

Assessment of Ease of Insertion and Success in use of the LMA-S by Paramedics in the Helicopter EMS environment.

Introduction:

Emergent airway management of air medical patients is a time- and skill-critical intervention. The use of adjunct devices to assist in successful ventilation and oxygenation of patients is of the utmost importance. REACH Air Medical Services utilizes a nurse/paramedic patient care team, both of whom have received training in emergent advanced airway management.. Our airway management tools include Rapid Sequence Induction (RSI) with endotracheal intubation; with both team members able to perform the physical intubation as well as back up supra-glottic airway. Additionally our crews are trained in surgical cricothyrotomy if endotracheal intubation or supra-glottic airway placement are not successful..

REACH has recently changed from the King Airway to the LMA-Supreme (LMA-S). This decision was based on new features of the LMA-S designed to improve the ease of insertion in the pre-hospital setting, and minimize the risk of aspiration of stomach contents. While King Airway insertion was allowed by state regulation by both our nurse and paramedic, the LMA-S is currently not part of the State of California Paramedic Scope of Practice. Since the introduction of the LMA-S, an increasing body of research literature and experience has shown the LMA-S to be easier to use, quicker to insert, and superiorly effective in protection from aspiration to other supra-glottic devices. This change by REACH from the King to the LMA-S now presents an opportunity to assist the State of California with evaluation of paramedic use of the device and consideration of inclusion in upcoming changes to paramedic scope of practice.

Methods:

Study Design:

This trial is a prospective, non-randomized, non-blinded study to evaluate the success of paramedic placement of the LMA Supreme; which is defined by the same criteria used in endotracheal intubation, ET_{CO}2 evaluation (with colorimetric and/or in-line measurement) and pulse ox readings, in use of the LMA-S for advanced airway management by paramedics at REACH. The measurement of ET_{CO}2 and pulse oximetry before, and after each attempt will allow us to determine the effect of each attempt on the physiology of the patient. This peri-intubation physiology has been shown to be an important component of patient care while doing any airway procedure. At REACH we have defined a significant change to be a drop in SPO₂ to less than 94% or a 10% drop if the sats were already less than 94%, and an ET_{CO} of less than 25 or greater than 70. This study is not a change from current care of the patient, as the flight nurse is currently inserting the LMA-S.

Setting:

REACH Air Medical Services is a privately owned air ambulance that has been serving California for 25 years. The medical crew is comprised of a State of California licensed registered nurse and paramedic. REACH currently has bases of operation in the following locations in California;

Santa Rosa, Sonoma County

Lakeport, Lake County

Redding, Shasta County

Marysville, Yuba County

Sacramento (fixed wing aircraft) Sacramento County

Stockton, San Joaquin County

Concord, Contra Costa County

Thermal, Riverside County

Oceanside, San Diego County

Upland, San Bernardino County

El-Centro, Imperial County.

Each of these bases averages two flights per day for an average of 20 patient contacts per 24 hour period or 7,300 patient contacts per year. Of these, approximately two percent are in need of advanced airway management.

Duration:

24 months

Inclusion Criteria:

All patient greater than or equal to 1kg who need advanced airway management and where endotracheal intubation is not possible.. In 95% of the case this will be after a failed endotracheal intubation attempt. In less than 5% of the cases the LMA-S may be the first advanced airway used based on patient condition and air medical team judgment.

Exclusion Criteria:

Patients with an intact gag reflex and patients with severe caustic substance ingestion.

Training:

Each crew member will receive initial training from a video provided by LMA (<http://www.lmana.com/pwpcontrol.php?pwpID=6347>) and competency testing with the device on a mannequin or human patient simulator. This original training is conducted by our clinical management team and lasts approximately an hour. They also receive ongoing training during our semi-annual clinical training labs as well as monthly airway drills (dependent on airway drill scenario). This training is included in our semi-annual Clinical training labs conducted at each base by the clinical management team and the medical directors. The scenarios are based on clinical experience from the prior year. Post test evaluation is done via observation during the training lab.

Protocol:

See attached reference document.

Data Collection:

The following information will be obtained for each use of the LMA-S

- Age
- Sex
- Date
- Flight number
- Indication for use
 - Primary- Why endotracheal intubation was not done first
 - Secondary- What were the reasons for unsuccessful endotracheal intubation
- Blood pressure before LMA insertion
- Blood pressure after LMA insertion
- Pulse oximetry before LMA insertion
- Pulse oximetry after LMA insertion
- ETCO2 after LMA insertion
- Ease of insertion on a 1-5 Likert scale 1 being very easy and 5 being very difficult
- Success yes or no
- Number of attempts needed to insert the LMA-S (attempt is defined as passing any part of the LMA-S beyond the teeth)
- Time to complete insertion in seconds
- Any difficulties encountered (Narrative comment by the paramedic)
- Were there any complications? If yes what.
- If the paramedic was unable to get insert the LMA-S was anyone else later successful?

Results:

The study was done for 2 years, with a total of 6 LMA Supreme insertion attempts California paramedics. The study was closed on August 13, 2014. Of the 6 uses: 5/6 was successful. The one that was not successful was a very large patient (122KG) with a failed ETI due to not able to reach the glottis with a Miller 4 blade, then even the largest LMA was not big enough to reach down and get a good seal. The patient was in full arrest and managed with BVM .

2/6 were pediatric

3/6 were rescue use after failed ETI, one as noted above, one due to blood and the other vomit in airway, making visualization difficult.

2/6 went straight to the LMA due to assessment that ETI would be difficult and time to airway was critical

In all of these cases there were no significant complications, including decrease in pulse oximetry, blood pressure, or increase in ETCO2 due to the LMA use. One patient had low pulse oximetry already due to aspiration, three patients had coded just prior to airway attempts, and one had been under CPR prior to the flight crew arrival, but there were no changes with the LMA insertion. The final patient had no good adequate vital signs during airway management which did not change significantly with LMA insertion.

Discussion:

There is a very small sample size for two reasons. One is the limited amount of LEMSA'S that agreed to participate in the study(6 total). The other reason is that 2 months prior the start of the study REACH had introduced the CMAC video

laryngoscope and our success rate with ETI went up, thus limiting the need for rescue LMA use. Of note our flight nurses have used the LMA supreme with great success and satisfaction. In addition REACH nurses and paramedics are using the LMA supreme at our base locations in Oregon and Texas with great success and satisfaction. In general the LMA Supreme has been a great tool for us and in this limited study paramedics in California are able to use it appropriately and with great success.

Limitations

The small sample size as noted in the discussion is a significant limitation. So although the experience is good, the numbers are small.

Conclusion:

In this limited study paramedics have the ability to appropriately determine the need for and successfully place the LMA Supreme during critical airway management.

References:

For now attached if we go to a publication will do a formal reference list.