***Introduction***

Management of the airway remains a major contributor to death and brain damage in anesthesia, emergency medicine, and intensive care settings. The ability to recognize and understand the difficult airway is not a redemptive grace in clinical practice. Successful interventions with good outcomes are based on an excellent knowledge of airway anatomy and physiology, equipment familiarity and variety, fluidity of thinking, improvisational skills, and sound judgment.

Ultrasound-guided techniques are increasingly used in anesthetic practice. Ultrasonography (US) has many potential advantages– it is safe, quick, repeatable, portable, widely available, and gives real-time dynamic images. sonography of the upper airway may be a useful adjunct to clinical methods of bedside airway assessment. US must be used dynamically in direct conjunction with the airway procedures for maximum benefit in airway management. For these, ultrasound can be used for airway assessment and imaging.

Ultrasound physics refers to sound beyond 20,000 Hz and frequencies from 2 MHz to 15 MHz are normally used for medical imaging. Ultrasound transducers act as both transmitters and receivers of reflected sound. Tissues exhibit differing acoustic impedance, and sound reflection occurs at interfaces between different types of tissues. The impedance difference is greatest at interfaces of soft tissues with bone or air. Some tissues give a strong echo (fat and bone, for example); these structures are called hyper echoic structures and appear white. Other tissues let the ultrasound beam pass easily (fluid collections or blood in vessels, for example), and thus create only little echo; they are called hypo echoic and appear black on the screen.

All modern US transducers used in airway management have a range of frequencies that can be adjusted during scanning in order to optimize the image. The linear high frequency transducer is the most suitable for imaging superficial airway structures (within2–3 cm from the skin).The curved low-frequency transducer is most suitable for obtaining sagittal and parasagittal views of structures in the submandibular and supraglottic regions, mainly because of its wider field of view. The micro convex transducer gives a wide view of the pleura between two ribs. If you must choose to use only one transducer, then a linear high-frequency transducer will enable you to perform the majority of ultrasound examinations relevant for airway management. Because the air does not conduct ultrasound, the probe must be in full contact with the skin or mucosa without any interfacing air. This is obtained by applying judicious amounts of conductive gel between the probe and the skin. Because of the prominent thyroid cartilage in the male, it is sometimes a challenge to avoid air under the probe when performing a sagittal midline scan from the hyoid bone to the suprasternal notch. Portable machines can provide accurate answers to basic questions5 and are thus sufficient for airway US.

Clinical applications for US in airway management are recently appeared so we can use it for; Prediction of difficult laryngoscopy in surgical patients,Intraoral sublingual US is a promising approach to examining the airway and possibly establish predictors of difficult airway management, Evaluation of pathology that may influence the choice of airway management technique, Diagnosing obstructive sleep apnea, Localization of the trachea in Obesity, short thick neck, neck masses, previous surgery, and/or radiotherapy to the neck, as well as thoracic pathology as they result in tracheal deviation, also Airway-related nerve blocks, Laryngeal ultrasound is a useful method in predicting post-extubation stridor ,

Ultrasound-guided percutaneous tracheal puncture, it has number of attractive advantages compared with competitive imaging techniques or endoscopy in management of critically ill patient and in Confirmation of endotracheal tube placement.

Securing the airway by tracheal intubation in children requires skill and experience. Direct visualization of the glottis and passing the tracheal tube under direct vision is considered the “gold standard”1 but is not a guarantee of correct placement, especially in the infant and young child. None recognized esophageal intubation or bronchial intubation can result in Significant morbidity and mortality and is more likely to occur in critical care environments or in small children. Successful tracheal tube placement is generally realized by auscultation and/or end-tidal capnography. However, none of these methods are absolutely reliable and both require ventilation of the lungs. Ultrasonography (US) is becoming more commonly available to anesthesiologists due to its success in identifying vascular structures.

Measuring subglottic airway diameter with ultrasonography facilitates the selection of appropriately sized ETTs in pediatric patients. This selection method better predicted optimal outer ETT diameter than standard age- and Height-based formulas.

The use of US to confirm tracheal intubation has been described in adults reporting either direct visualization of the tracheal tube or indirect signs of ventilation. In neonates, a sonographic approach has been used to confirm endotracheal tube tip position.