Preoxygenation and apneic oxygenation using Transnasal Humidified Rapid Insufflation Ventilatory Exchange (Thrive)during cesarean section under general anaesthesia

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Introduction

Due to physiological changes in pregnancy , the incidence of difficult intubation in obstetrics is 1:390 as compared to 1:2000 in general population. Rapid sequence induction is standard for both elective and emergency caesarean sections. Pre oxygenation allows the creation of an oxygen reservoir thus reducing the rapid onset of hypoxemia during the apneic period. Apneic oxygenation trans nasally at high flow rate has been shown to be beneficial in increasing apnea time in difficult airway patients under general anesthesia.

Objectives

The objective of our study was to determine whether THRIVE safely prolongs apnea time during cesarean section under general anesthesia

Materials and Methods

We conducted a prospective observational study using THRIVE for pre oxygenation and apneic oxygenation during cesarean section.

All cesarean sections under general anesthesia using THRIVE between January till June 2017 were included.

THRIVE was commenced from the time on arrival in theatre using Opti flow nasal cannula at a rate of 30 I/min as a pre oxygenation. At the time of induction ,flow increases at a rate of 70 I/min followed by a rapid sequence induction. Jaw thrust was performed immediately after the patient become unconscious and flow maintained at a rate of 70l/min through out apnea time which referred to time between muscle relaxant administration and the start of positive pressure ventilation.

Results

In this study, 38 patients were included who underwent cesarean section using THRIVE during general anesthesia.

Among them , 31 patients underwent immediate cesarean section , 5 patients had general anesthesia due to failed regional anesthesia and 2 patients had elective cesarean sections. Maternal BMI range from 19-42.3 kg/m2. These patients were in range of ASA grade 1-3. On airway assessment, they had mallampati in range of class 1-3. Electively video laryngoscope was used in 6 patients and intubation was attempted twice in 7 patients and thrice in one patient

Mean pre oxygenation time was 5 min with range of 3-12 min. Maximum apnea time noted was 240 seconds and the median (IQR[range]) apnea time was 77 sec (60-93 [30-240]). Oxygen saturation remains in range of 90%-100%.One patient experienced desaturation of 90% due to bronchospasm after apnea time of 160 sec. Linear regression analysis tested for correlation between apnea time and oxygen saturation. This line represent linear regression with R2=0.02 which is not significant. ETCO2 after apnea lie in range of 3.2-6.1 kpa. Linear regression analysis tested for correlation between apnea time and ETCO2. This line represent liner regression with R2=0.11 which is significant .

Discussion

Hypoxia is one of the leading causes of anaesthesia related injury. Avoidance of hypoxemia is key to preventing detrimental outcomes when a prolonged intubation is encountered.

The application of hi flow oxygen 70l/min through nasal cannula increases pharyngeal FiO2, which act as a pharyngeal oxygen reservoir that leads to a greater amount of oxygen delivery during the mass flow of gas from the pharynx to the alveoli. Apneic oxygenation has been used clinically as a strategy to extend the apneic window . We found apnea interval of 240 sec following pre oxygenation of 5 min maintaining spO2 97%. One patient experienced desaturation of 90 % due to bronchospasm after apnea time of 160 sec. No patient experienced untoward effect of hypercapnia

Conclusion

THRIVE is well tolerated by awake patients. It allow pre oxygenation to start sooner and reach target quicker. It extend the safe apnea window and lessen pressure in emergency difficult intubation situations,although it has limited role in condition such as bronchospasm.

Reference

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Cormack lehane laryngoscopy	N=32
GRADE 1	22
GRADE 2	9
GRADE 3	1