

## Review Article

# Current treatment of difficult airway: a practical review of advanced techniques for airway management

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## ABSTRACT

The airway by definition is a conduit through which the air passes; or it is the route by which the air travels from the nose or mouth to the lungs. An exhaustive review was performed with the available literature using the PubMed, ScienceDirect, Scopus and Cochrane databases from 2009 to 2021. The search criteria were formulated to identify reports related to difficult airway management. To allow controlled ventilation, the airway must meet two characteristics in priority order, be permeable and airtight. In assessing risk, in addition to looking for predictors of difficult airway, it was important to understand the global clinical circumstances. Faced with a patient with a difficult airway, decision-making must be agile and correct since any decision can modify the clinical outcome.

**Keywords:** Difficult airway, Intubation, Mechanical ventilation, Laryngeal mask, Intubation devices

## INTRODUCTION

The airway by definition is a conduit through which the air passes; or it is the route by which the air travels from the nose or mouth to the lungs. According to the recommendation guide of the American society of anesthesiologists (ASA) difficult airway is defined as a clinical situation in which an anesthesiologist with conventional training experiences difficulty in the ventilation of the upper airway with a facial mask, difficulty in tracheal intubation or both. Signs of inadequate ventilation are absence of respiratory noises, severe obstruction and gastric insufflation in auscultation, cyanosis, inadequate values of arterial oxygen saturation

(SaO<sub>2</sub>).<sup>1</sup> Certain clinical conditions such as maxillofacial trauma, morbid obesity, rheumatoid arthritis, congenital alterations, burns, previous intubations, respiratory diseases, dental problems, coagulopathies, congenital syndromes, diabetes mellitus and obesity can condition a difficult airway. The control of the airway in the critical patient can often be difficult for several reasons like inefficient pre-oxygenation, the urgent nature of the situation, the adverse physiological conditions of the critical patient, the associated comorbidities and/or the condition of a full stomach of most of these patients.<sup>1</sup> Because a difficult airway represents a life-threatening entity, the anesthesiologist who faces a probable difficult airway must ask himself the following: is airway

management required? can laryngoscopy be difficult to perform? can supralaryngeal ventilation be difficult to perform? is there a risk of aspiration? The answers to these critical questions can provide a more complete evaluation of any airway and its possible treatment.

#### ***Unique, rapid and optimal intubation attempt***

If a patient cannot be ventilated with a face mask, it does not imply that he cannot be intubated, although there is a weak statistical correlation.<sup>3,4</sup> Groups of patients with impossible face mask ventilation have been reported and almost all of them can be intubated in 1 or 2 attempts.<sup>5</sup> The possibility of an inadvertent foreign body in the airway causing the obstruction was a consideration that reinforced this behavior and that was carried out before inserting a supraglottic device.<sup>6</sup> It was especially indicated when no previous attempts have been made, given the priority need to seal the airway or when there was suspicion of an obstructive foreign body; but it must be agile and optimized.<sup>7</sup>

#### ***Advanced techniques for airway management***

The use of these techniques required training and constant updating almost exclusively for anesthesiologists, since they required elements and devices that were not generally found outside the operating room.

#### ***Laryngeal mask airway-Fastrach***

The laryngeal mask has been used successfully to achieve intubation also in those patients with involvement of the cervical spine. Recent research showed that the laryngeal mask produced minimal cervical movements in flexion, contrary to what occurred with laryngoscopy maneuvers, a situation that was beneficial in patients with compromised structures that produced instability in extension.<sup>8</sup> The intubation laryngeal mask was designed to achieve intubation through it, it had the general characteristics of the classic laryngeal mask, but had a rigid tube through which a ring-shaped silicone tube with a balloon can be inserted to allow securing the patient's airway.<sup>9</sup>

#### ***Video laryngoscopes***

During the last decade, laryngoscopes have been developed that carry a high-resolution video camera at the distal end of the blade, in order to visualize the glottis and introduce an endotracheal tube without the need for direct vision of the glottis, but through of a screen that can be on the device handle or next to the patient. There were different brands and models.<sup>10</sup>

#### ***Bonfils fiberscope***

It consists of a rigid stylet with an inclination of 40° at its distal end. The endotracheal tube is mounted on the

stylet, the stylet remaining inside the tube. At the tip of the bronchoscope there is a lighting system and a high-resolution video camera. It has demonstrated its advantages in patients with limited mouth opening and patients requiring cervical immobilization.<sup>9</sup>

#### ***Flexible fiberoptic bronchoscope***

This device has been used for several years for the management of difficult airways, especially in those patients with a history of difficult intubation. It is currently the method of choice for intubating patients who will undergo intubation with spontaneous ventilation and airway reflexes present. It can be intubated without moving the head or neck of the patient, due to its size it allows to intubate patients with limited mouth opening and perform nasal intubations.<sup>11</sup>

#### ***Cricothyrotomy***

Cricothyrotomy consists of making a hole in the airway at the level of the cricothyroid membrane to access the airway and achieve emergency ventilation of the patient, indicated in situations that require airway control, in which it is not possible to ventilate a patient with a mask, cannot be intubated and adequate oxygenation of the patient cannot be obtained by other means.<sup>12,13</sup>

#### ***Translaryngeal ventilation***

Translaryngeal ventilation is a less invasive procedure than cricothyrotomy, with a lower rate of complications, since it does not establish a durable and safe airway, it is always followed by another procedure, be it retrograde intubation, cricothyrotomy, tracheostomy or any other method that allow access to a safe airway.<sup>13</sup>

#### ***Retrograde intubation***

It is defined as the insertion of a tube into the trachea, assisted by a guide that is introduced into the airway from the outside at the level of the pericricoid area, cephalad towards the oral or nasal cavity in order to direct the entry of the tube endotracheal to the airway.<sup>14</sup>

#### ***Airway management protocol in patients with suspected or diagnosed SARS-CoV-2/COVID-19***

Endotracheal intubation is a high-risk procedure for the operator manipulating the airway as the highest viral load in COVID-19 patients appears in sputum and upper airway secretions. If contagion occurs, it may associate more severe disease. In turn, it is a high-risk procedure for patients. Critically ill patients with COVID-19 are more susceptible to developing severe hypoxemia and complications during the intubation process. About 10% of critically ill patients develop severe hypoxemia (SpO<sub>2</sub> <80%) during the intubation maneuver and approximately 2% cardiorespiratory arrest. These

percentages are higher in critical patients with COVID-19.<sup>15,16</sup>

In recent days, various protocols have been published for the prevention of the transmission of the COVID-19 virus during the manipulation of the airway. Vega's work team recently published a form for airway management that is used in some hospitals in the Boyacá area of Colombia and in Mexico city. This consists of nine phases that describe from the preparation of the medical equipment to be used as well as the medical personnel that will perform the procedure, to the removal of the endotracheal tube. These phases are placement of personal protective equipment, preparation, pre-oxygenation, induction, intubation, confirmation, aspiration tube, extubation and removal and disposal of material.

## DISCUSSION

To allow controlled ventilation, the airway must meet two characteristics in priority order, be permeable so it must allow air flow with minimal resistance and be hermetic, when these conditions were not achieved then it was a difficult airway, but it was classically defined as difficulty when ventilating with a face mask, or with tracheal intubation or both. In assessing risk, in addition to looking for predictors of difficult airway, it was important to understand the global clinical circumstances that could worsen the problem if complications occurred. Recent devices and novel techniques provided useful tools to face airway emergencies; however, knowledge and skills in the management of conventional intubation and ventilation techniques and their optimization strategies were irreplaceable.<sup>17</sup>

## CONCLUSION

Faced with a patient with a difficult airway, decision-making must be agile and correct since any decision can modify the clinical outcome, so it is crucial to know a previously designed strategic plan, including the availability of alternative airway devices and Supraglottic devices can help to successfully manage an anticipated or unforeseen difficult airway.

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