

Should videolaryngoscopy be used first line for all intubations in the post-COVID-19 era?

While previously reserved for use in patients with difficult airways or for trainee education, videolaryngoscopy has come to the forefront of anaesthesia after its use as first line in the intubation of all patients with suspected or confirmed COVID-19. This article examines its suitability for routine first line use in all intubations.

Introduction

Laryngoscopy and endotracheal intubation are critical steps in the provision of general anaesthesia. In direct laryngoscopy, correct flexion of the lower cervical spine and extension of the upper cervical spine (known as ‘sniffing the morning air’) allows a clear line of sight to the larynx. Conventional laryngoscopes, such as the Macintosh curved blade, retract the epiglottis to provide a direct view of the glottis. Difficult intubation can be associated with hypoxia, permanent brain damage and death (Caplan et al, 1990). The incidence of difficult intubation in the operating room has been reported at between 1% and 18% (Naguib et al, 2006). Risk factors for difficult intubation include obesity and anatomical factors such as limited neck flexion, reduced jaw opening and poor tissue mobility secondary to radiotherapy. Additionally, difficult intubation and airway complications are more common outside of the operating theatre environment as highlighted by the Fourth National Audit Project (NAP4) of the Royal College of Anaesthetists and Difficult Airway Society in the UK (Cook et al, 2011).

The videolaryngoscope uses digital technology to transmit an image of the airway from the tip of a laryngoscope to a monitor without requiring a direct line of sight. Either a conventional Macintosh blade or a hyperangulated blade is used, with the latter providing a greater field of vision, requiring less force and being useful in anticipated difficult airways (Russell et al, 2012). Videolaryngoscopes may reduce failed intubations and their associated complications but historically were primarily a ‘reserve’ technique for difficult airways or for the education of junior trainees. During the COVID-19 pandemic, consensus guidelines released by Cook et al (2020) recommended the use of videolaryngoscopes as first line for the intubation of all patients with suspected or confirmed COVID-19 to reduce exposure to high viral loads by increasing the ‘mouth-to-mouth’ distance compared to direct laryngoscopy (Hall et al, 2020). As anaesthetists face a backlog of elective operations and with videolaryngoscope now readily available, the role of videolaryngoscopy as first line for all intubations warrants discussion.

Videolaryngoscopy should be used for all intubations

A Cochrane meta-analysis incorporating 64 randomised controlled trials and involving 7044 adult participants by Lewis et al (2017) described fewer failed intubations (35 per 1000 vs 94 per 1000) when using a videolaryngoscope. This was replicated in a more recent ranking systematic review and network meta-analysis where videolaryngoscopy was again associated with fewer failed intubations than direct laryngoscopy (de Carvalho et al, 2022). Another meta-analysis of 32 randomised controlled trials with 15 064 emergency intubations outside of theatres identified greater likelihood of first-pass intubation with videolaryngoscopy compared to direct laryngoscopy in the intensive care unit and in less experienced intubators (Arulkumaran et al, 2018). A prospective, multicentre study involving 9694 intubations for cardiac arrest in the emergency department showed use of videolaryngoscope to have a greater first-pass rate than direct laryngoscopy (Okamoto et al, 2019).

Concerning known difficult airways, a systematic review and meta-analysis found videolaryngoscopy to have a greater first-pass rate than direct laryngoscopy (Pieters et al,

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2017). Videolaryngoscope also uses less force (5–13N) than direct laryngoscopy (14–28N), which is important when considering patients with cervical instability and soft tissue injuries (Russell et al, 2012). Failed intubation is more common in obstetric patients than in non-obstetric patients, which is attributed to physiological and anatomical changes during pregnancy as well as human and environmental factors (Kinsella et al, 2015). Accordingly, first-line videolaryngoscopy is recommended to maximise successful first-pass intubation during rapid sequence induction in obstetrics (Delgado et al, 2020).

The economic impact of videolaryngoscopy over direct laryngoscopy was evaluated in a retrospective observational cohort study including 72 284 elective procedures involving intubation in the USA. Average total inpatient costs were significantly lower in patients intubated using videolaryngoscopy, with cost savings from \$1144 to \$5891 per inpatient event. This was attributed to shorter hospital admissions, and a lower likelihood of intensive care unit admission and cardiovascular and respiratory complications. Taken together, the literature indicates a role for videolaryngoscopy in a variety of settings.

Videolaryngoscopy should not be used for all intubations

Arulkumaran et al (2018) highlighted that there was no significant difference between videolaryngoscopy and direct laryngoscopy when used by experienced clinicians, as well as a higher incidence of arterial hypotension when using videolaryngoscopy. Similarly, both Lewis et al (2017) and de Carvalho et al (2022) found no evidence that use of a videolaryngoscope shortens the time required for intubation. A randomised controlled trial of 150 patients undergoing rapid sequence induction in the emergency department showed no difference in first-pass rate between videolaryngoscopy and direct laryngoscopy (Sulser et al, 2016), which was attributed to the significant experience of participating anaesthetic consultants. A review by one institution suggested that videolaryngoscopy has higher rates of pharyngeal wall injury (Greer et al, 2017), although more evidence is needed.

A common pitfall is the correct insertion of a videolaryngoscope blade and visualisation of the glottis but an inability to pass the endotracheal tube. Videolaryngoscopy with a channelled endotracheal tube has been introduced and is an area for future research. Finally, the cost of videolaryngoscopy renders it largely inaccessible to healthcare systems in low- and middle-income countries.

Conclusions

The literature seems to suggest particular benefit for the use of a videolaryngoscope in environments where intubation happens less frequently and in emergency situations, namely the intensive care unit and emergency department. It also supports the use of videolaryngoscopy rather than direct laryngoscopy by less experienced intubators. In patients with difficult airways, including the obstetric population, videolaryngoscopy appears advantageous. Some of this population can be identified using examination and scoring systems but many of these lack appropriate sensitivity and specificity. As such, vigilance against the unexpected difficult airway is encouraged and, in these instances, videolaryngoscopy should be readily available in a timely manner, although this may be less possible in low- and middle-income countries. The current evidence indicates that all intubators should be familiar with both techniques and be able to confidently and capably perform both in the elective and emergency setting.

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