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Role of point of care ultrasound to determine the correct position of the nasogastric tube in intubated COVID -19 patients



Respected sir,

Enteral route of nutrition via a nasogastric tube (NG) is the preferred mode for feeding in critically ill patients. In COVID-19 ICU, where chances of cross-infection are common, the stethoscope has lost most of its significance. Confirmation of NG tube is of paramount importance since a wrongly placed NG tube can lead to trachea-bronchial injury, pulmonary hemorrhage, pneumothorax, pneumo-mediastinum, subcutaneous emphysema, and pneumonia [1]. In an awake patient, the diagnosis is relatively simple as the patients will start coughing once the NG tube is in the trachea-bronchial tree, but it is difficult to decipher in sedated/paralyzed intubated patients. There are several techniques for conformation of NG placement like testing of pH of the aspirate, auscultation over epigastrium by pushing air, chest X-ray, and ultrasound (USG). In the COVID-19 pandemic, the recommendation against the use of stethoscope and difficulty in transporting the patients makes USG a lucrative option.

The technique requires the involvement of two physicians, one inserting the NG tube and the other person performing the USG scan. The learning curve for the same is short in people trained with USG guided catheter placement and visualization of the trachea during percutaneous dilation tracheostomy [2]. Linear high-frequency probe is required to visualize the NG tube in the neck whereas a high-frequency curvilinear probe is required for abdominal structures. The cervical part (Fig. 1) of the esophagus is scanned in the neck using a linear probe (double trachea sign) but in an intubated patient it is difficult to localize the posterior wall of esophagus hence if the NG tube is not visible it should be considered to be in the cervical esophagus. Placing the curvilinear probe in the epigastrium in a longitudinal position with the marker placed cephalad helps in localizing the NG tube at gastro-esophageal junction. Some amount of tilting may be required to acquire a good quality image. The **antrum** is located posterior to the left lobe of the liver and anterior to the pancreas. Being a relatively deep structure, visualization in well-built/obese patients may be difficult. In such cases “dynamic fogging” (Fig. 2) produced with pushing of 50 cc saline in NG is confirmatory. The fundus is best visualized in right lateral decubitus with the probe placed in the mid-axillary line, it is located between the spleen and the left kidney; beneath the diaphragm. Localizing the NG tube in the cervical part and not at the gastro-esophageal junction is confirmatory of the coiling of the NG tube in the oral cavity.

This technique is especially advantageous in the COVID-ICU setup. USG has shown a sensitivity of 98.3% and a specificity of 100% in confirming the correct positioning of NG in intubated

and mechanically ventilated patients [3]. In a COVID-ICU where auscultation is not feasible in PPE (personal protective equipment) and stethoscope bears the chances of cross-infection, USG can be the tool of choice. Most patients in such ICU are either sedated/paralyzed owing to poor chest condition; a falsely directed NG can worsen an already affected lung. Real-time imaging provided by USG helps in preventing such complications. Chest X-ray (CXR) can be a feasible option in weighted tip NG but most ICU uses the non-weighted NG now, hence the role of CXR is limited. The time for obtaining a CXR is comparatively more than USG. USG reduces time and cut down expenses as well [4]. USG also reduces the radiation exposure, hence it is useful in patients in whom exposure is undesirable e.g. pregnancy. USG helps in guiding the passage NG in a surgical patient in whom placement is difficult. One important thing to be kept in mind is to paralyze the patient while doing NG insertion in ICU as it avoids aerosolization around the endotracheal tube. USG maintenance in the COVID area is also equally important for the safety of the health care worker. There should be a designated ultrasound for COVID-19 area in the hospital, handheld devices are preferred as they can be easily cleaned, touch screen machines are preferable than keyboard-based machines while performing aerosol-generating procedures in the operation room or ICU, all the non-essential components of the ultrasound machine should be covered by clear plastic and sheaths should be used to cover cord and probe which should be removed after scanning, wipe the entire machine surface with ethanol wipes inside the procedure room before doffing.

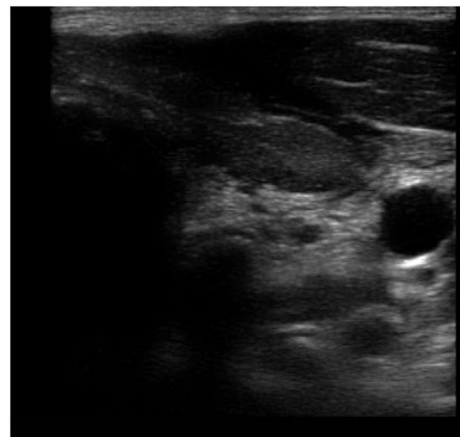


Fig. 1. Double trachea sign.

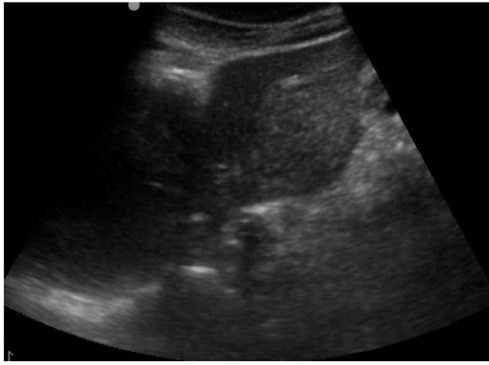


Fig. 2. Fogging effect in the antrum.

USG is an extra pair of eyes of an anesthetist. Proper application of USG will not only improve patient safety and outcome but will also reduce the incidence of infection among patients and healthcare workers.

Financial disclosures

None.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.tacc.2020.08.008>.

References

- [1] M.R. Harris, J.S. Huseby, Pulmonary complications from nasoenteral feeding tube insertion in an intensive care unit: incidence and prevention, *Crit. Care Med.* 17 (9) (1989) 917–919.
- [2] M. Zatelli, N. Vezzali, 4-Point ultrasonography to confirm the correct position of the nasogastric tube in 114 critically ill patients, *J Ultrasound* 20 (2017) 53–58.
- [3] H. Chenaitia, P. Brun, E. Querellou, J. Leyral, J. Bessereau, C. Aime, R. Bouaziz, A. Georges, Lousi F Ultrasound to confirm gastric tube placement in prehospital management, *Resuscitation* 83 (2012) 447–451.
- [4] C. Vigneau, J. Baudel, B. Guidet, G. Offenstadt, E. Maury, Sonography as an alternative to radiography for nasogastric feeding tube location, *Intensive Care Med.* 31 (2005) 1570–1572.

Sangam Yadav, Abhishek Singh*, Anirban Bhattacharjee,
Puneet Khanna, Kalung Manisha
*Department of Anesthesiology, Pain Medicine and Critical Care, All
India Institute of Medical Sciences, New Delhi, India*

* Corresponding author.
E-mail address: bikunrs77@gmail.com (A. Singh).

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