Effectiveness of intubating laryngeal mask airway (ILMA Fastrach) used by nurses during out of hospital cardiac arrest resuscitation

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Abstract: Objective: ILMA Fastrach™ is a recognized alternative to classic laryngoscopic intubation. In this study, we evaluated the success rate of intubation with Fastrach, used by emergency nurses who have no experience of field intubation.

Methods: Twelve untrained nurses used Fastrach during 71 out of hospital cardiac arrests (OHCAs). Each step of resuscitation was recorded.

Results: Fastrach effective ventilation was obtained in 97%. Rate of successful intubation was 86%.

Conclusions: ILMA Fastrach™ is a good alternative to classical laryngoscopic intubation by untrained nurses, even in difficult conditions such as OHCAs.

Key words: ILMA Fastrach™; airway management; pre-hospital setting.

INTRODUCTION

Airway management is a continual challenge in pre-hospital care (1). Difficult airway is an important cause of mortality and morbidity (2, 3). Success and time to intubate depends on paramedics or physicians experience even in countries with developed out of hospital care like US.

The intubating laryngeal mask airway (ILMA Fastrach™) is a device that can be used as a laryngeal mask but can also permit endotracheal intubation. ILMA™ (The Surgical Company, Netherlands) (Photo 1) consists of a curved steel tube bonded to a laryngeal mask. A single moveable aperture bar and a guiding ramp permit the insertion of a cuffed, wire reinforced silicone tube.

Like a laryngeal mask (LMA™), ILMA™ permits immediate patient oxygenation after insertion like LMA™ but also permits blind endotracheal intubation and secures airway.

ILMA™ has been demonstrated as a good alternative to difficult endotracheal intubation in the operating room (4, 5). ILMA™ is easy to use with a good rate of success even by untrained physicians (6, 7, 8, 9) A recent study has evaluated the success rate of tracheal intubation using ILMA™ in pre-hospital setting after manikin-based training. The paramedics observed in this study were occasional intubators. The success rate of intubation with ILMA™ was high (88%) (10). However, ILMA™ has never been documented by large study in pre-hospital setting and used by nurses without intubation experience.

OBJECTIVE

The aim of this study was to evaluate the efficiency and safety of this device used by untrained nurses in out of hospital cardiac arrest. Will ILMA™ permit immediate patients ventilation and quick tube insertion? Will ILMA™ be safe?

MATERIAL AND METHODS

Between April 4 2003 and August 15 2004, twelve nurses used ILMA Fastrach™ during seventy-one out of hospital cardiac arrest (OHCA) resuscitations in a prospective open study. All nurses...
(eleven men and one woman) were members of the mobile intensive care unit (MICU) staff and have no intubation experience. In our hospital, MICU include a nurse and a physician. Classically, the physician provides airway management during advanced life support (ALS).

Inclusion of OHCA was possible only when a trained emergency physician was in the MICU (anesthesiologist, intensivist trained in emergency medicine). Exclusion criteria were age < 18 years old, weight < 45 kg, and absence of trained physician.

According to our Ethics Committee, informed consent was obtained retrospectively if patient survive. Information letter was given to the family.

Nurses received a short instruction course to perform intubation with the ILMA Fastrach™. A manufacture training video was presented and they performed at least three intubations on an adult intubating manikin (Laerdal™).

Resuscitation was applied according to the guidelines of The European Resuscitation Council. During the procedure, the ambulance officers applied Basic Life Support. The physician and the nurse applied Advanced Life Support. Normally, the nurse provides intravenous lifeline management and the physician the airway management but, in these cases, the roles were inverted. ILMA™ sizes were selected according to manufacture recommendations and best-estimated weight of the patient (Table 1). Reusable ILMA™ components were prepared and lubricated with water gel before insertion.

The physician verified effectiveness of ventilation after mask insertion by observing presence of ample chest movements. The physician verified correct endotracheal intubation by chest auscultation and capnography on the monitoring (Lifepack™). Speed and success rates were collected thanks to a digital voice recorder and the monitoring event recorder (Lifepack™).

After two unsuccessful attempts, the emergency physician performed classic endotracheal intubation. Intubation difficulty and adverse events were recorded. The entire sequence included: inclusion decision, defibrillation, size mask choice, device preparation onset, end of preparation, Fastrach insertion onset, inflated mask cuff, external massage interruption, pulmonary inflation onset, inflation verification, external massage, disconnection for intubation, external massage interruption, tube insertion, external massage, inflated tube cuff, external massage interruption, pulmonary inflation onset, inflation verification, external massage and capnography. We do not have accurate data concerning height and weight of each patient.

Results

Seventy-one OHCAs were included in the study. Effective ventilation after ILMA™ insertion was obtained in 94% at the first attempt (63/67) and 97% after the second attempt (65/67). In the two unsuccessful cases, a deviated larynx was certified by the physician (one patient was hanged and the other has a lateraled larynx). This data was not collected in four patients because of recording problem. Each step time was recorded (Table 2).

Rate of successful endotracheal intubation was 73% (52/71) at the first attempt and 86% (61/71) after the second attempt. In eight unsuccessful cases, ventilation with the laryngeal mask was effective. Success of intubation was not correlated to success of Fastrach ventilation.

The physician easily intubated all the unsuccessful cases. He noticed a cephalic larynx in five cases, one hanged with larynx deviation and no abnormalities in the four others. Size 5 Mask has been chosen according to best-estimated weight in the five cases with cephalic larynx (Table 3).

Personal success of intubation varied from 43% to 100% in the nurses group.

Total mean time intubation was 143.4 sec with a mean time of 52 sec to prepare the device.

Esophageal intubation was noted in ten cases at the first attempt and six cases at the second attempt without inhalation.

Discussion

Unsuccessful intubations in prehospital setting are frequently the cause of desaturation and increase morbidity and mortality (11). Successful rate has been reported from 76 to 97% but it can be lower in most countries.

ILMA Fastrach™ has permitted to effectively oxygenate 97% of patients and to secure airway in

Table 1

<table>
<thead>
<tr>
<th>LMA Fastrach™</th>
<th>Patient weight (*)</th>
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<tbody>
<tr>
<td>Size 3</td>
<td>Children 30-50 kg</td>
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<tr>
<td>Size 4</td>
<td>Adults 50-70 kg</td>
</tr>
<tr>
<td>Size 5</td>
<td>Adults 70-100 kg</td>
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(*) Laryngeal depth is not directly related to patient size or weight.
86% of patients with out of hospital cardiac arrest after only (maximum) two attempts by untrained nurses. These results are not as favorable as in the operating room but no correcting maneuver was permitted in this study and conditions on the scene were obviously more difficult.

In the eight unsuccessful intubations, five patients presented a cephalic larynx and the mask chosen according to the weight was too great. It has facilitated esophageal intubation. According to the established procedure, it was impossible to try another ILMA™ in the conditions of the study and to prove that a size 4 mask should be effective. All these patients could have been oxygenated with the laryngeal mask without insertion of the tracheal tube.

However, ventilation with the ILMA™ was not predictive of successful intubation.

The time to perform intubation is short according to the time to prepare the device. A good training and a good preparation of the material are necessary and could reduce the intubation mean time and improve success (12).

Esophageal intubation must be detected immediately to avoid aspiration (clinical evaluation, capnography). In our study, the physician verifies the position of the endotracheal device. However, in daily clinical practice, the person that inserts the device must be able to verify its positioning.

**Conclusions**

ILMA™ is a good alternative to classical intubation by untrained nurses during OHCA resuscitations. Correcting maneuver could improve these results like the choice of a different size of mask. Training would also be longer, such as some studies suggest it (12). According to physicians or paramedics poor experience in tracheal intubations in many countries, ILMA™ must be evaluated in a large multicentre study to confirm these results (13). ILMA™ must be also evaluated in real difficult intubation situation on the scene while inclusions will be difficult.

**References**