CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

SJIF Impact Factor: 7.187
http://doi.org/10.5281/zenodo.4259315

Avalable online at: http://www.iajps.com *Research Article*

STUDY TO DETERMINE THE MASK VENTILATION DURING INDUCTION OF GENERAL ANESTHESIA

[1]Dr Asif Saleem, [2]Dr Muhammad Mashhood Ahmad Shad,
[3]Dr Hafiz Muhammad Faraz Hassan
[1, 2] King Edward Medical University, Lahore
[3]Punjab Medical College Faisalabad

Article Received: September 2020 **Accepted:** October 2020 **Published: November** 2020

Abstract:
Background: *. Depending on upper airway patency during anesthesia induction, tidal volume achieved by mask ventilation may vary. In 80 adult patients undergoing general anesthesia, the authors tested a hypothesis that tidal volume during mask ventilation is smaller in patients with sleep-disordered breathing priorly defined as apnea hypopnea index greater than 5 per hour. This study was conducted to determine the efficacy of ventilation using face mask induction of general anesthesia*
Study Design: *Cross-sectional study.*
Place and Duration of Study: *This study was conducted at the Lahore General Hospital, Lahore for the duration of six months from January 2020 to June 2020.*
Materials and Methods: *Eighty patients were enrolled. Average age of patients was 25 to 60 years, with a BMI lower than 30. Subsequently, the patients were arranged to divide into two groups Group A and Group B. In the group A, ventilation was performed using the standard mask ventilation with 100% oxygen for 4 minutes. And in other group B, ventilation was undertaken through an anatomical nasal mask. The mean expiratory volume, mean SpO_2, mean end tidal CO_2 (Et CO_2) and mean airway pressure were measured, recorded and compared in both groups. Once placed on the operating table, 100% oxygen were provided to the patients using a face mask for 4 minutes, after which medication (anesthesia) were arranged.*
Results: *The ventilation parameters, maximum airway pressure after starting of mask ventilation in the face mask group is higher than the nasal mask group (15.1±1.8 and 11.8±1.4during the 3rd minute respectively, $p< 0.001$) and the face mask group (94.5±2.1 and 96.1±4) is lower than the SpO_2 at this time respectively ($p< 0.001$). There is no any significant difference related to other parameters.*
Conclusion: *The ventilation with a face mask is less effective than the nasal mask which is more efficient with a BMI less than 30 and is observed by a minimum amount of complications and risk.*
Key Words: *Mask, Ventilation, Induction, Anesthesia.*

Corresponding author:
Dr Asif Saleem,
King Edward Medical University, Lahore

QR code

Please cite this article in press Asif Saleem et al, ***Study To Determine The Mask Ventilation During Induction Of General Anesthesia.,*** *Indo Am. J. P. Sci, 2020; 07(11).*

INTRODUCTION:

General anesthesia may expose patients to aspiration of gastro esophageal contents because of disappearance of pharyngeal reflexes and can result in morbidity and mortality attributable to aspiration pneumonitis.[1],2 In addition, in spite of full abstinence and fasting prior to surgery[3,4], patient pain, delayed gastric emptying (DGE) and other factors often increase the risk of vomiting and aspiration. In this study used techniques, for preventing vomiting and aspiration during general anesthesia can be discussed as follows: cricoid pressure, the use of postural changes, pre-oxygenation without inflation of lung, and the placement of gastric tube preoperatively.[5]

These techniques give us a relatively clear indication that the most effective way to reduce the occurrence of vomiting and aspiration is closely related to lowering gastric pressure during general anesthesia. During the apnoea phase between tracheal intubation and pre-oxygenation, it is resulted that some patients can become hypoxic.[6] In this process RSII hypoxia can be as high as 35.9% (SpO 2 <95%).[7] In this stage hypoxia is especially prevalent in those separately with lower apnoea tolerance which may include infants, obese patients, and pregnant women. The patient whose weight is over using oxygen desaturation during RSII was observed earlier to receive succinylcholine versus rocuronium. In this inspection, it was described by excessive metabolism secondary to succinylcholine fasciculations.[8]

MATERIALS AND METHODS:

This cross-sectional study was conducted at the Lahore General Hospital, Lahore for the duration of six months from January 2020 to June 2020 and comprised of 80 patients. The age including 25-60 years and BMI lower than 30kg/m^2 were included. We arranged to divide patients into two groups with equal numbers. In the patients, there was no any deformity or chronic lung disease. Ventilation was performed using the standard mask ventilation with 100 % oxygen for 4 minutes in group A. While in the group B, ventilation was undertaken through an anatomical nasal mask. The mean SpO2, the mean expiratory volume, mean airway pressure and mean end tidal CO2 (Et CO2) were measured, documented and compared in both groups. Using the face mask detained near to the face for 4minutes, 100% oxygen were provided and anesthesia induction medication were arranged for all patients once placed in the operating table. Patients were pre-oxygenated for 3 minutes on the surgical table during the day of surgery, mask detained closed to the face using 100%oxygen. Subsequently, anesthesia induction medication together, a bolus injection IV injection of sodium thiopental 5 mg/kg, fentanyl 2 mc/kg, midazolam 0.03 mg/kg were provided to all the patients. We arranged to divide patients into two groups, and used computer software to randomize them. In the group A, 100% oxygen were provided for 3 minutes and ventilation was undertaken using the standard anatomical face mask and in the group B, ventilation was performed using the examiner new method with a nasal mask. We used anesthesia machine with 8 cc/kg tidal volume and a rate of twelve breaths/minutes for ventilation of patients. The mean expiratory volume, mean SpO2, mean end tidal CO2 (Et CO2) and mean airway pressure in 3successive breaths in the 3rd minute were observed after ventilation, recorded and differentiate in these groups. We used to secure the tube and arranged to connect patients with anesthesia machine; all the above mentioned parameters were observed in the 5th minute after endotracheal intubation. Hemodynamic changes occurred which includes heartbeat, diastolicand systolic blood pressure were also differentiate between these two types of groups. In distinct, the mean expiratory volume at this time was peculiarly differentiated to the mean volume of expiratory before intubation as the standard parameter. After this we extracted the data, categorized and added into the computer software. Statistical analysis was performed using SPSS version 22 software. This provided result, using T-test and analysis of variance by repeated differentiation, it was significantly considered $p<0.05$.

RESULTS:

The mean age of 40.78±10.86 comprising of 21 males and 19 females were added in the face mask group and 40 patients including mean age of 38.42±12.32 years comprising of 22 males and 18 females in the nasal mask group (Table 1). There is no any demonstrate or significantly difference (p> 0.05) between the participants including height, weight and BMI. The comparison between face mask and nasal mask groups. It is apparent, after ventilation during the 3rd minute the mean maximum airway pressure is significantly higher (p<0.001) in the face mask group (15.1±1.8) than the nasal mask group (11.8±1.4 respectively, p< 0.001) The level of SpO2 is higher in the nasal mask group (94.5±2.1 and 96.1±4, respectively in the 3rd minute p< 0.001) [Table 2].

Table No.1: Attributes of members in groups

Variable	Face Mask	Nasal Mask	P value
Age (years) male/female	40.78±10.86 (21/19)	38.42±12.32 (22/18	0.45
Body mass index kg/m^2	33.24±6.89	32.01±5.34	0.30
Weights (kgs)	93.2±12.98	89.4±13.7	0.320

Table No. 2: Differentiation of variables related to feature of ventilation

Variable	Face Mask	Nasal Mask	P value
Maximum airway pressure at 3 minutes	15.1±1.8	11.8±1.4	<0.001
SpO2 level at 3 minutes	94.5±2.1	96.1±4.1	<0.001
Mean end tidal CO2 at 3 minutes	632±80.52	620±76.52	>0.05

DISCUSSION:

Many methods are applied in clinical practice to assess gastric volume, including epigastric auscultation, magnetic resonance imaging and ultrasound. Several studies have previously shown that the incidence of gastric insufflations increased with inspiratory pressure during the induction of general anesthesia, with a threshold of 20 cmH2O[9] in adults and 15 cmH2O[10] in children by epigastric auscultation. These values are significantly higher than those of this study, which used ultrasonography. Research shows that when auscultation is used, a large amount of diagnostic gas with a mask ventilation pressure of 20 cmH2O enters the gastric cavity.[11] This difference may be in part attributed to the fact that auscultation is far less sensitive than real-time ultrasound. Auscultation is easily disturbed by personal subjective factors, which can only be caught when the stomach intake accumulates quantitatively. In addition, one study described MRI examination of the stomach that was performed with a slice thickness of 6 mm without a gap, using an 8-channel and 8-element phased array coil that covered the entire stomach area.[12]

This detection can fully display the rhythmic movement of the stomach and quantitatively calculate the stomach volume, and is thus more accurate than ultrasonography. However, Magnetic Resonance Imaging is suitable for comprehensive preoperative evaluation of gastric function and fasting conditions. It is not possible to quickly monitor gastric intake during induction of general anesthesia. In this experiment, ultrasound as a noninvasive instrument can judge the stomach inlet quickly and efficiently. This study shows that CSA of all patients increased a certain extent more after ventilation than it did before ventilation. Hence, ultrasound as a portable tool can judge the volume of the stomach quickly and efficiently. With the use of ultrasound in clinical anesthesia, real-time ultrasound is adopted to accurately and reliably predict CSA.[6] Studies have shown that CSA ≥340 mm^2 is a risk threshold for diagnosis of pulmonary aspiration.[8] A tidal volume of 6 ml/kg is the minimum threshold for mechanical ventilation.[9] Therefore, this study used a CSA < 340 mm2 and tidal volume ≥6 ml/kg to assess the appropriate mask ventilation pressure. In this study, the first patient received 15 cmH2O initial pressure and two patients who underwent anesthesia with the same pressure turned out to have the appropriate pressure.[14]

However, the modified up-and-down method was used to conclude that the lower airway pressure was also suitable for lung ventilation. In the previous studies[14],15, the mask ventilation pressure was artificially divided into equal groups, and the conclusions obtained may be biased. This improved method can improve the accuracy of the final estimator and reduce the mean squared error under normal tolerance distribution. It has also been proven to be much better than the random grouping method. The initial pressure is a valid measurement and the next test results prove that CSA is within the normal range. The modified up-and-down method was used to determine that the ED50 and ED95 of pressure for facemask ventilation were 12.31 cmH2O and 13.12 cmH2O, respectively. It is worth noting that the area of the gastric antrum was significantly rising after facemask ventilation, which proved that the facemask ventilation does increase the risk of aspiration pneumonia.[16]To prevent the patients' increased airway resistance caused by the tongue after entrance of mask ventilation gas into the gastric cavity, this study's mask ventilation was placed before the oropharyngeal airway by anesthesia doctors with more than 5 years of working experience. In this study, there were many limitations in our experiment.

First, this research was conducted in a non-blind manner and the anesthesiologist knew about the group assignments, which may cause observer bias. Second, studies have shown that the correlation between CSA and gastric contents is stronger in the right lateral position.[6] However, because the right lateral position of the patient is not convenient for clinical operation after general anesthesia, the CSA is measured in the horizontal position. Third, excessive obesity and pregnancy status affected CSA measurement[6],19 and so this study excluded patients with a BMI of more than 30 kg/m2, which reduced the difficulty of traditional operation**.**

CONCLUSION:

The ventilation with a face mask is less effective than the nasal mask which is more efficient with a BMI less than 30 and is observed by a minimum amount of complications and risk.

REFERENCES:

1. Aghadavoudi O, Nazemroayasedeh B, Shirali M. Comparison of Ventilation Quality during Induction of General Anesthesia 2018.
2. Sato S, Hasegawa M, Okuyama M, Okazaki J, Kitamura Y, et al. Anesthesiol 2017;126:28-38.
3. Bertasi T O, Bertasi R O, Gruenbaum S E, et al. Induction of general anesthesia and mask ventilation 2020.
4. Baker P, et al. Department of anaesthesiolog F1000Res 2018;7: F1000 Faculty Rev-1683.
5. Goranovic T, Milic M, Holjevac JK, Maldini B, Sakic K: Inadequate face mask ventilation: clinical applications. Coll Antropol 2010, 34:1161-5.
6. Redfern D, Rassam S, Stacey MR, Mecklenburgh JS. Comparison of face masks in the bag-mask ventilation of a manikin. Eur J Anaesthesiol 2006; 23:169-72.
7. Oak S, Shetty A, Jain R, Wajekar A. ILMA as an alternative to face mask ventilation in a case of nasal chondrosarcoma. J Neurosurg Anesthesiol 2017;29:60-61.
8. Eastwood PR, Szollosi I, Platt PR, Hillman DR. Collapsibility of the upper airway during anesthesia with isoflurane. Anesthesiol 2002; 97(4):786-93.
9. Shimosaka M, Hashimoto M, Kouchi A, Shibutani K: A case of difficult mask ventilation and intubation due to giant nasal tip tumor. J Jpn Soc Clin Anesth 2004, 24:604-7.
10. Saini S, Bansal T. Anesthetic management of difficult airway in a patient with massive neurofibroma of face: Utility of Rendell Baker Soucek mask and left molar approach for ventilation and intubation. J Anaesthesiol Clin Pharmacol 2013, 29:271-2.
11. Bajwa SS, Haldar R, Kaur J, Samanta S: Modified mask ventilation in post rhinoplasty patient. Natl J Maxillofac Surg 2014, 5:248-9.
12. McClelland SH, Hardman JG: Inhalational induction of anaesthesia in adults: time for a breath of fresh air? Anaesthesia 2007, 62:1087-9.
13. De Hert S, Moerman A: Sevoflurane. F1000 Res 2015;4:626.
14. Hagberg CA, Artime CA. Airway Management in the Adult. In: Miller R, editor. Miller's Anesthesia. 8th ed. Livingstone: Churchill Livingstone; 2015.p.1647-83.
15. Vuyk J, Sitsen E, Reekers M. Intravenous Anesthetics. In: Miller R, editor. Miller's Anesthesia. 8th ed. Livingstone: Churchill Livingstone;2015.p.821-63.
16. Japanese Society of Anesthesiologists, JSA airway management guideline 2014: To improve the safety of induction of anesthesia. J Anesth 2014;*28:* 482–93.
17. Komatsu, R, Kasuya, Y, Yogo, H, Sessler, DI, Mascha, E, Yang, D, Ozaki, M Learning curves for bag-and-mask ventilation and orotracheal intubation: An application of the cumulative sum method. Anesthesiol 2010;112: 1525–31.
18. Kim HJ, Asai T. High-flow nasal oxygenation for anesthetic management, Korean J Anesthesiol 2019;72:527–47.
19. Nandi PR, Charlesworth CH, Taylor SJ, Nunn JF, Dore CJ. Effect of general anaesthesia on the pharynx. Br J Anaesth 1991; 66(2):157-62.