Short Communication

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Stem Cell Research & Annual Congress on Pediatrics 2018 - Positive end-expiratory pressure with I-gel in children: Is it safe and effective

Ghada Kamhawy

Suez Canal University, Egypt

Background & Aim:

I-gel is designed to suit the anatomy of hypo-pharyngeal and peri-laryngeal areas in adults without an inflatable cuff. There is inadequate evidence regarding quality of seal of I-gel during PEEP application in pediatric patients. The objective of this study was to evaluate the performance of I-gel utilization in children during general anesthesia with PEEP application at a caliber of 5 cm H2O and assess whether it ameliorates oxygenation. Patients & Methods: A total of 42 ASA physical status I, and II children undergoing surgery under general anesthesia were included. Patients were arbitrarily allocated to one of two equal groups to be on Pressure-Control Ventilation (PCV) with PEEP 5 cm H2O (group I) and PCV without PEEP (group II). I-gel size 2 1⁄2 was utilized in children weighing from 25-35 kg. Leak Volume (LV) and Leak Fraction (LF) were recorded. Peak Inspiratory Pressure (PIP), expiratory and inspiratory tidal volume as well as minute volume and End tidal CO2 (ETCO2) were withal recorded at 5 min, 30 min and 1 h after I-gel insertion. Results: Leak volume and leak fraction had no statistical consequential distinctions between both groups. Patients with PEEP had significantly lower (ETCO2), higher PIP, higher inspiratory tidal volume, and higher expiratory tidal volume (p=0.001) during the post I-gel insertion follow up period. Patients with PEEP additionally had significantly higher PaO2 and lower PaCO2 levels (p= 0.001). Conclusions: I-gel may be used safely during PCV while applying PEEP of 5cm H2O in children with an efficacious seal pressure, amelioration in oxygenation and without leak or gastric insufflation.

Introduction

The I-gel is an airway contrivance used both for patients with spontaneous breathing and those requiring positive pressure ventilation. It is a single-use supraglottic airway contrivance that has been an area of interest in the past decennium. Adult studies have been very inspiriting as regards both safety and efficacy. I-gel is designed to suit the anatomy of hypopharyngeal and perilaryngeal areas without an inflatable cuff, but no transmutations had done in its design to suite pediatric patients. The prevalent complication of atelectasis cognate to airway closure can be evaded utilizing tidal volumes and positive end expiratory pressure (PEEP). Endotracheal intubation with adequate tidal volume and PEEP is conventionally utilized in pediatrics to avert atelectasis and airway closure during general anesthesia. Supraglottic airway contrivances could supersede endotracheal tube during general anesthesia in pediatrics.

The insertion of I-gel has been demonstrated to be superior to the ProSeal laryngeal mask airway (PLMA) and the classic LMA regarding speed and feasibility. Supraglottic airway contrivances, have low airway leak pressure [p-leak] with risk of gastric inflation. It has been suggested that tidal volumes of 6–8 ml/kg be utilized with positive pressure ventilation. The I-gel may have more gas leaks than other supraglottic airway contrivances during positive pressure ventilation due to the absence of inflatable cuff . Applying PEEP with controlled ventilation has been suggested for lung recruitment, incrementing the functional residual capacity and ameliorating ventilation/perfusion mismatch with endotracheal tube or PLMA.

Patients and methods

After approbation of the local research ethics committee we obtained inscribed apprised consent from the parents of the 42 ASA physical status I and II pediatric patients aged 6–12 years and weight range from 18 to 38 kg who presented for any elective orthopedic upper or lower limb surgeries under general anesthesia and they were included in the study. The child was omitted if there were airway deformities or expected airway arduousness.

Intra-operative measures

Routine monitoring equipment was affixed to the patients to obtain the following quantifications: 5-lead ECG, capnography, pulse oximetry and blood pressure. General anesthesia was induced by fentanyl 1 mcg/kg, propofol 3 mg/kg, after corroboration of adequate anesthesia, the anesthetist inserted the I-gel, size 2, 2.5 or 3 I-gel was inserted according to patient's weight while the patient was in the sniffing position. To evaluate position in cognation to the larynx, endoscopy was performed and a fiberoptic score was assigned utilizing the relegation suggested

Note : This work is partly presented at Joint Event On World Congress on Novel Trends and Advances in Biotechnology, Cell & Stem Cell Research & 15th Annual Congress on Pediatrics (November 28-29, 2018 | Barcelona, Spain)

by Cook and Cranshaw : I (ideal situating), L (low situating) and H (high situating) depending on the view visually perceived. In the event of low or high situating, the I-gel was superseded, even if ventilation was efficacious. Maintenance was by Isoflurane 1–2% and fentanyl 0.2 mcg/kg if needed. the contrivance was connected to the closed circle breathing system (GE avance CS2) PEEP = 5 cm H2O was integrated to pressure-controlled ventilation (PCV) in Group I, while in Group II PCV without PEEP. A FiO2 of 1.0 utilized for 30 min then truncated to 0.3. There were no distinctions between both groups as regard ventilator settings except for PEEP level. A tidal volume of 6 ml/kg was distributed by setting Peak Inspiratory Airway (PIP) throughout the entire anesthetic procedure and remained unchanged. The rate was adjusted to achieve a cessation-tidal carbon dioxide of 30–35 mmHg. Three liter/min was set as fresh gas flow and inspiratory to expiratory (I:E) ratio was set to 1:2.After 60 min total anesthesia time, oxygen saturation was recorded and the genuine respiratory settings were recorded. Assessment of leak in both groups was done by recording of leak fraction, and leak volumes at 5 min, 30 min and 60 minIf the leak was above the accepted values, we set the tidal volume to 10–12 ml/kg in lieu of 6–8 ml/kg. Seal pressure was assessed by evaluation of gastric insufflation, utilizing abdominal circumference as a surrogate marker. We quantified it prior to induction at the terminus of expiration via a quantification tape around the child's abdomen at the caliber of umbilicus and this was considered the baseline abdominal circumference afore mechanical ventilation. The second quantification was performed at the terminus of expiration just afore I-gel abstraction. The I-gel was abstracted once the child was plenarily aroused at the terminus of surgery and after discontinuity of anesthesia. Adverse events were recorded.

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