The Egyptian Journal of Hospital Medicine (July 2023) Vol. 92, Page 5933- 5936

Difficult Airway: Assessment, Prediction and Management: Review Article

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ABSTRACT

Background: When an anesthesiologist with traditional training has trouble completing tracheal intubation, face mask ventilation of the upper airway, or both, this is referred to as a "difficult airway" (DA). The greatest danger is when treating the airways of patients who have been diagnosed with difficult mask ventilation (DMV) or who are anticipated to be problematic.

Objective: To highlight for using particular techniques makes it easier to intubate a problematic airway.

Methods: We searched PubMed, Google Scholar, and Science Direct for relevant articles on Difficult airway, assessment, Prediction and Management. Only the most recent or thorough study was taken into account between June 2003 and July 2020. Documents written in languages other than English have been ignored due to a lack of translation funds. Unpublished works, oral presentations, conference abstracts, and dissertations were generally agreed upon not to qualify as scientific research.

Conclusion: Difficulty in intubation is a main problem encountered during general anesthesia that arise from anatomical and physiological barriers. Algorithm for airway management in DA is important to overcome possible complications.

Keywords: Difficult airway, Difficult airway, difficult mask ventilation.

INTRODUCTION

Pre-intubation assessments frequently disregard anatomical and physiological constraints. Because of this, the following procedures were carried out at each intubation, just in case: In event of an emergency, phenylephrine and rescue equipment (such as but not limited to oropharyngeal, nasopharyngeal, bougie, laryngeal mask airway (LMA), and cricothyrotomy equipment) should be readily accessible [1].

Two procedure specialists are working as a team to do the intubation. The patient's left ear is where the primary proceduralist is positioned at the head of the bed, and the secondary proceduralist is standing nearby but helping [2].

In two-person bag-mask ventilation, the secondary proceduralist's responsibilities include monitoring vital signs, providing supplies to the primary proceduralist, and making sure the larynx stays in the proper position following external laryngeal manipulation. The most skilled proceduralist will give each airway management method (tracheal intubation, LMA, bag-mask ventilation) one "best effort" before going on to the next one, with a fast progression to cricothyrotomy in the exceedingly rare instances of "can't intubate, can't oxygenate" [3].

Difficulty in intubation

1. Anatomically difficult intubation

Prior to the procedure, risk factors for anatomically difficult intubations were evaluated. These factors included previous difficult intubations that were documented, immobility of the jaw [4, 5].

2. Physiologically difficult intubation

Patients with significant underlying lung illness, acute hypoxemic respiratory failure, or a $SpO_2 < 100\%$ despite preoxygenation are more prone to experience intubation-related hypoxemia. Positive pressure breathing must be used during pre-oxygenation and between induction and laryngoscopy in high-risk patients to prevent hypoxemia [6].

Difficult airway assessment

A "difficult airway" (DA) occurs when a classically trained anesthesiologist has difficulty performing tracheal intubation and face mask ventilation of the upper airway, or both. A more full explanation would include direct tracheal access, airway instrumentation (such as with supraglottic airway devices), and airway consideration during extubation [7].

Clinical history

Any past chronic illnesses, such as diabetes mellitus, ankylosing spondylitis, and rheumatoid arthritis, that have reduced joint mobility should be mentioned. The unusual DA-related disorders Pierre-Robin, Klippel-Feil, and Treacher-Collins are a few examples. Acute respiratory tract infections that have recently occurred increase the risk of bronchospasm and laryngospasm [7].

Clinical examination

Obesity, prominent chest/breasts, beards, and other external signs of head and neck disease are straightforward to spot during patient examination. Additional airway-specific tests that are designed to foretell difficulties have been extensively studied and published in the literature. Individual airway tests are

Received: 06/02/2023
Accepted: 06/04/2023

not statistically predictive, and there is no perfect approach to evaluate the airways. They should, however, increase our sensitivity to the possibility of difficulty and aid in our preparation [7].

Clinical investigation

- ***Radiographs***

Plain radiographs can be utilised in airway examinations, despite their uncommon use. It is known that a hard intubation can be identified by a narrowing of the space. The presence of foreign bodies may make it possible to identify the kind and strength of any barriers as well as the size of any accessible airspace that may be present. A chest X-ray may reveal an airway collapse, a distal blockage, or gas entrapment. Tracheal compression/deviation and soft tissue edoema may be seen in several illnesses, necessitating more CT or nasendoscopy research [7].

- ***Ultrasound***

Ultrasonography is being utilised increasingly frequently to find the cricothyroid membrane and carry out the actual procedure. It is widely known that ultrasonography may be used to detect significant midline vasculature and to determine whether percutaneous tracheostomy is necessary. A bigger sample size is required to confirm a variety of characteristics that have been proposed for use in predicting difficult intubation. These include the capacity to visualise the hyoid bone with sublingual ultrasonography, tongue thickness, and pre-tracheal fat at the level of the vocal cords [8, 9, 10].

- ***Nasendoscopy***

Nasendoscopy is helpful for inspecting the upper airway architecture, identifying abnormalities such as edoema or anatomical distortion in the upper airways, and establishing the relevance of any peri-glottic lesions. Nasendoscopy before induction is possible in the ward, pre-assessment clinic, or operating room. The strategy may be developed with knowledge of how any lesion can affect direct tracheal access, flexible fiberoscopy, intubation, and even laryngoscopy [7].

Predicting difficulty in mask ventilation

Mask ventilation is the most basic and conceivably most important technique in airway control. The greatest danger is when treating the airways of patients who have been diagnosed with difficult mask ventilation (DMV) or who are anticipated to be problematic. Our decision-making process should be most influenced by this part of management, potentially in conjunction with consideration of awake strategies. DMV might also indicate future laryngoscopy issues. A variety of traits are known to be predictive of DMV, which can affect up to 5% of patients. Because of early research that identified five distinct features, including being obese, bearded, old (> 55 years), snoring, and edentulous, it was feasible to memorise the acronym obese [10]. the male sex, modified Mallampati class 3 or 4, reduced jaw protrusion, etc. were all topics of more study on DMV. Even while it can be a sign of probable oxygenation problems (caused by a smaller FRC) and higher aspiration risk, BMI is not a highly reliable predictor. Because OSA and collapsing airways are both made worse by fat build up in the parapharyngeal tissues, it is crucial to account for the distribution of body fat when predicting DA. This is especially evident in cases of obesity due to the "android pattern", which distributes fat tissue throughout the neck, upper body, and trunk. The neck tissue's increased accumulation of fat may make airway obstruction worse. DMV is linked to OSA, snoring without apnea, and an increasing neck circumference of more than 40 cm. Increases in neck circumference increase the likelihood of DMV [11].

Management of difficult airway:

If a DA is known or suspected, the anesthesiologist should explain the specific risks and treatment techniques to the patient (or designated caretaker). Make sure there is always at least one other person available who can help manage a DA. Prior to controlling the DA, preoxygenation using a face mask should be used. A reluctant or young patient may limit preoxygenation opportunities [12].

Intubation technique for the difficult airway:

The study found that specific strategies made it simpler to intubate a difficult airway. Advisors usually agree that a pre-planned strategy may yield superior outcomes, despite the fact that the literature cannot be used to determine the full amount of any one approach's benefits.

By linking pre-planned techniques, airway management algorithms can be built. Because the technical and physiological complexity of life-threatening airway events is sufficiently similar to that of life-threatening cardiac events, the Task Force supports the use of algorithms in difficult airway care [12].

Recommendations:

In order to successfully intubate the difficult airway, the anesthesiologist must be ready with a specified plan. The algorithm shown in figure (1) is suggested by the Task Force. The intended surgery, the patient's condition, and the anesthesiologist's preferences and skill set will all have an impact on this strategy [12].

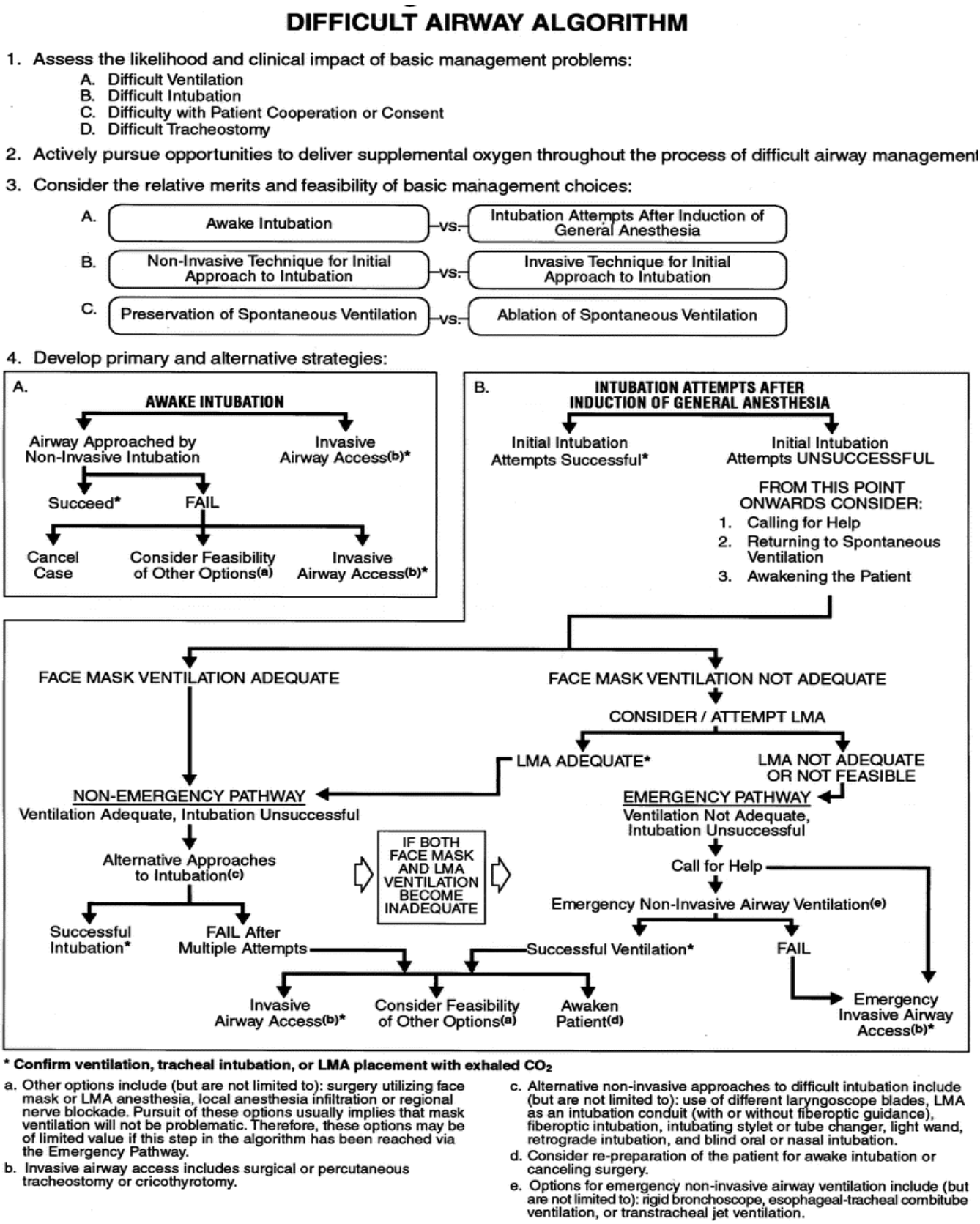

Figure (1): Algorithm for difficult airway management [12].

Comparing the therapeutic advantages and practicality of three basic management strategies: Use of non-invasive approaches as opposed to invasive techniques (such as surgical or percutaneous tracheostomy or cricothyrotomy) for the first approach to intubation includes: a. Awake intubation versus intubation after induction of general anaesthesia b. During intubation efforts, maintaining spontaneous ventilation as opposed for eliminating it [12].

Choosing a primary or preferred method for: (A) Intubation when awake. (B) The difficult-to-intubate patient who can breathe on their own. (C) An event that endangers the patient's life and prevents them from receiving intubation or ventilation. The identification of backup plans to utilise in case the primary strategy fails or is not workable. To verify tracheal intubation, carbon dioxide exhalation is performed [12, 13].

CONCLUSION

Difficulty in intubation is a main problem encountered during general anesthesia that arise from anatomical and physiological barriers. Algorithm for airway management in DA is important to overcome possible complications.

Sponsoring financially: Nil.
Competing interests: Nil.

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