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"Tracheal ultrasonography and ultrasonographic lung sliding for confirming endotracheal tube placement: Speed and Reliability."
Sinan Karacabey; Erkman Sanrı MD; Emin Gokhan Gencer MD; Ozlem Guneysel. July 1026, Volume 34, Issue 6, Pages 953-956.

Clinical Question: Is ultrasound a fast and reliable tool to confirm successful endotracheal intubation?

Background: There are many methods used to confirm endotracheal intubation, including colorimetric capnography, end-tidal capnography, lung auscultation for breath sounds, auscultation over the stomach for absence of air movement, improvement in measured SpO_2, and ultimately, chest x-ray. These methods are often considered in tandem rather than alone for greater confidence but all have limitations. Patients in cardiac arrest may not show improvement in SpO_2. Ventilation with a bag-valve mask can insufflate air into the stomach leading to a false color change on colorimetric capnography. Ultrasound is an added modality for confirmation and can be used easily and quickly at bedside.

Methods: This was a single center, prospective, and observational study performed in a tertiary hospital. Patients requiring intubation for respiratory failure, cardiac arrest, or severe trauma were included in the study. Those patients with severe neck trauma, history of neck tumors, or history of neck surgery/tracheotomy were excluded as anatomy may be distorted. Patients were broken into two groups: those that required intubation due to cardiac arrest and non-cardiac arrest patients that required endotracheal intubation and RSI. Intubations were performed by first year EM residents and tracheal and lung sliding ultrasounds were performed by 2 EM physicians trained in USA. A 7.5 mHz linear probe was used. The gold standard for comparison was capnography.

Results: A total of 115 patients, ages 16-95 were included. Of those 115, 30 were cardiac arrest. The remaining 85 were non-cardiac arrest using RSI. In the RSI group, there were 56 tracheal intubations and 29 esophageal intubations. Ultrasound was 100% sensitive and specific in this group. In the cardiac arrest group, there were 15 tracheal intubation including 2 which were mischaracterized on US as esophageal. There were 15 esophageal intubations, and 5 of these were characterized as tracheal by US. This translated to a sensitivity of 86.67 % and a specificity of 66.67% in the arrest group. Overall, US had a 97.18% sensitivity and 88.64% specificity. The overall PPV was 93.24%. The overall NPV was 95.12%

Conclusion: Ultrasound can reasonably be used in conjunction with other findings to quickly confirm endotracheal intubation. The authors mentioned a high rate of esophageal intubations (almost half the patient population) and attributed this to inexperience of first year residents performing the intubations. I feel this was a benefit to the study, because this allowed for accurate assessment of both positive endotracheal and esophageal tube placement. This accuracy was obviously affected by CPR, though the potential reason was not addressed by the authors. I suspect it could be secondary to motion artifact with active compressions in process. Ultimately, tracheal and lung sliding US is another useful tool to add to our arsenal.