

COMPARISON LARYGEAL MASK AIRWAY WITH THE ENDOTRACHEAL TUBE FOR THE EXTERNAL DACRYOCYSTORHIONOSTOMY SURGERY. A RANDOMIZED CLINICAL TRIAL

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Abstract

Background: General anesthesia (GA) is considered the gold standard for external dacryocystorhinostomy (DCR) surgery. There are few reports about laryngeal mask airway (LMA) use in DCR surgery. The aim of this study was to compare the use of endotracheal intubation (ETT) vs LMA for airway management during DCR surgery.

Methods: Ninety patients were randomized to two groups. In the group C, ETT and in the group L, classic LMA was used to maintain and protect the airway during the procedure. Hemodynamic data before, after intubation or LMA insertion and after skin incisions were recorded. Coughing and straining at the end of anesthesia and postoperative nausea and vomiting (PONV) were recorded.

Results: In the group L, the mean arterial pressure and the heart rate after LMA insertion and after the skin incisions were significantly lower than the group C ($p < 0.05$). Furthermore, incidence of coughing, straining at the end of anesthesia and PONV was lower in the group L than the group C ($p < 0.05$).

Conclusion: LMA can be used in external DCR, to decrease the hemodynamic changes, to decrease coughing, straining at the end of anesthesia and the incidence of PONV.

Keywords: Dacryocystorhinostomy. Laryngeal Masks. Postoperative Nausea and Vomiting

Introduction

Surgeons usually prefer to perform external dacryocystorhinostomy (DCR) procedure under general anesthesia (GA)¹⁻³ with the anesthesiologists using oral endotracheal intubation (ETT) for airway management⁴⁻⁷. Although ETT serves as a standard protective device against blood aspiration, marked hemodynamic response including hypertension, tachycardia and arrhythmias often follows direct laryngoscopy and tracheal intubation⁸. This response can be harmful, especially in the old patients with coexisting heart disease⁹.

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At the end of external DCR surgery a smooth extubation is indicated because coughing and straining will result in increased bleeding from the nose¹⁰. Also during DCR surgery, blood usually enters the stomach and as such postoperative nausea and vomiting (PONV) are common complications following this surgery¹¹.

Laryngeal mask airway (LMA) allows the support of a patent airway with some benefits. Insertion of an LMA doesn't require laryngoscopy and thus eliminate all its associated complications¹². Also, the incidence of coughing on emergence has been shown to be lower with the LMA than with the ETT¹³ secondary to lack of tracheal stimulation. Furthermore, previous studies showed that the incidence of postoperative nausea and vomiting (PONV) to be lower with LMA versus ETT¹⁴.

There is little data regarding the use of laryngeal airway mask during external DCR surgery. The aim of this study is to assess the effects of using an LMA for external DCR surgery on blood pressure and heart rate at the start of surgery, the incidence of coughing on emergence and the incidence of postoperative nausea and vomiting.

Methods

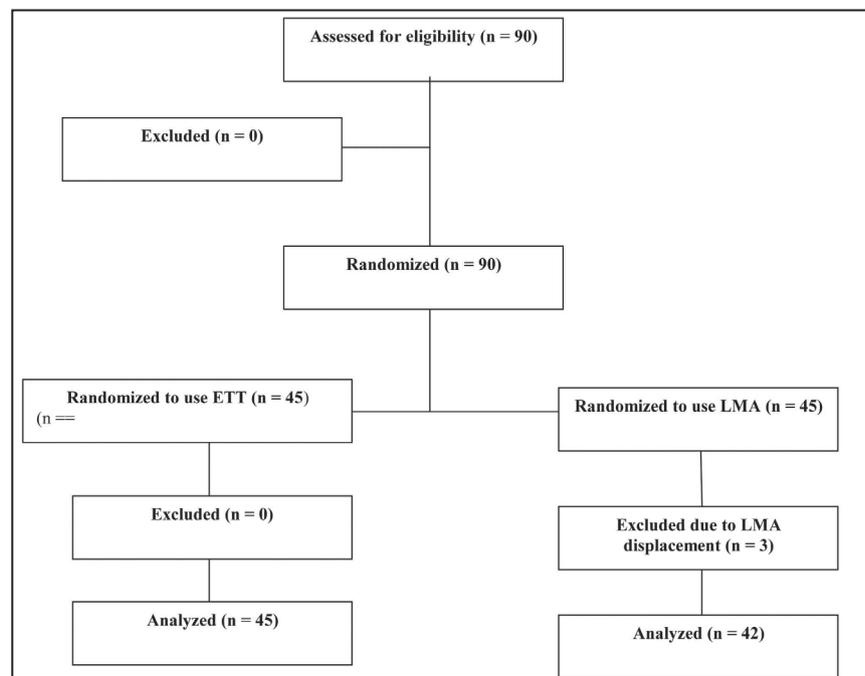
After the approval of our institutional ethics committee and attaining written informed consent,

ninety patients with ASA I-II, scheduled for elective external DCR because of nasolacrimal duct obstruction were randomized into two groups: Group C (Classical group, received ETT) and Group L (received LMA). Patients were excluded from the study if they had history of (1) any pathology in gastrointestinal tract (2) motion sickness or received antiemetic drugs for the last 2 weeks (3) chronic obstructive lung disease or asthma (4) bleeding diathesis or on anticoagulants and (4) with extreme obesity (body-mass index >40 Kg/m²).

Patients in both groups received midazolam (0.03 mg/kg) and fentanyl (2 µg/kg) intravenously. Then anesthesia was induced intravenously with thiopental (4-5 mg/kg) and atracurium (0.6 mg/kg) was used to facilitate oral tracheal intubation in the group C or classic laryngeal mask airway (LMA) insertion in the group L (Fig. 1). Anesthesia was maintained with isoflurane (1.20 vol %) in a 50% oxygen-N₂O mixture. Lung ventilation was mechanically controlled throughout the surgery and for prevention of gastric insufflation in patients who had LMA, tidal volume was set at 5 ml/Kg and peak airway pressure (PAP) was set at 18 cm H₂O.

The heart rate (HR) and mean arterial blood pressure (BP) of patients in both groups before induction of anesthesia, 5 minutes after oral tracheal

Fig. 1
Flowchart of the patients according to the consort guidelines



intubation in group C or 5 min after laryngeal mask insertion in group L, and 5 minutes after surgical incisions in both groups were recorded.

At the end of surgery and when the patients became fully awake, the LMA or ETT was removed and the incidences of coughing or straining, if any, were recorded. Then the patients were transferred to the post anesthesia care unit and the postoperative nausea and vomiting episode was recorded until 24 hours after surgery. The incidence of PONV was recorded according to the patients complaints as follow: 0 = no nausea or vomiting; 1 = nausea only; 2 = retching or/ and vomiting. Vomiting was defined as the forceful expulsion of gastric contents from the mouth nausea was defined as a subjectively unpleasant sensation associated with awareness of the urge to vomit.

Statistical analysis

The primary outcome of study was 20% decrease in the MAP following the use of LMA instead of ETT. According to variance 27 and mean difference 10 in the MAP, a sample size of at least 40 patients in each group was considered sufficient to detect a 5% difference ($\alpha = 0.05$, $\beta = 0.8$). However another 10% was added to sample size of each group to compensate for drop outs and finally, 45 patients in each group (total of 90 pts) was calculated as being appropriate. Statistical analyses were performed with SPSS version 14.0 software (SPSS, Inc., Chicago, IL, USA). All values were presented as means \pm SD and $P < 0.05$ was considered significant in all statistical tests.

Student's t-test was used for analysis of baseline characteristics of both groups and Chi-square test was used for analysis of categorical data. Repeated analysis of variance was used repeated measures of BP and HR. All comparisons were two-tailed. P-values < 0.05 were considered statistically significant.

Results

Three patients were excluded from group L due to displacement of LMA (Fig. 1). No significant differences were noted in the demographic characteristics of patients in both groups ($P > 0.05$)

(Table 1). No significant differences in baseline mean arterial pressure and baseline heart rate were noted between the two groups ($P = 0.15$, $P = 0.24$ respectively) (Fig. 2 and Fig. 3). However, at 5 min after intubation and 5 min after incision the mean arterial blood pressure and heart rate were significantly higher in the group C than in group L ($P = 0.002$, $P = 0.001$ respectively) (Fig. 2 and Fig. 3).

Table 1
Patients' Characteristics (mean \pm SD)

	Group C (N =45)	Group L (N =42)	P value
Age(year)	49.32 \pm 3.81	52.32 \pm 1.49	0.91
Weight(Kg)	69.67 \pm 4.19	70.34 \pm 3.92	0.70
Body-Mass Index (kg/m ²)	25.11 \pm 1.31	26.78 \pm 1.92	0.87
Gender(F/M)	25/20	27/18	0.69
Operation duration (min)	45.89 \pm 7.81	48.67 \pm 5.61	0.54

The incidence of coughing and straining in group L was 3% and significantly lower than in group C (64.44%; $P = 0.0001$). The incidences of postoperative nausea and vomiting were lower in group L than in group C ($P = 0.001$) (Table 2).

Table 2
Incidence of postoperative nausea and vomiting (PONV) in the group C and group L

Variables	Group C	Group L	P-value
Nausea, No. (%)	21(46.6%)	10 (23.8%)	0.01
Vomiting, No. (%)	15(33.3)	6(14.2%)	0.02
Total PONV, No.(%)	36(79.9%)	16(38%)	0.001

Discussion

The present study showed that use of classic LMA during GA for external DCR surgery is associated with less significant hemodynamic response as compared to oral endotracheal tube and may result in lesser coughing, straining at the end of anesthesia and less postoperative nausea and vomiting.

In 2008 Makuloluwa reported a case series about

Fig. 2
Mean arterial blood pressure (mmHg)
in both groups

At 5 min after intubation and 5 min after incision the mean arterial blood pressure (MAP) were significantly higher in the ETT group than in the LMA ($p < 0.05$)

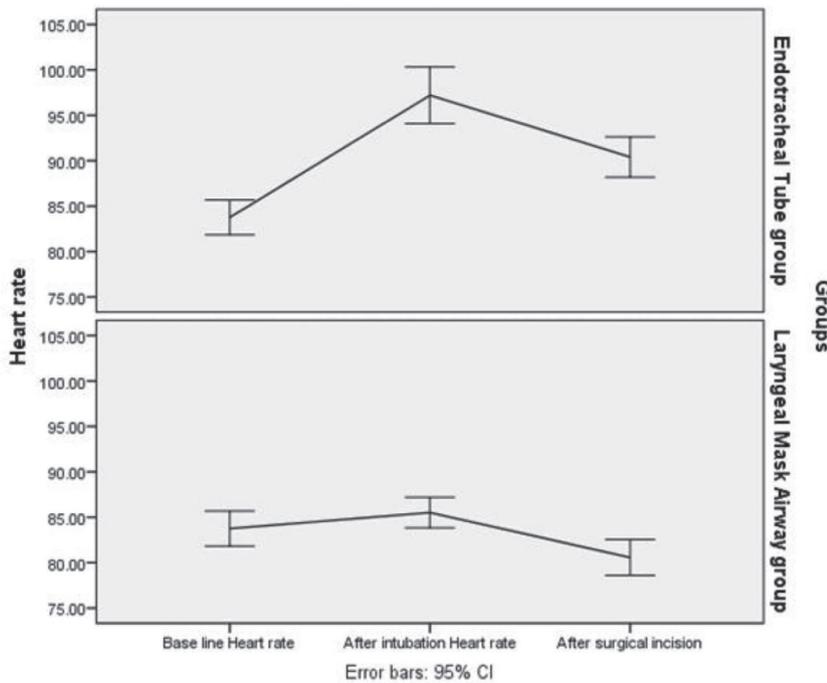
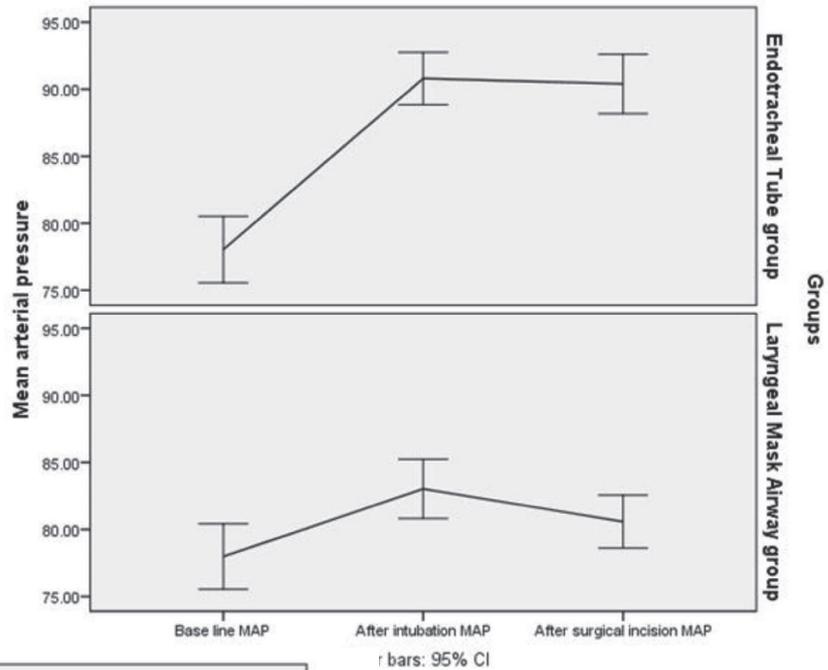


Fig. 3
Heart rate in the both groups

At 5 min after intubation and 5 min after incision, heart rate was significantly higher in the ETT group than in the LMA ($p < 0.05$)

the use of the classic LMA during endoscopic DCR and suggested the use of the classic LMA during anesthesia for endo-DCR decreased complications associated with the use of the ETT which include laryngospasm, aspiration and significant bleeding with straining and coughing following extubation¹⁵. These complications can produce considerable morbidity in the patients following GA for DCR¹⁵. However this report just was a case series but our study was a clinical trial with the

more patients that compared the classic LMA with the ETT during GA for external DCR, these are considered as the positive points of our study.

Waleed Riad et al. published an article regarding anesthesia for external DCR and wrote the use of endotracheal intubation and pharyngeal pack are remained an important place during GA for DCR⁶. However they confirmed that to decrease the bleeding during surgery, the patients' blood pressure should be

maintain 20% lower than normal value and to decrease nose bleeding at the end of surgery, a smooth extubation without coughing and straining is necessary. They also noted that postoperative nausea and vomiting is a common problem after DCR surgery that could be decrease by the use of pharyngeal pack⁶.

Multiple clinical studies showed that hemodynamic changes are less during the LMA placement than during tracheal intubation^{16,17,18} also, in the current study the mean arterial pressure and heart rate in the LMA group lower than the ETT group during the surgery. Regarding coughing and straining at end of surgery, Jeff E et al. and Tanaka A et al. in their studies Showed that the incidence of coughing and straining are much less during removal of the LMA than during tracheal extubation^{19,20}. The present study showed that incidence of coughing and straining are much less during removal of the LMA than during tracheal extubation and like other studies this could decreased nose bleeding at end of surgery.

Piltcher et al. like Waleed Riad in their study showed the effect of pharyngeal pack in the prevention postoperative nausea and vomiting by preventing blood enter the stomach during nasal and sinus surgery²¹, but Erkalp K et al. showed in their study that pharyngeal pack during nasal surgery increases postoperative

morbidity by leading to the development of painful oral aphthous lesions or sore throat²². In the present study, laryngeal mask worked like pharyngeal pack and effective in the prevention of entering blood to the esophaguse and stomach and decreasing PONV, without the usual complications of pharyngeal pack.

This study had some limitations, first we should used reinforced LMA instead of the classic LMA in our study, reinforced LMA has a flexible tube which permit the anesthetist to tape the tube away from the operative field especially in head and neck surgery so decrease the incidence of LMA displacement in the event of movement of head and neck during surgery. Second, the surgical filed and surgeon satisfaction with the ETT or LMA should be evaluated and compared. Therefore, more studies are recommended to use reinforced LMA during anesthesia and to compare surgeon satisfaction about surgical filed during surgery with the ETT or reinforced LMA.

In conclusion, LMA can be used instead of ETT in external DCR in the patients in whom insertion of LMA is not contraindicated, in order to decrease the incidence of hemodynamic changes during insertion, decrease the incidence of coughing and straining at the end of surgery and decrease the incidence of PONV.

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