Author’s response to reviews

Title: Ultrasound-guided identification of the cricothyroid membrane in a patient with a difficult airway: A case report

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Author’s response to reviews:

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Re: EMMD-D-17-00096

Dear Professor Hoogewerf:

Thank you for the opportunity to revise our manuscript. We have responded to each of the points made by the reviewers in a point-by-point fashion in the attached pages.

Sincerely,

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Reviewer 1 (Dr. Geert-Jan van Geffen)

Thank you very much for your comments.

Reviewer 2 (Dr. Iskander Maissan)

We appreciate your comments. Thank you. We responded to your important comments below.

1) Can you be more specific on the technic you've used to find the membrane? longitudinal scanning and sagittal identification or vice versa?

   Thank you for your comment. We have added information about this to the revised paper.

   We routinely use transverse scanning to identify the cricothyroid membrane. It is the so-called “TACA method”6). The letter “T” means the thyroid cartilage, which looks triangular on the ultrasound transverse view. The letter T also refers to triangle. The letter “A” means air-line, which indicates the cricothyroid membrane. The letter “C” means the cricoid cartilage, which is hypoechoic, and looks like a black letter “C”. The method starts at the superior thyroid notch proceeding caudally till we identify the cricothyroid membrane, and pass it and return to verify it.

2) Can you think of any (solid) landmark in the neck that can be a starting point in any swollen neck to find the membrane?

   Thank you for your comment. We added information to the revised paper.

   We usually use the superior thyroid notch as a landmark to start transverse scanning. It can be easily identified as a prominence of the upper neck, especially in males, because it’s common name is the “Adam’s apple”. Unfortunately, this prominence is relatively unclear in females. However, the thyroid cartilage is easily identified in both men and women. In this report, the anesthesiologist did not use the usual transverse scan technique. He could not find the superior thyroid notch due to the patient’s swollen neck. He started scanning from the lower neck which looked anatomically normal. At first, he found the trachea (the C portion of the TACA method), then scanned cranially to seek the cricothyroid membrane. We cannot recommend a standard method to identify this in patients with a difficult airway, but we strongly recommend trying to identify the thyroid cartilage or cricoid cartilage. The cricothyroid membrane should be present between them.

3) Are those the same in men and women?

   Thank you for your comment. We mentioned that in the revised paper.
We usually use the superior thyroid notch as a landmark when starting transverse scanning. It can be easily identified as a prominence of the upper neck, especially in men, because it’s common name is the “Adam’s apple”. Unfortunately, this prominence is relatively unclear in women. However, the thyroid cartilage is easily identified in both men and women.

4) Are there any limitations for this technique? I can imagine if the neck is swollen because of subcutaneous emphysema or by gas producing bacteria you won’t see a thing with sonographic imaging?

Thank you for your comment. We mentioned that in the revised paper.

Point-of-care ultrasound is an important tool in a new era. Using ultrasound for evaluation of the airway and identification of the cricothyroid membrane may become a basic tool and mandatory skill for anesthesia in near future. Recent progress in ultrasound examination for airway management show its efficacy, but may also reveal limitations. As you suggest, this may include patients with subcutaneous emphysema or gas gangrene.

5) Can you think of a role of sonography in the unpredicted difficult airway? If not it might also be worth mentioning I suppose!?

Thank you for your comment. We mentioned that in the revised paper.

This case report suggests the possible efficacy of ultrasound identification in airway management in the patient with an anticipated difficult airway. But, ultrasound usage in case of the unanticipated difficult airway might be limited because of time needed for set-up of the ultrasound equipment. If an ultrasound machine were present in all cases for airway management, that is “ubiquitous ultrasound”, if start-up of the machine could be instant, and if the operator had skilled hands to identify the cricothyroid membrane immediately, this skill may be useful in patients with an unanticipated difficult airway. The most important factor for successful cricothyroidotomy is thought to be correct identification of the cricothyroid membrane5). Cricothyroidotomy is the procedure of last resort in cases we “cannot intubate, cannot oxygenate” However, even in that situation, contraindications for cricothyroidotomy may be present, such as a subglottic tumor10).

References
