



The Missing Link At Anesthesia Induction: Excessive Dynamic Airway Collapse

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My opinion

As an anesthesia provider, it has always bewildered me that despite visual confirmation of endotracheal tube's passage across the vocal cords on video-laryngoscopy, capnography confirmation on the anesthesia monitor is sometimes delayed by few-to-many breaths. This delayed appearance of end-tidal carbon dioxide can be very misleading for anesthesia providers considering that they have been classically taught "when in doubt, take it out" while safely assuming inadvertent dislodgment of endotracheal tube into esophagus leading to end-tidal carbon dioxide's absence. However, we as anesthesia providers may not have realized that patients may respond in three different ways after foreign body has been introduced into their airways. We are familiar with laryngospasm as observed with supraglottic device and bronchospasm as observed with endotracheal tubes. However, the third entity (the missing link) called excessive dynamic airway collapse (EDAC) may have gotten overlooked until now. It can be simply stated that laryngospasm at vocal cords, EDAC at central airways (trachea and mainstem bronchi) and bronchospasm at peripheral airways are respectively the first line, the second line and the third line of defensive manifestations by functioning airways when they are exposed to foreign body. Except for anesthetic agents themselves inducing idiosyncratic allergic reactions in the airways, it can be safely assumed that it is always the insufficient suppression of airway reflexes by inadequate doses of anesthetic agents that lead to disinhibition at vocal cords, central airways and peripheral airways manifesting respectively as laryngospasm, EDAC and bronchospasm. Endotracheal tube in situ makes laryngospasm issue moot but immediate onset EDAC and delayed onset bronchospasm can be appreciated in response to endotracheal in situ among inadequately anesthetized patients. Alternatively, EDAC may be the consequence of anesthetic-induced muscular relaxation "anatomically" collapsing the central airways due to undiagnosed preexisting tracheo-bronchomalacia. To appreciate the significance of EDAC at the time of induction of anesthesia and intubation of trachea, the inquisitive

clinicians can ponder to investigate and document the incidence of EDAC happening immediately after fiberoptic intubations have been performed in awake spontaneously breathing morbidly obese patients but just before anesthesia induction agents have been administered to them. However, the advent of video-laryngoscopy has relegated awake fiberoptic intubations as rarities among morbidly obese patients presenting for procedures under anesthesia. Herein, we as anesthesia providers have to depend on the literature available from other specialties which have documented common incidence of EDAC among morbidly obese populations [1-5]. Therefore, it is my observation and suggestion that when endotracheal tube advancement across vocal cords has been visually confirmed on video-laryngoscopy being concurrently observed by multiple anesthesia providers but end-tidal carbon dioxide is not visible for few breaths on anesthesia monitor, EDAC must be considered as a cause which may get resolved with positive pressure ventilation whereafter appropriately placed endotracheal tube is not misleadingly removed in patients whose blood level oxygen saturation is sustaining appropriately all the while according to continuous pulse waveform oximetry.

Although EDAC may not be the universal cause for the above-mentioned scenario, it may be the case in a few scenarios [6-8], and hence, it is just my interpretation of observed phenomenon to inspire dedicated future investigations into the phenomenon. Additionally, herein lies my assumption that capnograms' response times (transit times and rise times [9]) being too long may not be explained by technical factors but by EDAC. However, my suggestion is to NOT make a definite diagnosis of EDAC but to consider EDAC as prompt differential to avoid unnecessary tracheal extubation based on delayed capnogram after video-laryngoscopic intubation has been concurrently confirmed by multiple providers, visually and directly observing the tracheal intubation. Essentially, my intention is to take away some focus from bronchospasm so as to give EDAC some of its long overdue focus because EDAC may have been completely overlooked as a phenomenon during induction of anesthesia.

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