Catheter Depth Control During Endotracheal Tube Exchanges in an Airway Manikin; A Comparison of a Novel Color-Zoned Qualitative System vs Traditional Quantitative System.

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Problem: Lack of depth control of airway introducers and exchange catheters is the prime cause of airway injuries and failed intubations when these devices are used. [1,2,3]

Hypothesis: Catheters with a qualitative color zoned depth control system, designed to be visually monitored with a video laryngoscope, at the level of the vocal cords, can improve catheter depth control during airway procedures.

Study design: 22 faculty anesthesiologists or senior residents performed 3 endotracheal tube exchanges in an airway manikin each with differing visual feedback and either qualitative or quantitative depth control markings.

Exchange 1: Exchange catheter with standard numeric depth markings (quantitative). The exchange was performed without a laryngoscope.

Exchange 2: Exchange catheter with standard numeric depth markings (quantitative) and a video laryngoscope to monitor exchange at the glottis.

Exchange 3: Exchange catheter with novel, qualitative color-zone depth control markings on the catheter tip and a video laryngoscope to monitor the exchange at the glottis.

Data Gathering

All exchanges were monitored in two ways:

1. All airway exchange catheters were fitted with a magnet in the tip and a magnetometer was used to monitor tip depth in the trachea throughout all exchanges;
2. A video, at the level of the glottis, was taken of all exchanges.

End points for catheter tip depth in the trachea:

1) Shallowest point during procedure
2) Deepest point on initial insertion of exchange catheter
3) Deepest point during entire procedure
4) Number of incursions into the bronchus
5) Total tip excursion

Results

Results are presented in Figure 1.

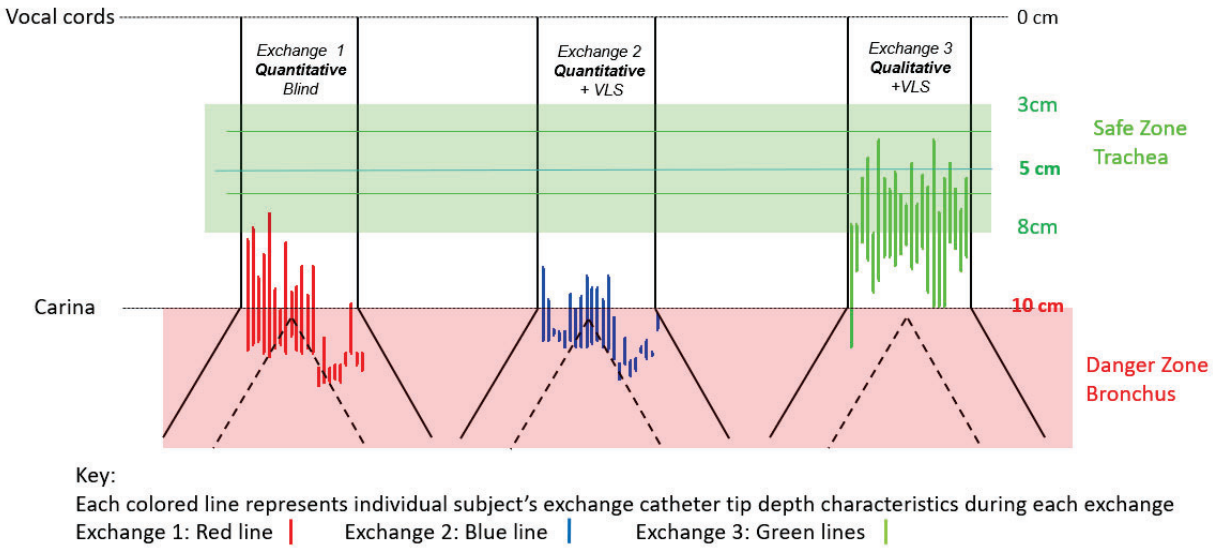

Figure 1: CATHETER TIP DEPTH IN TRACHEA AND BRONCHUS DURING AN ENDOTRACHEAL EXCHANGE WITH 3 DIFFERENT DEPTH MONITORING TECHNIQUES

Conclusion:

Airway exchange catheters with qualitative color zoned depth markings the decreases tip travel below the carina when used with a video laryngoscope during endotracheal exchanges in an airway manikin. Improved catheter depth control could lead to safer endotracheal exchanges in humans.

References:

1. Harris K. Endotracheal tube exchangers: should we look for safer alternatives? Heart Lung, 201;41(1):67-9
2. DeAlmeida,JP. Bronchial injury and pneumothorax after reintubation using an airway exchange catheter. Braz J Anesthesiol, 2013;63(1);107-9
3. Sheron McLean. Airway Exchange Failure and Complications with the Use of the Cook Airway Exchange Catheter®: A Single Center Cohort Study of 1177 Patients. Anesth Analg 2013;117:1325–7