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SCIENTIFIC ARTICLE

The role of videolaryngoscope in endotracheal intubation training programs

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KEYWORDS

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Paramedic;
Emergency staff

Abstract

Background: Macintosh laryngoscopes are widely used for endotracheal intubation training of medical students and paramedics whereas there are studies in the literature that supports videolaryngoscopes are superior in endotracheal intubation training. Our aim is to compare the endotracheal intubation time and success rates of videolaryngoscopes and Macintosh laryngoscopes during endotracheal intubation training and to determine the endotracheal intubation performance of the students when they have to use an endotracheal intubation device other than they have used during their education.

Methods: Endotracheal intubation was performed on a human manikin owing a standard respiratory tract by Macintosh laryngoscopes and C-Mac[®] videolaryngoscope (Karl Storz, Tuttlingen, Germany). Eighty paramedic students were randomly allocated to four groups. At the first week of the study 10 endotracheal intubation trials were performed where, Group-MM and Group-MV used Macintosh laryngoscopes; Group-VV and Group-VM used videolaryngoscopes. Four weeks later all groups performed another 10 endotracheal intubation trial where Macintosh laryngoscopes was used in Group-MM and Group-VM and videolaryngoscopes used in Group-VV and Group-MV.

Results: Success rates increased in the last 10 endotracheal intubation attempt in groups MM, VV and MV ($p=0.011$; $p=0.021$, $p=0.290$ respectively) whereas a decrease was observed in group-VM ($p=0.008$).

Conclusions: The success rate of endotracheal intubation decreases in paramedic students who used VL during endotracheal intubation education and had to use Macintosh laryngoscopes later. Therefore we believe that solely videolaryngoscopes is not enough in endotracheal intubation training programs.

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PALAVRAS-CHAVE

Laringoscópios
Macintosh;
Videolaringoscópios;
Intubação
endotraqueal;
Educação;
Reanimação
cardiopulmonar;
Anestesiologistas;
Paramédico;
Equipe de
emergência

O papel do videolaringoscópio em programas de treinamento de intubação endotraqueal

Resumo

Justificativa: Os laringoscópios Macintosh são amplamente utilizados para o treinamento de estudantes de medicina e paramédicos em intubação endotraqueal; contudo, há mais estudos na literatura que apoiam os videolaringoscópios no treinamento de intubação endotraqueal. Nosso objetivo foi comparar o tempo de intubação endotraqueal e as taxas de sucesso de videolaringoscópios e laringoscópios Macintosh durante o treinamento de intubação endotraqueal e determinar o desempenho da intubação endotraqueal dos alunos quando precisam usar um dispositivo de intubação endotraqueal diferente daquele que usam durante seu treinamento. **Métodos:** A intubação endotraqueal foi realizada em modelo humano com trato respiratório padrão usando laringoscópios Macintosh e videolaringoscópio C-Mac® (Karl Storz, Tuttlingen, Alemanha). Oitenta estudantes paramédicos foram randomicamente alocados em quatro grupos. Na primeira semana do estudo, 10 tentativas de intubação endotraqueal foram realizadas, nas quais o Grupo-MM e Grupo-MV utilizaram laringoscópios Macintosh e o Grupo-VV e Grupo-VM utilizaram videolaringoscópios. Quatro semanas depois, todos os grupos realizaram mais 10 tentativas de intubação endotraqueal, nas quais laringoscópios Macintosh foram utilizados pelo Grupo-MM e Grupo-VM e videolaringoscópios pelo Grupo VV e Grupo-MV.

Resultados: As taxas de sucesso aumentaram nas últimas 10 tentativas de intubação endotraqueal nos grupos MM, VV e MV ($p=0,011$; $p=0,021$, $p=0,290$, respectivamente), enquanto uma redução foi observada no Grupo-VM ($p=0,008$).

Conclusões: A taxa de sucesso da intubação endotraqueal diminuiu nos estudantes paramédicos que utilizaram VL durante o treinamento em intubação endotraqueal e precisaram usar laringoscópios Macintosh posteriormente. Portanto, acreditamos que o uso isolado de videolaringoscópios não é suficiente em programas de treinamento de intubação endotraqueal.

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Introduction

Macintosh laryngoscopes (ML) is the standard equipment worldwide for both the anesthesiologists and emergency staff. In the last decades to overcome visualization problems in difficult airway cases, Videolaryngoscopes (VL) are developed by integrating conventional laryngoscopes to camera systems.^{1,2} There are several types of videolaryngoscopes available by many manufacturers today,^{3,4} but unfortunately it has not been widespread in all emergency kits yet.⁵

In the recent resuscitation guideline published in 2015 states that emergency staff must do Endotracheal Intubation (ETI) without interrupting chest compressions during Cardiopulmonary Resuscitation (CPR) otherwise the success rate of CPR will decrease.^{6,7} Assertion of unexperienced staff for ETI may both frequently interrupt chest compressions and may lead to lethal complications due to unsuccessful intubation.

The paramedics who have a limited time to secure airway before transportation of patient to hospital must become experts of ETI and must perform it very fast. Paramedics should learn the equipment that are used for successful and fast ETI and should perform adequate number of ETI trials.⁸ Simulation workout is advised for the team to preserve their ETI ability.⁹ Beginners can start with human models during ETI training.^{10,11} The advantage of VL for the students during ETI education is that they can see both the upper airway

anatomical landmarks and the maneuvers on the screen at the same time.⁴ Some recent studies suggests ETI performance time is shorter with a higher success rate with VL compared to ML which primes VL for ETI training.^{12,13}

Primary goal of our study is to detect the effect of VL and ML on ETI timing. Secondary goals of our study are to detect the ETI success rate and ETI performance of the students when they have to use a laryngoscope other than they used during their ETI training program.

Materials and methods

After receiving approval from Ahi Evran University Ethical Committee, 80 paramedic students, who have not experienced ETI before, studying at Ahi Evran University Health Services Vocational High Scholl Emergency and First Aid Program, were enrolled into the study after signing their written informed consents. Theoretical ETI education was thought and ETI was performed by the trainer on a human manikin. In this study, GD/J55 Electronic Tracheal Intubation Simulator (General Doctor, PRC) were used as the manikin type.

Effect size was calculated from the study by Kim et al.¹⁴ Seventy-six participants ($n_1=19$, $n_2=19$, $n_3=19$, $n_4=19$) was needed for an effect size of $f=0.4$, $\beta=0.20$ with a statistical significance of $\alpha=0.05$. In the current study sample

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