ELSEVIER

Resuscitation 66 (2005) 21–25

RESUSCITATION

www.elsevier.com/locate/resuscitation

The use of laryngeal tube by nurses in out-of-hospital emergencies: Preliminary experience☆

Fulvio Kette*, Ingrid Reffo, Giuseppina Giordani, Fulvio Buzzi, Vilma Borean, Regina Cimarosti, Alberto Codiglia, Claudia Hattinger, Alessandra Mongiat, Sara Tararan

Emergency Department, ASS 6 "Friuli Occidentale", S. Vito al Tagliamento Hospital, 33078 S. Vito al Tagliamento (PN), Italy

Received 23 July 2004; received in revised form 28 December 2004; accepted 28 December 2004

Abstract

In out-of-hospital emergencies, including cardiac arrest, securing the airway and providing adequate lung ventilation are of paramount importance. Tracheal intubation is perceived as the gold standard technique and it is recommended by International Guidelines, but non skilled personnel often find the procedure difficult to achieve. Supraglottic devices are a good alternative in these situations, because they are superior to a bag-valve-mask for lung ventilation and offer better protection from aspiration.

We have tested the laryngeal tube (LT) in out-of-hospital emergencies by minimally trained nurses. The LT was placed in 30 patients in cardiac arrest. LT insertion was successful within two attempts in 90% of patients, and ventilation was adequate in 80% of cases. No regurgitation occurred in any patient. The laryngeal tube remained in the correct position throughout resuscitation attempts in 93.3% of cases, while in two patients (6.6%) it became dislodged.

In a subjective evaluation of the manoeuvre by nurses (ease of insertion, adequacy of ventilation, protection from aspiration), 86.7% of them expressed a positive opinion.

The laryngeal tube appeared to be a reliable device for nurses to manage the airway in out-of-hospital emergencies.

Keywords: Out-of-hospital CPR; Airway devices; Ventilation; Paramedic; Laryngeal tube

1. Introduction

In emergency situations, particularly when the level of consciousness is compromised, securing the airway is of paramount importance to ensure adequate ventilation [1,2]. Hypoxia following an obstructed airway leads to increased morbidity and mortality in both trauma and non traumatic cases [1,3].

Tracheal intubation is perceived as the overall gold standard for securing the airway because of near complete protection from aspiration [1]. However, this manoeuvre requires skill and continuous training and practice [4–6]. It is difficult to achieve without sedation and muscle relaxation unless the patient is deeply comatose. As nurses are often not allowed to use drugs, unless under strict medical supervision, tracheal intubation is not a routine intervention [1,7]. Indeed, the success rate of tracheal intubation in the field may not be higher than 50% when the manoeuvre is performed by inexperienced personnel [8–10], unless they have specific long term training and experience [1,11].

Alternative techniques to tracheal intubation have been adopted over the years. Many have been used by inexperienced personnel showing that airway patency can be safely achieved with supraglottic devices [4–8,12–17].

These include devices which are placed without the use of a laryngoscope. The cuffed oro-pharingeal airway (COPA), the esophageal obturator, the laryngeal mask airway (LMA) and its modifications, the intubating laryngeal mask airway (Fast Trach), the ProSeal laryngeal mask, are the most frequently used devices [4–7,15–20]. Their shape and structure allow blind placement into the desired position.

☆ A Spanish and Portuguese translated version of the Abstract and Keywords of this article appears at 10.1016/j.resuscitation.2004.12.023.

* Corresponding author. Tel.: +39 0434 841305; fax: +39 0434 841330.
E-mail address: fulvio.kette@ass6.sanita.fvg.it (F. Kette).

0300-9572/$ – see front matter © 2005 Published by Elsevier Ireland Ltd.
doi:10.1016/j.resuscitation.2004.12.023

The majority of these devices have been tested previously in the operating room to quantify their effectiveness in terms of ease of insertion, ventilation efficiency, possibility of aspiration and protection from regurgitation [18–20]. Subsequently, they have been applied in the out-of-hospital practice [5,11,12].

The laryngeal tube (LT) is a more recent device designed to be easily placed and to ensure the patency of the airway together with adequate ventilation. Preliminary reports of experience have shown that it is safe and delivers effective ventilation with a good airway seal that prevents aspiration [12,23–30].

The device has been used by nurses and inexperienced personnel, but most of the data refer to simulations and manikin tests; limited experience exist on the use of the LT in out-of-hospital emergencies [12,14,31–33]. When compared with the laryngeal mask airway or the ProSeal laryngeal mask, the LT has been demonstrated to be at least as easy to use and as effective as LMA, with a good success rate of insertion and protection from regurgitation [19–21,24,34,35].

Since in our country out-of-hospital emergency interventions are mostly performed by nurses rather than by physicians, we undertook this study to assess the ease of use and safety of the LT in out-of-hospital emergencies by minimally trained nurses.

2. Material and methods

Our department covers an area of approximately 2270 km^2 and ranges from countryside to mountain areas. The population served by the emergency system is about 90.000 people. The distance from the mountain hospital to the most remote villages may require up to 60 min travel by ambulance. Due to the long distances and the absence of doctors in the ambulances, we decided to attempt to make a step forward in the treatment of out-of-hospital emergencies by training the nurses in the use of a supraglottic device for the maintenance of airway patency when needed. Among the devices available, we chose the laryngeal tube (LT® VBM Rüsch srl, Milano, Italy) as its use appeared simpler than tracheal intubation for non medical personnel, and needed only brief training.

The study was approved by our Institutional Ethical Committee.

A two hour training period was used to illustrate the device and to attempt positioning of the device in a manikin. The training was repeated twice. The technique of insertion, cuff inflation and size selection were taught according to the manufacturer's instructions [22–25]. Ventilation was firstly assisted by face-mask for at least 30 s before attempting LT insertion. In conformity with current guidelines, stable dental prostheses were left in place during mask ventilation for a better seal. These, however, were immediately removed prior to LT placement.

Three sizes of the LT were placed in each ambulance and the personnel were instructed to attempt to use it in all cases in which ventilatory support was required.

The following data were recorded:

- Respiratory condition of the patient (absent or present; if so, adequate or inadequate).
- Number of attempts to position the LT. Each attempt had to be accomplished within 30 s, as recommended for tracheal intubation [1]. The patients were ventilated by face mask between each attempt; a maximum of three attempts was allowed, after which in case of failed insertion or inadequate ventilation the operator was instructed to return to bag-valve mask ventilation.
- Air leak: the air leak was evaluated by bubbling sounds detected in the mouth during ventilation, together with insufficient chest rise.
- Ease of placement was related to the capability to ventilate adequately. According to the current guidelines, ventilation is assumed adequate when rescuer sees the chest rise and fall during each inflation [1]. In addition, correct ventilation was confirmed by the presence of breath sounds and the absence of gurgling over the epigastrium.
- Stability of the device, namely any necessity to adjust the position of the device during resuscitation or ambulance transport because of difficult ventilation.
- Possibility to aspirate the trachea, indicated by the ease of insertion of a suction catheter into the trachea through the LT.
- Subjective perception of the device (positive or negative).
- Episodes of regurgitation and/or aspiration, were evaluated when the tube was removed by observing the presence of blood or gastric contents in hypopharynx or on the tube, and of gastric contents in the trachea.

The LT was left in place throughout resuscitation and transport. In patients experiencing ROSC, the device was removed in the hospital by a physician who performed tracheal intubation with prior evaluation of the ventilation through the laryngeal tube. In those patients who died at the scene, the LT was removed by paramedics. Each patient was ventilated by a bag-valve device throughout.

3. Results

Between January 2002 and September 2003, 30 adult patients were treated with the LT.

The demographics of the patients were as follows:

There were 18 men and 12 women. The mean age was 75.6 years with a range of 48–98 years. Twenty-nine patients were found in respiratory arrest (96.7%), one was gasping (3.3%); all patients were in cardiac arrest, 7 (23.13%) due to trauma and 23 (76.47%) from a non traumatic cause.

The number of attempts to obtain secure placement is depicted in Fig. 1. In all 21 patients in whom the LT was placed at the first attempt, ventilation was adequate, as it was in two