Intubation of child and infant manikins during resuscitation: does the Venner A.P. Advance video laryngoscope improve the performance of nurses?

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To the Editor: Direct laryngoscopy is considered the gold standard for intubation of children and adults. Gerritse and colleagues found that child intubation in prehospital care is inadequate because it is only 63.4% to 77% effective.[1] Ragg was developing Engelhard and Weiss's algorithm for the treatment of difficult airways in children and suggested the possibility of using video laryngoscopes in "plan A" as a method of intubation.[2,3]

We hypothesised that the Venner A.P. Advance video laryngoscope (VAVL) could be an alternative to standard direct laryngoscopy during intubation of paediatric manikins when performing cardiopulmonary resuscitation (CPR). We compared the effectiveness of the VAVL and the Miller laryngoscope (MIL) in child and infant resuscitation with and without chest compression.

Table 1. Time to and success of intubation

Intubation	Mean time to intubate, seconds (SD)	Tracheal intubation attempts (%)			
		1st	2nd	3rd	Failed
Infant					
VAVL	21.5 (14.3)	95.8%	100%	100%	0%
MIL	32.6 (11.6)	50.5%	72.6%	75.8%	24.2%
Child					
VAVL	22.9 (10.3)	97.9%	100%	100%	0%
MIL	31.6 (13.5)	55.8%	74.7%	78.9%	21.1%

VAVL = Venner A.P. advance video laryngoscope. MIL = Miller laryngoscope.

Our study was approved by the Institutional Review Board of the International Institute of Rescue Research and Education (approval 10.2014.11.33) and registered at the ClinicalTrials register (NCT02277418). It was a randomised nonblind crossover simulation trial which took place in November 2014. One hundred and twelve nurses who had more than 1 year's experience in emergency departments or emergency medical services participated. No participant had prior experience with VAVL. Voluntary informed consent was obtained from each participant before the study and they had 1 hour's training with the VAVL and the MIL before the trial. After watching demonstration videos, participants were allowed 30 minutes to practise until they could use each device correctly.

After the training session, each participant started their intubations using the VAVL and the MIL in infant and child scenarios in a randomised order. The order of interventions was randomised for each participant by a computer program (Research Randomizer [www.randomizer.org]). Two tracheal intubation devices were used: the VAVL (Venner Medical) and the MIL (Blade no. 2, Mercury Medical). In the child intubation scenario we used a PediaSIM CPR training manikin (CAE Healthcare), and a Lucas 2 device (Jolife AB) was used for chest compression. In the infant endotracheal intubation (ETI) scenario we used a Laerdal ALS Baby (Laerdal) and chest compression was performed using the two-thumbs technique, according to European Resuscitation Council guidelines.[4]

The primary end point of the study was defined as the time from the insertion of a device blade into the manikin's mouth to the first manual ventilation of the lungs. The secondary end point was the success rate of ETI. If an examinee failed at all attempts, the case was excluded from the time calculations. To assess subjective opinions about the difficulty of the procedure, participants were asked to report the ease with which vocal cords could be observed using Cormack–Lehane grading (grade 1–4).[5]

In the intubation during infant resuscitation scenario, there was a significant difference between the VAVL and the MIL in time to successful intubation (21.5 seconds v 32.6 seconds, $P < 0.001$), success of the first intubation attempt (95.5% v 50.9%, $P < 0.001$), overall success rate (100% v 75.9%, $P < 0.001$) (Table 1). In the child intubation scenario, there was a significant difference in success of the first intubation attempt (97.3% v 55.4%, $P < 0.001$), overall success rate (100% v 78.6%, $P < 0.001$) and time to ETI (22.9 seconds v 31.6 seconds, $P < 0.001$). The Cormack–Lehane glottic view scores were better with the VAVL than the MIL in the infant ETI scenario (mean score, 1.3 points v 2 points, $P = 0.056$) and in the child ETI scenario (mean score, 1.4 points v 2.5 points, $P < 0.001$).

In our simulated child and infant manikin study, intubation times with the VAVL were shorter than with the MIL, with a higher effectiveness at first intubation attempts and a higher overall effectiveness of ETI. The nurses achieved a better glottic view with the VAVL than the MIL. More studies are required to confirm these results.

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Central venous pressure is a stopping rule, not a target of fluid resuscitation

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To the Editor: Your editorial "Central venous pressure is a stopping rule, not a target of fluid resuscitation"[1] usefully described the limitations of using the central venous pressure (CVP) as a marker of the volume state, following Guyton's approach, with its focus on the venous return (VR). Filling the patient raises the mean systemic filling pressure (Pms) and, provided the right atrial pressure does not rise in parallel, the VR and (all other things being equal) the cardiac output will rise. When, however, the CVP and Pms rise in parallel, further filling may be a futile exercise.

It is surprising that your editorial did not recognise Parkin's pioneering Australian research in this field.[2] In the 1980s he developed the first practical technique for measuring the Pms without stopping the heart, and described heart performance (HP) as:

$$HP = (Pms - CVP)/Pms$$

It can be seen that the value of HP will decrease to 0 as Pms and CVP approach each other. This provides a quantitative measure of the stopping rule — the subject of your editorial. Your readers may be interested in his article "Therapeutic control of the circulation" which addresses these issues and more in some detail.[3]

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