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Case Study

Comparison of Two Intubation Techniques during General Anesthesia. Laryngeal Mask for Intubation (Fastrach) vs Endotracheal Intubation

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Abstract

Introduction: The American Society of Anesthesiology (ASA) has developed in recent years an algorithm to follow in case of presenting a difficult or unexpected airway. In said algorithm various techniques or mechanisms different from direct laryngoscopy are mentioned that can help in a pressing situation. The laryngeal mask for intubation (Fastrach) is a device that has increased its popularity by playing an important role in the management of the airway

Objective: To demonstrate that the laryngeal mask for intubation (Fastrach) is a useful device for the management of the airway and that it causes fewer complications than traditional intubation in patients undergoing general anesthesia.

Materials and methods: We studied 100 patients of both sexes and ages between 20 and 90 years, physical status ASA I, II and III, scheduled for elective surgery and general anesthetic technique. The time of Fastrach intubation and endotracheal intubation in seconds, hemodynamic and oxygen saturation values and finally the complications during and at the end of the procedure (oral bleeding, mucosal laceration, and impossibility of intubation, odynophagia and dysphonia) were measured.

Results: A statistically significant intubation time was obtained with $p < 0.05$ for the EIT with a time of 25.38 sec ± 13.68 sec and for the ML (Fastrach) of 57.04 sec ± 32.68 sec, the hemodynamic behavior remained practically the same in both cases. Groups and complications presented were more notable in the EIT mainly odynophagia and dysphonia.

Conclusion: The use of the laryngeal mask for Fastrach intubation as an alternative in direct laryngoscopy for endotracheal intubation in patients with easy airway is viable, demonstrating fewer complications than traditional intubation, as well as being safe, useful and effective.

Keywords: Endotracheal intubation; Fastrach; Laryngeal mask

Background

The anesthesiologist, in his daily practice, is faced daily with the management of the airway; this is in the possibility of providing minimal essential care to any patient who will undergo a surgical anesthetic procedure. The possibility of intubation will be latent in all cases, the maneuvers and procedures aimed at maintaining a permeable route with adequate ventilation are not exempt from risk. 4.6% of endotracheal intubations are associated with complications, among which the most common may be ventilation and difficult intubation [1]. For endotracheal intubation to be successful, a meticulous clinical and anatomophysiological assessment is required, in such a way that manipulation of the airway is simple and safe. However, it is often difficult and represents a challenge for anesthesiologists, even the most experienced [2]. The American Society of Anesthesiology (ASA) has developed in recent years an algorithm to follow in case of presenting a difficult and unexpected airway. It has submitted modifications according to the experience and needs of the case. In said algorithm, it is mentioned in different techniques or mechanisms different from direct laryngoscopy that can solve a pressing situation at a certain moment [3].

Infraglottic application techniques have been developed for the management of the airway, within which we can recognize Jet ventilation, cricothyroidectomy and tracheostomy. Others are of supraglottic application, such as ventilation with face mask, Guedel COPA

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cannula and Laryngeal Mask (ML), finally there are transglottic application techniques different to endotracheal intubation through direct laryngoscopy and blind digital intubation, nasotracheal intubation blindly or guided with direct laryngoscopy, the use of luminous stylet, fibro-laryngoscopy, retrograde intubation and guided intubation through ML [4]. The development of ML initiated in 1981 by Dr. Archie Brain, British anesthesiologist of the Royal London Hospital. Dr. Brain suggested that Goldman's dental mask could be modified to fit around the larynx and not in the nose. His intention was the specific search for an airway that was more practical than the facial mask and less invasive than the endotracheal cannula [5,6].

Some modifications related to ML are the following:

A rigid tube of stainless steel shorter in size, which allows better guidance of the mask when the Endotracheal Cannula (CET) passes through it, with a good ratio of the internal and external diameter (13/15 mm), covered of silicone and which can be desterilized. An integral 15 mm connector that allows it to be used as the conventional ML avoids accidental disconnections and allows the passage of a CET of 8.0 mm with inflatable sleeve. A curvature that follows the anatomy of the CET with which we can avoid the manipulation of the neck, the head and the insertion of the fingers, since the pressure against the palate can be applied externally; also promotes the alignment of the CET towards the glottis vestibule facilitating the insertion of the same through this structure, diminishing the possibility of trauma.

Integrated handle of the ML of intubation which allows a greater and easier handling while holding firm the device during the insertion of the CET. V-shaped ramp which fixes the TSC toward the center and guides it in the direction reducing the risk of trauma to the arytenoids cartilages or the displacement of the tube into the esophagus. Bar of elevation of the epiglottis: a membrane placed in the distal opening of the ML of intubation that keeps the epiglottis out of any possibility of being able to obstruct said opening while protecting and elevating it during the insertion process of the probe [7,8]. Because of the characteristics of our hospital in being always at the forefront of medicine, we decided to carry out this work to obtain an experience in the management of the airway comparing two intubation techniques for general anesthesia.

Objective

To demonstrate that the laryngeal mask for Fastrach intubation is a useful device for the management of the airway and which causes fewer complications than traditional intubation in patients undergoing general anesthesia.

Materials and Methods

Research design

He studied quasi-experimental, prospective, and longitudinal and comparative. It is a clinical, longitudinal, comparative study, where you will study that the laryngeal mask for intubation (Fastrach) is a useful device for the management of the airway and that it causes fewer complications than traditional intubation in patients undergoing general anesthesia.

Working universe

Patients undergoing elective surgery at the Hospital de Especialidades CMN Siglo XXI, in the period from February 2000 to February 2001.

Description of the variables

Dependent variables: Utility and safety of Fastrach according to: hemodynamic values, oxygen saturation, time of Fastrach placement as well as endotracheal cannula, transoperative complications, postoperative complications.

Independent variables: Laryngeal mask for intubation (Fastrach) and Endotracheal Cannula (ETC). They are qualitative variables, with a dichotomous qualitative measurement scale. Demographics (sex, age, weight and height), Predictive (physical status according to ASA, valuation of the airway according to the assessment of Mallampati, Pati and others), operative, respiratory and hemodynamic.

Sample selection

Convenience sampling was used and a sample size of 100 patients was estimated.

Selection criteria

Criterion of inclusion: Patients who agreed to participate in the study, patients of either sex scheduled for elective surgery, patients scheduled for general anesthesia, patients physical condition ASA I, II and III, ages between 20 and 90 years old.

Non-inclusion criteria: Patients who presented a predictive index for inadequate mouth opening, patients with pathology of the respiratory system, patients with risk of regurgitation or bronchoaspiration (previous surgeries of the upper gastrointestinal tract, hiatal hernia, gastro-esophageal reflux, ulceropéptica disease and those patients who have not fulfilled the fast properly), patients with oral or pharyngeal tumors, patients with a surgical historya of tracheostomy and/or laryngeal surgery, patients who had a history or risk of infection by hepatitis virus, cytomegalovirus or HIV.

Exclusion criteria: Patients who refused to participate in the study, impossibility of placement of the laryngeal mask for Fastrach intubation or intubation of the endotracheal cannula.

Procedure

Once the patient was in the operating room, he was monitored with a cardio-scope, non-invasive blood pressure (systolic, diastolic and mean), heart rate and pulse oximeter, taking these as T1 values. When the Fastrach was placed, the face opposite the distal opening was lubricated with water-soluble gel, Fastrach # 3 was used. The sterile conventional Endotracheal Cannula (ETC) was also lubricated to allow frictionless sliding. Internal diameter cannulas # 7.0, 7.5 and 8.0 mm were used.

Prior oxygenation with a face mask with 100% oxygen 3 liters/min, the induction of anesthesia was started (the use of medications and their respective doses were left to the anesthesiologist protocol). Three average minutes were waited for the peak action of the administered drugs and the hemodynamic values and oxygen saturation were taken again as a second time T2. After placement of the Fastrach and/or endotracheal cannula and once the airway was secured, the cuff was insufflated respectively; the hemodynamic and oxygen saturation values represented as T3 were measured again. The placement of

LMA-Fastrach and/or endotracheal intubation was performed by the anesthesia resident. The permeability of the airway was verified with thoracic expansibility and auscultation of respiratory sounds, which resulted in successful intubation. The total time of placement of the Fastrach and the endotracheal cannula was measured (independently if it was achieved in a first, second or third attempt). The intubation time was ruled out if it was failed and if direct laryngoscopy had to be performed. It was taken as total time, as it elapses since the anesthesiologist takes either the Fastrach or the laryngoscope until successful intubation is performed.

Likewise, it was analyzed whether there was any complication during the procedure or after the procedure, such as oral bleeding, laceration of the mucosa, and assessment of the first and 24 hours afterwards if the patient presented odynophagia (sore throat) and/or dysphonia (hoarseness). Using the analog visual scale (EVA), where zero indicates absence of pain or hoarseness and 10 the worst pain or hoarseness that the patient could imagine. Dysphonia/odynophagia when presented was indicating in the postoperative mediate pharmacaine 10% solution topical spray used.

Statistical analysis

Three different types of analysis will be used. The first is the descriptive analysis in which position measurements are calculated. The second is the graphic analysis, which is based on bar graphs, sector diagrams, frequency histograms; the third analysis is the statistical significance or validation, it is based on the comparison of proportions based on the sampling distribution for discrete variables through the chi-square test, for continuous variables we will use comparison by difference of means with unequal variances based on the t-student distribution. All the contrasts of hypotheses will be carried out with $\alpha = 0.05$, that is, 95% confidence.

Results

The sample size 100 patients, divided into two groups of 50 patients. Group 1 for Fastrach and group 2 for traditional intubation. 59 of the female sex (59%), 36 women from group 1 and 23 from group 2, and 41 from male sex (41%). 14 of group 1 against 27 of group 2, ages between 20 and 90 years, average of 50.78 ± 16.93 years for the first group and 56.06 ± 7.00 years for the second group, the weight in average kilograms was 65.84 kgs against 68.04 kgs with a standard deviation of 9.45 and 13.5, the average height was 1.57 meters ± 0.067 in group 1 meanwhile in group 2 with an average height of 1.59 meters ± 0.054. The time for intubation in seconds was significant with $p < 0.05$ for the second group of 25.38 ± 13.68 sec while group 1 was 57.04 ± 32.68 sec (Table 1). The physical condition ASA I in 25 patients, ASA II in 61 patients and ASA III in 14 patients, the referals services were: 65 ophthalmology patients, 10 gastro-surgery patients, 23 otorhinolaryngology patients, 1 head and neck patient and 1 angiology patient. The predictive index for airway assessment was measured according to the Mallampati classification; Mallampati I in 23 patients, II in 63 patients and III in 14 patients (Table 2). According to Patil's classification, it is expressed in percentages according to the group; group 1, 80% grade I and 20% grade II, while group 2, 88% grade I and 12% grade II (Table 3).

	Fastrach	IET Tradicional	p
Patients	50	50	NS
Gender Male/Female)	14/36	27/23	NS
Age (years)	50.78 ± 16.93	56.06 ± 7.00	NS
Heigh (Meters)	1.57 ± 0.067	1.59 ± 0.054	NS
Weight (Kilograms)	65.84 ± 9.45	68.04 ± 13.50	NS
(Intubation time (seconds	32.68 ± 57.04	13.68 ± 25.38	0.05 >

Table 1: General characteristics.

NS= No significative; P= Probability; EIT= Endotracheal Intubation

		Group1 (Fastrach)	Group 2 (Traditional ETI)	Total
ASA	I	18	7	25
	II	29	32	61
	III	3	11	14
Service Referal	OPHT	28	37	65
	GCx	2	8	10
	ORL	19	4	23
	H&N Cx	0	1	1
	ANG	0	1	1
Mallampati Clasification	I	19	4	23
	II	25	38	63
	III	4	10	14

Table 2: Qualitative variables.

	Grade I	Grade II
Traditional ETI	12%	88%
Fastrach p > 0, 05	20%	80%

Table 3: Patil classification.

The hemodynamic behavior was evaluated based on three parameters (MAP, FC, Sat O_2%), with measurements in the three aforementioned times (T1, T2 and T3) analyzing the average. The MAP premedication for the Fastrach was 106 mm Hg in group 1 and 100 mm Hg for group 2. The post-medication MAP for group 1 was 88 mm Hg while group 2 was 81 mm Hg and the post-intubation MAP was 87 mm Hg group 1 and 84 mm Hg for group 2 (Table 4).

	Group 1 (Fastrach) mm HG	Group 2 (Traditional ETI) mm HG
Pre-medication MAP	106	100
Post-medication MAP	88	81
Post Intubation MAP	87	84

Table 4: Mean arterial pressure events.

Complications during the procedure were assessed according to: mild bleeding in a patient of group 1 and absent in 99 patients; no mucosal lacerations were evidenced in both groups. The impossibility of intubation in the first group (Fastrach) occurred in 3 patients but they were successful in the second group (Traditional ETI) at 100%. The intensity of the odynophagia assessed by EVA (1-3 pts) during the

first and 24 hours after the event was presented in 42 and 12 patients in group 1 (Fastrach), 8 and 2 patients in group 2 (Traditional ETI). The intensity of the dysphonia assessed by EVA (1-2 pts) during the first and 24 hours after the event was presented in 18 and 2 patients in group 1 (Fastrach), 8 and 3 patients in group 2 (Traditional ETI) (Table 5).

	1° Hour fastrach	24 Hours fastrach	1° Hour fastrach	24 Hours fastrach
Odynophagia EVA (1-3 pts)	42	12	8	2
Dysphonia EVA (1-2 pts)	18	2	8	3

Table 5: Odynophagia-Dysphonia.

Ethical Considerations

The control of the airway results for the anesthesiologist in the possibility of providing minimal essential care to any patient who will undergo a surgical anesthetic procedure. In order for intubation to be successful, a meticulous clinical evaluation is required, in such a way that manipulation of the airway is simple and safe to achieve an adequate gas exchange. Among the different techniques described for the management of the airway, the use of ML for Fastrach is a useful, safe and effective alternative.

Discussion

The results of this feasibility study have shown that, in patients of both sexes with predictive index of non-difficult airway, the laryngeal mask for Fastrach intubation can be successfully used for oxygenation and ventilation, demonstrating that the hemodynamic behavior in both groups shown by the patients in all three times during intubation did not show statistically significant differences. Kihara, et al., [9] published similar results in their study tracheal intubation with the Macintosh laryngoscope versus intubating LMA in adults with normal airways.

Regarding the intubation time, it was observed that the intubation through the Fastrach takes a time of 57.04 ± 32.68 sec compared with traditional intubation with a time of 25.38 ± 13.86 sec. It is important to note that the more experience you have in daily practice with the Fastrach can reduce these times by making the anesthesiologist more skilled in his daily work, also commenting that the traditional intubation, its intubation time, will depend on the type of laryngoscope blade what is used as well as the experience of the person who makes it.

Regarding intubation success, the attempt in our study was 100%, while the Wulff-Puente study achieved 58% at the first attempt, 32% at the second attempt and 4% at the third attempt, compared to the international literature. Joo and Rose show a 97% success rate, where 90% went to the first attempt, 6.7% to the second attempt and 3.3% to the third attempt [10].

It was also shown that the complications of the first group manifested by odynophagia and dysphonia assessed by the Visual Analogue Scale (VAS) showed a lower index in which they show the results obtained by Wulff-Puente [11], understanding that it is a subjective assessment of pain compared in different ethnic groups and races.

There are authors who have defended the use of the laryngeal mask for intubation Fastrach in patients with difficult airway. In the literature consulted there are a limited number of satisfactory intubations with Fastrach in patients with difficult airway as reported by Joo HS and Rose DK [12] who describe intubation LMA with and without fiberoptic guidance. Nakazawa K, et al., [13] with the use of LMA-Fastrach in blind endotracheal intubation in patients undergoing cervical spine operation present a good experience. In conclusion we consider that we cannot oppose the use of Fastrach for the use of endotracheal intubations in patients with difficult airway until it becomes available of more evidence on its efficacy and in addition to continuing studies aimed at comparing the usefulness and efficacy of intubations with instruments of frequent use in the management of the airway.

Conclusions

The use of the laryngeal mask for Fastrach intubation as an alternative in direct laryngoscopy for endotracheal intubation in patients with easy air is feasible and has shown to have fewer complications during its use as well as being useful, safe and effective.

The hemodynamic behavior shown in both groups and the discomfort or complications after the procedure showed no statistical differences.

We suggest becoming familiar with the use of new work instruments for the management and control of the airway before attempting to use it with difficult airway patients.

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