

Comparison between Trapezius Squeezing Test and Jaw Thrust as Indicators for Proseal Laryngeal Mask Airway in Paediatric Patients: A Single Blind Prospective Study

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Abstract

Aim: Present study was carried out to compare the efficacy of trapezius squeeze test and jaw thrust as clinical tests to indicate an adequate depth of anaesthesia for insertion of the Proseal laryngeal mask airway after induction of anaesthesia with sevoflurane in children. **Method:** Eighty eight paediatric patients between age group 2 to 8 years of either genders weighing between 10 to 20 kg with ASA grade I & II were selected who were undergone for planned lower abdominal surgery. This study was a single blind prospective type in hospital settings, carried out during May 2014 to April 2016. **Results:** Trapezius squeeze test and Jaw thrust, both are effective as an indicator to assess the depth of anesthesia for PLMA insertion in children under sevoflurane anaesthesia. Trapezius squeeze test provides excellent conditions and higher success rate for PLMA insertion in spontaneously breathing children without any untoward effects.

Keywords: Trapezius Squeeze; Jaw Thrust; PLMA; Sevoflurane.

Introduction

Laryngeal Mask Airway (LMA) with its many advantages over tracheal tube is widely used for

anaesthesia in children. The advantages are speed and ease of placement, improved oxygen saturation during emergence, reduced anaesthetic requirement for airway tolerance, lower frequency of coughing during emergence and lower incidence of sore throat. The only disadvantage of LMA over intubation is improper seal and gastric insufflations, this can be overcome by using a modified version of Proseal Laryngeal Mask Airway (PLMA). PLMA was introduced by Dr. Brain in 2002 and then modified in 2004. PLMA offers adequate seal and protection against regurgitation, aspiration as well as gastric insufflation. PLMA in paediatric patients is a benchmark second generation of supraglottic airway device (SAD), with established record of safety and efficacy. PLMA also provides lesser perioperative complications in comparison to ETT.

Sarla Hooda et al did a study of Trapezius squeeze test as an indicator for depth of anesthesia for laryngeal mask airway insertion in children under sevoflurane anaesthesia in 2012 [1]. Another study of Comparison of the trapezius squeeze test and jaw thrust as indicators for laryngeal mask airway insertion in adults was done by Chul-Ho Chang et al in 2011 [2]. Handattu M Krishna et al concluded that LMA Classic can be inserted successfully without the need to insert index finger into patient's mouth, though the first attempt

success rate is higher with the standard technique [3]. Sudeep Krishna and Pankaj Kundra showed that more than 20% fall of MAP from baseline was noted in group CD after induction but there was no significant hypotension at any time in group JT. Loss of motor response to jaw thrust provide satisfactory LMA insertion conditions [4-6].

Sevoflurane known and proved agent for safe induction of anaesthesia in paediatrics [7-9]. Such comparative study of these tests has not been done in paediatric patients. So we decided to carry out this study to compare the effectiveness of the trapezius squeeze test with that of the jaw thrust maneuver as clinical indicators of an adequate condition for LMA insertion in children under sevoflurane anaesthesia.

Methodology

The aim of the study was to assess and compare the efficacy of

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trapezius squeeze test and jaw thrust as clinical tests to indicate an adequate depth of anaesthesia for insertion of the Proseal laryngeal mask airway after induction of anaesthesia with sevoflurane in children.

Present study was aimed to obtain Insertion time (Time for TST/JT to become negative), End tidal sevoflurane concentration at the time of PLMA insertion, MAC value of sevoflurane at the time of PLMA insertion, Ease of PLMA insertion, Attempts to place PLMA, Complications during PLMA insertion and Hemodynamic changes in parameters.

This single blinded prospective study was carried out on total 88 pediatric patients selected for general surgery of short duration at GMERS Medical College and Hospital, Vadodara, Gujarat during May 2014 to April 2016. Institutional Ethical committee permission was taken prior to the study.

Inclusion Criteria

- ASA – I/II
- Age Group – 2 to 8 years of either genders weighing 10 – 20 kg
- Planned lower abdominal surgery

Exclusion Criteria

- Delayed development
- Recent URTI
- Previous / Anticipated difficult airway
- Restricted mouth opening
- H/O Regurgitation
- Pathology of oropharynx, neck & upper GIT

Procedure

The children were randomly allocated into two groups of 44 in each using envelop method as follows:

- *Group 1:* Trapezius squeeze test (44 patients)
- *Group 2:* Jaw thrust (44 patients)

All the patients underwent detailed pre anaesthetic checkup. Routine investigations were done in every patient. After explaining the procedure and the method of anaesthesia to be administered, written informed consent/assent was obtained from the parents/patients.

All the patients were kept nil by mouth, 3 hours for clear fluids and 6 hours for solids and milk. Nil by mouth status of child was confirmed from parents.

Intravenous line was secured under all aseptic and antiseptic precaution. As a premedication Inj. Glycopyrrolate 5µg/kg was given intravenously before induction. No sedative premedication was given.

Sevoflurane concentration (End tidal and MAC), EtCO₂, SpO₂, pulse rate and Blood Pressure were measured using the Compact airway module of Datex-Ohmeda S/5 or Drager Fabius Anaesthesia machine.

General anesthesia was induced via a face mask with Jackson-Rees circuit primed with 4% sevoflurane and oxygen with 4 Liter/min fresh gas flow. Spontaneous ventilation was first to be assisted and then if required, controlled manually. As soon as the child loses his/her eyelash reflex, the TST/ Jaw thrust were performed according to group.

Trapezius Squeeze Test (TST): It is a simple test to perform in which 1-2 inches of full thickness trapezius muscle is held between thumb and index finger and squeezed for 1-2 seconds and response is evaluated in the form of toe/body movement.

Jaw Thrust (JT): The jaw thrust is applied gently by lifting the angles of the mandible vertically upward.

Performance of the tests and PLMA insertion was done by the same anesthesiologist throughout the study. Either of the tests was repeated every 15 seconds till it became negative. When child loses response to test, a well lubricated, PLMA No. 2 was inserted with the standard digital technique and cuff was inflated with 10cc air. Effective ventilation was determined.

Data Analysis

Data was entered in MS Excel sheet and analysed using Stata MP-13 software. Data was summarized in form of mean & SD. Independent t-test was performed to compare parameters between two groups whereas Paired t-test was used to compare parameters between follow-ups. Throughout the study significance level was kept at 5% (0.05).

Results and Discussion

Total 88 pediatric patients were selected for present study with mean age 5.57 yrs with SD 1.53 ranges from 3 to 8 yrs. Mean weight was 14.2 kg with SD of 1.79. There were 58 male and 32 female patients in this study. Majority of the patients had ASA grade – I.

Table 1: Comparison of Induction and Insertion time between two groups

	Group – 1	Group – 2	p-value
Insertion Time (miin)	4.42±0.82	4.54±0.57	0.428
End tidal sevoflurane concentration at the time of PLMA insertion (%)	3.63±0.12*	3.59±0.14*	0.154
MAC value of sevoflurane at the time of PLMA insertion	1.72±0.05*	1.73±0.08*	0.484

* indicates significant reduction at 5% level

Insertion time in group-1 was 4.42±0.82 and in group-2 it was 4.54±0.57. The difference of insertion time between two groups was statistically not significant. End tidal sevoflurane concentration at the time of PLMA insertion in group-1 was 3.63±0.12% and in group-2 it was 3.59±0.14%. This difference was statistically not significant. MAC value of sevoflurane at the time of PLMA insertion in group-1 was 1.72±0.05 and in group-2 was 1.73±0.08. There is no statistically difference in MAC value between two groups. PLMA was inserted with single attempt in 43 cases of Group-1 whereas 42 cases of Group-2. In remaining patients in both the groups PLMA was inserted in second attempt. Mean sevoflurane was significantly decreased from baseline in both groups (p-value<0.05). This findings are consonance with studies done by Taguchi M et al and Grabowska

Gawel et al who observed the MAC value of sevoflurane for LMA insertion. In their study after the predetermined end tidal concentration of sevoflurane established and maintained for 20 minutes, LMA insertion was attempted without neuromuscular relaxants or other adjuvants and they observed the MAC values of sevoflurane for the same were 2.00 ± 0.28% and 1.53 ± 0.23% respectively [10-11].

42 (95.46%) patients in Group-1 whereas 40 (90.9%) patients in Group-2 had excellent insertion condition. Remaining patients had acceptable condition. There is no statistical difference in insertion condition between two groups (p-value >0.05). One patient from Group-1 and three patients from Group-2 had coughing. No other complications were observed in either group.

Table 2: Comparison of Hemodynamics changes between two groups

Time	Systolic Blood Pressure (mm Hg)			Diastolic Blood Pressure (mm Hg)		
	Group-1	Group-2	p-value	Group-1	Group-2	p-value
Baseline	107.38±7.7	106.83±6.82	0.724	64.93±7.21	63.53±6.56	0.343
Immediate after LMA insertion	102.33±9.32*	102.2±6.51*	0.939	61.32±7.17*	62.2±7.51*	0.576
5 minutes after LMA insertion	98.93±7.11*	97.77±5.42*	0.392	58.03±7.51*	58.28±5.13*	0.856

* indicates significant reduction at 5% level

Difference in baseline systolic and diastolic blood pressure between two groups were statistically not significant. There was decrease in both SBP & DBP was observed immediately and 5 minutes after LMA insertion in both study groups. Mean difference of SBP & DBP between two groups were not

significant. Mean systolic and diastolic blood pressure was significantly decreased from baseline to immediate and 5 minutes after LMA insertion (p-value<0.05). Our findings supports the study results of Sarla Hooda et al and Chul-Ho Chang et al [1,2].

Table 3: Comparison of Pulse Rate, SpO₂ and EtCO₂ between two groups

	Pulse rate (/min)			SpO ₂ (%)			EtCO ₂		
	Group-1	Group-2	p-value	Group-1	Group-2	p-value	Group-1	Group-2	p-value
Basal	140.3±13.14	138.1±14.51	0.458	98.97±0.61	98.87±0.52	0.410	34.99±4.12	35.13±3.02	0.856
Immediate after LMA insertion	135.87±12.11*	133.97±12.95*	0.479	99.63±0.53	99.39±0.67	0.066	33.73±3.17	33.27±3.26	0.504
5 mins after LMA insertion	127.12±71.48*	126.23±11.13*	0.935	99.8±0.57	99.9±0.6	0.425	32.63±2.93	32.43±3.37	0.767

* indicates significant reduction at 5% level

Reduction in pulse rate was observed in both groups immediately after PLMA insertion and further decrease after 5 min of PLMA insertion but it was not significant statistically. Oxygen saturation and End tidal CO₂ concentration were almost equal in both the groups. Mean pulse rate is significantly decreased from baseline to immediate and 5 minutes after LMA insertion (p-value <0.05) but SpO₂ and EtCO₂ were remained unchanged. Our findings supports the study results of Sarla Hooda et al and Chul-Ho Chang et al [1,2]. No post operative complications were observed in either group in present study.

Conclusion

Present study concludes that Trapezius squeeze test and Jaw thrust, both are effective as an indicator to assess the depth of anesthesia for PLMA insertion in children under sevoflurane anaesthesia. Trapezius squeeze test provides excellent conditions and higher success rate for PLMA insertion in spontaneously breathing children without any untoward effects.

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