



# Assessment of Proper Endotracheal Intubation by Point-of-Care-Ultrasound

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## Short Communication

After the vessel's canalization, the tracheal intubation is the second invasive procedure used in the emergency services, critical patients' units and surgical units. The auscultation of the lungs has been used in both hemithorax to confirm the correct position of the tracheal tube; however this method is not completely safe for this end. The direct visualization of the entrance of the tracheal tube for the glottic space is a safe method to assert a correct tracheal intubation, but in patient with difficult airways, it cannot always achieve an appropriate visualization of the vocal cords. On the other hand, it is also used with success the capnometry during and after the tracheal intubation, method that has demonstrated an appropriate security and reliability. In the last decades the clinical ultrasonography has been developed next to the patient (Point-of-Care-Ultrasound) to evaluate the patients in emergency scenarios and based on that system has confirmed the utility of the ultrasound to verify the correct tracheal intubation. The ultrasound performed before, during and after the tracheal intubation is a clinical method of easy realization, quick, repeatable and exempt of complications. Their only inconvenience is that it is operator dependent and that the personnel that accomplish it should have abilities in the procedure. By means of the ultrasound for the evaluation of the proper position of the tracheal tube, indirect images are observed, since the endotracheal tube is not visible in the light of the trachea.

The ultrasound characteristics of a correct tracheal intubation are the following:

- Esophageal distension is not observed (the esophagus is a virtual cavity), therefore the tube is inside the trachea. In the event of esophageal intubation it appears dilated;
- Slide of both pleura is appreciated in both hemithorax (selective intubation is discarded).
- The motility of both hemidiaphragms is verified (selective intubation is discarded).

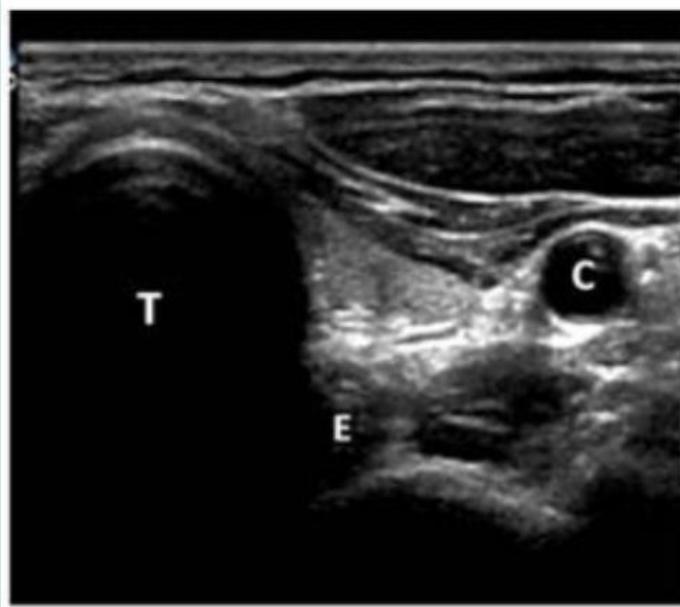
Technique for the tracheal intubation guided by point of care ultrasonography:

- Request informed consent to the patient or their next of kin.
- Verify that it is available the necessary team and equipment.
- Hygiene of hands.
- Use of protective devices and clothes.
- Use the proper probe (too bigger frequency produce smaller penetration and bigger resolution of the image) (Figure 1).



**Figure 1:** Right location of the linear probe for ultrasound guided tracheal intubation.

- f. The image should be optimized by means of gain and depth, in such way that the structures to be visualized locate in the center of the monitor of the ultrasound device.
- g. The operator that performs the tracheal intubation initiates the technic according to the established protocols.
- h. During the introduction of the tracheal tube it is constantly visualized the ultrasound monitor; if the intubation is proper done; dilation of the esophagus is not observed (Figure 2).
- i. Confirmation of pleural slide and motility of both hemidiaphragms.
- j. Fixation of the tracheal tube by means of the habitual technique.
- k. Daily ultrasound control of the position of the tube and lung images.



T: Trachea; E: Esophagus; C: Carotid artery.

**Figure 2:** Ultrasound view of trachea and adjacent structures.



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