



**LARYNGOSCOPY AND LARYNGEAL INTUBATION USING
MACINTOSH VERSUS FLEXITIP (TRUPTI) BLADE – RANDOMIZED,
PROSPECTIVE STUDY OF A COMPARISON OF THE STRESS
RESPONSE, LARYNGOSCOPIC VIEW AND EXTERNAL
MANIPULATION**

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ABSTRACT

Background: Laryngoscopy and intubation are known to have profound cardiovascular effects like a pressure response and tachycardia along with an increase in catecholamine concentrations. The major cause of sympathoadrenal response is believed to arise from stimulation of supraglottic region by the Laryngoscope blade and tracheal tube placement and cuff inflation contributing additional stimulation. We studied in a prospective study of a comparison of the stress response, laryngeal view, requirement of the external manipulation(BURP-backward upward rightward pressure) during

laryngoscopy and laryngeal intubation, Macintosh versus Flexitip (TruPTI) blade. **Methods:** After obtaining approval from Institutional Ethics Committee and written informed patient consent, 100 ASA I and II patients in the age group 18-60 years of age of either sex, who were normotensive and undergoing planned elective surgery under general anaesthesia were selected in this randomised, prospective study. Data within each group were analyzed using

repeated measured analysis of variance and both the group using Chi-square t-test. A 'p' value of <0.05 was considered significant. **Results:** Significant difference is noted in hemodynamic parameters in both the groups. **Conclusion:** To avoid the stress response to laryngoscopy, use of Flexitip (TruTip) blade is a good choice.

KEYWORDS: laryngoscopy, endotracheal intubation, pressor response.

INTRODUCTION

Laryngoscopy and intubation are known to have profound cardiovascular effects like a pressure response and tachycardia along with an increase in catecholamine concentrations. The major cause of sympathoadrenal response is believed to arise from stimulation of supraglottic region by the Laryngoscope blade and tracheal tube placement and cuff inflation contributing additional stimulation.

When laryngoscopy proves difficult, the force applied increases as the degree of difficulty increases.^[1,2] The factors that can cause difficulty during intubation are - forward displacement of larynx, forward or prominent upper incisor teeth, backward displacement of the tongue because of anatomical problems, in such situations, elevation of the epiglottis may be difficult or impossible.

The McCoy laryngoscope blade is a modification of standard Laryngoscope blade to facilitate tracheal tube placements in the case of difficult visualization of the larynx.^[3,4,5] The Flexitip is a new laryngoscope with the same concept of an internal levering blade but with a wider range of movements.^[6] The hinged blade tip, controlled by a lever on the handle of the laryngoscope, allows elevation of the epiglottis with less overall elevation of tongue, epiglottis and mandible and resulting in the exertion of lesser force.^[7,8]

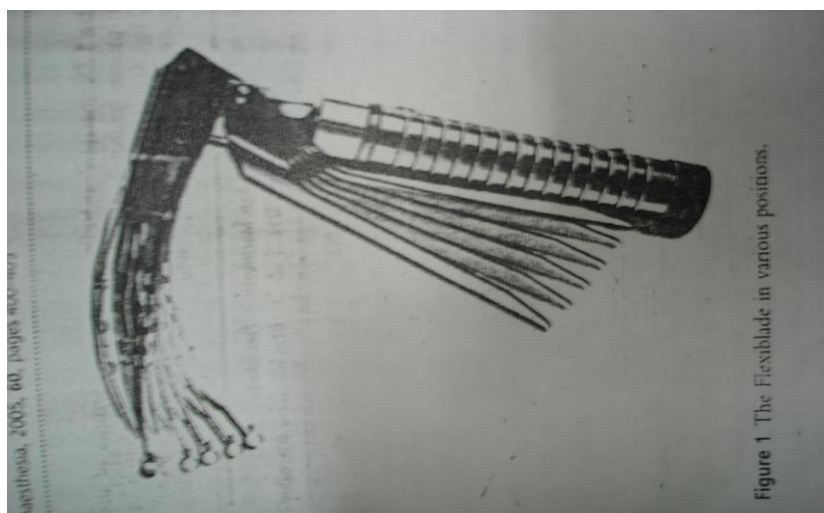
We studied in a prospective study of a comparison of the stress response, laryngeal view^[9], requirement of the external manipulation (BURP-backward upward rightward pressure)^[10] during laryngoscopy and laryngeal intubation, Macintosh versus Flexitip (TruTip) blade¹. Laryngeal exposure was graded as per Cormac and Lehane, We have studied two groups of patients with 50 patients in each group.



Macintosh Laryngoscope Handle And Blades^[11,12]



Mccoy Laryngoscope Blade With Handle^[12,13]



Flexiblade In Various Positions^[12]

PHYSIOLOGY OF PRESSOR RESPONSE

The reflex nature of the pressor response is evident from the fact, that changes occur at very instant that laryngoscope and ET intubation are performed.^[14]

The laryngoscope blade pressing on the base the tongue or lifting of epiglottis initiates these changes². Although initially it was thought to be vasovagal reflex, as both afferent and efferent pathway of reflex arc were assumed to be vagus nerve. It is now known to be a sympathetic reflex, provoked by the epipharynx and laryngopharynx. The afferent portion of reflex arc is the nerve ending in the larynx and the trachea. The nerve supply of the larynx is via vagus nerve, which is predominantly parasympathetic, although it does contain some cardio accelerator fibers. Therefore, intense stimulation of vagus, as produced by laryngoscopy and ET intubation may cause impulse to spread to sympathetic fibers.^[2,14]

The efferent limb of the reflex arc is through the sympathoadrenal system, monosynaptic pathways for motor laryngeal reflex, also exists.^[2,14]

Most important factor affecting this reflex circulatory response, appear to be a depth of anaesthesia obtained during laryngoscopy and ET intubation. Changes were worsened by hypoxia, hypercarbia, coughing etc and found to be independent of anaesthetic agent. Pressor response is more completely blocked by deep planes of anesthesia than the HR response, various studies have emphasized on the rate of ETT in the reflex circulatory response but laryngoscope alone can cause increase in HR and BP is capable of producing cardiac arrhythmias.

Duration of laryngoscopy is important in influencing the magnitude of the response. Progressive increases in BP and HR have been demonstrated during the first 45 seconds of laryngoscope and prolongation of laryngoscopy to 60 seconds produced additional increases above the value of 45 seconds. After intubation there is a gradual return of BP and heart rate to the pre laryngoscopic levels, probably due to fatigue of reflex receptors, but subsequent deepening of anesthesia and intervention of buffer mechanisms must also be considered.^[2,14]

The hemodynamic changes responsible for rise in BP are difficult to analyze completely. From actual examination of pulse pressure records, it was seen that stroke volume may or may not remain unchanged at the time of intubation. This then suggest myocardial stimulation and adequate venous return as the cause of rise in BP. Increases in peripheral

resistance as a result of arteriolar constriction may also contribute. Increases in heart rate could be due to the cardio accelerator, but is more marked with endotracheal intubation.

MATERIALS AND METHODS

After obtaining approval from Institutional Ethics Committee and written informed patient consent, 100 ASA I and II patients in the age group 18-60 years of age of either sex, who were normotensive and undergoing planned elective surgery under general anaesthesia were selected in this randomised, prospective study.

Exclusion Criteria

- Anticipated Difficult intubation
- Inter Incisor Gap < 5 cm or 2 finger breadth
- Neck circumference > 18cm
- Mallampatti classification Grade I and II
- Thyromental Distance < 6.5 cm
- Body Mass Index > 30kg/m²
- History of reflux oesophagitis
- ASA grade III, IV
- Patients not willing for participation in the study

These patients were randomly divided into two groups of 50 patients in each group

Group I : 50 patients laryngoscopy and intubation using Macintosh blade

Group II : 50 patients laryngoscopy and intubation using McCoy Flexitip (TruTip) blade

All the patients undergoing planned elective surgery were assessed as per the routine preoperative protocol and had been kept nil by mouth for 6 hours before surgery.

Anaesthesia protocol: Patients were randomly assigned to one of the two group using computer generated random codes. On arrival in the OT, monitors were attached such as, Noninvasive blood pressure monitoring, cardioscope pulse oximeter. Intravenous access achieved with 18G angiocath an DNS were started. Premedication was given with, IV Glycopyrrolate 0.004mg /kg., IV Midazolam 0.03 mg/kg, IV Fentanyl 1 µg/kg. Arterial pressure and heart rate were recorded at baseline preoperative and after sedation. Induction with Thiopentone sodium 4-5mg/kg. Neuromuscular block were given with IV succinyl choline 2mg/kg for muscle relaxation. 60 Sec. After succinyl choline laryngoscopy were performed

with any of the two blades enabling a clear view of the vocal cord, tip of the either laryngoscope blade gently introduced towards the glosso-epiglottic fold . Larynx were visualised with the Macintosh blade by forward movement of the whole instrument and with the McCoy blade by just pressing the lever and lifting the blade upward. Laryngoscope placed in the correct position with a clear view of glottis.

Laryngeal view were classified according to method described by Cormac and Lehane (C & L)

Grade I : Full view of glottis

Grade II : Glottis partly exposed, anterior commissure not seen

Grade III : Only epiglottis seen

Grade IV : Epiglottis not seen

Trachea what intubated, Heart rate, Blood pressure recorded for five minutes with 1 minute interval after intubation. later on every five min interval till end of surgery. Two attempts of intubations with or without BURP were allowed. All intubations will be performed by the same anaesthesiologist undertaking study. All intubations were performed in less than 15 sec.

Monitoring – Pulse oximeter – continuous

Electrocardiogram, rhythm and heart rate continuous Noninvasive blood pressure monitoring at the interval of one min. till five min. and then with the interval of five min till end of surgery.

Pulse rate – at the interval of one min. till five min. and then with the interval of five min till end of surgery. Data recording were done over case record from

Statistical consideration – Data within each group were analyzed using repeated measured analysis of variance and both the group using Chi-square t-test. A ‘p’ value of <0.05 was considered significant.

OBSERVATION AND RESULTS

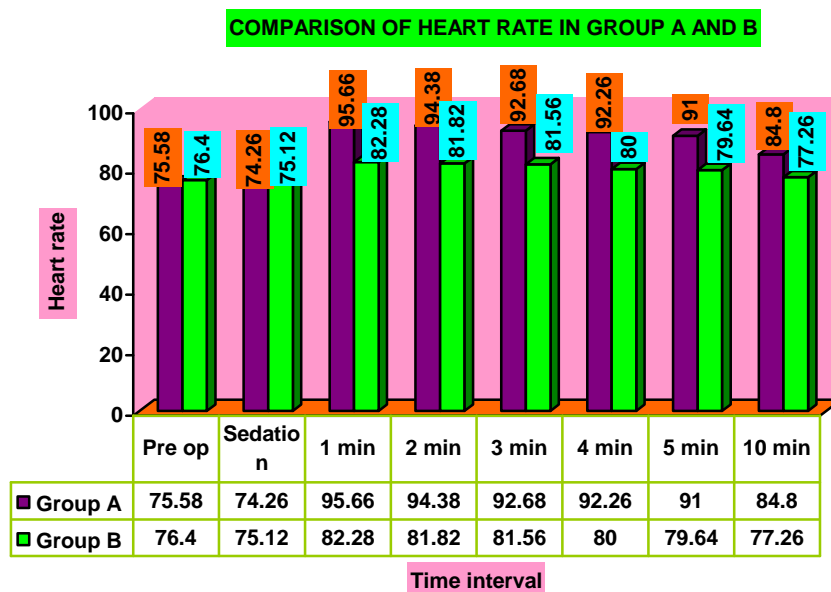
The study was performed with a total of 100 randomly selected patients keeping an eye on the eligibility criteria. Both the groups were comparable with respect to age, sex, weight and height. Comparison of Gender, Age, Body Weight and height of Cases between two groups were non-significant so not presented graphically here.

Even there is no significant difference ($p=1.000$) between number of attempts required for laryngoscopy and endotracheal intubation in both the groups.

TABLE 1 : Comparison Of Heart Rate At Various Intervals Between Group-A And Group-B Using Chi-Square T-Test(Intergroup Comparison)

Time Point	Group A		Group B		P-value
	Mean+SD	SEM	Mean+SD	SEM	
Pre op	75.58+4.572	0.6466	76.4+5.743	0.8122	0.4315
Sedation	74.26+4.619	0.6533	75.12+5.773	0.8165	0.4128
1 min	95.66+14.843	2.099	82.28+13.784	1.949	<0.0001
2 min	94.38+13.561	1.918	81.82+13.102	1.853	<0.0001
3 min	92.68+12.904	1.825	81.56+12.977	1.835	<0.0001
4 min	92.26+12.62	1.785	80.00+12.646	1.704	<0.0001
5 min	91+12.169	1.74	79.64+12.042	1.703	<0.0001
10 min	84.8+10.829	1.531	77.26+9.15	1.296	<0.0003

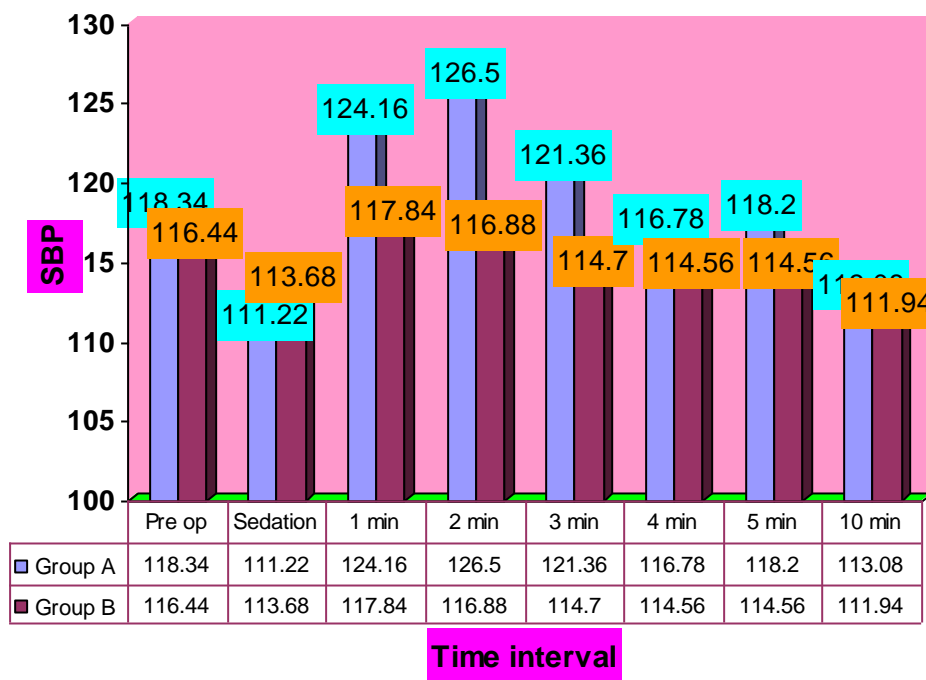
- Heart rate in preoperative and after sedation in both the groups have no significance ($p = 0.4315$ and 0.4128).
- Heart rate was increased in group I patients where Macintosh blade was used during laryngoscope and intubation. It was significantly increased for first ten min ($p < 0.0001$).
- Mean heart rate was increased by 9-20/min (12% to 26.66%) above preoperative value in Group A patients while in Group B patient it was increased by 1 to 6/min(1.33% to 8%).



Comparison Of Systolic Blood Pressure At Various Intervals Between Group-A And Group-B Using Chi-Square T-Test

- Systolic blood pressure in preoperative and after sedation in both the groups have no significance
- Systolic blood pressure was increased in Group-A patients with the use of Macintosh blade for laryngoscopy and intubation. It was significantly increased for first 3 min after intubation ($p=0.0596$), ($p=0.0005$), ($p=0.0204$) at first, second and third min. respectively.
- Mean systolic blood pressure was increased by 3 to 6 mmHg (6% to 12%) in Group-A patients and in Group-B it was increased by 0 to 2mmHg (0% to 4%).

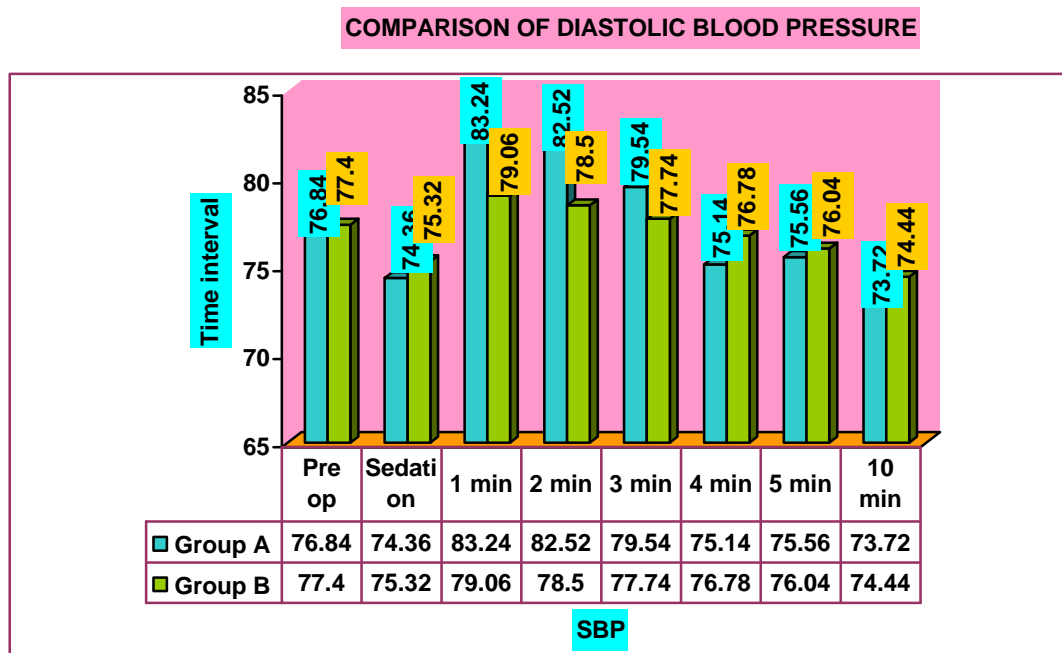
COMPARISON OF SYSTOLIC BLOOD PRESSURE IN GROUP A AND B



Comparison Of Diastolic Blood Pressure At Various Intervals Between Group-A And Group-B Using Chi-Square T-Test

Time Point	Group A		Group B		P-value
	Mean+SD	SEM	Mean+SD	SEM	
Pre op	76.84+5.464	0.7227	77.4+5.55	0.7856	0.6124
Sedation	74.36+7.159	1.012	75.32+5.385	0.7615	0.4504
1 min	83.24+9.623	0.361	79.06+8.001	1.132	0.0202
2 min	82.52+10.981	1.553	78.5+8.355	1.182	0.042
3 min	79.54+8.906	1.259	77.74+6.942	0.9818	0.02624
4 min	75.14+8.202	1.16	76.78+7.249	1.025	0.3828
5 min	75.56+9.154	1.295	76.04+6.866	0.971	0.7674
10 min	73.72+8.91	1.26	74.44+5.953	0.8418	0.6358

- Diastolic blood pressure in preoperative and after sedation in both the groups have no significance in preoperative($p=0.6124$),and after sedation($p=0.4504$)
- Diastolic blood pressure was increased in Group A patients with the use of Macintosh blade for laryngoscopy and intubation. It was increased for first three min after intubation ($p=0.0202$), ($p=0.042$), ($p=0.02624$) at first, second and third min. respectively
- Mean diastolic blood pressure was increased by 3 to 7 mmHg (6% to 14%) in Group-A, and in Group-B it was increased by 0 to 2 mm Hg (0% to 4%)



There was no significant difference ($p=0.0713$) observed between requirement of external maneuver required for laryngoscope in both the groups. Out of 50 patients, 10 patients (20%) in Group A and 3 patients in Group-B(6%) required external manipulation during laryngoscopy and intubation.

In all 100 patients Cormac and Lehane were grade I and there mean was 1. p value could not be observed.

DISCUSSION

The reflex nature of the pressure response to laryngoscopy and intubation is due to changes that initiated by laryngoscope blade, pressing on the base of tongue or lifting of epiglottis.

In past, Flexitip (McCoy) and Macintosh blades had been compared with regard to pressure, heart rate and rhythm changes in response to laryngoscopy where McCoy blade had been

shown to require less force than a Macintosh blade for visualization of the laryngoscope (Anesthesia, 1996, Vol. 51 pages 912-915)

Thus Flexitip (McCoy) laryngoscope has been described as being useful in a variety of situations where previously difficult or impossible intubation has been overcome (Anesthesia 1996 Vol. 51, Pages 977-980)

- This study is a randomized, prospective study of a comparison of the stress response, laryngoscopic view and external manipulation during laryngoscopy and laryngeal intubation using Macintosh versus Flexitip (TruTip) blade.

In this study, 100 ASA grade-I patients were selected between the age group of 18-60 yrs undergoing elective surgery under general anesthesia.

Patients were divided randomly into two groups as follows:

Group I ;-- 50 patients, laryngoscopy and intubation using Macintosh blade

Group II;--50 patients, laryngoscopy and intubation using Flexitip (TruTip) blade

All intubations were performed in less than 15 sec. After intubation heart rate and blood pressure recorded for 5 min. with 1 min interval and later on at the interval of 5 min.

Whenever laryngeal view was not adequate to improve visualization, external laryngeal manipulation was done using BURP technique.

❖ In this study it was observed that.

- Age, weight and height compared between two groups with chi square test showed, there were no significant difference with respect to age ($P=0.9035$), height ($P=0.4173$), weight ($P=0.4868$)
- There were no significant difference observed in between two groups in respect of Gender ($P=1.176$).
- Comparison of heart rate in between the two groups it was observed that,
 - There was no significant difference in pre operative and after sedation values in two groups ($P=0.4135$).
 - Heart rate was increased by 9 to 20 per min. (18% to 40%) in Group-A and in Group-B it was increased by 1 to 6 per min. (2% to 12%)

- Heart rate was increased in both groups, but in Group-A patients where Macintosh blade was used during laryngoscopy and intubation, It was extremely significantly raised for first 10 min ($P < 0.0001$)
- Comparison of the systolic blood pressure in between two groups it was observed that,
 - In preoperative ($p=0.4315$) and after sedation ($p=0.4128$) systolic blood pressure have no significance,
 - Mean systolic blood pressure was increased by 3 to 6 mmHg (6% TO12%) in Group-A and by 0 to 2 mmHg (0% to 4%) in Group-B patients
 - Systolic blood pressure was increased in both the groups, but it was significantly increased for first three min. after intubation ($p= 0.0596$), ($p=0.0005$) ($p= 0.0204$) during first, second and third min. respectively in Group-A patients where Macintosh blade was used
- Comparison of the diastolic blood pressure in between two groups, it was observed that,
 - In preoperative ($p=0.6124$) and after sedation ($p=0.4504$) diastolic blood pressure have no significance
 - Mean diastolic blood pressure was increased by 3 to 7 mmHg (6% to14%) in Group-A, and by 0 to 2 mmHg (0% to4%) in Group-B patients
 - Diastolic blood pressure was increased in both the Groups, but it was significantly increased in Group-A patients with the use of Macintosh blade for first three min. after intubation ($p=.0202$), ($p=.042$), ($p=.02624$) during first, second and third min. respectively
- Comparison of the requirement of external manipulation for visualization of Vocal cords showed no significant difference ($p=0.0713$)
 - Out of 50 patients in Group-A,10 patients (20%),and in Group-B, 3 patients (6%) required external manipulation (BURP)
 - Although there was clinical difference observed for requirement of external manipulation in both the groups, however there were no statistical differences observed
- Comparison of the requirement of number of attempts in between two groups shown no significant difference ($p=1.000$) out of 50 patients, 3 patients (6%) required second attempt in Group-A, and 2 patients (4%) required second attempt in Group-B
 - Although there was clinical difference observed for requirement of second attempt in both the Groups, however there was no statistical significance observed

From above results it was observed that laryngoscopy and intubation performed with Flexitip (Truption) blade produces less stress response than with Macintosh blade.

- ❖ Also it was observed that there were less difference in between two groups in relation to requirement of external manipulation and number of attempts during laryngoscopy and intubation

CONCLUSION

To avoid the stress response to laryngoscopy, use of Flexitip (Truption) blade is a good choice.

There was a minimal increase in heart rate, Blood pressure with the use of Flexitip laryngoscope blade which further helps in avoiding stress related complications.

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