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RESEARCH ARTICLE

COMPARISON OF LARYNGOSCOPIC VIEW & HAEMODYNAMIC RESPONSE TO LARYNGOSCOPY& OROTRACHEAL INTUBATION BY USING MACINTOSH/ MACCOY LARYNGOSCOPE FOR ADULT PATIENTS

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Abstract

Background: Direct Laryngoscopy and intubation lead to stress response and sympathetic stimulation which is disadvantage for some high risk patients of cardiac ischemia, raised intracranial tension, cerebral aneurysm, open globe injury, glaucoma etc. Hence reduction of the intense stress response is of utmost importance for a stable and safe hemodynamics in those patients.

Aims and Objectives: To access hemodynamic response to laryngoscopy done by the Macintosh/ McCoy blade.

Materials and Methods: In this study we had selected 60(male and female in equal number) ASA grade-I&ll patients posted for elective general surgery. They were randomly divided into two groups - group I(laryngoscopy done by Macintosh blade)and group II(laryngoscopy done by McCoy blade). Systolic Blood Pressure, Diastolic Blood Pressure , Mean Blood Pressure and Heart Rate were recorded before and after anaesthesia induction, just after intubation and one, three ,five minutes after orotracheal intubation.

Results: The results were compared over time between the two groups. Mean values of Systolic Blood Pressure, Diastolic Blood Pressure, Mean Blood Pressure and heart rate were significantly higher in group 2 as compared to group 1.

Conclusion: The stress response was significantly higher when laryngoscopy was done with Macintosh blade as compared with McCoy blade. Intubation with McCoy laryngoscope blade provide better laryngoscopy view.we recommend usage of McCoy blade in routine Anaesthesia practice as non pharmacology means to attenuate haemodynamic response to laryngoscopy& intubation.

Introduction:-

Laryngoscopy and intubation are vital part of anaesthesia & extremely important components for critical care and emergency medicine also.. A good laryngoscopy is a skill which is perfected over time. Laryngoscopy can be both direct as well as indirect. It was due to the pioneering effort of three anaesthesiologists - Alfred Kirstein (1863 - 1922),(1,)Chevalier Jackson (1865 - 1958)2 and Gustav Killian (1838-1912)(2)that the first use of laryngoscopy came into existence. Robert A Macintosh(3/ and Robert A Miller(4) also contributed significantly to the

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development of modern laryngoscopes. Since then, laryngoscopes of various sizes, shapes(,5), handles6 and blades(7)have been developed to facilitate different clinical situations(8)There are various studies to understand the technique of laryngoscopy(9) and the physiological changes caused by it.(10)Direct Laryngoscopy and intubation lead to extensive stress response and sympathetic stimulation in the body which can be critical for some patient subsets like cardiac ischemia, raised intracranial tension, cerebral aneurysm, open globe injury, glaucoma etc. Hence reduction of the intense stress response is of utmost importance for a stable and safe hemodynamics in those patients.Various pharmacological measures have been used to blunt this stress response. Various adaptations in the designs of the laryngoscope blades have also been tried. The time duration of laryngoscopy also contributes to the stress response and hence duration of less than 15 seconds is said to be ideal. No technique has yet proved to be perfect.Various studies have been carried out in the past and they have shown that the difference in amount of stretch and force caused by different designs of blades leading to varied degrees of stress responses.(11) It is interesting to see how this simple technique of changing the laryngoscope blade design changes the degree of stress response. As laryngoscope blades are reused, it is also a very cost effective measure.

A detailed pre-anaesthetic check-up was done on the day before surgery including history of present illness and its management, previous medical and surgical illness, previous anaesthetic exposure, drug and allergy history. A detailed examination of the airway, other systems of the body and spine were also done. All routine blood investigations, ECG and chest X ray were checked. The height and weight of the patient were also recorded. All patients were given suggestions regarding the preoperative preparations. After patient identification and checking the consent for surgery and anesthesia the patients were shifted to the operating table with an intravenous line for infusing Ringer Lactate.Monitors like noninvasive blood pressure cuff, pulse oximeter, 12 lead ECG, capnograph and temperature probe were attached to the patients.All patients were given intravenous Ondansetron 4mg, injection Fentanyl 2 mcg / kg, three minutes before induction of anaesthesia. Pre-oxygenation was done for 5 minutes and then induction of Anaesthesia was done with Injection 2% Propofol 2mg/kg and Injection succinylcholine 2mg/kg to facilitate laryngoscopy and intubation was given. Laryngoscopy was done in less than 15 seconds in all cases.Laryngoscopic view by Cormarck Lahane grade was notified. Endotracheal tube size 7.5 mm was used for females and 8.5mm was used for males. The tube was secured with adhesive tapes after the tube position was being confirmed by auscultation and ETCO2 bycapnography. Anaesthesia was maintained with 66 percent N2O and 33 percent O2 & Sevoflurane 2-3%with intermittent intravenous Fentanyl and Atracurium as required.after surgery, patient were reversed with glycopyrrolate & inj.Neostigmine.5 min after intubation is endpoint of the study.

Perioperative Monitoring

1) Heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure before and after induction, 1 minute, 3 minute and 5 minute after intubation.
2) ECG lead 2 and lead 5 continuously for any rhythm disturbance.
3) End tidal CO2 by capnography.
4) laryngoscopy view grade by cormarck Lahane grade on laryngoscopy for intubation was noted.

Data Analysis

Data was analyzed by SPSS version 19. Student-test was applied to find the difference between the mean values of the parameters of the two groups at the base line and after induction with Propofol. Student t test. Was used for nalysis of numerical parameters.chisquare test was used for categorical parameters.P value less than 0.05 was considered to be significant.,<0.001 is Highly significant HS,&P>0.05 is non significant(NS)

Results:-

Table 1:- Demographic charisteristics.

Parameters	Group l(n=30)	Group ll(n=30)	P value	Inferences
Age(yrs)	38+/-12	40+/-11	>0.05	NS
Gender (M:F)	16:14	15:15	>0.05	NS
BMI	22+/-2	22+/-3	>0.05	NS
ASA grade(l/ll)	15:15	15:15	>0.05	NS
Duration of surgery (mins)	110+/-25	114+/-20	>0.05	NS

Table 2:- Heart Rate (beats/ min).

HR	Group l(n=30)	Group ll(n=30)	P value	Inferences
Baseline	72+/-7	75+/-5	>0.05	NS
1 min	98+/-9	78+/-2	<0.001	HS
3 min	86+/-3	74+/-2	<0.05	S
5 min	80+/-4	72+/-4	>0.05	NS

Table 3:- Systolic Blood pressure(in mm of Hg).

SBP	Group l(n=30)	Group ll(n=30)	P value	Inferences
Baseline	122+/-4	120+/-6	>0.05	NS
1min	144+/8	124+/-2	<0.001	HS
3 min	142+/-6	122+/-8	<0.05	S
5 min	130+/-8	120+/-2	>0.05	NS

Table 4:- Diastolic Blood pressure (in mm of Hg).

DBP	Group l (n=30)	Group ll (n=30)	P-value	Inferences
Baseline	76+/-4	78+/-2	>0.05	NS
1min	88+/-8	80+/-4	<0.001	HS
3min	86+/-5	74+/-2	<0.05	S
5 min	74+/-5	72+/-4	>0.05	NS

Table 5:- Mean Arterial pressure (in mm of Hg).

MAP	Group l (n=30)	Group ll (n=30)	P value	Inferences
Baseline	74+/-3	72+/-2	>0.05	NS
1 min	94+/-8	78+/-4	<0.001	HS
3min	82+/-4	72+/-3	<0.05	S
5min	78+/-2	72+/-1	>0.05	NS

Table 6:- Cormarck Lahane grade for laryngoscopy.

Parameters	Group l (n=30)	Group ll (n=30)	P value	Inferences
Cormarck Lahane grade (I/ll/lll)	10/12/8 33/39/26)%	24/6/0 (80/20/0)%	<0.001	HS

Discussion:-

In our study we have seen that the amount of stress response generated by McCoy laryngoscope is significantly less than that of Macintosh blade. The systolic, diastolic and mean arterial blood pressure and heart rate in both the groups did not vary significantly at baseline after induction with Propofol .But they all varied significantly across the groups after laryngoscopy and intubation. On an average the systolic, diastolic,mean arterial blood pressure and heart rate in group l were significantly higher than group ll .There are significant intra-group variations of the mentioned parameters. Though, their values did not vary significantly at baseline in both the groups, their values fell down in both groups after induction which can be attributed to the vasodilatory property of Propofol. There is a rise in systolic, diastolic, mean arterial blood pressures as well as heart rate immediately after intubation and one minute after intubation. But on an average their mean values were more in groupl as compared to group ll. Thereafter their values had fallen down but they were consistently higher in group 2 as compared to group 1, after 3 minutes and 5 minutes of induction.These results are in concurrence with studies by McCoy EP & others.(1,2).However a study carried out and published by H Jung Shin and others shows conflicting results showing no significant difference between the change of systolic and diastolic blood pressure of McCoy and Macintosh group.4Both sympathetic and parasympathetic nervous systems are involved in heart rate response which maintains a balance between cardiac sympathetic excitation and cardiac vagal withdrawal.5 Aging is also associated with decreased autonomic reflex function.(6) Elderly patients have lesser chronotropic effect associated with tracheal intubation(7)However the impact of age is not significant in our study as there is not significant age difference between the age in the 2 groups.

The findings of our study correlates well with many studies like the study carried out by **Norris TJ** etal,(11) **Barak M** etal(12) and **Xue FS etal**(13)concluded that the stress response by McCoy blade was significantly less as compared to the stress response by Macintosh blade. The difference is mainly due to a lesser force exerted by the McCoy laryngoscope. The blood pressure and heartrate settled down in both the groups over time of 5 mins as the stress response decreased gradually,but response is more in group ll compare to group l.as per table 2,3,4,5..

The hemodynamic changes seen with laryngoscopy and intubation are a result of rise in catecholamine levels. Studies have shown an increase in noradrenaline level with laryngoscopy(12)

In our study statistical high significance was there in cormarck Lahane grade on laryngoscopy view as shown in table 6.($p<0.001$)**Harioka et al**(14,)studied 219 patients and concluded that without external laryngeal pressure, the MacCoy blade provided a better laryngoscopic view than that obtained by the Macintosh laryngoscope ($p<0.05$)

MacCoy EP, Mirakhur RK. et al (15)compared the stress response to laryngoscopy, using the Macintosh and MacCoy blade. The cardiovascular changes and catecholamine concentrations were measured.here was significant increase in both heart rate (33%) and arterial blood pressure (27%) after laryngoscopy using the Macintosh blade ($P < 0.05$). Use of the MacCoy blade did not result in any significant change in either heart rate or arterial blood pressure. They concluded that the stress response to laryngoscopy is less marked with the use of MacCoy blade and it is probably due to a reduction in the force necessary to obtain a clear view of the larynx.

Nishiyama T, et al(16) , compared the stress response during laryngoscopy using three different laryngoscopes, Macintosh, Miller, or MacCoy. Blood pressure, heart rate (in 58 patients) and plasma concentration of catecholamine (in 29 patients) were measured before, during and after laryngoscopy without tracheal intubation. The results suggest that the stress response during laryngoscopy without intubation is the highest with the Miller blade and the least with the MacCoy blade.

In the study by **Sakai T et al.** (17), compared the grade of laryngeal visualization with the MacCoy, Macintosh and the Miller blade in 117 patients for elective surgery under general anesthesia requiring tracheal intubation. They found that the grades of laryngeal visualization with McCoy blade were significantly better than those with Macintosh blades.The cause of less stress response by McCoy blade is due to less force or traction exerted by McCoy blade during direct laryngoscopy.

One of the limitations of our study is that we have not measured the catecholamine levels. Measuring of catecholamine levels would have been of great relevance to quantify and to find the exact pharmacology behind the stress response. We have also not been able to measure the cortisol levels in the patients which is the marker of anystress response.Another major limitation of the study is that in both groups of patients were given i.v Fentanyl (2 microgram / kg) before laryngoscopy and intubation. This drug is used to decrease the stress response. But as both the groups had received the same amount of fentanyl, we are able to compare the haemodynamic response evoked by different laryngoscopic blades.Our study includes only ASA 1 and 2 patients, neither of them was hypertensive, diabetic or on any drug therapy.

There are various studies which show that autonomic neuropathy associated with diabetes mellitus leads to an altered stress response to laryngoscopy and intubation.8

Limitations

1.large scale studies should be carried out on hypertensive patients on antihypertensive therapy to study laryngoscopy induced stress response.

2.We have not measured adrenaline level , cortisol levels of patients in study.

Conclusion:-

We conclude that the stress response was significantly higher when laryngoscopy was done with Macintosh blade as compared with McCoy blade. We recommend usage of McCoy blade in high risk patients will subsequently reduce complications caused by adverse sympathetic surge. We also recommend usage of McCoy blade for orotracheal intubation in normal Anaesthesia practice to attenuate haemodynamic response to laryngoscopy intubation as non-pharmacology means.

In nutshell McCoy laryngoscope is more advantageous than Macintosh laryngoscope as it provides better laryngoscopy view& lesser haemodynamic response to laryngoscopy & intubation than Macintosh laryngoscope.

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