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Commentary Open Access

Always Oxygenate above the Zone of Airway Narrowing

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Commentary

There are several case reports in literature regarding the risks of barotrauma and tension pneumothorax during flexible bronchoscopy in both adults and children [1]. The benefits cited in literature for oxygen insufflation through the working channel of a fiberoptic bronchoscope (FOB) during fiberoptic guided endotracheal intubation include provision of supplementary oxygen, blowing away of secretions and prevention of fogging. However, it is recognized that serious barotrauma may occur whenever the flow of oxygen into the patient exceeds its egress around the FOB and into the atmosphere. This is a special concern whenever there is any narrowing or a pathological or potential obstruction in the airway preventing or limiting this egress. In small children, even without any airway pathology, collapse of the airway is likely due to several reasons. Children have small caliber airways and a large tongue, the upper airway muscles are more sensitive to depression during anesthesia or sedation and in neonates and infants the neck is short and may meet the chest and the mandible is relatively hypoplastic, rendering the upper airway susceptible to collapse. Furthermore, the epiglottis is short, stubby, omega shaped and angled over the laryngeal inlet. Thus there are numerous sites of potential airway obstruction following sleep, sedation or general anesthesia in children. For fibreoptic guided intubation of the pediatric airway some sedation is required, rendering the upper airway prone to some degree of collapse and the associated risks of barotrauma when oxygen is insufflated through the working channel of the FOB. It does not seem to be very important whether oxygen is delivered from an anesthesia machine or a wall outlet. The risks would appear to be similar, with even low flow rates causing barotrauma if oxygen egress is curtailed. As early as 1997, Ovassapian et al. declared that FOB oxygen insufflation is not recommended [2]. It is advisable and safer to supplement oxygen at a site above that of any potential obstruction i.e. via a nasal cannula, mask, or even an oral catheter. Airway opening manoeuvres will need to be applied throughout the process of securing the airway to ensure adequate oxygenation.

Concerns over insufflating oxygen below an obstruction and development of barotrauma even in adults are extended to the insufflation of oxygen through an airway exchange catheter (AEC) following extubation of the trachea or use of jet ventilation in the lower airway. These techniques should be undertaken with extreme caution and only very occasionally due to the very real risks of barotrauma. An AEC is used primarily as a guide to reintubate the trachea and also for oxygenation. However much of the morbidity associated with AEC use is due to inappropriate oxygenation [3]. Oxygen insufflation and high-pressure source (jet) ventilation through an AEC should be undertaken with extreme caution as barotrauma and death have been reported [4].

The incorporation of newer terminologies in the literature like NODESAT [5] (Nasal Oxygenation During Efforts of Securing A Tube) and HFNC (high flow nasal cannula) oxygen therapy seem to indicate that the nasal route seems to have emerged as the safest way to supplement oxygen during the process of airway management and even very high flow rates can be used provided the gases are warmed and humidified to ensure patient comfort.

It thus seems to be appropriate to emphasize that oxygen must always be insufflated above the zone of any potential airway collapse!

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