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Research Article

Degree of cervical mobility differs or not when using alternative way of intubation: Intubating laryngeal mask or classic laryngoscope

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KEYWORDS

Intubation;
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Abstract *Background:* Spine surgery needs a special consideration as regards minimizing the movement during intubation to avoid the hazards to spinal cord. The present study aims to highlight the preferable technique for cervical intubation. The Intubating Laryngeal Mask Airway (ILMA, Fastrach™ laryngeal mask company, Henle-on-Thomes, U.K.) is a supraglottic device specially designed to be an effective ventilator device and blind intubation guide in patient with normal and abnormal airways.

Methods: 40 patients were involved and randomly assigned to two equal groups according to the used technique of endotracheal intubation: (Group 1): Intubating Laryngeal Mask technique and (Group 2): Direct laryngoscopy technique. Anesthesia was induced using a combination of 1 μg/kg fentanyl, 5 mg/kg thiopental sodium (sleeping dose) and atracurium 0.5 mg/kg (Intubating laryngeal Mask or the Macintosh blade) was used to secure the airway according to the patient group. Meanwhile a continuous videofluoroscopy was recorded. The radiographs were analyzed for movements in the cervical segments C1/2 and C2/3. A reference line was drawn following the dorsal alignment of C2. Another two lines, one connecting the anterior and posterior arch of C1, and one through the basal plate of C3, were drawn to transect the above mentioned reference line.

Results: The mean cervical spine extension at C1/C2 was 77.2 ± 3.5 before intubation, 74.8 ± 4.3 during intubation, and 75.9 ± 4.2 after intubation for group 1, while it was 74.95 ± 4 before, 65.9 ± 4.4 during, and 68.75 ± 3.9 after intubation for group 2 there was statistically significant difference between LMA group (group 1) and direct laryngoscopy group (group 2) in the motion of cervical spine extension at C1/C2 during and after intubation where the p-value was <0.05.

Conclusion: The ILM (Fastrach) is a satisfactory alternative to the currently used methods of airway management in cervical spine injuries and reduces movement of the cervical spine.

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1. Introduction

Management of difficult airway remains one of the most relevant and challenging tasks for anesthesia care providers, and claims involving airway management continuing to compromise an important aspect of the American Society of Anesthesiologist (ASA) closed claims project database which tracks all anesthesia-related insurance claims [1]. The practice of airway management has become more advanced in recent years. This advancement is demonstrated by the introduction of many new airway devices, several of which have been included in the American Society of Anesthesiologist (ASA) Difficult Airway Algorithm [2]. The Intubating Laryngeal Mask Airway (ILMA, Fastrach™ laryngeal mask company, Henle-on-Thomes, U.K.) is a supraglottic device specially designed to be an effective ventilator device and blind intubation guide in patient with normal and abnormal airways [3]. Cervical spine surgery needs a special consideration as regards minimizing the movement during intubation to avoid the hazards to spinal cord. The degree of cervical spine extension makes a challenge for the anesthesiologist specially when there is cervical disc lesion or cervical spine fracture.

2. Aim of the study

The present study aims to compare different intubation methods as regards the cervical spine mobility to highlight the preferable technique for limitation in cervical mobility during intubation. The primary outcome was recording the change in angles C1/2 and C2/3 before, during and after intubation, the secondary outcome which was airway complications as blood streaked mucous after removal of the device, vital signs such as, heart rate and blood pressure, as well as oxygen saturation.

3. Subject and methods

This randomized controlled study was carried out in Kasr El Ainy Teaching Hospital. We used the simple randomization technique where sequence generation was created by a computerized random number generator (MS Excel model). Participants were intentionally allocated in equal numbers to each group in 1:1 ration. The allocation sequence was concealed from the investigator enrolling and assessing participants in sequentially numbered, opaque sealed envelopes.

After the approval of the ethical committee, 40 patients were undergoing cervical spine surgeries, age from 18 to 65 years, weight 50–120 kg, height >150 cm; ASA class I or II; airway score <4 according to EL Ganzouri scoring system [4]. Patients with BMI more than 30 kg/m^2; Patients age above 65 years; airway score $\geqslant 4$ (EL Ganzouri scoring system [4]); any chest or cardiac condition that interferes with safe general anesthesia (chest infection, COPD, Bronchial asthma); any anatomical abnormalities in the head and neck that interfere with intubation; or trauma patients were excluded from the study. The patients were randomly (by closed envelope technique) assigned to two equal groups of 20 patients each according to the used technique of endotracheal intubation; (Group 1): Intubating Laryngeal Mask technique and (Group 2): Direct laryngoscopy technique. History taking was done for all patients and they were assessed preoperatively by El Ganzouri scoring system which includes seven criteria. The study has an unique identification number in Pan African Clinical Trial Registry: PACTR201502000993337.

4. Anesthetic technique

- The standard monitors (pulse oximetry, 5-leads ECG, non-invasive blood pressure) and capnogram were attached to the patient. Check of the ILMA (intubating laryngeal mask airway): Check of both cuffs; the modified tube and the ILMA by inflation and deflation of them. Adequate lubrication of the tube and the ILMA, its outer surface and its inner surface (through frequent passage of the lubricated tube through the ILMA in–out), as well as complete deflation of the cuff of the ILMA. Check of the Macintosh blade: Check the availability of different sizes; blades 3 & 4, depending on the overall size of the patient trying to obtain the best possible view of the larynx normally expected for tracheal intubation. Check of the C-ARM Image: Check the electric source and screen.
- Before induction of general anesthesia, pre-oxygenation with 100% oxygen for 3 min is given via face mask, General anesthesia was induced using a combination of fentanyl 1 μg/kg, thiopental sodium 5 mg/kg and atracurium 0.5 mg/kg. The patient is mechanically ventilated using a face mask aided with an inhalation anesthetic (isoflurane 1% end tidal) until a full relaxation was established after about 3–5 min.
- One of the two devices (Intubating laryngeal Mask or the Macintosh blade) was used to secure the airway according to the patient group. Meanwhile a continuous videofluoroscopy was recorded. The radiographs were analyzed for movements in the cervical segments C1/2 and C2/3. A reference line was drawn following the dorsal alignment of C2. Another two lines, one connecting the anterior and posterior arch of C1, and one through the basal plate of C3, were drawn to transect the above mentioned reference line.
- Thus, two angles could be defined. The angle between the reference line and the line connecting the anterior and posterior arch of C1 was called a, and the angle between the reference line and the line through the basal plate of C3 was named b (Fig. 1) [5].
- After intubation, endotracheal placement of the tube rechecked after re-inflated the tubal cuff by attaching the capnogram to the tube and checking ventilation.

5. Data management

Data were collected to compare between both groups : the primary outcome which was recording the change in angles C1/2 and C2/3 before, during and after intubation, and the secondary outcome which was airway complications as blood streaked mucous after removal of the device, vital signs such as, heart rate and blood pressure, as well as oxygen saturation.

5.1. Data analysis

Data were statistically described in terms of mean ± standard deviation (±SD), median and range, or frequencies (number of cases) and percentages when appropriate. Comparison of