Ultrasound Imaging in Airway Management: A Boon?

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Airway management is the basic skill acquired and mastered by anaesthesiologist and is their prime responsibility. Difficulties in optimal airway management can lead to serious adverse effects and failure can even lead to mortality. Due to these reasons, diligent efforts are continuously being undertaken to improve the care in form of introduction of various guidelines, audits, safe monitoring standards and newer airway gadgets. Conventional imaging includes x-rays, computed tomography (CT) or Magnetic resonance imaging (MRI). However these have risk of radiation hazards and do not provide real time imaging required during airway management. Ultrasound (US) is one such relatively recent adjunct to anaesthesiologist’s armamentarium. Since its inception in airway management, the list of applications of ultrasonography in perioperative, emergency and critical care settings is increasing exponentially. Its advantages include safety, simplicity, portability, non-invasiveness, cost effectiveness and reproducibility. Ample literature now exists to support its utility as well as efficacy.

Sound knowledge of the basic physics in relation to US, regional sono-anatomy and proper transducer selection is important to gain maximum advantage of the technique. Standard 7.5 MHz linear probe for visualisation of superficial structures and 5 MHz curved array probe for deeper structures are used [1]. The image is built from reflected sound signals. Despite the fact that airway is filled with air which is a poor medium for US transmission, the superficial location reflected sound signals. Despite the fact that airway is filled with air which is a poor medium for US transmission, the superficial location

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US guided percutaneous dilatational tracheostomy (PDT) is increasingly being advocated. It permits visualisation of pretracheal blood vessels and selection of puncture site [21]. It decreases adverse effects related to PDT e.g. cranial misplacement, major haemorrhage, posterior tracheal wall puncture and injury to thyroid isthmus [21-23]. Hypercapnia associated with FOB guided PDT can also be avoided with US guided procedure [24]. Real time visualisation of the needle path and guide wire placement using linear array probe may increase the success with US guided PDT [25].

Post extubation stridor can be reliably predicted in intubated patients by measuring the width of air column after deflating the ETT cuff [26]. An air column width of less than 4.5 ±0.8 mm was found to be associated with stridor. In addition to assessment and intervention, US has found its place in diagnosis of various conditions that can have implication for airway management e.g. vocal cord malfunction, [27] swallowing abnormalities, [28] supraglottic hemangiomas, [30] respiratory papillomatosis [31], laryngeal stenosis, [32] Zenker’s diverticulum, [33] maxillary sinusitis [34] etc to name a few.

Limitation of sonography like any other skill based technique is that its use is operator dependent and requires initial training to become proficient in its use. Though encouraging evidence exists, it is not robust enough to prompt a change in standard practise at present. US can be viewed as a complement to other monitoring and imaging modalities rather than a replacement. Recent developments in sonography technology like pocket sized smart phone based system can widen the horizon for its application even in remote areas [35].

To conclude, ultrasonography is turning out to be a boon to managers of airway. With better accessibility, familiarity and further improvement in technology, its use in airway management may well become a rule rather than exception in future.

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