Editorial

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Use of videolaryngoscopy as a teaching tool for novices performing tracheal intubation results in greater first pass success in neonates and infants

Videolaryngoscopes (VLs) have been an important addition to our airway management armamentarium in the past decade. Videolaryngoscopy has revolutionised the way we manage the airway both in adults and paediatrics and become an integral component of airway management guidelines. The All India Difficult Airway Association (AIDAA) guidelines for unanticipated difficult intubation in paediatrics recommend the use of VLs in the first step of the algorithm.[1] Multiple studies have shown VLs to improve the glottic visualisation and success rate of intubation in children.[2-6]

VLs have been recognised as a teaching tool and are helpful in teaching novices the technique of laryngoscopy.[7,8] The magnified view, better illumination and wider viewing angle help in defining, identifying and recognising the anatomy better. The instructor and trainee share the same view on the screen, thereby helping the instructor to guide the trainee better, resulting in a higher success rate during the intubation attempt.[7] Studies have suggested that the knowledge gathered from video intubation translates into a higher success and ease of intubation with direct laryngoscopy (DL).[9,10]

Neonates are a special population with difference in airway anatomy. These include a small-sized mouth and airway, disproportionately large tongue, large head and occiput, larynx placed high in the neck and an omega-shaped epiglottis.[11] The low pulmonary reserve, high oxygen demand, limited visibility and space in the oral cavity make the management of the neonatal airway even more challenging.[11] The success rate with neonatal intubation varies from 64% with experienced providers to 20%–26% with novice providers and residents.[12] The margin of error with neonatal intubations is very narrow, making training extremely difficult. Structured simulation-based training program, mannequin models and use of VLs have been suggested to improve the success rate and training novices and residents in neonatal intubations.[12,13]

During DL in neonates by trainees, the instructor must look over the shoulder or rely on verbal feedback given by the trainee to guide them (conventional instructions). However, when a VL is used, the glottis view can be seen on the screen by both the trainee and the instructor, making it easier to guide the trainee, thereby helping in learning and proficiency with laryngoscopic skills.

In this issue of the journal, Saran *et al*. report a prospective randomised cross-over study in 144 American Society of Anaesthesiologists (ASA) grade I–II patients of day one to six months of age, requiring general anaesthesia with tracheal intubation (TI) performed by 24 anaesthesia trainees.[14] All patients were intubated using a C-MAC™ VL with a Miller blade. The TI was performed either video-assisted (VL group) or using DL with the video screen covered (DL group). The trainees were randomly allocated to two groups, video-assisted instructions followed by conventional instructions or conventional instructions followed by video-assisted instructions. Each trainee performed three intubations with one technique and switched to other technique to perform three more intubations. The primary outcome was the first attempt success rate, and the secondary outcomes were time to best view, time to intubation, ease of intubation and manoeuvres used.

The first attempt intubation success rate was significantly higher in the VL group when compared with the DL group (83.3% vs 44.4%). In addition, the time to obtain the best view, time for intubation and ease of intubation were significantly better in

the VL compared to the DL group, and the need for external laryngeal manipulations and the use of a stylet were higher in the DL group. Though there was no difference in the incidence of complications such as trauma, bradycardia, desaturation or the lowest oxygen saturation reached during intubation, there was a significantly higher incidence of oesophageal intubation in the DL group. The authors concluded that that video-assisted instructions to trainees resulted in high intubation success rate and reduced complications during neonatal and infant intubations, when compared with DL with conventional instructions.

This is a well-designed and well-conducted study in a large number of patients. The strength of the study is the randomised cross-over design which helps nullify the effect of the differences in skills among the anaesthesiologist. The study has a few limitations. First, the trainees were not blinded so there can always be a potential for bias; however, this is not possible to achieve in such a study. Second, only the C-MAC™ VL was tested, and therefore the results may not apply to other VLs. Third, each trainee had a limited number of intubation attempts with each method, and hence the transferability of skill could not be assessed. Fourth, patients with anticipated difficult airway were excluded, and thus the effect on this population could not be assessed.

Though the study was conducted in a mixed group of neonates and infants, a majority of the patients were neonates. A recent Cochrane review[15] comparing VL versus DL for TI in neonates included three studies[16-18] of trainees performing neonatal intubations, highlighting the usefulness of VL as a teaching tool. This suggested that VL increases the first attempt of intubation success compared with DL; however, there was no difference in time to intubation, number of attempts for intubation, oxygen desaturation, and airway trauma. Residents reached competency faster with VL (second intubation) compared with the DL (seventh intubation).[16]

A study in neonatal mannequins compared using different education methods among residents for training with DL and VL. Although the intubation time was longer and the success rate was lower with VL, the residents felt that VL is an important educational tool.[19] Increased success of TI by paediatric residents was seen in a simulation-based randomised study comparing VL to DL in standard neonatal mannequins.[13] Both these studies, however, were conducted in manikins.

The authors used the C-MAC™ VL for all the intubations. Hackell *et al*. in a case series reported successful intubation of seven infants including two preterm neonates with CMAC™ VL after failure of DL.[20] Sinha *et al*. did a retrospective study and found that CMAC™ VL Miller blade size 0 is suitable for endotracheal intubation in preterm and previously preterm infants.[21] The difficulty in the insertion of the endotracheal tube (ET) with CMAC™ in neonates can be circumvented using the groove of the straight blade as the ET track rather than insertion from the corner of the mouth.[5] Most studies in neonates and children using both patients and mannequins[4,15,19,22-24] report a longer time to intubation with VL. Saran *et al*., however, found short time for intubation with VL.[14] Similar intubation time and success rates were achieved in neonates and infants with the GlideScope Cobalt® VL as with DL among experienced anaesthesiologists.[6]

The results of this study further add to the recent literature supporting the superiority of VL over DL during TI performed by trainees under supervision in neonates and infants. The high oesophageal intubation rates in the DL group when performed by novices highlight the importance of video-assisted instructions to the trainees in avoiding this complication.

Oesophageal intubation can not only be avoided but also picked up immediately by the instructor having a good screen view of the larynx when the trainee is performing TI using a VL. The high intubation success rate and reduced complications with VL use justify its use for TI in this vulnerable population, though the cost may be prohibitive and availability limited. The magnified view of the larynx available to instructor and the trainee makes it easier to provide guidance during intubation, which can help increase the intubation success and avoid complications, making VL an excellent teaching tool for neonates and infants.

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