Rapid Sequence Education

ACCM Journal Club Newsletter – 02/2022

JOHNS HOPKINS MEDICINE
THE JOHNS HOPKINS HOSPITAL

Can POCUS determine endotracheal vs endobronchial intubation?

Summarized by: Zachary Janik, MD

This month, **we review Ramsingh et al's trial from Anesthesiology in 2016, which investigates the accuracy of point-of-care ultrasound (POCUS) in diagnosing endotracheal vs endobronchial intubation.** Auscultation is an unreliable method to determine location of the endotracheal tube (ETT) in the pulmonary tree with a sensitivity of only 60-65%. POCUS may provide an alternative, reliable method to determine endotracheal tube position, which can decrease the hypoxemia, barotrauma, and atelectasis that comes with unintentional endobronchial intubation.

Design: single center, prospective, double-blinded, randomized trial

Population: 42 adult surgical patients requiring endotracheal intubation

Method: Auscultation and POCUS were performed separately and ETT position and monitors were covered (except for audible pulse oximetry). See figures on the next page.

- Anesthesiologist 1 intubated participants after induction of general anesthesia and was responsible for the patient care throughout the study
- Anesthesiologist 2 positioned ETT in the trachea, right mainstem bronchus, or left mainstem bronchus under flexible bronchoscopy guidance
- Anesthesiologist 3 performed auscultation
- Anesthesiologist 4 performed the Pulmonary tree and Lung expansion Ultrasound Study (PLUS) (assessing for tracheal dilation and bilateral lung sliding)

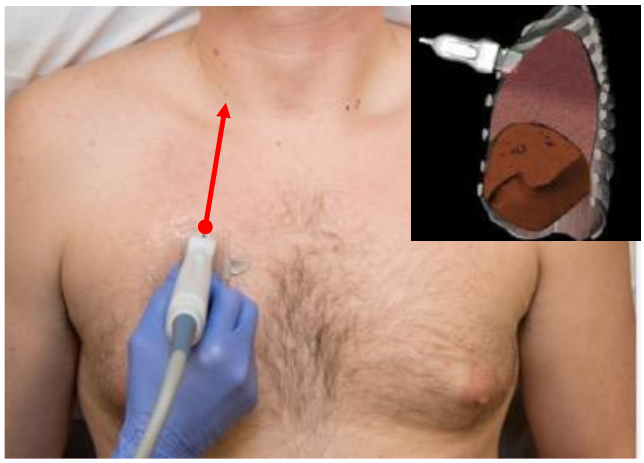
Outcome: primary: endotracheal vs endobronchial intubation. Secondary: right endobronchial vs endotracheal, and left endobronchial vs endotracheal intubation

Conclusion: PLUS correctly identified ETT position in 95% of participants while auscultation did so only in 62% of participants.

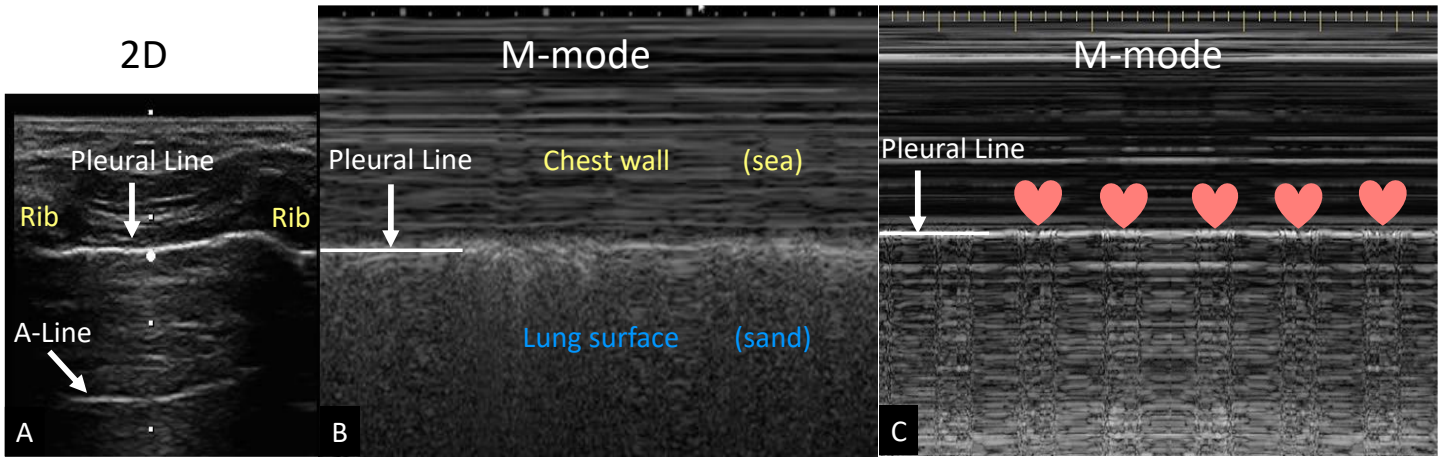
Limitations: sample size of only 42, POCUS and PLUS are advanced skills requiring extra training (75 PLUS in this study) and available equipment. The study did not include participants with high BMI. Ultrasonographic visualization of tracheal dilation is not necessary for determining endotracheal vs endobronchial intubation and has not been validated as an accurate tool to determine endotracheal vs esophageal intubation.

ETT Positioned in Trachea			
	Trachea	Bronchus	Correctly Identified
Auscultation	10	5	67%
POCUS	14	1	93%

ETT Positioned in Main Stem Bronchus			
	Trachea	Bronchus	Correctly Identified
Auscultation	11	16	59%
POCUS	1	26	96%



ETT Position	POCUS findings
Trachea (Fig. B)	Bilateral presence of lung sliding Bilateral absence of lung pulse
Bronchus (Fig. C)	Unilateral presence of lung sliding and absence of lung pulse Contralateral absence of lung sliding and presence of lung pulse



A-lines

Lung sliding: Seashore sign
No lung pulse sign

No Lung sliding: Barcode sign
Lung pulse sign

Further reading: Our resident Gabe Prada explains how to use POCUS for endotracheal intubation on this video on www.TheICUDoc.com, and he further expands on this topic in a review article published by the Journal of Cardiothoracic and Vascular Anesthesia in 2019.

In 2016, Jaeel et al review the use of ultrasound for positioning of endotracheal tubes in the pediatric population, which is of particular interest given the difference just a few cm can make.

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