

Laryngeal mask ventilation during tympanoplasty and mastoidectomy



Marinov Ts.¹, M. Belitova¹, B. Dimitrova¹, J. Kasaboglu², Y. Hadzhiev², T. Popov²

¹Department of Anesthesiology and Intensive Care; University Hospital "Queen Giovanna" – ISUL; Medical University – Sofia

²Department of ENT Surgery; University Hospital "Queen Giovanna" – ISUL; Medical University – ofia

Abstract: Introduction: Although otologic surgery encompasses a wide range of procedures from simple myringotomy with tube placement to radical mastoid tumor resections, many of the surgical and anesthetic considerations for these procedures are universal throughout the spectrum of disease prevalence and severity.

The Aim of the study is to determine and characterize the specifics and complications of laryngeal mask airway (LMA) use during tympanoplasty and mastoidectomy.

Materials and methods: A 2-year prospective cohort study of 30 patients who underwent tympanoplasty and mastoidectomy in the Department of ENT Surgery; University Hospital "Queen Giovanna" – ISUL; Medical University-Sofia.

Results and discussion: Mean age of the patients included in the study is 29.27 years. A predominance of male sex is observed: men – 60%, women – 40%. Most patients have low preoperative ASA grades. None of the patients suffered desaturation during the operation. LMA displacement and need for repositioning by the anesthesiologist was observed in 13.33% of the patients. In all patients ETCO₂ values are in the normal range. Sore throat was recorded in 20% of patients. Forty percent (40%) of the patients experienced postoperative nausea and vomiting (PONV). The incidence of hoarseness among patients was 3.33%. In none of the cases we observed aspiration under the LMA and laryngospasm.

Conclusion: The results from the study showed that LMA can be successfully and safely used in patients during tympanoplasty and mastoidectomy.

Key words: Tympanoplasty and mastoidectomy, ventilation, laryngeal mask airway

Introduction

Although otologic surgery encompasses a wide range of procedures from simple myringotomy with tube placement to radical mastoid tumor resections, many of the surgical and anesthetic considerations for these procedures are universal throughout the spectrum of disease prevalence and severity. The seasoned otolaryngologist knows that optimal otologic outcomes will be achieved if there has been clear and thorough communication with the anesthesiologist, as well as appropriate preoperative preparation before the patient reaches the operating room.¹ Duff² reported the use of LMA in 100 cases undergoing general anesthesia for major ear surgery which included 24 tympanoplasty, 55 tympanoplasty with mastoidectomy. No cases of gastric regurgitation were reported with the exception of one case of regurgitation without aspiration immediately prior to LMA extraction. Overall, 3

patients complained of sore throat after surgery during recovery, but their complaints improved after 24 hours. No cases of hoarseness, dysphagia, laryngospasm or nausea were observed. In one case, surgery was interrupted due to patient's movement during the operation. LMA was approved by the FDA in 1991, and its use in airway management has been gaining popularity ever since.³ When compared with the tracheal intubation, the LMA has many advantages.⁴ The advantages include easy insertion, lowering of the risk of vocal cord paralysis, and minimal cardiovascular response in comparison with other methods of airway management. Lighter depth of anesthesia is better tolerated in these patients and there is a lower risk of bronchospasm, laryngospasm, and sore throat. Esophageal and endobronchial intubation do not occur with this method.⁵⁻¹⁰



The Aim of the study is to determine and characterize the specifics and complications of laryngeal mask airway use during tympanoplasty and mastoidectomy.

Materials and methods

A 2-year prospective cohort study of 30 patients who underwent tympanoplasty and mastoidectomy in the Department of ENT Surgery; University Hospital "Queen Giovanna" – ISUL; Medical University –Sofia. In all patients we used quamatel 20 mg for premedication. A general anesthesia was performed in all patients. Fentanyl 0.15 mg, thiopental 5–6 mg/kg and succinylcholine 1-1.5 mg/kg were used for anesthesia induction. After placement of LMA 2.5% sevoflurane was used for anesthesia maintenance. Additional fentanyl was administered for pain relief in total dosage of 5-6 µg/kg. Ventilation during operation was successfully performed with LMA № 4 and № 5 according to the weight of the patients. The LMA was advanced by pressure against the hard palate to follow the oropharyngeal curve, advancing its tube with the other hand and oropharyngeal leak around LMA was detected by noise during manual bag ventilation. Mechanical ventilation was started using a ventilator (Drager Primus) in the volume control mode. A tidal volume of 6-8 ml/kg, a respiratory rate of 10-12/min and an inspiratory: expiratory ratio of 1:2 was used. Standard intraoperative monitoring was applied (non invasive blood pressure at 5 minutes interval, ECG, pulse oximetry and capnography).

Results

The mean age of the patients is 29.27 years. Most of the patients (30%) are between 20-29 years of age (fig. 1).

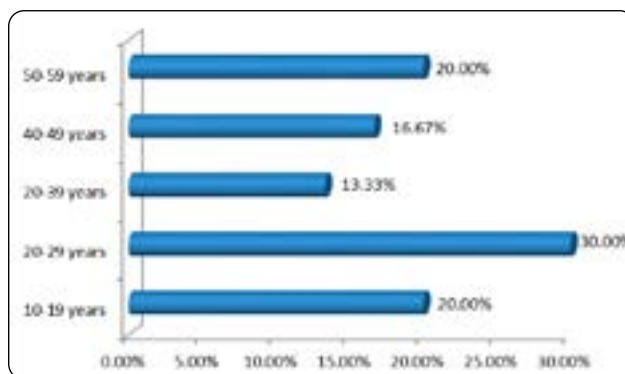


Fig. 1. Distribution according to age

We found that 60% of the patients are men and 40% are women. According to anesthesia risk assessment 53.33% of the patients are with ASA 1 class, 40% of them are with ASA 2 class, 6.67% are with ASA 3 class and none are with ASA 4 class.

The distribution of patients according to the type of surgical intervention is almost the same, tympanoplasty 46.67% and mastoidectomy 53.33% (fig.2).

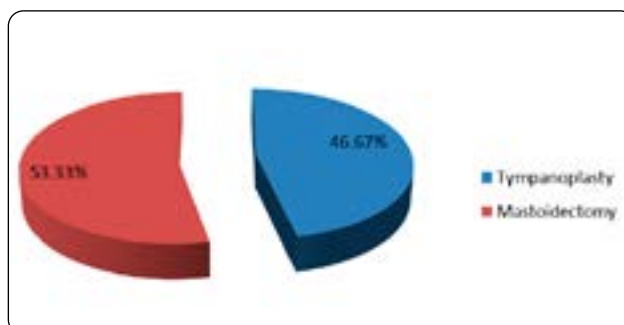


Fig. 2. Distribution according to the type of surgical intervention

According to the hemodynamic profile of the patients there is no significant range variation of the studied parameters (fig.3).

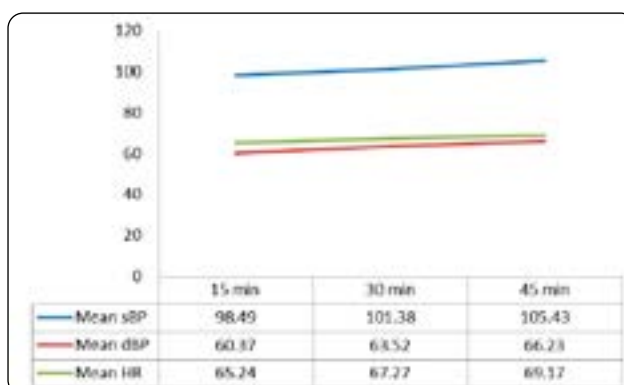


Fig. 3. Hemodynamic profile

Desaturation is registered in none of the patients (fig.4).

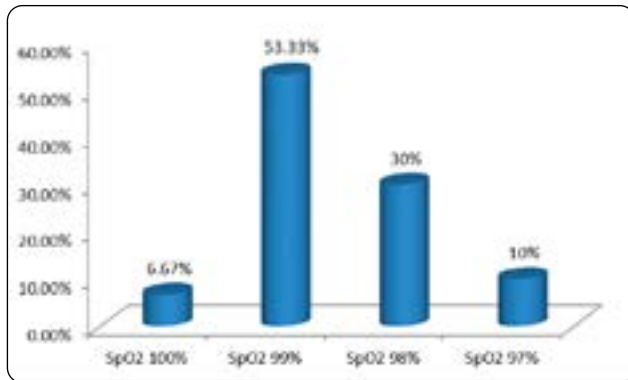


Fig. 4. Saturation profile

In all patients $ETCO_2$ values are in the normal range. Dislocation of the LMA, which requires intervention by the anesthesiologist, is observed in 13.33% of the patients. In none of the cases we need to use another method of ventilation - endotracheal intubation or ventilation with a facial oxygen mask. We considered sore throat as any kind of unpleasant sensation in the throat region like pain with or without swallowing. Sore throat was recorded in 20% of patients. Forty percent (40%) of the patients experienced postoperative nausea and vomiting (PONV). The incidence of hoarseness among patients was 3.33%. In none of the cases we observed aspiration under the LMA and laryngospasm (fig. 5).

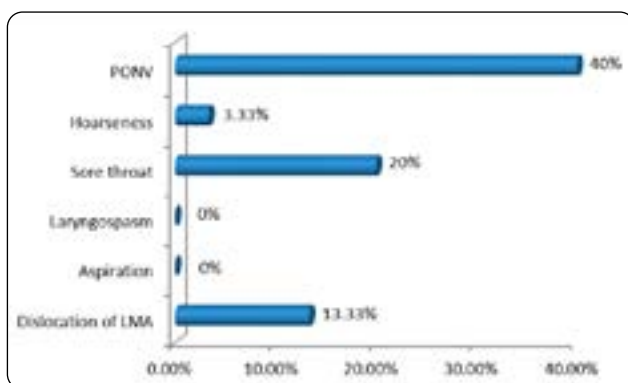


Fig. 5. Intraoperative and postoperative complications

Discussion

Surgical repair, tympanoplasty, of the perforated tympanic membrane is indicated to restore hearing ability as well as to prevent recurrent otorrhea. There are various surgical approaches to tympanoplasty. Mastoidectomy is performed to remove infected air cells within the mastoid bone, usually caused by cholesteatoma. Cholesteatoma arises from migration of squamous epithelium into the middle ear and accumulated desquamated epithelium that accumulates in the middle ear as a result of chronic middle-ear infection. Advantages of the LMA are that there is no positive pressure cuff directly contacting the luminal surface of the trachea and the LMA does not require direct laryngoscopy for placement, in our study such anatomical advantages decreased the risk of dental and oral cavity injury during intubation and more rapid, better-controlled emergence from anesthesia.

The demographic analysis showed that all of the patients are young people without any accompanying disease with predominance of group between 20 and 29 years of age. Distribution according to sex shows slight predominance of men. According to anesthesia risk assessment most of the patients are ASA I class. Ventilation through the operation was successfully performed through LMA without any respiratory or cardiovascular complications. According to the hemodynamic profile of the patients there is no significant range variation of the studied parameters. Heart rate and arterial blood pressure during operation were stable. Desaturation is registered in none of the patients. In all patients $ETCO_2$ values are in the normal range.

Acceptance of the LMA as a safe practical alternative to tracheal intubation for tympanoplasty and mastoidectomy requires that placement be relatively facile, that position of the mask be stable throughout surgery, and that the airway be protected from the risk of aspiration. In 4 of our patients (13.33%) was observed intraoperative displacement of LMA, caused by pressure from the surgical team on the device, which led to leakage and lower minute ventilation. After adjustment of the LMA the normal parameters of ventilation were restored. In none of the cases we need to use another method of ventilation - endotracheal intubation or ventilation with a facial oxygen mask. Postoperative nausea and vomiting rate has been reported to vary (20% to 30%) in various surgical



operations and in different methods of anesthesia, and constitutes the second most common complaint reported.¹¹ The incidence rate of postoperative nausea and vomiting after tympanoplasty surgical operations has been reported to be significant.¹² The high incidence of nausea and vomiting after tympanoplasty might be attributed to the complex innervation of this area by the cranial nerves V, VII, VIII and X, and cervical nerves II and III.¹³ Moreover, proximity of cranial surgical field to the semilunar ducts and vestibular system, and heat and vibration transmission at excision of the surgical field through stimulation of the ampulla can lead to postoperative nausea, dizziness, and vomiting. Therefore, postoperative nausea and vomiting are more common in these patients.¹⁴ In our study 40% of the patients experienced postoperative nausea and vomiting, although we used dexamethasone and ondansetron as antiemetic prophylaxis. Sore throat was recorded in 20% of patients. A possible explanation is that the LMA cuff exerts pressure on the mucosa above the larynx. The incidence of hoarseness among our patients was 3.33%. Mild local irritation and edema of the vocal cords are usually the causes of hoarseness, which resolve in several postoperative days. Laryngospasm is one of the most common life-threatening respiratory adverse events. In none of the cases we observed aspiration under the LMA and laryngospasm.

Conclusion

The results from the study showed that laryngeal mask airway can be successfully and safely used in patients during tympanoplasty and mastoidectomy.

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Address for correspondence:

Tsvetomir Marinov, MD, PhD
 Department of Anesthesiology and Intensive Care
 University Hospital "Queen Giovanna"- ISUL
 Byalo More Str 8
 Medical University-Sofia
 E-mail: ts.marinov@abv.bg