

Laryngeal mask vs orotraqueal tube in pre-hospital care - hospital outcomes

Máscara laríngea vs tubo orotraqueal no atendimento pré-hospitalar - desfechos hospitalares

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RESUMO | INTRODUÇÃO: Em situações emergenciais, se torna crucial o manejo adequado das vias aéreas, pois falhas neste processo contribuem consideravelmente para piores desfechos clínicos. **OBJETIVO:** comparar a utilização do tubo endotraqueal e da máscara laríngea no atendimento pré-hospitalar em relação aos desfechos hospitalares tais como tempo de ventilação mecânica, tempo de permanência na UTI e taxa de óbito. **MATERIAIS E MÉTODOS:** estudo observacional retrospectivo, desenvolvido no Hospital Santa Cruz, Rio Grande do Sul. Foram incluídos pacientes maiores de 18 anos, de ambos os sexos, que foram atendidos pelo SAMU durante o atendimento pré-hospitalar, e após o encaminhados para o Pronto Atendimento ou Ambulatório do Hospital Santa Cruz. As variáveis analisadas foram extraídas dos prontuários médicos dos indivíduos selecionados. **RESULTADOS:** foram analisados 27 indivíduos, maioria do sexo masculino, com média de idade de 46,5±22 anos, sendo a causa predominante do atendimento pré-hospitalar o politraumatismo. Ao compararmos os pacientes que utilizaram tubo endotraqueal com os que utilizaram máscara laríngea, não foram observadas diferenças significativas em relação ao tempo de atendimento pré-hospitalar. Na fase intra-hospitalar, observamos diferença significativa em relação ao tempo de ventilação mecânica e tempo de internação na UTI, não sendo o mesmo observado em relação a taxa de óbito. **CONCLUSÃO:** Os pacientes submetidos a utilização da máscara laríngea no atendimento pré-hospitalar apresentaram menor tempo de ventilação mecânica e menor tempo de internação na UTI, em relação aos pacientes intubados com tubo endotraqueal.

PALAVRAS-CHAVE: Serviços médicos de emergência. Intubação intratraqueal. Máscaras laríngeas. Respiração artificial. Avaliação de resultados (cuidados de saúde).

ABSTRACT | INTRODUCTION: In emergency situations, proper management of the airways becomes crucial, because flaws in this process contribute considerably to worse clinical outcomes. **OBJECTIVE:** To compare the use of the endotracheal tube and laryngeal mask in prehospital care in relation to hospital outcomes such as mechanical ventilation time, length of stay in the ICU and death rate. **MATERIALS AND METHODS:** a retrospective observational study, developed in a Hospital Santa Cruz, Rio Grande do Sul. Patient records were used from the Emergency Mobile Service (SAMU) of Santa Cruz do Sul, sent to the Emergency Department or Ambulatory of Santa Cruz Hospital. **RESULTS:** 27 individuals, mostly males, with an average age of 46.5 ± 22 years, were analyzed, being the predominant cause of pre-hospital care the polytrauma. When comparing the patients who used the endotracheal tube with those who used laryngeal mask, no significant differences were observed in relation to the time of prehospital care. In the in-hospital phase, we observed a significant difference in relation to the time of mechanical ventilation and length of stay in the ICU, and the same was not observed in relation to the death rate. **CONCLUSION:** The patients submitted to the use of the laryngeal mask in the pre-hospital care presented a shorter time of mechanical ventilation and a shorter time of hospitalization in the ICU than the patients intubated with an endotracheal tube.

KEYWORDS: Emergency medical services. Intratracheal intubation. Laryngeal masks. Artificial respiration. Evaluation of results (health care).

Introduction

Prehospital care is a modality of care that aims to assist victims early and provide adequate transportation to an integrated health service, aiming to reduce the worsening of injuries and, consequently, the levels of morbidity and mortality¹.

The main benefits of prehospital care are realized during the second phase of trauma, when care can limit or disrupt the cascade of events that may lead to death or disability throughout life. Without this care, people who could survive their injuries could die on the spot or on their way to hospital. Most deaths within hours of injury result from airway compromise, respiratory failure, as well as uncontrolled bleeding².

In this context, then, proper airway management becomes crucial, as failures in this process contribute considerably to worse clinical outcomes³. There are several recommendations in cases of endotracheal intubation failure, including the use of supraglottic devices, such as the laryngeal mask, which are a good alternative and are the first line of choice in these situations^{4,5}.

The laryngeal mask consists of a tube similar to the endotracheal tube, with an inflatable mask at the distal end, suitable for adaptation to the posterior pharynx, sealing the region of the base of the tongue and the laryngeal opening⁶⁻⁹. The ease of handling of this device makes it useful for establishing ventilation in at-risk patients, especially among professionals who are poorly trained for endotracheal intubation^{6, 9-12}.

Thus, the aim of this study was to compare outcomes such as mechanical ventilation time, length of hospital stay, and death among patients who used endotracheal tube and laryngeal mask during prehospital care.

Materials and methods

This is a retrospective observational study, developed at Santa Cruz Hospital in Santa Cruz / RS. We reviewed the medical records of patients from the Santa Cruz do Sul Mobile Emergency Care Service (SAMU) who required tracheal intubation and were referred to this hospital from March 2014 to December 2015.

The present study was approved by the Research Ethics Committee of the Centro Universitário Metodista (IPA) number 1.374.978 (CAAE 49630315.3.0000.5308).

Patients over 18 years of age, of both sexes, who were treated by SAMU and intubated during prehospital care, either with endotracheal tube or laryngeal mask, were included. Patients who entered the hospital with previously observed death were excluded.

It was evaluated from the medical records of the prehospital care the cause of the care, the time of the care and the device used for tracheal intubation. During the period of hospitalization we evaluated the permanence of these patients in the emergency and / or intensive care unit (ICU), time of mechanical ventilation, complications during hospitalization, hospital transfer and mortality. All continuous data were described as mean and standard deviation or median (minimum - maximum) and categorical as absolute frequency and percentage. Normality was measured by the Shapiro-Wilk test. The comparison between the groups of patients who were intubated with the endotracheal tube and the patients who used the laryngeal mask was performed using the Mann-Whitney Student's t-test. All data were stored and analyzed using the Statistical Package for Social Sciences (SPSS) for Windows 20.0 software, adopting a significance level of 5%.

Results

During the study period, 27 subjects met the study eligibility criteria. The average age was 46.5 ± 22 years, there was a male prevalence (67.8%) and the most observed prehospital care was polytrauma (Table 1).

The patients intubated with the laryngeal mask totaled 13, the prehospital care time was 24.14 ± 8.19 minutes. The length of ICU stay and mechanical ventilation were 3.5 (1 - 11) days and 1 (1 - 5) days, respectively. Of these, seven were referred to the ICU, with two evolving to death. In relation to the others, one individual was admitted to the ward, two were transferred to another hospital and three died.

Fourteen patients were intubated with endotracheal tube in the prehospital care, the time of this care was 29.13 ± 15.48 minutes. The length of stay in the ICU and the time of mechanical ventilation were 7 (3 - 18) days and 5 (1 - 12) days, respectively. Of this group, eight patients were referred to the ICU, of which three died. The remaining patients were admitted to the hospital emergency room, with four of them evolving to death. (Table 2).

When comparing individuals who used laryngeal mask and endotracheal tube for tracheal intubation, no significant differences were observed regarding the length of prehospital care. In the hospital care phase, we observed shorter mechanical ventilation time ($p = 0.03$) and shorter ICU stay ($p = 0.004$) in patients undergoing laryngeal mask intubation. Regarding the death rate, no significant difference was observed between the groups (Table 2).

Table 1. Characteristics of the patients included in the study (n = 27)

Variables	Results
Age, years	46,5 ± 22
Gender	
Male	19 (67,8%)
Female	8 (32,1%)
Cause of Prehospital Care	
Polytrauma	10 (35,7%)
Neurological	5 (17,8%)
Others	12 (42,8%)
Prehospital care time, min	13,5 ± 5,4
Artificial airway used	
Laryngeal Mask	13 (46,4%)
Endotracheal tube	14 (53,6%)

Data expressed as means ± standard deviation and n (%). Min - minutes.

Table 2. Comparison between intubated patients with laryngeal mask and endotracheal tube

Variables	Endotracheal tube		P
	Laringea Mask		
Age, years	44,54 ± 24,31	47,29 ± 20,11	0,652
Gender, n (%)			
Male	10 (77,5)	9 (64,3)	
Female	3 (22,5)	5 (35,7)	
Cause of care, n (%)			
Polytrauma	6 (46,1)	5 (35,7)	
ARF	2 (15,4)	3 (21,4)	
Firearm injury	2 (15,4)	2 (14,3)	
Cardiopulmonary arrest	1 (7,7)	4 (28,6)	
Stroke	1 (7,7)	-	
FAB	1 (7,7)	-	
Prehospital care time, min	24,14 ± 8,19	29,13 ± 15,48	0,141
Length of ICU stay, days	4,57 ± 4,27	8,28 ± 4,82	0,004
Mechanical ventilation time, days	1,57 ± 1,40	5,14 ± 3,18	0,03
Complications, n (%)			
Respiratory infection	2 (15,4)	4 (28,6)	
Pharyngeal Injury	1 (7,7)	-	
Hospital transfer, n (%)	2 (15,4)	0	
Admission to the ward, n (%)	1 (7,7)	2 (14,3)	
Without complications	2(15,4)	1 (7,1)	
Death, n (%)	5 (38,5)	7 (50,0)	

Data expressed as means ± standard deviation and n (%). Min - minutes.

Discussion

The main finding of this study was the fact that patients intubated with the laryngeal mask during prehospital care had shorter mechanical ventilation time and length of ICU stay in the hospital stay. However, these results presented by individuals intubated with the laryngeal mask did not significantly influence their hard outcome, and did not present a significant death rate when compared to the endotracheal tube intubated group. This fact is in line with another study¹³, which found that, although supraglottic devices provided shorter tracheal intubation time, they did not influence a better survival rate in the two hours of hospital admission compared to patients intubated with the tube endotracheal.

Wang et al.¹⁴ compared the use of the endotracheal tube and laryngeal mask during prehospital care of patients with cardiopulmonary arrest (CRP). Survival rates at hospital discharge and within 24 hours after hospital discharge, as well as pulmonary and airway complications at hospital discharge, were assessed in their study. The authors found better results regarding endotracheal tube use in relation to all variables analyzed.

In another study, Kang et al.¹⁵ compared the use of endotracheal tube and supraglottic devices where they observed that survival was higher in individuals who were intubated with the use of endotracheal tube. Similar results were also found by Benoit et al.¹⁶, who observed in their meta-analysis that patients intubated with endotracheal tube had better survival and neurological condition at the time of hospital admission. In the present study, we analyzed the death rate during the hospital care phase and did not observe significant differences between the groups.

In contrast, Kajino et al.¹¹ found no significant differences between the use of endotracheal tube and supraglottic devices in prehospital care when analyzing survival in the first month after care, as well as neurological outcomes. However, they also reported that early airway management is associated with better outcomes. This fact corroborates our findings, considering that the length of prehospital

care was shorter in individuals undergoing tracheal intubation with the laryngeal mask. Although this variable did not present significant difference, it contributed to better hospital outcomes such as shorter mechanical ventilation time and shorter ICU stay, as already mentioned.

An important factor to note is that the efficacy of the endotracheal tube is not yet clear, as the training level of emergency care teams may influence the outcome of the intubation process¹³. Wang et al.¹⁶ evaluated in another study the relationship between professional experience in the process of tracheal intubation and survival after prehospital care of various causes. The authors noted that the team's experience in the tracheal intubation process is associated with longer survival after prehospital care in patients with cardiac arrest. The same was not observed in polytrauma patients, which is the predominant profile of the present study. For professionals with little experience in airway management, supraglottic devices are recommended for tracheal intubation procedures¹⁷.

As in our study, male prevalence in the profile of patients treated by emergency mobile medical services, region-specific sociocultural factors may justify the distinction of morbidity between men and women¹⁹⁻²³. In this study, we also found a predominance of causes related to trauma in the care provided, which contrasts with the other studies that address this theme^{11,14,15,16}.

Becker et al.²⁴ observed in their study that higher mortality rates were associated with patients categorized as high priority in emergency hospital screening. Therefore, we believe that the severity of the individual at the time of prehospital care may be one of the main factors contributing to hard outcomes, regardless of the device used for airway management. However, in the present study the severity of the patients was not assessed.

Despite the benefits observed with the use of the laryngeal mask in emergency care, complications associated with its use cannot be ruled out. Benhard et al.²⁵, who evaluated eight case reports, observed incorrect placement of the instrument in

the trachea, dislocation and/or incorrect placement of the pharynx mask, tongue and pharyngeal edema, with subsequent laryngoscopy difficulty, inadequate ventilation due to unrecognized airway obstruction and hypertensive pneumothorax. The aforementioned changes were not observed in our study. However, it is noteworthy that a constant training of health professionals working in the prehospital area is essential to refine the expertise of care, regardless of the devices and techniques used during them. This study has strengths, such as the comparison of two different pre-hospital intubation tools and the outcome of using each one. The limitation of this study is related to the sample size and the fact that we did not use any severity assessment instrument in the studied population.

Conclusion

The use of laryngeal mask during prehospital care showed positive outcomes on mechanical ventilation time and ICU stay in the population studied.

Author Contributions

Prestes RB participated in the conception, design, collection of research data, interpretation of results and writing of the scientific article. Fontela PC participated in the conception, design, and interpretation of the results. Coutinho WM participated in the conception, design and writing. Forgiarini Junior LA participated in the conception, design, statistical analysis and interpretation of results.

Conflicts of interest

No financial, legal or political conflict involving third parties (government, companies and private foundations, etc.) has been declared for any aspect of the work submitted (including but not limited to grants and funding, advisory board membership, study design, preparation manuscript, statistical analysis, etc.).

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