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BJAN-D-22-00193_Clinical Image

Next generation in ultrasound imaging to assess upper airway

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Point of Care Ultrasound (POCUS) is well established in anesthetic practice but underused for and during airway management. In addition to 2D images, three/four Dimensional (3D/4D) ultrasound technology provides clearer and more accurate imaging for airway, and additional visual information to diagnose potential pathological conditions more efficiently.[1] Moreover, POCUS, facilitates rapid screening for possible difficult laryngoscopy[2] and identification of the cricothyroid membrane.[3] We present a complete four-step upper airway assessment in 2D (Column 1) images and the correspondence with 3D/4D images (Column 2) and the position for ultrasound probe (Column 3).

Figure 1 shows four-step measurements of ultrasound parameters that assess upper airway anatomy suggesting difficult laryngoscopy. Picture 1a and 1b corresponds to Hyomental Distance (HMD) in Midline Sagittal Plane (MSP); Picture 2a and 2b is the Distance from Skin to Hyoid bone (DSH) in Transversely Plane (TP); Picture 3a and 3b shows the Distance from Skin to Epiglottis (DSE) in TP; Picture 4a and 4b displays the Distance from Skin to Vocal Cords (DSVC) in TP.

Figure 2 shows four-step tracheal structures to identify the cricothyroid membrane. Picture 1a and 1b corresponds to Cricoid cartilage in TP; Picture 2a and 2b, to tracheal rings in TP; Picture 3a and 3b, to Cricoid cartilage and tracheal rings in MSP and Picture 4a and 4b, to cricothyroid membrane in MSP.

Authors' contributions

Miguel Angel Fernandez-Vaquero had the idea for the study, carried out the study, acquired the images, and wrote the manuscript. Ernesto Delgado-Cidranes advised in the design of the study and supervise images interpretation. Robert Greif advised in the design of the study, reviewed critically the manuscript, and contributed to the final version of the manuscript and images. All authors read and approved the final version of the manuscript.

Presentation

The images have been accepted for presentation at Euroanaesthesia (June 2022 Milan, Italy) the annual conference of ESAIC (European Society of Anaesthesiology and Intensive Care).

Conflicts of interest

The authors declare no conflicts of interest.

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Figure 1 Four-step measurements of ultrasound parameters that assess upper airway anatomy suggesting difficult laryngoscopy. Column 1: 2D images; Column 2: 3D/4D images. Gained from a Voluson Swift ultrasound machine and a Convex Array Volume Probe (GE; Little Chalfont, UK). QR available. Picture 1a/b Midline sagittal scan of Hyomental Distance (HMD); Hyoid bone; Mandible; Genioglossus muscle; Palate; Mylohyoid Muscle (MH) and Geniohyoid Muscle (GH). Picture 2a/b transverse midline scan of Distance from Skin to hyoid bone (DSH) and Hyoid bone. Picture 3a/b transverse midline scan of Distance from Skin to Epiglottis (DSE); Pre-Epiglottic Space (PRE-E); Epiglottis and Air-Mucosa interface (A-M). Picture 4a/b transverse midline scan of Distance from Skin to Vocal Cords (DSVC); Anterior Commissure (AC); True Cords (TC); False Cords (FC); Arytenoids and Thyroid cartilage. Picture 5 the position of the ultrasound probe for pictures 1-2-3-4 respectively.

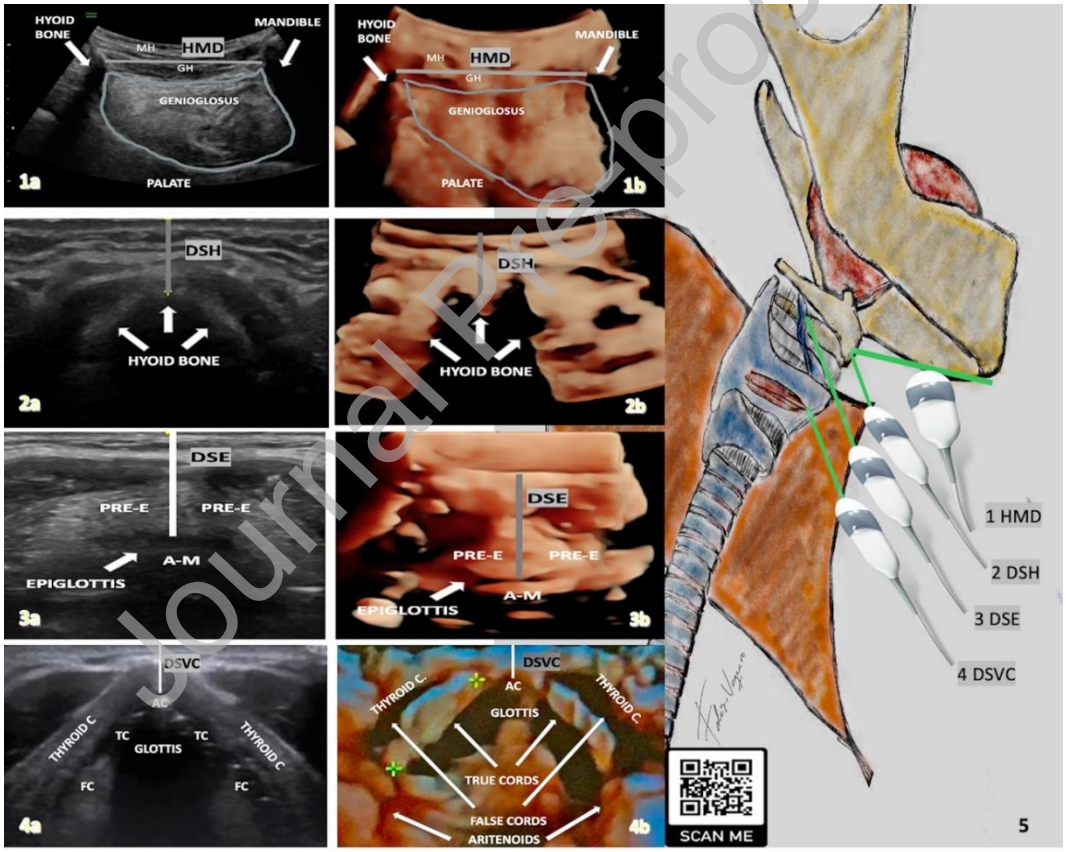

Figure 2 Four-step tracheal structures to identify the cricothyroid membrane. Column 1: 2D images; Column 2. 3D/4D images. Gained from a Voluson Swift ultrasound machine and a Convex Array Volume Probe (GE; Little Chalfont, UK). QR available. Picture 1a/b transverse midline scan of Cricoid cartilage. Picture 2a/b transverse midline scan of a tracheal ring; Airway and Air-Mucosa interface (A-M). Picture 3a/b midline sagittal scan of Cricoid cartilage; Tracheal rings and airway. Picture 4a/b midline sagittal scan of Thyroid Cartilage (Thyroid C.); Cricothyroid Membrane (C-T Membrane); Cricoid cartilage (Cricoid C.); Airway and Air-Mucosa interface (A-M). Picture 5 the position of the ultrasound probe for pictures 1-2-3-4 respectively.