLS led to significant rise in SBP and HR compared to baseline[11] similarly, the present study revealed a substantial rise in mean arterial pressure and HR during laryngoscopy and intubation with either the McGrath Series 5 VLS or Macintosh Laryngoscope. Recently, studies have demonstrated that tracheal irritation rather than laryngeal irritation is the main stimulating factor for hemodynamic responses.[6] In our study, after induction of anaesthesia, a significant reduction in MAP was recorded in both groups from their respective baseline values but HR remained unchanged. Immediately before laryngoscopy (pre-laryngoscopy), there was no significant difference between the two groups in the values of any of the hemodynamic variables (All p-values >.05). Blood pressures and HR values changed significantly over time within the groups. After intubation, arterial pressure increased significantly in both groups to a peak level observed at 1-minute post-intubation, at which point it was significantly greater than pre-laryngoscopy level in both groups (p<.05).

Heart rate rose significantly 1 min following laryngoscopy in Macintosh group. A significant drop was seen at 10 min following laryngoscopy in Macintosh group. Maximum rise in HR in Macintosh and McGrath groups were comparable, with no significant difference.

Macintosh showed a significant rise in mean arterial pressure immediately after and 1 min following intubation. A significant drop was observed at 5 and 10 min in Macintosh group.

In our study, there was no statistically significant difference between McGrath group, in whom the McGrath VLS was used, and Macintosh group, in whom the direct laryngoscope was used, in BP and HR 1, 3, and 5 minutes after tracheal intubation. In contrast, several studies have demonstrated that tracheal intubation performed by devices using indirect laryngoscopy led to significantly lower hemodynamic responses in ASA class I and II patients.[12,13] This could be because of the small sample size and also the presence of confounding factors such as age, comorbidities, drug history, and type of induction medications.

Further, McGrath VLS requires a longer time for intubation than direct laryngoscopy with Macintosh which could possibly contribute to an increased incidence of hemodynamic changes.[6] Our results showed that total intubation time was significantly longer in McGrath group than in Macintosh group but it did not result in greater hemodynamic response. The reason that intubation with the McGrath led to similar hemodynamic changes to the laryngoscope, despite less lifting stimulation from the laryngoscope, could be first that the stimulation due to the passage of tracheal tube through the vocal cords has a greater impact on BP and HR than that due to the laryngoscope.

In previous studies, hemodynamic responses were greater when endotracheal intubation and laryngoscopy were performed in combination than when just lifting with the laryngoscope. This was attributed to the greater irritation on the respiratory tract from the tracheal tube than from the laryngoscope.[14-16] Further, it has been postulated that the longer intubation time in McGrath group resulted in exaggerated cardiovascular responses to tracheal intubation, counterbalancing the effect of reduced laryngoscope-lifting force. In the study by Pournajafian et al.,[6] patients with anticipated difficult airway were excluded, because of which the differences in hemodynamic responses between the groups may be less noticeable. In patients with difficult airway, more pressure from the laryngoscope is applied during tracheal intubation, and hemodynamic responses due to the laryngoscope could be more intensive.

Most tracheal intubations with direct laryngoscopy are not performed with styletted endotracheal tube. However, the use of a stylet with indirect videolaryngoscopy is strongly recommended. Andre et al. compared various VLS to test whether it is feasible to intubate the trachea of patients without using the stylet. They noted intubation time, number of intubation attempts, use of extra tools to facilitate intubation. They found all VLS offered equal or better view of glottis assessed by mean Cormack and Lehane grading compared with traditional Macintosh Laryngoscope.[17]

Similarly, Shippey et al.[18] reported a first pass success rate of 93% when using the McGrath with a styletted ETT. They believed that mounting the tube onto a stylet and angling the distal tip upwards by 60-70° at the proximal end of the cuff allowed easier insertion of the tube into the larynx, and using a stylet and correctly shaping the tracheal tube was mandatory to assist tracheal intubation with the McGrath. Maassen et al.[19] confirmed that a styletted ETT was highly desirable to intubate the trachea in morbidly obese patients when the McGrath were used.

In this study, stylet was not in the first attempt but used in the 2ndattempt.The first pass success rate of the McGrath VLS and Macintosh laryngoscope was 9/30 (30%) and 29/30 (96%) respectively. On using the stylet, I was able to intubate 19 patients in 21 patients (90.4%) in 1st attempt after the intubation got failed without stylet use. 2nd attempt with stylet in situ was required only for 1 in 20 patients (5%).

Mean time to intubation using the Macintosh and the McGrath was 19.80 sec and 52.97 sec respectively, which is comparable to times achieved with other studies. This longer time may be related to number of attempts taken to intubate in case of McGrath VLS. While 97% of the patients (29/30) got intubated in 1st attempt in case of Macintosh Laryngoscope, only 30% of the patients (9/30) got intubated in 1st attempt in case of McGrath VLS without the use of stylet. Remaining 3% of the patients (1/30) in Macintosh group got intubated in 2nd attempt and 66% of the patients in McGrath laryngoscopy (20/30) got intubated in 2nd attempt when stylet was used and remaining 3%(1/30) of patients in McGrath VLS got intubated in 3 attempts.

In McGrath videoscopes, the anatomy of the blade is such that there is a steep bend for alignment of oral, pharyngeal and laryngeal axes for viewing the glottis. The VL improves the Cormack Lehane grade of visualization of glottis and navigation or advancement of ETT. Thus, less or no pressure is exerted on the upper airway structure with videoscopes.

This study confirms that a stylet is highly recommended when McGrath VLS is used. When using a stylet, VLS may not had differed in intubation time or number of intubation attempts. This study also confirms excellent unobstructed view of glottis opening obtained indirectly with a VLS as opposed to Macintosh laryngoscope.

No conversion to direct laryngoscopy was necessary in any patient studied in VLS group. Equal or better C and L grade can be obtained in all cases which is in agreement with other studies.

Good visualization is paramount for successful tracheal intubation; however, providing good view of glottis doesn't always correlate with successful intubation. This fact is evidenced in our study by the fact that although 96.66% of the patients in VLS group showed C and L grading 1 but only 30% of patients got intubated in 1st attempt and 66.66% of patients got intubated in 2nd attempt with stylet in it. Still one patient needed a 3rd attempt for getting intubated. In contrast, in Macintosh group, though only 66.66% of patients had grade 1, 30% of the patients had grade 2 and 3.33% of the patients had grade 3 but still 97% of the patients got intubated in 1st attempt without stylet and rest 3% patients got intubated in 2nd attempt with stylet.

Due to more anterior view of larynx provided in general by indirect laryngoscopy, tube passage may be more difficult and lead to impingement on the anterior commissure of the glottis. Shippey et al.[20] recommended the use of a thicker more rigid stylet and preshaping of the tracheal tube. If endotracheal tube can't be advanced, stylet can be removed and Eschmann gum elastic bougie inserted into the tube and advanced into the trachea. Video can then assist rail roading of the tube over bougie.

All indirect laryngoscopic techniques have a mechanism to illuminate glottis region. McGrath have LED at the tip. The anti-fogging mechanism is integrated inside McGrath laryngoscope. Preheating it is unnecessary because LED heats a window over video chip. If fogging does occur, it likely means that VLS is defective.

There was no significant difference in complication rates between the two devices with respect to blood on device, oral bleeding, bronchospasm and arrhythmias concerned.

The incidence of sore throat in Macintosh laryngoscope group at 6, 24 and 48 h after the operation were significantly higher than in videolaryngoscope.

The incidence of hoarseness in VLS group at 6 h after the operation was significantly lower than in Macintosh group.

The incidence and severity of a sore throat were increased by intubation and increased operation time.

SUMMARY AND CONCLUSION: This study was done on sixty patients of ASA 1 and 2, undergoing elective surgery under general anaesthesia. The patients were allocated in two groups of 30 patients each. Patients selected were allocated in two groups and without risk factors.

The patient's airway assessment like mouth opening, Mallampati grading and neck extension was done. Pre-induction Heart rate, mean arterial pressure and saturation were noted. All patients were induced with standard general anaesthesia technique. Post induction and post intubation vitals were noted.

Direct laryngoscopy group (group 1) patients were intubated through direct laryngoscope. Video laryngoscopy group (group 2) patients were intubated through McGrath VLS.

The distribution of patients according to age, sex and weight was comparable (p>0.001) in both groups. The changes in heart rate, mean arterial pressure, oxygen saturation were not significant (p >0.001) between the two groups after intubation at different time intervals. The number of attempts and intubation time was found to be significantly higher in McGrath VLS as compared to Macintosh laryngoscope. The increase in post-operative sore throat and hoarseness after 6 and 24 hrs following operation was found to be significant in group 1 compared to group 2.

So from our study, we conclude that the use of McGrath video laryngoscope has no advantage over direct laryngoscopy in attenuating the cardiovascular responses attributed to tracheal intubation in patients with normal airway. It is also associated with greater number of attempts and longer intubation time. But with the use of stylet number of attempts can be reduced; however, use of stylet has its own complications.

VLS has lesser incidence of post-operative sore throat and hoarseness as compared to Macintosh laryngoscopy.

In the future, McGrath VLS may be used as an alternate to Macintosh laryngoscope in neurosurgical patients with normal airway and difficult airway.

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