



# Awake or asleep approach to difficult airway during microlaryngeal surgery

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## Abstract:

**Introduction:** Patients presenting for microlaryngeal surgery frequently have a difficult airway. The chosen approach to this airway depends on the pathology and the patient's symptoms. The **Aim** of the study is to determine the safest anesthesiological approach to difficult airway during microlaryngeal surgery. **Materials and Methods:** A prospective cohort study including 200 patients undergoing microlaryngeal surgery in the Department of Otorhinolaryngology at the University Hospital "Queen Giovanna" - ISUL, Sofia, in the period 2014-2019; Medical University-Sofia. Preoperative examination of the larynx is performed in all patients by Storz 8402 ZX fiber optic laryngoscope with video capability. **Results and discussion:** In 76% of the patients the tumor mass causing obstruction is localized in the area of the larynx, and in 24% of them the tumor mass is localized in the area of the hypopharynx. In 20% of the patients with 3rd degree of laryngeal obstruction an awake tracheostomy is chosen as a primary approach because of impossible intubation. The same approach is chosen in all of the patients presenting with respiratory failure at rest. In 25% of the patients with tumor mass causing hypopharyngeal obstruction an awake tracheostomy is chosen as a primary approach because of impossible intubation. **Conclusion** The decision to proceed with an awake or asleep approach to an anticipated difficult airway depends on the degree of laryngeal or hypopharyngeal obstruction and the experience of the anesthesiologist.

**Key words:** microlaryngeal surgery, anesthesiological approach, laryngeal obstruction, hypopharyngeal obstruction

## Introduction

Patients presenting for microlaryngeal surgery frequently have a difficult airway. The chosen approach to this airway depends on the pathology and the patient's symptoms. In situations with critical airway compromise, an awake tracheostomy may be warranted from the outset, but it may prove to be technically challenging or impossible and may require general anesthesia. Even if an awake tracheostomy is chosen as a primary approach, full backup preparation for alternative airway management is necessary. Video laryngoscopy reliably improves laryngeal exposure by at least one grade, allows continuous observation of the entire intubation procedure by the entire team, and may therefore be a near-ideal technique for managing difficult airways in patients presenting for microlaryngeal surgery. Choosing the video laryngoscopic device depends on the operator's preference and must consider the nature and location of the lesions. The strongest predictor of the technique failure was altered neck anatomy with presence of a surgical scar, radiation changes, or a mass. Factors indicating difficult intubation also need to be considered.<sup>13,14,15</sup> These conditions are frequently encountered in patients presenting for microlaryngeal surgery.<sup>1,2,3,4,5</sup>

## Material and methods

A prospective cohort study including 200 patients undergoing microlaryngeal surgery in the Department of Otorhinolaryngology at the University Hospital “Queen Giovanna” – ISUL, Sofia, in the period 2014-2019; Medical University-Sofia. Preoperative examination of the larynx is performed in all patients by Storz 8402 ZX fiber optic laryngoscope with video capability. The degree of laryngeal obstruction is determined by modified Cotton-Myer scale with 4 degrees of obstruction: up to 50% (1st degree), 51–70% (2nd degree), 71–99% (3rd degree) and full obstruction (4rd degree). In all patients we used quamatel 20 mg for premedication. For induction in general anesthesia we used propofol 2.5 mg . kg<sup>-1</sup> and succinylcholine 1 mg . kg<sup>-1</sup> as muscle relaxant. Endotracheal intubation was performed by endotracheal tube № 6.0 or № 6.5 from the anesthesiologist and mechanical ventilation was performed. For maintenance of general anesthesia we used sevoflurane inspiratory concentration of 2.5 vol. % and fentanyl 4-5 µg . kg<sup>-1</sup>. for pain relief.

## Results

We found that 86% of the patients were men and 14% were women (fig.1).

In 76% of the patients the tumor mass causing obstruction is localized in the area of the larynx, and in 24% of them the tumor mass is localized in the area of the hypopharynx (fig.2).

From the patients with tumor mass causing laryngeal obstruction 39.5% are with 1<sup>st</sup> degree of obstruction, 26.3 % are with 2<sup>nd</sup> degree, 31.6% are with 3<sup>rd</sup> degree and 2.6% are with respiratory failure at rest (fig.3).

In 20% of the patients with 3<sup>rd</sup> degree of laryngeal obstruction an awake tracheostomy is chosen as a primary approach because of impossible intubation. These are 5.3% of all patients with tumor mass causing laryngeal obstruction. The same approach is chosen in all of the patients presenting with respiratory failure at rest. These are 2.6% of all patients with tumor mass causing laryngeal obstruction (fig.4).

In 25% of the patients with tumor mass causing hypopharyngeal obstruction an awake tracheostomy is chosen as a primary approach because of impossible intubation (fig.5).

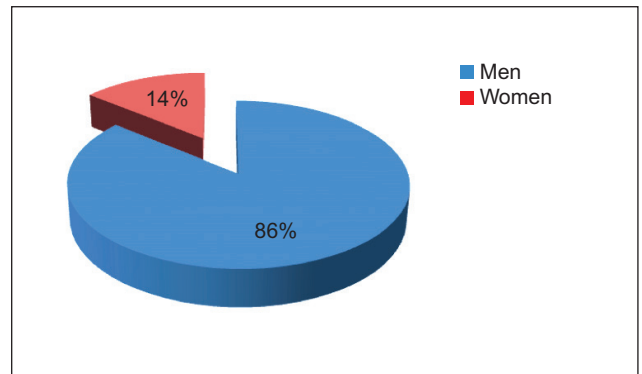


Figure 1. Distribution according to gender.

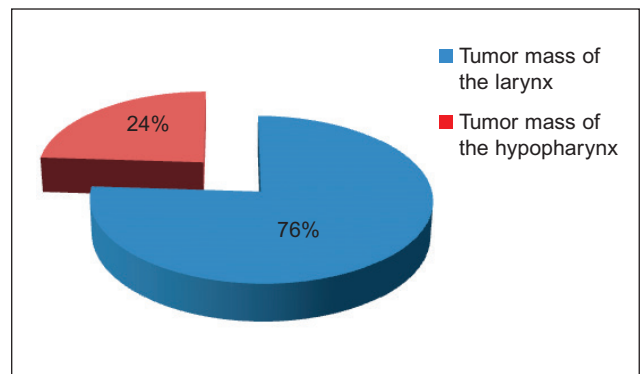


Figure 2. Distribution according to localization of the tumor mass.

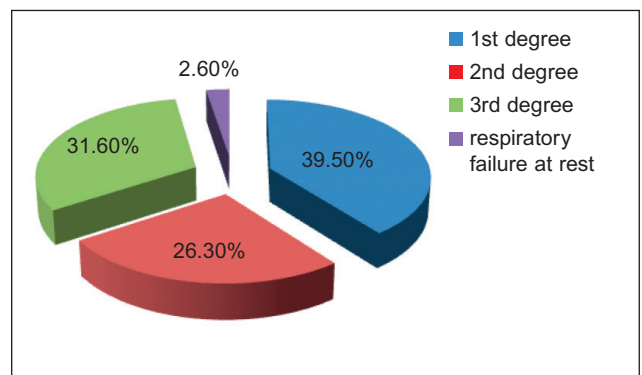


Figure 3. Distribution according to the degree of laryngeal obstruction.

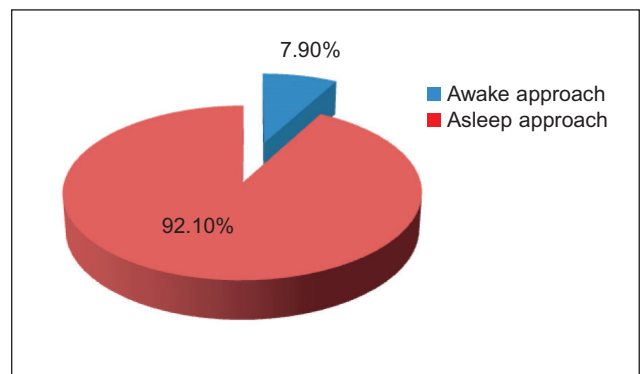
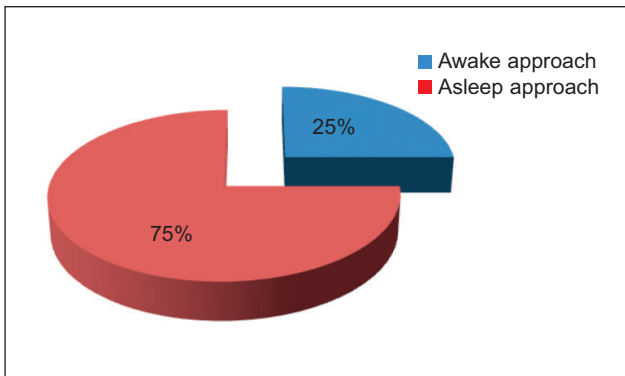


Figure 4. Awake or asleep approach in patients with tumor mass causing laryngeal obstruction.



**Figure 5.** Awake or asleep approach in patients with tumor mass causing hypopharyngeal obstruction.

## Discussion

The decision to proceed with an awake or asleep approach to an anticipated difficult airway should follow the American Society of Anesthesiologists (ASA) difficult airway algorithm, with special attention directed to predictors of difficult mask ventilation, impossible mask ventilation, and their association with difficult intubation.<sup>6</sup> The anesthesiologist also should review the pertinent preoperative findings identified on flexible fiberoptic laryngoscopy, chest radiography, CT, and MRI and should discuss these findings with the surgeon.

If an asleep approach to the difficult airway is chosen, several preformulated alternative airway management plans must be in place before induction of anesthesia. If the airway is marginal, the patient's neck should be prepped, and the surgical team should be present on induction, ready to perform an emergent cricothyrotomy or tracheostomy, or to employ rescue techniques such as a rigid bronchoscope.<sup>7,8</sup> In experienced hands, rigid bronchoscopy may be used to rescue failed direct laryngoscopy and failed intubation and to manage a "cannot intubate, cannot ventilate" (CICV) situation. It also serves as an indispensable tool for managing acute airway obstruction resulting from foreign bodies, hemoptysis, or tumors.<sup>9</sup> After the bronchoscope is placed into the patient's trachea by the surgeon, manual or jet ventilation can commence in a safe manner through the lumen of the bronchoscope.

Patients with an advanced airway obstruction and inspiratory stridor at rest comprise some of the most feared and complicated cases for the anesthesiologist. The incidence of difficult mask ventilation and impossible mask ventilation among patients with severe stridor and upper airway obstruction

of more than 75% of the lumen reaches 40% and 6%, respectively,<sup>10</sup> compared with 1.4% and 0.15% for the general surgical population.<sup>11</sup> These patients frequently present for microlaryngeal surgery on an emergent or semi-emergent basis, yet they require a systematic and thoughtful approach by the anesthesiologist and the surgeon. The nature of the obstructing lesion (e.g., vascular, submucosal, pedunculated, inflammatory) and its location (e.g., supraglottic, glottic, subglottic, midtracheal, lower tracheal, and bronchial [mediastinal]) may require completely different intubation considerations and approaches.

In the context of laryngeal surgery, the optimal technique of airway management of the stridorous patient with an advanced proximal airway obstruction (i.e., supraglottic, glottic, and subglottic levels) remains a subject of controversy. An awake flexible fiberoptic intubation, inhalational induction, and intravenous induction with muscle relaxants have been used successfully, but none should be considered fail-safe.<sup>12</sup> Thorough preoperative discussion of the surgical pathology and formulation of closely coordinated airway management plan with the surgeon are essential for safe management of these patients.

In the patients with tumor mass causing hypopharyngeal obstruction an awake tracheostomy is more often compared with patients with tumor mass causing laryngeal obstruction because the size of the tumor mass prevents intubation or the use of supraglottic devices. On the other hand, unsuccessful attempts for intubation in patients with laryngeal obstruction can lead to laryngeal trauma, hemorrhage and subsequent impossible ventilation. Therefore, our advice is in patients with obstruction of the larynx 3rd to 4th degree or respiratory failure at rest, the tracheostomy should be performed in the awake state of the patient under local anesthesia with preservation of spontaneous breathing. The assessment of the possibility of intubation in a patient with 3rd degree laryngeal obstruction depends on the clinical symptoms, the fiberoptic laryngoscopy, the results of the CT or MRI and to the greatest extent on the experience of the anesthesiologist.

## Conclusion

The decision to proceed with an awake or asleep approach to an anticipated difficult airway depends on the degree of laryngeal or hypopharyngeal obstruction and the experience of the anesthesiologist.

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