Original Article

AWAKE TRACHEAL INTUBATION VIA INTUBATING LARYNGEAL MASK VS DIRECT LARYNGOSCOPY AND CERVICAL SPINE EXCURSION

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ABSTRACT

Objective: To compare intubating laryngeal mask airway (ILMA) with direct laryngoscopy in patients with cervical spine injury.

Patients and Methods:: Prospective, hospital based study conducted during March 2004 to May 2005, in Imam Khomeini Hospital, Tabriz Medical Science University, Iran. We compared the excursion of the upper cervical spine during tracheal intubation using direct laryngoscopy with awake intubation via Laryngeal mask airway in 40 patients.

Results: Intubating laryngeal mask caused less extension (at C2-3 and C1-2) than intubation by direct laryngoscope. Patients, who were locally anesthetized and sedated tolerate intubation well. However laryngoscopy is still the fastest method to secure an airway.

Conclusion: In traumatic patients who require intubation and have limitation with cervical spine movement, we can use intubating laryngeal mask in awake patients locally anesthetized as a safe, tolerable and relatively fast method to secure an airway.

KEY WORDS: Intubating laryngeal mask, Awake Intubation, Cervical spine, Laryngoscopy.

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INTRODUCTION

Until recently, the most appropriate technique for intubation of patients with cervical spine injury was doubted.[1] Different techniques have been investigated including awake blind nasal, oral or fibreoptic intubation for the experienced anesthetist,[2,3] direct laryngoscopy with head and neck stabilization,[4] Indirect laryngoscopy with the bullard laryngoscopy,[5] intubation by means of Augustine intubation aid,[6] and the combitube described by Frass.[7] Howevere each of these methods has certain disadvantages.

The intubating laryngeal mask airway (ILMA) has been introduced as a prototype of laryngeal mask airway for blind tracheal intubation. The success rate of blind intubation using ILMA was up to 99.3% in patients with or without airway problems.[8] Therefore, the ILMA might be a helpful device for intubation in patients with cervical spine disease.

These patients have two major problems in management of their airways: A need to avoid aggravation of spinal cord damage during intubation and to reduce the duration of intubation because of the increased risk of gastric regurgitation,[9] because majority of these patients have usually eaten within the last six hours. Direct laryngoscopy is still the fastest method to secure an airway but it has problems in

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patients with cervical spine injury. In this study we evaluated intubation via ILMA in locally anesthetized patients therefore we eliminate the risk of possible regurgitation and aspiration and lessen the cervical spine excursion in patients with cervical spinal injury.

PATIENTS AND METHODS

After obtaining approval from the hospitals ethics committee and informed consent from patients, we examined 40 adult patients with ASA physical status I,II without any pathology of cervical spine or suspected difficult airway (Mallampati class 3 or 4), scheduled for elective surgery, requiring anesthesia and tracheal intubation. In each patient, the hyomental distance and Mellampati test was assessed. Patients were randomly assigned to two 20-patient groups: In Group-A intubation was done by direct laryngoscopy and in Group-B intubation was done via ILMA (Fastrach).

The patient was supine with the head placed in the neutral position. Heart rate, oxygen saturation and capnography were continuously monitored. Blood pressure was measured before, at the time of intubation and three, six and ten minutes after intubation. Patients received 7cc/kg Ringer·s lactate and breathed 100% oxygen for three minutes.

In group-A, anesthesia was performed by propofol 2mg/kg and succinylcholine 1.5mg/kg following fentanyl 2 μg/kg, midazolam 30 μg/kg. Intubation was performed via direct laryngoscopy with a size 3 or 4 Macintosh blade. In group B, patients recieved Robinul 0.2 μg/IV, Fentany 2mg/kg and Droperidol 2-4 mg and oxygention was done via nasal canula. The tongue and oropharynx was anesthetized with 10% lidocain spray. Once there was sufficient anesthesia the long applicator adaptor for 10% lidocain spray was placed to spray local anesthetic directly onto supraglottic and glottic structures. Trachea was anesthetized with a transtracheal application of 3ml of 2% lidocain. Sizes 3,4 or 5 of ILMAs were available, but size three for women and size four for men, were the first choice. The cuff was totally deflated and the posterior surface of mask tip was lubricated with gel to facilitate insertion. After that patients were ventilated with 100% oxygen. If the patient was not well ventilated, the LMA would be removed and reinserted. When adequate ventilation was established, a lubricated silicon ETT (in appropriate size) was passed through the ILMA. If resistance was felt, intubation would again be attempted by changing the position of the mask.

If intubation was not successful within two manipulations (failed intubation) or patient did not bear ILMA , general anesthesia would be used. Ease of ILMA insertion and condition of ventilattion or intubation were evaluated. Successful intubation was confirmed by capnography. Three lateral cervical X-Rays were taken. The first one was taken before any manipulation in neutral position of head and cervical spine. The second one was taken in the greatest excursion of the cervical spine which in group A, it was when the best possible view of larynx was seen and in group B when ILMA reached the posterior pharyngeal wall. The third one was taken at the final position of head and neck. The radiographs were analyzed in the cervical segments $C_{2/3}$ and $C_{1/2}$. A reference line was drawn following the dorsal alignment of C2,other two lines, one connecting the anterior and posterior arch of C1, and the other through the basal plate of C3, were drawn to transect the above mentioned reference line. The lines were drawn and angles were measured by a radiologist, who was unaware of the purpose of study. Intubation time was defined as the time from the passage of the tip of the laryngeal mask or the Macintosh blade through he the lips of patient, till the cuff inflation.

The angle between the reference line and the line connecting the anterior and posterior arch of C1, and the angle between the reference line and the line through the basal plate of C3 were measured.

RESULTS

Anesthesia was uneventful in all patients. Intubation via direct laryngoscopy was unevent-

ful and successful at the first attempt in all patients. Patient's demographic data is shown in Table-I.

The ILMA was successfully inserted in all patients at the first attempt. The trachea was intubated successfully at the first attempt in 17 patients. It required more than one attempt in three patients and was successful after re-positioning of ILMA. Success rate for tracheal intubtion was 100%. Changes of cerebral spine extension during and after intubation are shown in Table-II.

The angle of cervical spine extension during intubation with ILMA was significantly less than direct laryngoscopy in C1/2 ($P<0.01$). Systolic and diastolic blood pressure and heart rate changes in group A was less than group B but it was not statistically significant. Oxygen saturation did not decrease below 97%, in group A and below 96% in group B. Therefore, no difference in hemodynamic parameters was seen between two groups. The mean time of successful intubation in group A was 19s (ranging from 16 to 34s) and in group B was 52s (ranging from 48 to 68s), which was significantly less in group A ($P<0.005$).

DISCUSSION

Numerous studies have been performed to examine cervical spine movement during different tracheal intubation techniques. Fitzgerald showed that less extension occurred within the atlanto-occipital joint using the Augustine Guide.[6] Watts et al showed that extension of the occipito-atlanto axial complex was reduced when using bullard laryngoscopy and in- line stabilization.[10]

These studies showed that the greatest cervical spine excursion during intubation occurred at the level of C1/2 and therefore we decided to investigate this segment. Our study showed significantly less cervical spine extension at C1/2 in patients intubated via ILMA compared with direct laryngoscopy therefore one of two major problems with cervical spine injured patients was reduced significantly.

Wong JK showed the possibility of awake orotracheal intubation via ILMA in patients with cervical spine disorders[11] and suggested ILMA as an acceptable alternative to the fiberoptic bronchoscope for awake tracheal intubation. Another problem with these patients is the risk of regurgitation and it depends on the duration of intubation. Watts et al showed the duration of intubation was 40.3 seconds with in- line stabilization vs 20.3s for Macintosh laryngoscope.[10] Mlinek et al reported these minute duration of fiberoptic intubation in emergency situation of three minutes and the increased risk of aspiration.

Joo and Rose showed intubation time of 53.5s via ILMA (blind intubation) and 77s with fibreoptic- guided intubation via ILMA.[12] As we see, the fastest method for intubation is still direct laryngoscopy but it has many problems such as cervical spine movement. In other methods the duration of intubation is long enough to increase the risk of aspiration. So we evaluated the intubation via the ILMA in awake patients. After local anesthesia, we introduced ILMA and all of patients tolerated it well. Therefore we omitted the risk of aspiration.

Different studies have evaluated the success rate of blind intubation via ILMA as follows: Heath and Allagain showed a rate of 90%,[13] Kapila showed a rate of 95%[14] and Joo et al showed a rate of 97%.[12] In our study all of the patients were successfully intubated. The difference between studies may be because of acquiring expertise for use of this device.

Table-I: Patient s demographics data

	*Group A**	*Group B**
Male/Female	13/7	11/9
Age (year)	50±14	47±12
Height	170±11	168±12
Weight	70±13.4	72±14.1
Mallampati 1/2	14/6	12/8

*Mean±SD

Table-II: Changes in cervical spine extension before, during and after intubation.

		Before	*During*	*After*
$C_{1/2}$	ILMA	74.1	70.9	71.5
	Laryngcoscopy	76.2	68.8	69.5
$C_{2/3}$	ILMA	98.1	101.00	101.2
	Laryngoscopy	99.4	104.5	103.7

With these results, every anesthesiologist has to select the appropriate technique, by balancing the need for safe and rapid airway control because of factors such as respiratory failure, the risk of aspiration, hemodynamic instability and the need for reduction of movement in the atlanto – occipital line.

CONCLUSION

We recommend awake intubation via ILMA as a satisfactory alternative to the currently used methods of airway management in cervical spine injured patients. It is relatively fast and a well established technique for blind laryngscopy, it reduces movement of cervical spine and omits the risk of aspiration.

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