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ANESTHESIA USING LARYNGEAL MASK AIRWAY FOR INTRA-NASAL SURGERY; A COMPARATIVE STUDY

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Abstract:

The purpose of the study was to compare the suitability and safety of the laryngeal mask airway (LMA), for intranasal surgery (INS) anesthesia, with endotracheal tube (ET) anesthesia.

we studied 65 patients (ASA grade I and II, according to American Society of Anesthesia classification), aged (18-39) years. The study population was scheduled for elective intranasal surgery. The patients were randomly assigned into two groups: the first group (33 patients), a laryngeal mask airway (LMA Group) was inserted under propofol , fentanyl and muscle relaxant (atracrium), anesthesia was maintained by using a mixture of halothane in N_2O/O_2. The second Group (32 patients), an endotracheal tube (ET Group) was inserted under propofol, fentanyl and muscle relaxant (atracrium), anesthesia was maintained with a mixture of halothane in N_2O/O_2.

All complications concerning airway insertion, removal or interruption of surgery for compromised airway and ventilation were recorded. Mean blood pressure, heart rate and pulse oxymetry, were continuously monitored and recorded before and after induction and airway device insertion, followed by 10 minutes intervals. Data were analyzed using chi square statistical test; Null hypothesis was rejected at *P> 0.05.*

In LMA Group, there were no episodes of post removal laryngospasm. The incidence of oxyhemoglobine desaturation at removal was significantly reduced compared with that in ET Group (P< O.O2). The number of patients with oxyhemoglobine desaturation less than 92% on airway device removal was 0% in LMA Group, 3 patients (9.375%) in ET Group.

In ET Group, the mean blood pressure and heart rate showed significant variation between the different time measurements *(P> 0.005)*. Intubation and extubation resulted in significant transient increase in mean blood pressure and heart rate. In LMA Group, the mean blood pressure was less than baseline value from 1 minute after induction onwards *(P< 0.005)* and did not show any significant changes during the different time points measurements. LMA application or removal did not cause any significant increase in mean blood pressure or heart rate *(P< 0.001).*

We conclude that using LMA is suitable method for intranasal surgery. It provides a safe, protected airway with a smoother emergence from anesthesia than tracheal intubations. Anesthesia using LMA for intranasal surgery provides a stable circulation.

Introduction:

Operations on the nose have one common feature that they involve surgery on a particularly vascular structure. Tracheal intubation is performed during general anesthesia to secure a clear airway, to obviate contamination of the larynx with blood, to allow good surgical access (special problems are caused when the airway is shared by both anesthetist and surgeon) and to facilitate ventilation of the lungs during the muscle relaxant technique.

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Intubation is associated with tachycardia, hypertension, and increase in surgical bleeding. Also extubation and early post-extubation period is associated with coughing , spasm, with the result of O_2 desaturation[1]. More and more anesthetists now use the Brain's laryngeal mask airway (LMA), instead of tracheal tube (TT) during general anesthesia (GA) for different surgical procedures. LMA seems that it can replace TT in many aspects of anesthetic practice. Contamination of larynx with blood may be the main worry of using laryngeal mask airway during intranasal surgery . John R.E and his colleagues 1991, prove in a pilot study that a correctly positioned LMA attains a gas tight seal of up to 2 Kpa, and has been shown to protect the larynx from dye placed in the pharynx[2.]

The aim of this prospective study was to compare the suitability and safety of the laryngeal mask airway (LMA), for intranasal surgery (INS) anesthesia, with endotracheal tube (ET) anesthesia and to compare the pressor effect of airway device insertion and removal on the mean blood pressure and heart rate.

Patients & Methods

We studied 65 patients(18-39 years old), ASA grade I and II according to American Society of Anesthesia classification). The study population was scheduled for elective intranasal (SMR) surgery. The patients were randomly assigned into two groups: LMA group (33 patients). TT group (32 patients). Morbidly obese patients or patients with increase risk of regurgitation were excluded from the study[3]. Patients characteristics and distribution are shown in table I.

Informed consent was obtained from all patients. No premedications were given. Monitoring consisted of continuous ECG monitoring, non-invasive blood pressure monitoring, pulse oxymetry and end tidal carbon dioxide partial pressure monitoring (capnography).

Anesthesia was standardized for both groups; After determination of baseline data and 3 minutes preoxygenation, induction took place, it consisted of propofol (1-3 mg/Kg), fentanyl (1-2mcg/Kg)and atracrium (0.5mg/kg) for both groups. LMA insertion or TT intubation took place after inflation of the patients lung with a mixture of halothane (0.8-1%) in N_2O/O_2, FiO_2= 40% for 180 seconds and when the patient did not respond to jaw lift. Correct placement was confirmed by a clear airway and the ability to inflate the patient's lung without any audible gas leak.

Anesthesia was maintained by using a mixture of halothane (0.8-1%) in N_2O/O_2,FiO_2=40%.with IPPV atracrium

After insertion of the airway device, a posterior pharyngeal pack was inserted. At the beginning of surgery, the surgeon infiltrated a local vasoconstrictor (adrenaline mixed with lignocaine) 2-3ml in both sides of septum. All patient were positioned in a 10-15^0 head up position. Whenever the surgeon complained from bleeding, controlled hypotensive anesthesia with glyceryl trinitrate (50 mg in 100 ml saline) intravenous infusion of 10-20 mcg/ min was initiated.

At the end of anesthesia, a flexible direct laryngoscope was inserted through the LMA tube, to view the larynx above the vocal cords, then a good gentle pharyngeal toilet was performed, then the pharyngeal pack was removed. For antagonism of neuromuscular blocking agent, a neostigmine 2.5-5 mg and atropine 1.2-2.4 mg was given. The air way device was lift in situ till spontaneous breathing and full consciousness resumed.

All complications concerning LMA insertion, removal or interruption of surgery for compromised airway and ventilation were recorded. Heart rate and mean blood pressure, were continuously monitored and recorded before and after induction and airway device insertion, followed by 10 minutes intervals. Pulse oxymetry and capnography were continuously monitored and recorded on specific changes. Data were analyzed using Chi-Square statistical test. Null hypothesis was rejected at P>0.05.

Table I: Patients characteristics and distribution.(mean +SD)

Patients	LMA Group	TT group
Age	30.5+6.42	31.6 +7.68
M : F	26:7	28:4
Weight	66.4+5.2	68.91+7.3
M. BP	86.33+7.64	89.67+6.79
M.HR	79.43+8.02	76.35+6.87

Results

There were no significant differences between the two groups in age, weight and sex. TT intubation and LMA insertion was achieved without difficulty in all patients. Surgical access was good in all patients of both groups.

There were no significant interruption during anesthesia and surgery. A mild air leak was diagnosed in 1 patient of LMA group, surgery and anesthesia continued without interruption.

Laryngeal spasm occurred in 2 patient of LMA group, once on LMA insertion (table II), because of inadequate depth of anesthesia and premature insertion, which resolved with deepening of anesthesia. The other laryngeal spasm occurred on extubation, which was treated with 100% oxygen with manual ventilation, three patients of LMA group coughed after exertion of LMA, in one of these patient the SaO_2 was reduced. One laryngeal mask was displaced by laryngoscope, during pharyngeal packing, it was re-positioned easy while in situ. Laryngeal spasm and coughing episodes occurred more frequently (7 patients, P>0.5 and 25 patients P>0.5 respectively) in the TT group at extubation (table III), most probably due to tracheal stimulation from TT intubation[4]. Two of the patients with laryngeal spasm were treated with suxamethonium 20 mg intravenously and manual ventilation with 100% oxygen, the others were treated with only support.

Table II: Perioperative observation

complications	LMA	TT
obstruction	0	0
displacement	1	0
Laryngospasm	1	0
SO2<94%	1	0

Table III: Recovery observation

airway maintenance	LMA	TT Guedal.
easy	30	22
support	3	10
Coughing	3	25
laryngospasm	1	7
SpO2<94%	2	9
Blood inner surface	2	-

Tables IV and V shows the changes of mean blood pressure and heart rate of both groups, there were significant group differences in both of these variables after induction of anesthesia, intubation or laryngeal mask insertion and maintenance of anesthesia. Patients in the laryngeal mask group experienced a decrease in mean arterial pressure during induction, insertion and maintenance of anesthesia ($P< 0.01$) while patients in TT group showed a significant increase in arterial pressure and heart rate at intubation ($P<0.02$). LMA was associated with lower mean arterial pressure throughout the procedure ($P<0.01$).

Table IV: Mean (S.D) blood pressure for both groups

	Baseline data	Post intubation		1 min before incision	Extubation		
		30 sec	3min		1 min before	1 min after	5 min after
LMA	**86.33+7.64**	**82.4(5.3)**	**85.3(4.74)**	**84.8(5.1)**	**92.7(5.5)**	**102.3(2.5)**	**101.34(5.8)**
TT	**89.67+6.79**	**112.9(9.6)**	**107(6.45)**	**103(5.8)**	**101.6(3.9)**	**115.8(7.4)**	**112.9(4.63)**

Table V: Mean heart rate (SD)of both groups

	Baseline data	Post intubation		1 min before incision	Extubation		
		30 sec	3min		1 min before	1 min after	5 min after
LMA	**73.1(6.3))**	**82,3(6,3)**	**76,6(5.3)**	**70.2(3.5)**	**65.8(7.6)**	**82.8(5.6)**	**76.4(4.8)**
TT	**70,6(5.9)**	**97.5(8.75)**	**95.6(7.33)**	**85.8(6.5)**	**75.3(9.6)**	**98.65(10.3)**	**95.4(6.9)**

Discussion

Our results show that the Laryngeal mask airway may be used in place of tracheal intubation during anesthesia for intra-nasal surgery. Reducing the bleeding during intranasal surgery to facilitate the surgical access is of prime importance. Tracheal intubation and extubation may be associated with sympathoadrenal activity manifested by tachycardia, hypertension and elevation of plasma catechol-amines[5,6] which leads to increase bleeding during intranasal surgery, while LMA insertion results in stable circulation[7,8]

In this study the differences in the mean blood pressure and heart rate after intubation or LMA insertion are in agreement with previous compare-sons[5-8]. The mean blood pressure and heart rate results after insertion of LMA was significantly smaller than that after TT insertion, as also the differences between the different time points measurements during the individual procedure. There was however significant haemodynamic response to intubation with a 15% increase in mean arterial pressure and a 18% increase in heart rate. These finding are in broad agreement with other studies[9].

In most of patients of LMA group, increasing the halothane concentration could lead to decrease in the systemic pressor effect (MBP, HR) and the nasal bleeding, while it needed a hypo-tensive agent in 8 patients in TT group to do so, halothane alone was not enough. This was probably caused by the increase in pressor effect of TT.

It is noteworthy that LMA anesthesia provided adequate and safe surgical access during intra nasal surgery, the surgeon could not distinguish between it and tracheal tube.

Although we didn't see the trachea in both groups, we have assumed that the trachea was not contaminated because there were no cases of laryngeal contamination and only one case of blood entering the inner face of LMA by the end of surgery.

The airway was compromised in one patient in the LMA group, this patient developed mild laryngeal spasm on premature insertion of LMA, and this highlights the need to insure adequate depth of anesthesia before insertion of LMA. In this patient, there was a reduction of SO_2 <94% for 30 sec period. Manual forceful ventilation and increasing the depth of anesthesia with propofol could end the drop in SO_2. this study is in agreement with the results of Haynes and his colleagues[4] while studying arterial oxygen during induction of anesthesia and laryngeal mask insertion found that, most of drop of Spo_2 and difficulties in insertion of LMA, were caused by inadequate depth of anesthesia initially. With the exception of this iatrogenec case of laryngeal spasm, the laryngeal mask provided as clear an airway as the TT.

One laryngeal Mask Airway was displaced during pharyngeal pack insertion, this occurred because the laryngoscope blade elevated the tongue base, allowing the LMA to slip over it. This can be avoided if care is taken to elevate the mask portion of the LMA and the tongue base together.

In this study, the sequels at extubation of the airway device were more in the TT group. This resulted from the increase stimulation of the TT on laryngeal and tracheal mucosa, these results are in agreement with other studies comparing the effect of either TT or LMA on laryngeal and tracheal mucosa[10, 11].

We conclude that controlled ventilation anesthesia using LMA is suitable method for intranasal surgery. It provides a safe, protected airway, stable circulation, and smooth emergence from anesthesia than tracheal intubation.

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