

# DIFFICULT AIRWAY MANAGEMENT AT SESTRE MILOSRDNICE UNIVERSITY HOSPITAL CENTER

Branka Maldini<sup>1</sup>, Tatjana Goranović<sup>2</sup>, Marinko Vučić<sup>1</sup>, Joško Kovač<sup>1</sup>, Senka Baranović<sup>1</sup>  
and Renata Letica-Brnadić<sup>1</sup>

<sup>1</sup>Department of Anesthesiology, Resuscitation and Intensive Medicine, Sestre milosrdnice University Hospital Center, <sup>2</sup>Department of Anesthesiology and Intensive Care Unit, Sveti Duh University Hospital, Zagreb, Croatia

**SUMMARY** – Difficult airway has gained increasing interest due to a relatively high number of adverse effects following unsuccessful intubation. Besides traditional techniques, several alternative methods are available today. It is crucial for the anesthesiologists and intensive care physicians to maintain sufficient oxygenation and ventilation of the patient. Hypoxia is one of the most frequent causes of death or severe neurologic defects in anesthesia. Therefore, it is necessary to have an easy alternative to secure the airways in critical situations.

**Key words:** *Difficult airway; Unsuccessful intubation; Hypoxia; Algorithm*

## Introduction

Difficult airway is defined as a clinical situation in which a conventionally trained anesthesiologist experiences difficulty with face mask ventilation of the upper airway, difficulty with tracheal intubation, or both<sup>1</sup>. Complications in the setting of airway management are the single most important contributing factor to anesthesiologic morbidity and mortality<sup>2</sup>. Up to 30% of anesthesia-related deaths are attributable to problems in securing the airway<sup>1,2</sup>. Yet, the complications are often classified as “preventable” in disability evaluations. Consequently, treatment algorithms, techniques and instrumentation must be available that will preclude failure in patients with a difficult airway. It should be noted, however, that every device is limited in its use to a specific range of indications. Thus, it may be difficult to select the optimal instrument for everyday use and acquire thorough understanding of

its applications. As a result advances in instrumentation and development of effective algorithms for difficult airway are dependent on constant updating of theoretical knowledge and practical skills<sup>2</sup>.

Modern anesthesiology and emergency medicine employ a variety of techniques and devices for securing the patient's airway<sup>3,4</sup>. Oral endotracheal intubation is traditionally performed with a laryngoscope and Macintosh blade. Because it provides a direct view of the laryngeal inlet, this technique is also known as direct laryngoscopy. Various devices are often used to ventilate the patient without endotracheal intubation (e.g., supraglottic and laryngeal devices such as the laryngeal mask and laryngeal tube), especially in elective procedures, but endotracheal intubation continues to be the gold standard for airway management. Securing the airway with a cuffed endotracheal tube has several advantages: 1) effectively prevents inadvertent gastric insufflations during ventilation, leading to overdistention and consequent regurgitation of stomach contents; 2) safeguards against tracheal aspiration of fluids or solid foreign bodies; 3) patient can be positioned according to the requirements of the surgical procedure; 4) ability to deliver high inspiratory oxy-

Correspondence to: *Prof. Branka Maldini, PhD, MD*, Department of Anesthesiology, Resuscitation and Intensive Medicine, Sestre milosrdnice University Hospital Center, Vinogradska c. 29, HR-10000 Zagreb, Croatia  
E-mail: brankamaldini@yahoo.com

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gen concentrations; 5) capability for controlled positive-pressure ventilation (e.g., positive end-expiratory pressure, PEEP); 6) capability for endotracheal drug administration *via* endotracheal tube; and 7) provides access for bronchial toilet, suctioning of secretions, and foreign body removal from the tracheobronchial tract<sup>3</sup>. Increasingly in recent years, alternatives to classic direct laryngoscopy with the Macintosh blade have been developed that allow visualization of the glottis plane even in patients with a difficult airway<sup>4</sup>. These techniques are based on a procedure often described as indirect laryngoscopy because they display the glottis plane without a direct line of sight, i.e. in an endoscopic eyepiece or on a video monitor. This category includes the Bonfils Retromolar Intubation Fiberscope (Karl Storz Endoscopy, Tuttlingen, Germany), which can be used for both anticipated and unanticipated airway problems. The Bonfils Retromolar Intubation Fiberscope is a rigid endoscope and is especially preferred for the retromolar technique in patients with limited mouth opening<sup>5</sup>. With these principles in mind, the Bonfils Retromolar Intubation Fiberscope should be used in an unanticipated difficult airway only if the user has adequate experience in its routine use<sup>6</sup>.

## In-Hospital Airway Management

Problems with in-hospital airway management generally fall into two broad categories: the unanticipated difficult airway and the anticipated difficult airway.

### *Unanticipated difficult airway*

Although various clinical studies and scores have improved the predictability of difficult intubation, the anesthesiologist should always be ready for unforeseen difficulties during airway management, even in patients with no apparent abnormalities.

Generally speaking, a difficult airway is present when an anesthesiologist with average training experiences difficulties with mask ventilation or intubation. Intubation is defined as “difficult” if tracheal intubation requires multiple attempts, in the presence or absence of tracheal pathology. Endotracheal intubation is always unsuccessful in cases where vocal cords cannot be visualized by direct laryngoscopy<sup>2</sup>.

In principle, it is preferable to deal with an unanticipated difficult airway by using instruments and techniques for which the individual user has adequate training and experience. Conversely, the use of unfamiliar procedures often results in failure and may jeopardize the patient. It is also best to use techniques that are readily available and are capable of solving the problem at hand.

### *Anticipated difficult airway*

Various anomalies and disorders of the face and jaws may signal an anticipated difficult airway or may preclude conventional intubation. An effort is made to keep the patient conscious and maintain spontaneous respiration until the airway has been successfully secured.

Awake flexible fiberoptic intubation is considered the current gold standard for the anticipated difficult airway. The necessary equipment is costly, however, and learning the method is a time- and training-intensive process. For these reasons, techniques have increasingly been established in recent years for safely performing endotracheal intubation in patients with an anticipated difficult airway<sup>4</sup>.

### *Our practice in difficult airway management*

After appropriate education and training in the use of Bonfils Retromolar Intubation, all staff members of the Department of Anesthesiology, Resuscitation and Intensive Medicine, Sestre milosrdnice University Hospital Center, Zagreb, have recognized the Bonfils Retromolar Intubation Fiberscope as the instrument of choice in securing difficult intubation. Since 2010, our Department has accepted and implemented the guidelines and algorithm for in-hospital airway management, developed at the Department of Anesthesiology, University Medical Centre of the Johannes Gutenberg University from Mainz, Germany (with their consent). The practice guidelines are not intended as absolute requirements; they rather provide basic recommendations. The guidelines are subject to revision as warranted by the evaluation of medical knowledge, technology and practice<sup>2</sup>.

The algorithm for in-hospital implementation of the Bonfils Retromolar Intubation Fiberscope from Mainz<sup>3</sup> is shown in Figure 1.

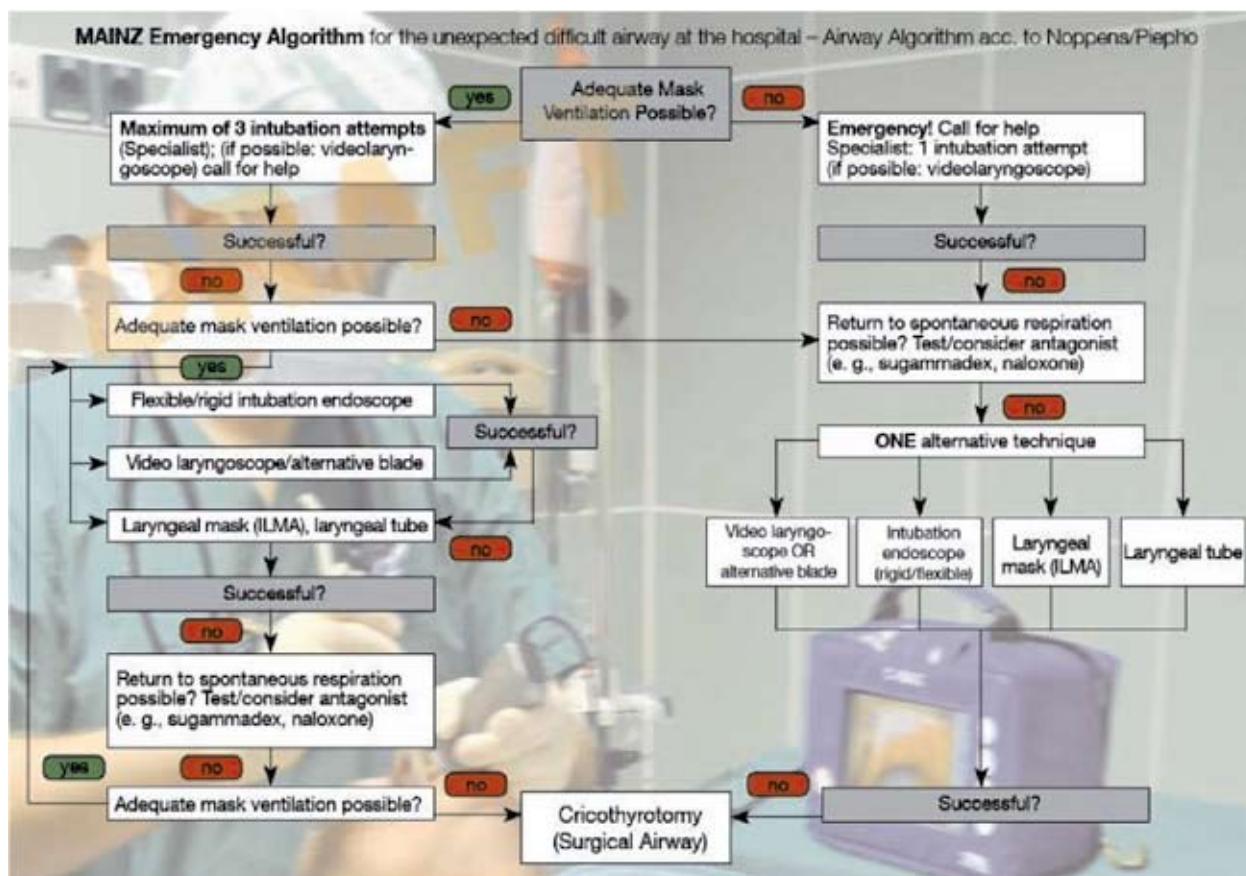


Fig. 1. Mainz Emergency Algorithm for the unexpected difficult airway at the hospital according to Piepho and Noppens<sup>3</sup> (the algorithm has been adopted and implemented at our Department since 2010, with permission from the authors).

## Conclusion

Safe airway management is certainly one of the main responsibilities of the anesthetist and thus a main focus of training and continuing education in this medical discipline. The aim is to ensure optimal patient safety, even in difficult clinical situations. Catastrophic situations are only avoidable with appropriate education and special preparation for the difficult airway. In our practice, the guidelines from Mainz for the unexpected difficult airway at the hospital, the Mainz Emergency Algorithm, has facilitated the management of difficult airway and reduced the likelihood of adverse outcomes.

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## Sažetak

ZBRINJAVANJE OTEŽANOG DIŠNOG PUTA U KLINIČKOM BOLNIČKOM CENTRU  
"SESTRE MILOSRDNICE"

*B. Maldini, T. Goranović, M. Vučić, J. Kovač, S. Baranović i R. Letica-Brnadić*

Otežani dišni put izaziva sve veće zanimanje zbog relativno velikog broja različitih rezultata nastalih neuspješnom intubacijom. Uz tradicionalne tehnike danas na tržištu postoje i alternativne metode. Veoma je važno za anesteziologa i liječnika u Jedinici intenzivnog liječenja održavanje dostatne ventilacije i oksigenacije u bolesnika. Hipoksija je jedan od najčešćih uzroka smrti ili neuroloških ispada u anesteziji. Stoga je iznimno važno imati alternativno rješenje zbrinjavanja otežanog dišnog puta u hitnim stanjima.

Ključne riječi: *Otežani dišni put; Neuspješna intubacija; Hipoksija; Algoritam*