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*Original Article*

# Comparison Between Laryngeal Mask and Endotracheal Tube: The Impact of The Incidence of Postoperative Nausea and Vomiting After Breast Augmentation

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## *Abstract:*

***Background:*** *Postoperative nausea and vomiting (PONV) is a common and bothersome side effect after general anesthesia; many patients rank it as the worst experience together with postoperative pain and intraoperative awakening.*

***Objective:*** *to determine the existence of postoperative nausea and vomiting after the use of laryngeal mask or endotracheal tube, in women undergoing breast augmentation in our hospital.*

***Material and method****: A descriptive, prospective study was carried out in patients undergoing augmentation mastoplasty, in the period from Jan 2020 to Dec 2023, and 192 female patients aged between 20 and 45 years, classified as ASA I according to the physical fitness scale of the American Association of Anesthesiology and who were willing to cooperate were enrolled in the study.*

***Results:*** *patients were divided into two groups in which 96 women in each group, within mean age 29.41 ± 4.3 years for laryngeal mask and 29.02 ± 2.8 years in endotracheal tube group. in the Postoperative room, the nausea and vomiting were recorded in 16.7% of patients in the LM group and 12.5% in the ET group.*

***Conclusion:*** *It is concluded that no statistical variances were recognized between the use of laryngeal mask and an endotracheal tube for the approach of the airway and the incidence of postoperative nausea and vomiting after breast augmentation.*

***Keywords****: laryngeal mask, endotracheal tube, postoperative nausea and vomiting, breast augmentation*

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## 1. INTRODUCTION

Postoperative nausea and vomiting (PONV) is a common and bothersome side effect after general anesthesia; many patients rank it as the worst experience together with postoperative pain and intraoperative awakening (1). PONV increase the risk of postoperative complications, delay discharge from the PACU, and represent one of the leading causes of unplanned hospital admission after day surgery, contributing to increased hospital costs . It is estimated that between 20 and 30% of patients present PONV, and in high-risk groups this incidence can reach up to 70% (2). PONV are the result of a response from the nervous system in the face of a relatively wide succession of stimuli that trigger the release of various mediators or neurotransmitters with a corresponding range of receptors. Most of the research has focused on prophylaxis strategies or drug treatment that they interact with those mechanisms to avoid this event or mitigate its severity (3). Some research has been directed towards identifying those exogenous stimuli that are most likely to trigger this nausea, regardless of those endogenous gears that may be involved. In such a dilemma, general anesthesia has been contrasted with regional anesthesia, the use or not of μ receptor agonist agents, the use or not of nitrous oxide, the presence or not of postoperative pain, as well as the different anatomical regions that are the objects of surgical intervention, to name just a few contrasts (4). When general anaesthesia is the choice for a surgical intervention and the operation exceeds 30 to 40 minutes, the anesthesiologist, for safety reasons for the patient, usually establishes artificial respiration controlled by devices placed in the airways to guarantee this vital function (5). Currently, the most widely used instruments for this purpose are the endotracheal tube (ET), with a pneumatic sleeve that, when inflated, guarantees the tightness and protection of the lower respiratory tract or one of the supraglottic devices (more recently introduced) such as the laryngeal mask (LM), or one of its substitutes are the most universally used (6). Since the advent of LM in the 80s of the last century, multiple investigations have been designed to contrast ET versus LM; but among the various response variables, derived from these interventions, the incidence and severity of POVN has not been included explicitly except in a report published by Porhomayon J. et al, through a comparative study in interventions for total knee arthroplasty (7). Let's consider that the conformation of these two types of devices, their insertion technique, their location and contact with potentially hematogenous anatomical structures (both of the respiratory tract and its crossroads with the digestive

tract), differ markedly. The scientific question arises: which could significantly influence the incidence and severity of PONV in the postoperative period (8,9). The present study is probably the first or one of the first studies in our country and the world, with a level of evidence aimed at identifying the specific influence of the use of an LM or a ET on the occurrence of PONV in the surgical intervention for the placement of breast implants for the one that states that the PONV is not related to the device used.

## 2. PATIENTS AND METHODS

A descriptive, prospective study was carried out in patients undergoing augmentation mastoplasty, in the period from Jan 2020 to Dec 2023, with the aim of determining the occurrence of postoperative nausea and vomiting with laryngeal mask vs. endotracheal tube anaesthetic technique in women underwent for breast augmentation.

**Inclusion criteria:**

Female patients aged between 20 and 45 years, classified as ASA I according to the physical fitness scale of the American Association of Anesthesiology and who were willing to cooperate were enrolled in the study.

**Exclusion criteria:** Women with a history of PONV in previous interventions, history of motion-associated nausea and vomiting, consumption of drugs with antiemetic action (antihistamines, phenothiazine's, butyrophenone, dopaminergic or serotoninergic antagonists, as well as anticholinergic agents or dexamethasone). history of smoking, alcoholism, hiatal hernia and gastro esophageal reflux, any anatomical factor that makes an anatomically difficult airway to be expected for intubation of the trachea and women with body mass indexes below 18 nor above 25 kg/m2.

**Sample size:** It was constituted by a consecutive series of 192 patients who met the selection criteria during the period of the study

**Method:**

**Procedure for conducting the study**

After patients arrived to the operating room, venous routing and pre-anaesthetic medication were given, Each patient arrived at the preoperative room that was placed (after he changed clothes and installed on a transfer table) expedited precordial electrodes for a V5 derivation modification each due to the need for that the entire pectoral region on his ventral face is cleared for surgical manoeuvres. An electrode was placed in the sixth

intercostal space on the posterior axillary line, another behind of the right shoulder and the third behind the left shoulder. A peripheral vein, preferably on the back or at the edge radial of the wrist of the non-dominant hand, was channelled with an 18 or 20 G cannula in which an intravenous line was installed with a three-way key inserted and a venoclysis was initiated with a dextrose-free balanced electrolyte solution with a conflux of 100 mL per hour. The anesthesiologist responsible for the project or one of his collaborators administered in instant before transferring her to the operating room 0.03 mg intravenous midazolam more 0.003 mg of atropine.

**Monitoring, anesthesia induction and instrumentation of the respiratory tract.**

Once every patients has moved from the transfer table to the table of operations, the wires corresponding to the V5 branch modified each were connected to the previously attached electrodes to the skin by selecting the DI shunt on a monitor Nihon-Kohdem BSM 4303, the one that allowed, at the same time, continuous monitoring from the time of arrival at the operating room, the percentage of haemoglobin saturation, blood pressure non-invasive arterial every 2.5 minutes and from capnography (Carbon dioxide monitoring) to start mechanical ventilation. The induction of anaesthesia was performed through a hypno-analgesia based on the intravenous administration of the following drugs: atracurium, 0.05 mg/kg of which is administered 10% at the start of the induction. Then 0.003 mg/kg of atropine was administered, followed by 5 µg/kg of fentanyl. Another 0.003 mg/kg was administered consecutively of atropine, followed by the remaining 90% of the calculated dose of atracurium to administer a pulse of 2 mg/kg of propofol. From the beginning of intravenous induction of anaesthesia, each patient breathed 100% oxygen through a gently adjusted face mask by placing the machine of anaesthesia, which in all cases was a Fabius GS of Dräger, in manual ventilation mode to drive the breathing from spontaneous to controlled passing through a transitional phase with assisted ventilation whose progress it marched parallel to the deepening of the anaesthetic plane. Between one and two minutes before the end of the induction of the anaesthesia, three continuous infusions were initiated from respective perfusing syringes with 50 mL each; the first of them contained 2% propofol at a rate of 10 mg/kg/hour during the first hour (0.5mL/kg/hour), the second syringe it contained fentanyl 750 µg for an infusion flow of 3 µg/kg/hour for the first hour and the third infusion syringe contained 100 mg atracurium and was adjusted to deliver 60 µg/kg/hour that is, 0.3 mL/kg/hour. In the case of fentanyl and of the atracurium the diluent

solution was the sodium chloride to 0.9%. After the anesthetic induction, which should take not less than 10 minutes nor more than 15 minutes, we proceeded to establish the corresponding LM device or ET strictly following the techniques described by John Henderson in Chapter 50 of the (Airway Management in the Adult) book Miller' Anesthesia in its seventh edition of 2009 (10)

**Maintenance of anaesthesia and other adjuvant measures.**

Mechanical ventilation was carried out in the modality controlled by volume, with current volumes between 6 and 8 mL/kg and respiratory rates between 12 and 16 cycles per minute, with adjustments of both variables to obtain values of carbon dioxide exhaled between 35 and 45 mmHg. The inspired fraction of oxygen was 0.40, and fluxes were given of fresh gas equal to the minute volume applied. Immediately after the start of mechanical ventilation, all patients received an intravenous dose of dexamethasone of 0.1 mg/kg, then one gram of intravenous cefazolin as an antimicrobial prophylaxis.

After the first hour, the heart rate and blood pressure trends reduce by 30 to 50% the fluxes of propofol and fentanyl. The three infusions should be closed between 20 and 10 minutes before completing the surgical intervention; at that moment, all the patients received a tramadol dose of 1 mg/kg more than an intravenous dose of dipyrone of 2.4 grams. It began breathing in manual control mode to identify the beginning of the inspirational efforts of the patient to progress from assisted to spontaneous breathing.

**The end of anesthesia:**

After the intervention, no administered, in no case, drugs to reverse the effects of the agents previously supplied. All the patients were recovered in the operating room. The removal of the TE or from the ML was performed when the patient had an adequate flowing volume of at least 5 mL/kg with a frequency respiratory rate greater than 8 and less than 20 cycles per minute at to open his eyes and mouth in response to commands commanded by the anesthesiologist and that he has been able to hold the head raised above the plane of the table for at least 30 seconds.

**Collection of the data.**

For the collection of information, we worked with the medical records. It was made the data collection fi cha and proceeded to review the medical records, from which the relevant information was extracted to the variables selected for the study.

**Sources of information.**

Hospital clinical history and data collection form.

Information processing. For the processing of the information, an automated database was created with the Excel 2003 electronic spreadsheet; to ensure the security of the same, backup copies were made in compact discs and "Flash" memories—the primary data they were processed with the SPSS 25.0 software.

**Statistical processing.**

The data of the form were emptied into a database created in the program statistical SPSS version 22.0, where distributions were made of frequencies, percentage calculations, standard deviation calculations and measures of central tendency. They have used the methods of descriptive statistics. The variables qualitative and the age taken to ordinal scale were described statistically by frequency and percentage figures; for the percentages of interest, their range of trust with (95% CI).

**Ethical aspects of research.**

The research was conducted at all times under prevailing ethical standards in the health care system that we enjoy in our society. The information obtained was used only for scientific and teaching purposes.

Informed consent of the patients was not required well; first of all, they were subjected to procedures and treatment protocols established in our hospital; secondly, the necessary information was collected from the usual medical records. In addition, this research it was approved by the Scientific Council of the hospital, which entails the commitment to ethical behavior in all phases of the study by the professionals involved, and that the data obtained be used only for scientific and/or educational purposes.

## 3. RESULTS

192 patients were evaluated, included in the study and divided into two groups of 96 patients each. The distribution of the groups according to mean age and body mass index showed no significant differences between the studied groups (P>0.05) (**Table 1**). The occurrence of NVPO can be observed in the operating room, at the end of the anesthetic act. The use of mask laryngeal had a 1.17 times higher risk of presenting with OPNV than when endotracheal tube was used (**Table 2**). The occurrence of nausea and vomiting is shown in (**Table 3**) upon arrival at PACU. The use of LM has 1.15 times higher risk of

developing OPVN than ET, with a level of confidence of 95%. The occurrence of nausea and vomiting are shown in (**Table 4**) to the discharge of PACU. Was observed both in patients with LM as ET the presence of PONV was 4.17% of the cases, with four patients respectively. It can be pointed out that the results of the occurrence of nausea and vomiting during the period of hospitalization, according to the anesthetic technique, showed that four patients (4.17%) with ET were existing with nausea and vomiting, while in the patients with LM was detected in two patients (2.1%). It was found that there is no important differences were recognized with the use of LM or ET in the existence of PONV in the theater room, to the arrival at PACU, on discharge from it, for the period of hospitalization and rescue at PACU, in clinical practice to obtain an effective control of the PONV. The occurrence of nausea and vomiting was demonstrated during the rescue in PACU according to anesthetic technique. Both in the patients with LM as with the ET, a predominance was observed of nausea and vomiting in 2.1% of cases respectively.

Table 1. Distribution of the groups according to the study's age and body mass index.

| Parameters (mean ± SD) | LM | ET | Medium differences | P. value |
|---|---|---|---|---|
| Age | 29.41 ± 4.3 | 29.02 ± 2.8 | 0.2 | 0.4 Ns |
| BMI | 23.1 ± 1.3 | 22.9 ± 1.04 | 0.32 | 0.24 Ns |

ET = Endotracheal tube, LM = Laryngeal mask, p = Statistical significance, NV = Nausea and vomiting.

Table 2: Occurrence of nausea and vomiting postoperative procedures in the operating room

| NV in the operating room | LM | | ET | | P value |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| Yes | 16 | 16.7 | 12 | 12.5 | P<0.05 |
| No | 80 | 83.33 | 84 | 87.5 | |
| Total | 96 | 100.0 | 96 | 100.0 | |

ET = Endotracheal tube, LM = Laryngeal mask, p = Statistical significance, NV = Nausea and vomiting.

Table 3: Occurrence of nausea and vomiting on arrival at PACU.

| Arrival at PACU | LM | | ET | | P. value |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| Yes | 8 | 8.3 | 6 | 6.2 | P<0.05 |
| No | 88 | 91.7 | 90 | 93.8 | |
| Total | 96 | 100.0 | 96 | 100.0 | |

ET = Endotracheal tube, LM = Laryngeal mask, p = Statistical significance, PACU= Post-anesthetic Care Unitو RR = 1.17 (95% confidence level).

Table 4: Occurrence of nausea and vomiting on discharge from PACU.

| High of PACU | LM | | ET | | P. value |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| Yes | 4 | 4.17 | 4 | 4.17 | Ns |
| No | 92 | 95.83 | 92 | 95.83 | |
| Total | 96 | 100.0 | 96 | 100.0 | |

ET = Endotracheal tube, LM = Laryngeal mask, p = Statistical significance, PACU= Post-anesthetic Care Unit.

## 4. DISCUSSION

The presentation of OPNV is one of the postoperative complications more common, often resulting in increased postoperative stay, unanticipated hospitalization and rising healthcare costs. Even today, it is one of the most common complaints after the intervention of surgery and anaesthesia, with an incidence ranging from 4.6 and 49%, according to the world literature (11). Nausea and vomiting are the most unwanted post-surgical side effects according to accounts of the studies that used ET or LM to report in among that events (1). Several risk factors for PONV linked to the patient, with surgical intervention or with anesthesia they were described in the literature (12). Apfel et al. (8), established a risk score for PONV which has been used for antiemetic prophylaxis. In that score the author identified the female sex, the non-smokers, a history of PONV, and the postoperative use of opioids as independent risk factors for PONV; this study showed an incidence of PONV of 14.6%, lower as demonstrated by other authors. The incidence of POVN has remained static for the last twenty years despite the use of anesthetics short-acting and the execution of minimally invasive surgeries, most of these performed in an outpatient setting (13).

As the components related to the surgical procedure, it has been shown that the duration of surgical intervention is a risk factor for PONV. An outpatient study found that for every 30-minute increase in the duration of the intervention during surgery, the baseline risk of PONV increased by 60% (14). The type of surgical intervention has been identified as a risk factor in numerous reports and is controversial; it has been identified that patients brought to procedures by laparoscopy they have a higher incidence of PONV (15.3%), compared with open surgical procedures (8.3%) and endoscopic surgery (3.9%). In the meantime, the surgeries otolaryngo logical-maxillofacial and general surgery were the procedures most associated with PONV, with a percentage of 10.1% and 9.7%, respectively (15). Suffering from nausea and vomiting is one of the main concerns of patients in the immediate postoperative and may cause significant adverse effects that delay the recovery process. The risk of PONV should be stratified preoperatively and decreased by adjusting the anesthetic techniques or using pharmacological resources available (16). In patients with a low risk of developing PONV, the routine use of medications is not recommended in prophylactic form, unless they have a medical condition of risk in case of vomiting. In patients with moderate risk mono therapy is recommended. If the risk is high, it will use combination therapy with agents of different classes, typically, an antagonist of the 5HT receptor plus dexamethasone (17).

## 5. CONCLUSION

It is concluded that no statistical variances were recognized between the use of laryngeal mask and an endotracheal tube for the approach of the airway and the incidence of postoperative nausea and vomiting after breast augmentation.

**Ethical Issues:** All ethical issues were approved by the authors from the Iraqi Ministry of Health. Verbal and signed informed consents were obtained from all patients who included in the study during their first visit.

**Conflict of interest:** None

**Source of funding:** Authors declared no funding agency, or organization

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