ORIGINAL ARTICLE

COMPARISON OF HEMODYNAMIC RESPONSE TO TRACHEAL INTUBATION WITH MACINTOSH AND MCCOY LARYNGOSCOPES

Mukta Jitendra¹, Sonal Sharma², Madan Katoch³, Smriti Gulati⁴, Heena Gupta⁵

HOW TO CITE THIS ARTICLE:

Mukta Jitendra, Sonal Sharma, Madan Katoch, Smriti Gulati, Heena Gupta. "Comparison of Hemodynamic Response to Tracheal Intubation with Macintosh and McCoy Laryngoscopes". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 50, June 22; Page: 8676-8684, DOI: 10.14260/jemds/2015/1255

ABSTRACT: BACKGROUND: McCoy laryngoscope incorporates a modification of the Macintosh laryngoscope. It was designed to facilitate difficult intubation. Use of this blade reduces the lifting force required during laryngoscopy. **MATERIAL AND METHODS:** The present prospective randomized study was conducted to evaluate the effectiveness of McCoy laryngoscope in attenuating the pressor response secondary to tracheal intubation as compared to Macintosh laryngoscope in terms of magnitude and duration in 80 patients of ASA Grade I and II. The changes in heart rate, systolic, diastolic, mean arterial pressure and rate pressure product were observed for 10 minutes post intubation. Time taken for laryngoscopy and intubation was also noted. **RESULTS:** Following laryngoscopy and intubation, it was observed that there was statistically significant rise in heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure and rate pressure product in both the groups. The increase in hemodynamic variables was statistically significant with Macintosh laryngoscope as compared to McCoy laryngoscope and lasted for lesser duration in McCoy group. **CONCLUSION:** McCoy laryngoscope produces significantly less marked hemodynamic response as compared to Macintosh laryngoscope.

KEYWORDS: Tracheal intubation, Macintosh, McCoy, Hemodynamic.

INTRODUCTION: Laryngoscopy and intubation is an essential part of anaesthesia practice. However, it is a noxious stimulus and can provoke marked adverse responses in cardiovascular system known as pressor response which is characterized by tachycardia, hypertension and a variety of cardiac arrhythmias. The mean increase in arterial pressure of the order of 20-25mmHg with a maximum rise of 40-45mmHg has been reported.¹ This peak response occurs approximately 30-45 seconds after laryngoscopy² and lasts less than ten minutes. This rise in blood pressure and heart rate on laryngoscopy and intubation is transient, highly variable and generally well tolerated in healthy patients. But in patients with hypertension, coronary artery disease, cerebrovascular disease, thyrotoxicosis and various other diseases, this may lead to dangerous complications like left ventricular failure, myocardial infarction, dysrhythmias or cerebral haemorrhage.

The major part of this sympatho-adrenal response is believed to arise from stimulation of supra-glottic region by laryngoscope blade. Tracheal tube insertion and inflation in infra-glottic region contributes only a little additional stimulation.³ The Macintosh laryngoscope is one of the most popular laryngoscopes used universally. It was designed by Sir Robert Macintosh in 1943 in Nuffield department of anaesthetics, University of Oxford.⁴ In 1993, McCoy and Mirakhor introduced McCoy laryngoscope, a modification of the standard Macintosh blade, to facilitate intubation in cases of difficult visualisation of the larynx. It differs from Macintosh blade in four aspects. It has a hinged tip, a lever at the proximal end, a spring loaded drum and a connecting shaft. The McCoy laryngoscope was developed for anticipated difficult intubation.⁵

ORIGINAL ARTICLE

It requires less force for performing laryngoscopy^{6,7} and as a result may reduce the sympatho-adrenal response to laryngoscopy, thus decreasing the pressor response associated with laryngoscopy. The present study was conducted to compare the efficacy of McCoy laryngoscope in obtunding the pressor response to laryngoscopy and intubation as compared to the Macintosh blade.

MATERIAL AND METHODS: After getting approval from hospital ethical committee, 80 patients of either sex, aged between 18-60 years, belonging to ASA grade I and II, undergoing elective surgery under general anesthesia were included in the study. Patients with ASA grade III or more, Mallampati class III or more, BMI >30 or requiring more than one attempt at intubation were excluded from the study. Patients with uncontrolled hypertension, preexisting cardiovascular diseases, significant respiratory, hepatic, renal or endocrine disorder were also excluded.

Pre-anaesthetic check-up was done one day before the surgery and airway assessment was done using Samssoon and Young's modification of the Mallampati classification. An informed written consent was taken from all patients at the time of pre- anaesthetic examination.

The patients were randomly allocated to one of the two study groups. Group A included 40 patients in whom conventional Macintosh laryngoscope (blade 3 or 4) was used for laryngoscopy. Group B included 40 patients in whom McCoy laryngoscope (blade 3 or 4) was used for laryngoscopy. To eliminate observer bias, all intubations were done by a single observer. All the patients were kept fasting for a period of 8 hours preoperatively. Patients received tab. pantoprazole 40mg per oral and tab. alprazolam 0.5mg per oral, night before surgery. On the day of surgery, an intravenous line was established and a ringer lactate infusion started. Patients then received inj. diclofenac 75mg i/m and inj. pantoprazole 40 mg i/v. Monitors were attached to the patient which included electrocardiogram, non-invasive blood pressure, pulse oximeter and end-tidal carbon dioxide. All baseline parameters, i.e. heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, rate-pressure product & oxygen saturation, were recorded.

A pillow was placed under the occiput of the patient to obtain classical sniffing position. Patient was then given inj. ondansetron 4mg i/v and inj. tramadol 1 mg/kg i/v before induction. The patient was pre oxygenated with 100% oxygen for 3 minutes with facemask of appropriate size. Anaesthesia was induced with inj. propofol 2.5mg/kg i/v followed by inj. succinylcholine 1.5mg/kg i/v. The patient was ventilated with 100% oxygen for one minute. All the parameters were noted immediately before laryngoscopy. Laryngoscopy and intubation was performed one minute after administration of succinylcholine. Patient was intubated with an appropriate sized, cuffed PVC endotracheal tube and air entry was checked for proper placement of endotracheal tube. The duration of laryngoscopy and intubation was timed using a stopwatch. The duration of laryngoscopy and intubation was defined as the time taken from when the tip of the blade passed the incisors until the time when the tip of the blade passed out of the incisors after inserting the endotracheal tube. During intubation, laryngeal inlet was visualized and graded using Cormack and Lehane grading.

All the parameters were noted immediately after laryngoscopy and intubation i.e. when the tip of the blade passed out of the incisors-T0. Further readings of the parameters were noted at 1, 2, 3, 4, 5, 7 and 10 minutes after intubation i.e. at T1, T2, T3, T4, T5, T7 and T10. Anaesthesia was maintained with 66% nitrous oxide, 33% oxygen, 0.5%-1% halothane and neuromuscular blockade was achieved with inj. atracurium 0.5mg/kg i/v followed by 0.1mg/kg i/v as maintenance dose. At the end of surgery neuromuscular blockade was reversed with inj. neostigmine 0.05mg/kg i/v and inj. glycopyrrolate 0.01mg/kg i/v before extubation.

ORIGINAL ARTICLE

Any untoward incident in the form of arrhythmias, bradycardia, hypotension and bronchospasm was noted and treated accordingly. Patients having bucking, coughing on intubation, requiring more than one attempt or requiring optimal external laryngeal manipulation were excluded from the study. At the end of the study, all the data collected was compiled and analysed using appropriate statistical tests. Repeated measure analysis of variance (ANOVA) was used to compare means for hemodynamic variables in intragroup comparison to baseline parameters. Inter group comparison was done by paired t-test. A p-value of less than 0.05 was considered significant.

RESULTS: Both the study groups were comparable in terms of age, weight, height, sex distribution, Mallampati grading and the difference was not statistically significant.

After intubation, there was statistically significant increase in HR in Group A (109.18 ± 8.31) as compared to Group B (100.20 ± 10.20). Also, increase in SBP, DBP, MAP and changes in rate pressure product observed in group A and group B were 157.88 ± 9.20 vs 148.80 ± 10.33 ; 103.90 ± 6.45 vs 97.70 ± 9.33 ; 121.89 ± 6.32 vs 116.08 ± 8.80 ; 17243 ± 1752 vs 14940 ± 2031 which was statistically significant ($p \leq 0.05$) till 3 minutes after intubation in Group A as compared to Group B. The mean time for laryngoscopy and intubation in Group A was 10.80 ± 1.74 sec compared to 10.38 ± 1.69 sec in Group B. Both the groups were comparable in terms of time for laryngoscopy and intubation and the difference was not statistically significant. In Group A, 27 patients (67.5%) had Cormack and Lehane grade I and 13 patients (32.5%) had C & L grade II. In Group B, 28 patients (70%) had C & L grade I and 12 patients (30%) had C & L grade II. Both the groups were comparable in terms of laryngoscopic view and the difference was not statistically significant. No rhythm disturbances were seen in any of the patients during the study period. No incidence of local injury, bleeding, cyanosis, laryngospasm or regurgitation was found in any of the patients.

Variables	Group A	Group B	p- value	Remarks
Age (in years)	34.60 ± 10.10	36.60 ± 11.50	0.42	NS
Weight (in kg)	60.35 ± 6.51	60.10 ± 6.71	0.87	NS
Height (in cms)	163.93 ± 7.19	162.70 ± 5.94	0.41	NS
Sex distribution (%)				
Male	13 (32.50%)	16 (40.00%)	0.485	NS
Female	27 (67.50%)	24 (60.00%)		
Mallampati grade (%)				
I	31 (77.50%)	27 (67.50%)	0.317	NS
II	9 (22.50%)	13 (32.50%)		

Table 1: comparison of demographic data and airway assessment

ORIGINAL ARTICLE

Time Interval	Mean $\pm$ Standard Deviation		p-value	Remarks
	Group A	Group B		
Base Line	79.65 $\pm$ 6.46	79.08 $\pm$ 6.71	0.70	NS
Before Laryngoscopy	77.33 $\pm$ 5.15	79.35 $\pm$ 6.07	0.11	NS
At 0 minute	109.18 $\pm$ 8.31	100.20 $\pm$ 10.20	0.00	HS
At 1 minute	102.17 $\pm$ 8.19	95.50 $\pm$ 8.60	0.00	HS
At 2 minutes	95.63 $\pm$ 8.20	91.70 $\pm$ 7.12	0.02	S
At 3 minutes	90.50 $\pm$ 7.77	87.25 $\pm$ 7.15	0.05	S
At 4 minutes	88.58 $\pm$ 6.84	85.55 $\pm$ 8.00	0.07	NS
At 5 minutes	85.65 $\pm$ 6.89	83.00 $\pm$ 8.47	0.13	NS
At 7 minutes	82.15 $\pm$ 4.73	79.90 $\pm$ 8.78	0.16	NS
At 10 minutes	78.97 $\pm$ 5.46	78.00 $\pm$ 7.28	0.50	NS

Table 2: Comparison of Heart rate

Time Interval	Mean $\pm$ Standard Deviation		p-value	Remarks
	Group A	Group B		
Base Line	126.33 $\pm$ 8.53	126.33 $\pm$ 8.28	1.00	NS
Before Laryngoscopy	122.30 $\pm$ 8.20	121.57 $\pm$ 7.91	0.69	NS
At 0 minute	157.88 $\pm$ 9.20	148.80 $\pm$ 10.30	0.00	HS
At 1 minute	149.70 $\pm$ 9.27	138.75 $\pm$ 9.88	0.00	HS
At 2 minutes	139.80 $\pm$ 13.10	131.60 $\pm$ 11.6	0.00	S
At 3 minutes	131.40 $\pm$ 13.30	125.50 $\pm$ 12.50	0.04	S
At 4 minutes	128.00 $\pm$ 12.10	123.40 $\pm$ 11.60	0.09	NS
At 5 minutes	125.38 $\pm$ 9.25	122.70 $\pm$ 11.70	0.26	NS
At 7 minutes	123.32 $\pm$ 7.95	121.22 $\pm$ 9.35	0.28	NS
At 10 minutes	123.92 $\pm$ 6.24	121.55 $\pm$ 9.01	0.17	NS

Table 3: Comparison of Systolic blood pressure

Time Interval	Mean $\pm$ Standard Deviation		p-value	Remarks
	Group A	Group B		
Base Line	78.13 $\pm$ 5.47	77.75 $\pm$ 7.70	0.80	NS
Before Laryngoscopy	75.63 $\pm$ 6.48	75.18 $\pm$ 6.41	0.76	NS
At 0 minute	103.90 $\pm$ 6.45	97.70 $\pm$ 9.33	0.02	S
At 1 minute	99.12 $\pm$ 5.06	89.53 $\pm$ 8.91	0.00	HS
At 2 minutes	90.05 $\pm$ 9.34	85.30 $\pm$ 8.80	0.02	S
At 3 minutes	84.80 $\pm$ 10.40	79.57 $\pm$ 9.08	0.01	S
At 4 minutes	83.10 $\pm$ 9.98	78.40 $\pm$ 9.05	0.03	S
At 5 minutes	79.95 $\pm$ 7.14	76.83 $\pm$ 7.76	0.06	NS
At 7 minutes	76.87 $\pm$ 5.77	75.78 $\pm$ 6.20	0.41	NS
At 10 minutes	77.37 $\pm$ 5.38	76.37 $\pm$ 5.19	0.40	NS

Table 4: Comparison of Diastolic blood pressure

ORIGINAL ARTICLE

Time Interval	Mean±Standard Deviation		p-value	Remarks
	Group A	Group B		
Base Line	94.19±5.72	93.94±7.27	0.86	NS
Before Laryngoscopy	91.18±6.37	90.64±6.09	0.70	NS
At 0 minute	121.89±6.32	116.08±8.80	0.00	S
At 1 minute	115.98±5.55	105.93±8.25	0.00	HS
At 2 minutes	106.60±10.10	100.73±9.12	0.00	S
At 3 minutes	100.40±10.90	94.90±9.08	0.02	S
At 4 minutes	98.06±9.97	93.42±9.34	0.04	S
At 5 minutes	95.09±7.11	92.11±7.94	0.08	NS
At 7 minutes	92.36±5.12	90.93±6.46	0.27	NS
At 10 minutes	92.89±4.68	91.43±5.75	0.22	NS
Table 5: Comparison of Mean arterial pressure				

Time Interval	Mean±Standard Deviation		p-value	Remarks
	Group A	Group B		
Base Line	10051±965	9989±1077	0.79	NS
Before Laryngoscopy	9470±1030	9639±874	0.06	NS
At 0 minute	17243±1752	14940±2031	0.00	HS
At 1 minute	15300±1590	13274±1703	0.00	HS
At 2 minutes	13418±2027	12078±1512	0.00	HS
At 3 minutes	11933±1806	10978±1510	0.01	S
At 4 minutes	11378±1681	10573±1515	0.03	S
At 5 minutes	10755±1312	10211±1633	0.10	NS
At 7 minutes	10135±923	9695±1368	0.09	NS
At 10 minutes	9782±784	9485±1131	0.18	NS
Table 6: Comparison of Rate pressure product				

Groups	Time taken for Laryngoscopy and Intubation (Sec)
Group A	10.80 ± 1.74
Group B	10.38 ± 1.69
p-value	0.27
Remarks	NS
Table 7: Comparison of time taken for Laryngoscopy and Intubation	

ORIGINAL ARTICLE

Groups	Laryngoscopic view (%)	
	I	II
Group A	27 (67.50%)	13 (32.50%)
Group B	28 (70.00%)	12 (30.00%)
p-value	0.809	
Remarks	NS	

Table 8: Comparison of Laryngoscopic view

DISCUSSION: Several methods have been used to blunt the cardiovascular response associated with laryngoscopy and intubation with more focus on pharmacological methods as compared to non-pharmacological methods. There is limited literature regarding the influence of the type of laryngoscope blade on hemodynamic response to laryngoscopy and intubation.

The present study was undertaken to evaluate the effectiveness of McCoy laryngoscope, in attenuating the pressor response secondary to laryngoscopy and intubation, as compared to Macintosh laryngoscope in terms of magnitude and duration. In both Groups, significant increase in heart rate as compared to baseline was observed after laryngoscopy and intubation. While doing inter group comparison, we found that mean heart rate was lower in Group B as compared to Group A immediately after and at 1, 2 and 3 minutes after intubation which was statistically significant. Following 4 minutes, the difference was statistically insignificant. The maximum rise in the heart rate compared to baseline was 37.0% in Group A compared to 26.70 % in Group B. Also, rise in SBP, DBP and MAP was lower in Group B as compared to Group A immediately after and at 1, 2 and 3 minutes after intubation which was statistically significant. Following 4 minutes, the difference was statistically insignificant. The maximum rise in SBP compared to baseline was 24.9% in Group A compared to 17.7% in Group B and the maximum rise in DBP compared to baseline was 32.9% in Group A compared to 26.8% in Group B. The maximum rise in MAP compared to baseline was 29.4% in Group A compared to 23.5% in Group B.

The rate pressure product is calculated by multiplying systolic blood pressure with heart rate. It gives a rough indication of cardiac workload and myocardial oxygen requirements. A rate pressure product greater than 15000 is considered undesirable in patients with coronary artery disease.⁸ RPP was lower in Group B as compared to Group A immediately after and at 1, 2, 3 and 4 minutes after intubation which was statistically significant. Following 5 minutes, the difference was statistically insignificant. The mean time for laryngoscopy and intubation in Group A was 10.80±1.74 sec and in Group B was 10.38±1.69 sec. Both the groups were comparable in terms of time for laryngoscopy and intubation and the difference was not statistically significant.

The magnitude of pressor response is proportional to duration of laryngoscopy and intubation.⁹ A longer intubation time should result in a higher pressor response. However, a study by Gill showed that laryngoscopy duration less than 30 seconds did not have any effect on the hemodynamic response.¹⁰ All our intubations were performed in less than 30 seconds. In Group A, 27 patients (67.5%) had C & L grade I and 13 patients (32.5%) had C & L grade II. In Group B, 28 patients (70%) had C & L grade I and 12 patients (30%) had C & L grade II. Both the groups were comparable in terms of laryngoscopic view and the difference was not statistically significant.

ORIGINAL ARTICLE

Our results were consistent with the results of various previous studies. McCoy et al compared cardiovascular changes and catecholamine concentrations in 20 patients before and after laryngoscopy with either Macintosh or McCoy laryngoscopes.⁶ Significant increase in heart rate (33%), arterial blood pressure (27%) and slight increase in catecholamine levels were noted with Macintosh laryngoscope as against McCoy laryngoscope where no significant change in either heart rate or arterial blood pressure was found. Nishiyama et al compared stress responses during laryngoscopy using three different laryngoscopes-Macintosh, Miller and McCoy.¹¹ Blood pressure, heart rate and plasma catecholamine levels were measured before, during and after laryngoscopy without tracheal intubation. Systolic blood pressure was significantly higher in Miller than in other groups. Plasma epinephrine concentration in McCoy group were significantly lower than in other groups. Heart rate and plasma norepinephrine concentration were not different among the three groups. But in our study, heart rate did rise significantly till 7 minutes after intubation and the heart rate changes were significantly higher in Macintosh group as compared to McCoy group.

This could be explained by the fact that Nishiyama only studied response to laryngoscopy and not tracheal intubation. Tracheal intubation has been shown to affect heart rate more than laryngoscopy. Tiwari et al compared the two blades in 180 neurosurgical patients.¹² They found that use of McCoy laryngoscope resulted in lesser change in heart rate and blood pressure compared to Macintosh laryngoscope when fentanyl was not used in obtundation of stress response. However, when fentanyl was given as an analgesic, no difference was observed between the groups. Similar to our study, Singhal et al compared hemodynamic response to laryngoscopy and intubation using Macintosh and McCoy laryngoscopes in 100 patients¹³. They found that significant rise in heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure was seen in both the groups but this rise was significantly more with Macintosh laryngoscope as compared to McCoy laryngoscope. Bhosle et al compared hemodynamic response with McCoy and Macintosh laryngoscopes in 200 patients.¹⁴

The percentage increase in heart rate and mean arterial pressure from baseline after intubation and at one minute was found to be higher in Macintosh group as compared to McCoy group and was statistically significant. The parameters returned to baseline in 3 to 5 minutes. Haidry et al compared hemodynamic response to laryngoscopy and intubation using Macintosh and McCoy laryngoscope in 60 patients.¹⁵ They found that hemodynamic changes with the use of McCoy laryngoscope were lesser in magnitude as compared to Macintosh laryngoscope. The maximum rise in heart rate compared to baseline observed in Macintosh group was 18.7% compared to 7.7% in McCoy group. The maximum rise in mean arterial pressure compared to baseline observed in Macintosh group was 25.7% compared to 13.6% in McCoy group. We also got similar results in our study. In our study, the maximum rise in heart rate compared to baseline observed in Macintosh group was 37.0% compared to 26.7% in McCoy group. The maximum rise in mean arterial pressure compared to baseline observed in Macintosh group was 29.4% compared to 23.1% in McCoy group.

CONCLUSION: McCoy laryngoscope, primarily devised for difficult intubation, produces significantly less rise in hemodynamic parameters as compared to Macintosh laryngoscope. It requires less force for performing laryngoscopy and as a result reduces the sympathoadrenal response to laryngoscopy, thereby decreasing the pressor response. Therefore use of McCoy laryngoscope can serve as an additional tool along with different pharmacological agents for obtunding the pressor response.

ORIGINAL ARTICLE

BIBLIOGRAPHY:

1. Forbes AM, Dally FG. Acute hypertension during induction of anaesthesia and endotracheal intubation in normotensive man. *Br J Anaesth* 1970; 42: 618-24.
2. Stoelting RK. Circulatory changes during direct laryngoscopy and tracheal intubation: Influence of duration of laryngoscopy with or without lidocaine. *Anesthesiology* 1977; 47: 381-84.
3. Shribman AJ, Smith G, Achola KJ. Cardiovascular and catecholamine responses to laryngoscopy with and without tracheal intubation. *Br J Anaesth* 1987; 59: 295-99.
4. Macintosh RR. A new laryngoscope. *Lancet* 1943; 1: 205.
5. McCoy EP, Mirakhur RK. The levering laryngoscope. *Anaesthesia* 1993; 48: 516-19.
6. McCoy EP, Mirakhur RK, McCloskev BV. A comparison of the stress response to laryngoscopy- The Macintosh versus the McCoy blade. *Anaesthesia* 1995; 50: 943-46.
7. McCoy EP, Mirakhur RK, Rafferty C, Bunting H, Austin BA. A comparison of the forces exerted during laryngoscopy. *Anaesthesia* 1996; 51: 912-15.
8. Gobel FL, Norstrom LA, Nelson RR, Jorgensen CR, Wang Y. The rate-pressure product as an index of myocardial oxygen consumption during exercise in patients with angina pectoris. *Circulation* 1978; 57: 549-56.
9. Stoelting RK. Circulatory changes during direct laryngoscopy and tracheal intubation: Influence of duration of laryngoscopy with or without lidocaine. *Anesthesiology* 1977; 47: 381-84.
10. Gill YS, Lee GY, Chung RK, Kim DY, Kang SY. Effect of laryngoscopic and tracheal intubation duration on hemodynamic response during anesthetic induction with thiopental, fentanyl and rocuronium. *Korean J Anesthesiol* 2005; 49: 147-51.
11. Nishiyama T, Higashizawa T, Bito H, Konishi A, Sakai T. Which laryngoscope is the most stressful in laryngoscopy-Macintosh, Miller or McCoy? *Masui* 1997; 46: 1519-24.
12. Tewari P, Gupta D, Kumar A, Singh U. Opioid sparing during endotracheal intubation using McCoy laryngoscope in neurosurgical patients: The comparison of hemodynamic changes with Macintosh blade in a randomized trial. *J Postgrad Med* 2005; 51: 260-64.
13. Singhal S, Neha. Hemodynamic response to laryngoscopy and intubation: Comparison of McCoy and Macintosh laryngoscope. *The Internet Journal of Anesthesiology* 2008; 17: 1.
14. Bhosle P, Aphale S, Bansal M. A comparison of circulatory response to laryngoscopy and intubation with Macintosh and McCoy blade. *The Internet Journal of Anaesthesiology* 2013; 32:1.
15. Haidry MA, Khan FA. Comparison of hemodynamic response to tracheal intubation with Macintosh and McCoy laryngoscopes. *J Anaesthesiol Clin Pharmacol* 2013; 29: 196-99.

ORIGINAL ARTICLE

AUTHORS:

1. Mukta Jitendra
2. Sonal Sharma
3. Madan Katoch
4. Smriti Gulati
5. Heena Gupta

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Anaesthesia, GMC, Jammu.
2. Junior Resident, Department of Anaesthesia, GMC, Jammu.
3. Lecturer, Department of Anaesthesia, GMC, Jammu.

FINANCIAL OR OTHER

COMPETING INTERESTS: None

4. Professor & HOD, Department of Anaesthesia, GMC, Jammu.
5. Junior Resident, Department of Anaesthesia, GMC, Jammu.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Mukta Jitendra,
28, Bakshi Nagar, Jammu,
Jammu & Kashmir,
E-mail: muktajatinder.mj92@gmail.com

Date of Submission: 28/05/2015.
Date of Peer Review: 29/05/2015.
Date of Acceptance: 13/06/2015.
Date of Publishing: 19/06/2015.