

## Awake intubation in patients with expected difficult airway and high risk of gastric aspiration: case report

*Intubação traqueal em paciente acordado com via aérea difícil antecipada e alto risco de aspiração: relato de caso*

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### ABSTRACT

**Objective:** Awake intubation is an important strategy in the management of difficult airways, particularly in situations with a high risk of gastric content aspiration. This report demonstrates that the procedure can be performed safely and with minimal patient discomfort, even in the absence of airway nerve blocks, flexible fiberoptic bronchoscopy, and bispectral index monitoring. The objective of this report is to describe two cases of patients with anticipated difficult airways and a high risk of bronchoaspiration, who underwent awake intubation using videolaryngoscopy. **Ethical consideration:** The patient provided consent for this case report. The case report was approved by the institutional research ethics committee (CAAE: 89373125.4.0000.5066).

**Case Report:** Two patients with difficult airways and high risk of bronchoaspiration were described. The first one, a 59-year-old woman, presented severe upper abdominal pain, cessation of bowel movements, and vomiting. She was scheduled for an emergency exploratory laparotomy. Anticipated difficult airway was expected due to obesity, limited mouth opening, and a history of sleep apnea. The second patient, a 68-year-old man, presented with abdominal pain and distension, with clinical deterioration, disorientation, fever, and a pneumoperitoneum detected on computed tomography. He was scheduled for an emergency exploratory laparotomy. He has a medical history of difficult intubation due to reduced cervical mobility. **Conclusions:** Awake intubation is the safest method of airway management and can be performed with minimal patient discomfort, even when peripheral nerve blocks are contraindicated, flexible fiberoptic bronchoscopy, and bispectral index monitoring are not available.

**Keywords:** Airway Management; Respiratory Aspiration of Gastric Contents; Abdomen, Acute; Case Report.

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There were no supporting sources.

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## RESUMO

**Objetivo:** A intubação acordada é um recurso importante no manejo de via aérea difícil, principalmente em situações com alto risco de aspiração de conteúdo gástrico. Este relato mostra que o procedimento pode ser realizado com segurança e sem grande desconforto ao paciente, mesmo na ausência de bloqueios para intubação, fibroscópio flexível e monitorização de consciência por índice Bispectral. O objetivo deste relato é descrever o caso de 2 pacientes com via aérea difícil antecipada e alto risco de broncoaspiração, intubados em consciência com auxílio de videolaringoscópio. **Considerações éticas:** Os pacientes deram consentimento para a realização do relato de caso. O relato de caso foi aprovado pelo conselho de ética local (CAAE: 89373125.4.0000.5066). **Relato de caso:** Descreveu-se o caso de dois pacientes com alto risco de broncoaspiração e via aérea difícil. A primeira, 59 anos, com quadro de dor intensa em abdome superior associado a parada da eliminação de fezes e episódios de vômitos, programada para laparotomia exploratória de urgência, com provável via aérea difícil, devido à obesidade, abertura de boca limitada e histórico de apneia do sono. O segundo, 68 anos, com dor e distensão abdominal, piora do estado geral, desorientação, febre e pneumoperitônio constatado em tomografia computadorizada, programado para realizar laparotomia exploratória de urgência. Apresenta histórico de intubação difícil por baixa mobilidade cervical. **Conclusões:** A intubação acordada é o método mais seguro de manipulação de via aérea, e é possível ser realizada com mínimo desconforto ao paciente, mesmo quando contraindicados bloqueios periféricos e sem utilizar fibroscópio flexível ou monitorização de consciência por índice Bispectral.

**Palavras-chave:** Manuseio Das Vias Aéreas; Aspiração Respiratória de Conteúdos Gástricos; Abdome Agudo; Relatos de Casos.

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## INTRODUCTION

Bronchoaspiration is the inhalation of gastric content into the respiratory system. Aspiration syndromes, such as chemical pneumonitis and aspiration pneumonitis, are significant causes of morbidity and mortality during general anesthesia<sup>1</sup>.

Risk factors include conditions that increase gastric volume or predispose to gastroesophageal reflux, with obstructive and perforative acute abdomen being important examples<sup>2</sup>.

Awake intubation allows for airway protection before the induction of general anesthesia, thus preventing the potential risks associated with difficult airway management. In patients at high risk of bronchoaspiration, airway management becomes more challenging, as regional blocks for tracheal intubation are contraindicated<sup>1</sup>.

Although the flexible fiberoptic bronchoscope remains the gold standard for difficult airway management,

videolaryngoscopy is comparable in effectiveness in first-attempt intubations and can safely replace the fiberoptic bronchoscope<sup>3</sup>.

## CASE REPORT

**Case 1:** 59-year-old obese female, with a history of abdominoperineal amputation for rectal neoplasia and colostomy, presented with severe upper abdominal pain for 3 days, associated with cessation of stool output through the colostomy and vomiting. Abdominal tomography revealed fluid–gas distension of small bowel loops, likely due to adhesion. The surgical team indicated emergency exploratory laparotomy.

In the operating room, after monitoring the patient and acquiring a peripheral venous access in the upper left limb with an 18G IV cannula, a suspected difficult airway was identified due to obesity, limited mouth opening, and history of sleep apnea. Therefore, the anesthesiology team opted for

awake intubation. The patient, who was lucid and oriented, was informed about the nature of the procedure, possible discomfort, safety profile, and potential complications.

After consent, the process began with preoxygenation with high-flow face mask, while the following materials and drugs were prepared: a 7.5 orotracheal tube lubricated with lidocaine gel, a tested videolaryngoscope, fentanyl 0.5µg/kg, lidocaine 10% spray, dexmedetomidine diluted to 4 mcg/ml for continuous infusion (CIP), as well as anesthetic induction drugs for post-intubation (propofol 1.5mg/kg, rocuronium 0.6mg/kg, and fentanyl 1.5µg/kg).

Since the patient had a 14F nasogastric tube in place, aspiration was performed.

The bispectral index (BIS) monitor was in maintenance, and thus unavailable. Due to this, the Ramsay sedation scale was used to titrate sedation. An initial loading dose of dexmedetomidine 1mcg/kg IV was infused via continuous infusion pump (CIP) over 10 minutes, with periodic assessment of the patient's consciousness until she was calm and responsive to verbal commands (Ramsay 2). After the loading dose, maintenance continued at 0.5mcg/kg/h.

Topicalisation of the oral cavity and tongue base was performed with 10% lidocaine spray, followed by videolaryngoscope insertion to anesthetize the vallecula with the same agent. At this stage, the patient experienced discomfort; therefore, fentanyl 0.5µg/kg was administered, waiting for its onset before reattempting videolaryngoscope insertion. Naloxone was diluted to a concentration of 0.04mg/ml in case of respiratory depression. Fentanyl was preferred over remifentanyl to ensure time efficiency.

Finally, videolaryngoscopy was performed, with indirect visualization-guided intubation. Correct tube positioning was confirmed by capnography, and anesthetic induction was carried out. The patient remained conscious and cooperative until induction of anesthesia, with no hemodynamic instability or exacerbation of autonomic reflexes.

After surgery, she was extubated and transferred to the ICU. The following day, she was questioned regarding memory of intubation, perception of pain or discomfort during the procedure, and understanding of the reason for awake intubation. She reported recalling the procedure and experiencing discomfort but denied pain. Finally, she claimed to comprehend the reason for the procedure.

**Case 2:** 68-year-old male patient with a history of severe peripheral arterial occlusive disease and late postoperative status after thoracic aortic endoprosthesis implantation for aortic ulcers, presented with abdominal pain, distension, clinical deterioration, disorientation, and fever. Abdominal tomography revealed pneumoperitoneum. The surgical team indicated emergency exploratory laparotomy.

The patient had a history of difficult intubation due to limited cervical mobility, and awake intubation was chosen. Given that he presented a decreased level of consciousness, the procedure was explained both to the patient and to his accompanying relative. Both provided consent for awake intubation.

The bispectral index (BIS) monitor was in maintenance, and thus unavailable. Due to this, the Ramsay sedation scale was used to titrate sedation. Before administration of medications, the patient already presented reduced consciousness, as he was drowsy but responsive to verbal commands without the need for physical stimuli (Ramsay 3). Therefore, the procedure was performed without hypnotics, using remifentanyl as the sole agent, reducing the risk of over-sedation.

Preoxygenation with a high-flow face mask was initiated, and the following materials and drugs were prepared: a 7.5 orotracheal tube lubricated with lidocaine gel, a tested videolaryngoscope, 10% lidocaine spray, remifentanyl diluted to 50 mcg/ml for continuous infusion, as well as anesthetic induction agents for post-intubation (propofol 1mg/kg, ketamine 0.3mg/kg, and rocuronium 0.6mg/kg).

Since the patient had a 16F nasogastric tube in place, aspiration was performed.

Target-controlled infusion of remifentanyl was started via CIP, with progressive titration up to 2 mcg/ml, monitoring for potential side effects such as bradycardia or further decrease in consciousness. Local anesthesia of the oral cavity and tongue base was performed with 10% lidocaine spray, followed by videolaryngoscope insertion to anesthetize the vallecula with the same agent. At this moment, the patient experienced a brief coughing episode. The team waited until spontaneous respiration normalized before proceeding.

Videolaryngoscopy was then performed, allowing indirect visualization-guided intubation. Tube placement was confirmed with capnography, and anesthetic induction was carried out. The patient did not present agitation, hemodynamic instability, or emesis during the procedure.

During surgery, vasopressor infusion and blood transfusion were required. Therefore, in agreement with the surgical team, the anesthesiology team decided to maintain the patient intubated and transfer him to the ICU. He was kept sedated and on mechanical ventilation for 24 hours, until partial clinical improvement was achieved; therefore, immediate postoperative satisfaction with the procedure could not be assessed.

After extubation, the patient was questioned about his memory of intubation, pain and discomfort during the procedure, and his understanding of the reason for awake intubation. He reported vague recollection of the procedure, partial memory of the explanation, and discomfort related to the coughing episode, but denied pain. He affirmed understanding the importance of performing awake intubation.

In both cases, it was deemed reasonable not to obtain written informed consent directly from the patients or their relatives, as they presented severe surgical conditions in which additional communication might have caused unnecessary psychological distress. Furthermore, this study was retrospective, relying solely on pre-existing medical records with exclusion of personal identifiers. Accordingly, exemption from the need for written informed consent was requested and approved by the local ethics committee.

## DISCUSSION

Awake intubation is the safest method to ensure airway control. Since it is an uncomfortable procedure, it should not be performed indiscriminately, but rather indicated in the presence of difficult airway, defined as failure or difficulty in airway management by an experienced physician or anesthesiologist. The concept includes difficulty with ventilation, laryngoscopy, intubation, and extubation<sup>1</sup>.

Any anesthetic procedure should be preceded by airway assessment. Predictors of a difficult airway include thyromental distance <6cm, sternomental distance <12.5cm, a short and thick neck, limited cervical extension, obstructive sleep apnea, the presence of beard, BMI >30, and limited mouth opening<sup>1</sup>.

The American Society of Anesthesiologists (ASA) difficult airway algorithm indications for awake intubation are patients with suspected difficult laryngoscopy associated with another predictor of difficulty airway, such as difficult ventilation, high risk of aspiration, high risk of rapid desaturation, or suspected difficult emergency airway<sup>4</sup>.

Perioperative pulmonary aspiration refers to inhalation of gastric contents into the lungs during anesthetic induction, intraoperatively, or in the immediate postoperative period. Although not a frequent event, it accounts for 20% of anesthesia-related mortality, being more common in emergency surgeries and in patients with poor clinical status<sup>2</sup>.

The risk factors for aspiration are associated to the increase gastric volume or predisposal to gastroesophageal reflux. Examples include inadequate fasting, acute trauma, intestinal obstruction, pregnancy or immediate postpartum, difficult airway, critically ill patients (ASA III and IV), and gastroparesis, which occurs in diabetes mellitus, morbid obesity, and age over 80 years<sup>2</sup>.

In patients with high risk of aspiration and suspected difficult airway, intubation becomes more complex, as some techniques of airway nerve blocks (glossopharyngeal, superior laryngeal, and recurrent laryngeal) are contraindicated<sup>5</sup>. This highlights the importance of psychological preparation of the patient, anxiolysis, and the availability of a videolaryngoscope or flexible bronchoscope<sup>4</sup>.

Awake intubation may be performed without sedation, though its use is beneficial for improving patient tolerance, decreasing anxiety, and reducing discomfort. The Difficult Airway Society (DAS) guideline defines minimal sedation as “a drug-induced state during which the patient responds normally to verbal commands, whilst the airway, spontaneous ventilation and cardiovascular function are unaffected”<sup>6</sup>. The professional can measure the sedation depth using the Ramsay Sedation Scale, presented in Figure 1, and depth-of-anesthesia monitors such as the bispectral index (BIS).<sup>1</sup>

The DAS algorithm for awake intubation establishes a logical sequence for performing the procedure. After indication of awake intubation, high-flow nasal oxygen therapy is initiated and maintained throughout the procedure. Next, airway topicalization is performed, with its

effectiveness tested atraumatically. Only then is the patient sedated, followed by aspiration of secretions. Intubation should be performed with the patient in a semi-upright or sitting position<sup>6</sup>.

Regarding drug selection for sedation, several agents are safe for use, allowing room for variation depending on the anesthesiologist's experience. A careful combination of hypnotics and opioids is recommended, though some agents may be used alone<sup>1,6</sup>.

Opioids provide analgesia and suppress the cough reflex. Fentanyl may be used in doses of 0.5–1µg/kg, always cautiously and with naloxone immediately available<sup>6</sup>.

Remifentanyl is the opioid most commonly recommended in current literature, as it can be easily titrated and has a short half-life, both features that reduce the risk of excessive sedation. Consciousness, respiratory pattern, and hemodynamics should be closely monitored. It is one of the two drugs that can be used as a sole agent, the other being dexmedetomidine, and it offers high levels of safety and patient comfort. The downside is patients may retain memory of the procedure<sup>6</sup>.

The goal of hypnotic drugs is to cause anxiolysis while maintaining consciousness and spontaneous ventilation, ideally with some degree of amnesia. The patient should remain calm, cooperative, and responsive<sup>1</sup>.

Midazolam is widely used, but doses should be limited to ≤1mg per administration, with even greater caution in elderly patients. Propofol may be used, but only in target-controlled infusion, not exceeding 1mg/kg, due to the risk of cardiovascular and respiratory depression<sup>1</sup>.

Dexmedetomidine is the hypnotic agent most commonly recommended in current literature. It is an α<sub>2</sub>-adrenergic agonist with sedative, anxiolytic, and sympatholytic effects, and it has a low incidence of respiratory depression. In addition, the drug provides mild analgesic effects and can be used as a sole agent for awake intubation, similar to remifentanyl. It may also be administered in combination with an opioid analgesic<sup>1</sup>.

When comparing the use of dexmedetomidine and remifentanyl as single agents, dexmedetomidine offers superior amnesic properties but inferior antitussive and analgesic effects. Therefore, its use as a sole drug should be accompanied by extensive topical anesthesia. For this reason, it may not be the best choice in patients with contraindications to peripheral nerve blocks for intubation<sup>1</sup>.

Dexmedetomidine is an excellent option as it provides anxiolysis, analgesia, and attenuates the hemodynamic response to intubation without causing respiratory depression. It is administered via target-controlled infusion, with a loading dose of 1µg/kg infused over 10–20 minutes, followed by maintenance at 0.2–0.5µg/kg/h. Its main drawback is the lack of antitussive effect. Like remifentanyl, it can be used as a single agent, with high safety and patient comfort<sup>1</sup>.

During the procedure, sedation depth should be assessed. The main methods are the Ramsay Sedation Scale, and depth-of-anesthesia monitors such as the (BIS). These

Level of response	Ramsay sedation scale
1	The patient is anxious and agitated or restless or both
2	The patient is cooperative, oriented and tranquil
3	The patient responds to commands only
4	The patient exhibits a brisk response to a light glabellar tap or loud auditory stimulus
5	The patient exhibits a sluggish response to a light glabellar tap or loud auditory stimulus
6	The patient shows no response

**Note:** Data from Ramsay et al.

**Figure 1.** Ramsay Sedation Scale.

**Source:** Adapted from Ramsay et al. (1974)<sup>7</sup>.

devices do not replace the clinical assessment of the patient, as they do not evaluate the patient's hemodynamic profile or respiratory pattern<sup>1</sup>.

The use of consciousness monitoring devices is not mandatory for performing awake intubation; however, they assist in titrating sedation, helping to prevent discomfort due to insufficient sedation and the risk of respiratory depression resulting from excessive sedation<sup>8</sup>.

Furthermore, it is important to emphasize that the use of monitoring devices does not replace the clinical assessment of consciousness. This is because loss of consciousness may occur at different BIS values, depending on the drug used and the patient's clinical profile<sup>9</sup>. Moreover, BIS values fluctuate and are subject to interference, making it inappropriate to assess the level of consciousness based on a fixed value, instead, the correct approach is to evaluate a range of values<sup>10</sup>.

Ideally, the patient should stay awake, cooperative, oriented, and tranquil (Ramsay 2), or only responding to commands (Ramsay 3)<sup>1</sup>. The optimal BIS range is 80–86, which allows the procedure to be performed with minimal side effects<sup>7</sup>. There is a significant correlation between Ramsay  $\leq 3$  and BIS  $\geq 80$ , so if BIS monitors are unavailable, the Ramsay scale may be used safely to assess anesthetic depth<sup>11</sup>.

The flexible bronchoscope is considered the gold standard for difficult airway management. However, the development of modern, simpler devices such as the videolaryngoscope has expanded the anesthesiologist's options. Meta-analyses comparing videolaryngoscopy and flexible bronchoscopy in awake intubation conclude that both methods have similar first-attempt success rates, but videolaryngoscopy reduces intubation time and the risk of hypoxia<sup>3,12</sup>.

Other advantages of videolaryngoscopy over flexible bronchoscopy include a shorter learning curve, wider airway view, no restriction of orotracheal tube diameter, and easier tube exchange during the procedure<sup>3</sup>.

## AUTHOR'S CONTRIBUTIONS:

We describe contributions to the papers using the taxonomy (CRediT) provide above: *Conceptualization, Investigation, Methodology, Visualization & Writing – review & editing:*

Carneiro, B. *Project administration, Supervision & Writing – original draft:* Carneiro, B. *Data curation & Formal Analysis:* Carneiro, B.

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## CONCLUSION

Awake intubation is the safest method to ensure airway control and should be the technique of choice in the management of difficult airways with a high risk of aspiration. In such cases, gradual and careful patient anxiolysis is essential, since peripheral nerve blocks for tracheal intubation are contraindicated. Furthermore, the use of devices that facilitate tracheal visualization and intubation is ideal; however, reliance on the flexible bronchoscope is not mandatory, as the videolaryngoscope can safely replace it.

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