

# Airway management with cervical spine immobilisation: a comparison between the Macintosh laryngoscope, Truview Evo2 and Totaltrack VLM - a manikin study

Co-authors: Dawid Aleksandrowicz<sup>1</sup>, Tomasz Gaszyński<sup>2</sup> Contact: daleks@doctors.org.uk

<sup>1</sup> London North West Healthcare NHS Trust, London, UK, <sup>2</sup> Medical University of Łódź, Poland

## Introduction

Airway management plays an important role in the care of trauma patients with suspected cervical spine injury. During early treatment it is essential to follow a reliable algorithm, the most widely recognised and accepted being the AcBCDE (Ac - Airway and cervical spine immobilisation, B - Breathing, C - Circulation, D - Disability, E - Exposure).<sup>1</sup> It emphasises simultaneous airway control and cervical spine protection. Acquiring both of these skills form an essential part of paramedic education. The aim of this study was to evaluate 3 different airway devices during intubation of a manikin with reduced cervical spine mobility.

## Methods

Forty third year emergency medicine (paramedic) students at the Medical University of Łódź agreed to participate in the study (F=26, M=14). They had no prior intubation skills. Each student used all 3 airway devices in random order and were limited to 3 intubation attempts per device. Time required to obtain a laryngeal inlet view as well as successful ventilation were recorded. Cormack-Lehane laryngoscopic view and incisor damage were also assessed.<sup>2</sup> The efficacy of intubation was measured by success rates at 1st attempt as well as overall success rate per airway device.



## Results

The shortest mean time required to obtain laryngeal inlet view was with the Macintosh laryngoscope at 13.4 seconds ( $\pm 2.14$ ). Truview Evo2 had the shortest successful ventilation time at 35.7 seconds ( $\pm 9.27$ ). There were 3 failed intubation attempts in the Macintosh group and the use of this device had the highest incidence of incisor damage (10 in 40 intubations, 25%). The best view of the entry to the larynx was obtained with the Totaltrack VLM device.

**Table 1a. Time required to obtain laryngeal inlet view**

Time [s]	Intubating Device		
	Macintosh	Truview Evo2	Totaltrack VLM
Min	3.5	4.0	4.6
Max	30.2	52.5	68.0
Mean(SD)	13.4(2.14)	14.2(2.36)	21.5(6.2)

**Table 1b. Time from beginning of intubation to successful ventilation**

Time [s]	Intubating Device		
	Macintosh	Truview Evo2	Totaltrack VLM
Min	12.8	17.0	13.8
Max	90.0	78.3	107.2
Mean(SD)	39.1(4.57)	35.7(9.27)	52.8(11.1)

**Table 2. Efficacy of intubation**

Number of attempts	Intubating Device		
	Macintosh	Truview Evo2	Totaltrack VLM
1	80%	82%	88%
2	82%	100%	100%
3	93%	-	-

**Table 3. The entry-to-the-larynx view**

Cormack-Lehane Classification	Intubating Device		
	Macintosh	Truview Evo2	Totaltrack VLM
1	11%	29%	59%
2	65%	59%	23%
3	24%	12%	18%
4	0%	0%	0%

**Table 4. Incisor damage during intubation**

Intubating Device	The rate of incisor damage
Macintosh	25%
Truview Evo2	12%
Totaltrack VLM	5%

## Discussion

Despite some criticism in the literature, intubation with simultaneous manual in-line stabilisation (MILS) of the cervical spine remains the gold standard during the management of trauma patients.<sup>3 4</sup> This novel study compares three different devices in students with no previous intubation experience. The new airway devices were both found not to shorten the time to laryngeal inlet visualisation as well as to successful intubation and ventilation. They were found to have a 100% success rate, to cause less teeth damage and they enabled better visualisation of the laryngeal inlet.

## Conclusion

The new intubation devices may be an alternative to the classic Macintosh laryngoscope for intubation of trauma patients with suspected injury to the cervical spine.

## References

- Aleksandrowicz D, Gaszyński W, Gaszyński T. Wytyczne dotyczące udrażniania dróg oddechowych w warunkach pozaszpitalnych u chorych po urazach. Anest Ratow 2013; 7: 233-243.
- Cormack RS, Lehane J. Difficult intubation in obstetrics. Anaesthesia 1984; 39: 1105-1111.
- Wang HE, Yealy DM. Out-of-hospital endotracheal intubation: where are we? Ann Emerg Med 2006; 47: 532-541.
- Manoach S, Paladino L. Laryngoscopy force, visualization, and intubation failure in acute trauma: should we modify the practice of manual in-line stabilization? Anesthesiology 2009; 110: 6-7.

# Summary

Truview Evo2 and Totaltrack VLM may be a good alternative to the Macintosh laryngoscope:

- Better visualisation of the entry to the larynx
- Minimised risk of incisor damage during intubation
- Improved rate of successful intubation