Acta Anaesth. Bel., 2025, 76 | Suppl. 1: 77-86

Masterthesis

Techniques in awake intubation: a narrative review

Heyns M.[1], Jappie R.[1], Van De Velde M.[1,2]

[1]Department of Anesthesiology KU Leuven-University, Leuven, Belgium; [2]Department of Cardiovascular Sciences KU Leuven-University, Leuven, Belgium, University Hospitals Gasthuisberg, Herestraat 49, Leuven, 3000 Belgium.

Corresponding author: dr. Heyns Matthias, Master in Medicine, Department of Anesthesiology, KU Leuven-University, Leuven, Belgium; University Hospitals Gasthuisberg, Herestraat 49, Leuven, 3000 Belgium. Phone + 32 498 16 48 78 - Email: matthias.heyns@gmail.com / matthias.heyns@uzleuven.be

Abstract

Awake tracheal intubation is a critical airway management technique used in patients with anticipated difficult airways, airway pathology, or compromised respiratory function. Unlike conventional intubation under general anesthesia, ATI preserves spontaneous breathing, reducing the risk of hypoxia and airway collapse. This thesis explores the various techniques employed in ATI, with a focus on optimizing patient comfort, ensuring procedural success, and minimizing complications.

Key elements of ATI include adequate patient preparation, effective topicalization of the airway, and appropriate sedation strategies that balance patient cooperation with airway reflex suppression. Techniques such as fiberoptic bronchoscope-guided intubation and video laryngoscope-assisted intubation are discussed in terms of efficacy, safety, and operator preference. The role of high-flow nasal oxygenation, adjunct airway devices, and emerging technologies in ATI are also examined.

Through a review of current literature, clinical guidelines, and expert opinions, this study provides a comprehensive analysis of ATI techniques and their clinical applications. The findings highlight the importance of structured preparation, standardized protocols, and individualized patient approaches to enhance procedural success and patient safety.

Keywords: **Intratracheal intubation, awake intubation, sedation, regional anesthesia, bronchoscopy, laryngoscopy.**

Introduction

Awake tracheal intubation (ATI) is a critical airway management technique utilized in selected patients with anticipated difficult airways, cervical spine instability, or airway pathology that precludes rapid sequence induction[1].

Unlike traditional intubation, awake intubation preserves spontaneous ventilation and patient cooperation, reducing the risks associated with hypoxia and failed intubation[2]. This technique is particularly valuable in scenarios where complete airway obstruction or loss of the airway could lead to significant morbidity or mortality. Over the years, various techniques and technological advancements have refined the approach to awake intubation, improving both patient safety and procedural success[3].

The introduction of novel airway and intubation equipment such as video laryngoscopy has reduced the need to perform ATI. Nevertheless, certain patients with selected pathologies will have a clear advantage of ATI over other intubation techniques[4].

This narrative review aims to explore various techniques employed in awake intubation, highlighting their indications, advantages, and practical applications.

Anatomical and Physiological Considerations

Understanding airway anatomy and physiological responses is crucial for successful awake intubation[5]. The key anatomical structures include the oral cavity, pharynx, larynx, and trachea, which must be carefully navigated to ensure atraumatic tube placement. The tongue, epiglottis, and glottic opening are significant landmarks that influence intubation success. In patients that need ATI these anatomic landmarks can be disrupted due to the underlying disease or anomaly, for example

obstruction or aberrant anatomy due to tumor growth, reduced mouth opening due to trismus or damage to the maxillary joint or secretions and blood in the airway[6].

Physiologically, airway stimulation by manipulation can trigger laryngospasm, coughing, and sympathetic activation, leading to tachycardia, hypertension, and increased intracranial pressure. Excessive stimulation may also provoke gagging and discomfort, potentially compromising the procedure[7].

Therefore, adequate preparation, including sedation and topical anesthesia, is essential to optimize patient comfort and cooperation while minimizing adverse hemodynamic responses or the occurrence of life-threatening airway compromise.

Preparation and Patient Selection

Patient selection is a critical step in awake intubation. Accurate prediction (using for example certain scoring systems) of a difficult airway is often unreliable[8], but in patients needing ATI some common features can be identified. This list of features is non-exhaustive but certainly contains patients with head and neck pathology (including malignancy, previous surgery or radiotherapy); reduced mouth opening; limited neck extension; obstructive sleep apnea; morbid obesity; and progressive airway compromise[9,10]. Candidates also often include individuals with known or suspected difficult airways, high-risk aspiration, or conditions necessitating airway control without deep sedation[10].

A thorough pre-procedural assessment includes airway examination using tools such as the Mallampati score, thyromental distance measurement, and neck mobility assessment[9]. These evaluations help predict the likelihood of a difficult airway and inform the choice of intubation technique. In addition to physical assessment, psychological preparation plays a vital role. Educating the patient about the procedure, addressing their concerns, and providing reassurance can significantly improve cooperation[11]. Anxiety management through premedication (e.g., low-dose benzodiazepines) may also be considered[12].

Apart from the indications for an ATI, patients obviously need the appropriate preoperative management according to the degree of urgency of their case. For elective cases they need to be appropriately fasted[13], and it needs to be remembered that in urgent cases with a non-fasted patient there still is a risk of aspiration, even with ATI[14].

There are some relative contra-indications for ATI, including local anesthetic allergy, or severe bleeding in the airway or uncooperative patients, but the only absolute contraindication for ATI is patient refusal[1].

Procedural setup

Location and timing of ATI

ATI is often regarded as one of the most physically, mentally, and psychologically demanding procedures in elective airway management[15]. These stressors can contribute to decreased operator performance, potentially increasing the risk of complications, including intubation failure. However, these challenges can be mitigated through effective teamwork, clear communication, and thorough preparation[16]. The role of well-trained and competent assistants is crucial, and their contribution to the procedure's success should not be underestimated.

Time pressures imposed by other team members should not compromise patient safety. Proper coordination and communication between the anesthesia team (both trained and experienced), operating theatre nursing staff and surgeons are essential to ensure a controlled and safe intubation process[17].

The choice of location for ATI requires careful consideration and planning. Ideally, ATI should be conducted in an operating theatre setting, where access to skilled personnel, necessary medications, essential equipment, and adequate space is readily available[18]. This environment is particularly advantageous for high-risk patients, such as those with significant airway obstruction, hypoxia, respiratory failure, or a history of difficult or failed ATI. Compared to an anesthetic room, the operating theatre offers greater space and immediate access to surgical intervention if required[7].

When ATI must be performed outside the operating theatre—such as in the critical care unit or emergency department—the same high standards of care should be maintained to ensure patient safety and procedural success[19].

Patient Positioning

To facilitate optimal airway patency and enhance overall patient comfort, the individual undergoing awake intubation is typically positioned in either an upright seated posture or a semi-Fowler position[20]. This positioning aids in maintaining airway stability, reduces the risk of airway obstruction, and allows for better anatomical alignment to support the intubation process. Proper head and neck positioning should also be ensured to further optimize visualization and access to the airway

structures. This is also the most comfortable positioning for the patient[21]. Sometimes the anesthesiologist may choose a supine positioning, mostly depending on previous experience and the modality of intubation.

Monitoring

Comprehensive physiological monitoring must be established in accordance with the standards set in the guidelines to ensure patient safety throughout the procedure[22]. This includes continuous pulse oximetry to assess oxygen saturation, electrocardiography (ECG) to monitor cardiac activity, and non-invasive blood pressure measurement at regular intervals to detect any hemodynamic changes. Additionally, capnography should be utilized to continuously evaluate end-tidal carbon dioxide ($EtCO_2$) levels, providing real-time feedback on ventilation and respiratory status during critical moments in the process.

Intravenous (IV) Access

Securing adequate intravenous access is an essential step in the preparation process. A well-functioning IV line should be established to allow for the administration of sedation, analgesia, or emergency medications as required. This ensures that necessary pharmacologic interventions can be promptly delivered to manage patient comfort and address any potential complications that may arise during the intubation process.

Airway Equipment

A complete and well-organized set of airway management tools should be readily available to facilitate a smooth and successful intubation[19]. The essential equipment includes:

- A flexible fiberoptic bronchoscope or a video-assisted laryngoscope, which are critical for visualizing the airway structures and guiding endotracheal tube placement.
- Suction devices to clear secretions, ensuring an unobstructed view and reducing the risk of aspiration.
- An appropriately sized endotracheal tube (ETT) to secure the airway once proper placement is achieved. In patients with difficult airways it is very important to take into account the aberrant anatomy (stenosis because of tumor growth, fibrous tissue,…) and select the appropriate tube size[23].
- A bougie or stylet (e.g. an Eschmann tracheal tube introducer or a intubating introducer), which may be used to aid in guiding the ETT during more challenging intubations[24], or when using a video laryngoscope[25].
- A laryngeal mask airway (LMA) to serve as an alternative airway device in cases where endotracheal intubation proves difficult or fails[26-28].
- A surgical airway kit, which must be immediately accessible in the event of a failed airway requiring an emergent surgical intervention, such as cricothyrotomy or tracheostomy[29].

By ensuring thorough preparation with appropriate positioning, monitoring, IV access, and equipment availability, the likelihood of a safe and effective awake intubation is significantly enhanced.

Oxygenation

Oxygenation is another important part of ATI, especially if the patient is being sedated. Airway topicalization on itself is rarely associated with desaturation events[30]. No significant difference has been observed in desaturation rates between flexible bronchoscope-guided ATI (ATI:FB) and video laryngoscope-assisted ATI (ATI:VL)[31,32]. As a result, oxygenation recommendations apply to both techniques.

The incidence of desaturation ($SpO_2 \leq 90\%$) during ATI varies depending on the oxygenation technique used. With low-flow oxygen delivery methods (<30 L/min) 12-20% of patient experience desaturation[31]. However, when warmed and humidified high-flow nasal oxygen (HFNO) is administered, the incidence of desaturation significantly decreases to 0–1.5%[33].

Although there are no randomized controlled trials directly comparing air versus oxygen use during ATI, findings from bronchoscopy studies indicate a significant reduction in both the incidence and severity of desaturation with oxygen administration[34]. Furthermore, in various procedural sedation settings, the use of supplemental oxygen has been shown to lower the risk of desaturation compared to breathing room air alone[35]. Current sedation guidelines advocate for the routine use of supplemental oxygen in these scenarios[36,37].

Based on the available evidence, the administration of supplemental oxygen during ATI is strongly recommended. Oxygen therapy should be initiated as soon as possible (upon the patient's arrival) and continued throughout the procedure. When accessible, HFNO is the preferred technique due to its superior efficacy in preventing desaturation.

Sedation and Topical Anesthesia Techniques

The cornerstone for a successful attempt at ATI is the topical anesthesia of the airway, accompanied by conscious sedation when needed for maximizing

patient comfort. Within the following few paragraphs, we will discuss the variating sedation strategies and topicalization techniques.

Sedation

The goal during awake intubation is to ensure the patient remains comfortable, relaxed, and cooperative while maintaining spontaneous breathing. Awake intubation can safely be performed without the use of sedation techniques[38], but especially in anxious patients comfort can be optimized with adequate sedation while also increasing procedure tolerance[39,40]. In the following part of this narrative review, we will discuss some common sedation strategies.

Each of these agents has its advantages and considerations based on the specific needs of the patient and the procedure. A careful combination of these drugs, often titrated during the procedure, ensures that spontaneous breathing is maintained, and the patient remains comfortable and cooperative. Several agents can be used to achieve this, each with its specific benefits and considerations.

Dexmedetomidine

Starting with dexmedetomidine, an alpha2-agonist and commonly used sedative in these situations due to its sedative, anxiolytic, and analgesic properties without causing significant respiratory depression[41]. This agent is particularly valuable because of its ability to be titrated, which allows for precise control over sedation levels and helps keep the patient calm and comfortable while ensuring they can maintain spontaneous breathing.

Clonidine

Clonidine, an alpha-2 adrenergic agonist, is used as well for its mild sedative and analgesic properties. It helps reduce the sympathetic response to intubation and has minimal impact on respiration. Often used in combination with other sedatives and analgesics, clonidine can optimize patient comfort during awake intubation. It is however inferior to dexmedetomidine[42].

Remifentanil

Remifentanil is an ultra-short-acting opioid and is another agent frequently used in awake intubation. It provides effective analgesia and suppresses airway reflexes, but its rapid onset and offset minimize the risk of significant respiratory depression, making it ideal for procedures that require quick adjustment in sedation depth[43].

Benzodiazepines

Midazolam, a benzodiazepine, is often used for its anxiolytic effects and ability to induce mild sedation and amnesia[44]. It is commonly combined with opioids like remifentanil to enhance patient comfort during the procedure, providing relaxation without markedly depressing respiratory function at low doses[45].

Remimazolam, a newer derivative of midazolam, offers similar benefits but with a shorter duration of action. Its rapid onset and quick recovery make it an attractive option for shorter procedures, providing anxiolysis and sedation without significant residual effects once the procedure is over[46,47].

Propofol

Propofol, while typically associated with general anesthesia, may be used for conscious sedation in some awake intubation procedures. However, it requires careful titration to prevent respiratory depression. It acts rapidly and has a quick recovery profile and is frequently used in combination with other sedatives[48].

Ketamine

Besides the earlier mentioned agents, ketamine is a dissociative anesthetic known for its ability to provide analgesia, sedation, and amnesia while maintaining airway reflexes and spontaneous breathing[49]. Its unique properties make it particularly useful for awake intubation, especially when there is a need for strong pain control alongside sedation, as it does not significantly depress respiration.

Each of these agents plays a critical role in maintaining comfort, cooperation, and safety during awake intubation. Depending on the patient's condition and the specific requirements of the procedure, a combination of these drugs is often carefully titrated to ensure optimal outcomes. The choice of sedative agents also depends on the experience of the qualified anesthetist and its availability in the hospital.

Sedation should be carefully titrated to avoid excessive drowsiness or loss of airway protective reflexes. Monitoring with capnography and pulse oximetry is recommended throughout the procedure[48].

Topicalization Techniques

As mentioned before, effective airway anesthesia is paramount in awake intubation, as it ensures the patient's comfort and cooperation while preventing the stimulation of airway reflexes that could interfere with the procedure[27]. Lidocaine is the most commonly used local anesthetic due to its favorable safety profile regarding systemic toxicity[50]. Topical lidocaine dosing should not exceed 9 mg per kg of lean body mass to avoid systemic toxicity[51].

Table I. — Common used sedative in ATI and their dosing regimens, onset and considerations.

Drug	Route	Dose (ATI context)	Onset	Comments
Dexmedetomidine	IV infusion	Loading: 0.5–1 µg/kg over 10–20 min Maintenance: 0.2–0.7 µg/kg/h	5-10 min	Sedation with minimal respiratory depression; can cause bradycardia and hypotension
Clonidine	IV bolus	1–2 µg/kg bolus given slowly	15-30 min	Longer onset than dexmedetomidine; less commonly used. Monitor for bradycardia.
Remifentanil	IV infusion/Target Controlled Infusion (TCI)	0.05–0.1 µg/kg/min (± loading: 0.5–1 µg/kg over 30–60 sec, optional) or TCI 0.5-2ng/mL	1-2 min	Rapid onset/offset; good for suppressing cough; risk of respiratory depression
Midazolam	IV bolus	0.5–2 mg increments every 2–3 min (max 0.1 mg/kg)	2-3 min	Risk of respiratory depression, oversedation; long half-life in elderly/renal dysfunction
Remimazolam	IV bolus/infusion	Bolus: 2.5–5 mg; Infusion: 1–2 mg/kg/h (titrate to effect)	1-3 min	Ultra-short acting benzodiazepine; rapid recovery; minimal accumulation
Propofol	IV bolus/infusion/TCI	Bolus: 10–20 mg titrated; Infusion: 25–75 µg/kg/min or TCI 0.5-4 µg/mL	30-60 sec	Use with caution due to risk of apnea; titrate slowly; often avoided as sole agent in AT
Ketamine	IV bolus/infusion	Bolus: 0. 0.5 mg/kg; Infusion: 0.1–0.5 mg/kg/h	1-2 min	Preserves airway reflexes; may cause hallucinations or increased secretions

Several topicalization techniques are employed to achieve this, each with its specific advantages and methods of administration.

Nebulization

Starting with nebulization of lidocaine (4%) which is commonly used to provide oropharyngeal and laryngeal anesthesia, offering a non-invasive approach to desensitize the airway[52]. This method allows for widespread coverage of the upper airway while minimizing discomfort for the patient.

Atomization

Another technique is atomization, which involves the use of a mucosal atomization device (MAD) to deliver a local anesthetic directly to the oropharynx and larynx. This method provides precise application to the targeted areas, ensuring effective anesthesia of the airway[53]. Additionally, lidocaine soaked swabs can be used for localized anesthesia, applied to critical regions such as the tongue base and vallecula, further enhancing the desensitization of the airway[54].

Nerve blocks

For more focused anesthesia, nerve blocks are often utilized[55,56]. A glossopharyngeal nerve block provides anesthesia to the oropharynx, effectively reducing the gag reflex and facilitating smoother intubation. The superior laryngeal nerve block targets the supraglottic structures, ensuring that the area around the larynx is numbed, which helps reduce discomfort and reflexive responses during intubation.

Transtracheal injection

A transtracheal injection of local anesthetic ensures effective tracheal anesthesia by directly infiltrating the tracheal lumen, offering complete desensitization of the airway to minimize any discomfort during the procedure. Disadvantage of this techniques is the invasiveness, which carries risk of airway bleeding.

By combining the mentioned agents and techniques, airway anesthesia can be effectively achieved, allowing for a smooth and well-tolerated awake intubation procedure.

Anti-sialogues

Anti-sialogogues can be used to reduce oromucosal secretions and provide a better and less obstructed view during awake intubation[57]. As there is a delay between admission and peak effect timing of premedication is important[58]. Glycopyrrolate and atropine are the most commonly used agents.

Techniques of Awake Intubation

As we have established, awake intubation is a procedure used to secure the airway in patients who are at risk of difficult intubation or cannot tolerate general anesthesia. The procedure involves maintaining the patient's consciousness while carefully navigating the airway for intubation. To achieve this, a combination of airway anesthesia and specific maneuvers are employed to ensure both safety and comfort. Effective awake intubation is achieved through the combination of various

techniques. By utilizing the methods discussed below, awake intubation allows for controlled and secure placement of the endotracheal tube while the patient remains responsive and able to protect their airway.

Flexible Fiberoptic Bronchoscopy (FOB)

Fiberoptic bronchoscopy, also referred to as FOB, remains the gold standard for awake intubation, primarily due to its ability to navigate complex airway anatomy with precision[59,60]. The procedure involves advancing the bronchoscope either transnasally or transorally under continuous visualization, allowing the clinician to have real-time guidance as they maneuver through the airway. One of the major advantages of this technique is its exceptional ability to provide clear airway visualization, minimizing trauma and increased patient comfort[60]. This is particularly beneficial in patients with difficult airway anatomy or anatomical variations, as the bronchoscope can navigate around these challenges with ease. However, fiberoptic bronchoscopy does have its limitations. It requires a high level of expertise, as the procedure can be technically demanding[61]. Additionally, it may take longer to perform, and its effectiveness can be compromised by secretions or blood in the airway, which can obscure the visualization and hinder the intubation process.

Video Laryngoscopy-Guided Awake Intubation

Video laryngoscopy has gained significant popularity as an alternative to fiberoptic bronchoscopy (FOB) for awake intubation, due to its ability to provide clear visualization of the airway[32]. The procedure involves introducing a video laryngoscope, such as the GlideScope or C-MAC, while maintaining both direct and video-assisted visualization to guide the endotracheal tube into the trachea. One of the major advantages of video laryngoscopy is its faster learning curve, as it is generally easier to master compared to fiberoptic techniques[62]. Additionally, it offers improved visualization of the airway and is widely available in most operating rooms. However, there are limitations to this technique. Video laryngoscopy may offer less maneuverability in highly restricted airways, where fiberoptic bronchoscopy would provide more flexibility[63]. Moreover, secretions can sometimes obscure the camera view, making it more difficult to achieve successful intubation. Despite these challenges, video laryngoscopy remains a valuable tool in awake intubation, particularly when fiberoptic equipment is not available or when a faster procedure is needed.

Combined Techniques (Hybrid Approach)

Using both fiberoptic bronchoscopy and video laryngoscopy together can enhance success rates, especially in complex airways. For example, video laryngoscopy is used for primary visualization, followed by fiberoptic guidance for tube placement in difficult cases[64].

Challenges and Troubleshooting

Awake intubation, while a critical technique for securing the airway in challenging cases, often

Table II. — A comparison between awake nasotracheal intubation and awake orotracheal intubation.

	Awake Nasotracheal Intubation	Awake Orotracheal Intubation
Route of Insertion	Through the nasal passage	Through the mouth
Preferred in	Limited mouth opening, oral pathology, dental surgeries	Most general ATI cases, when nasal route is contraindicated
Equipment Used	Nasal RAE or flexible reinforced endotracheal tube	Standard or reinforced oral endotracheal tube
Need for Nasal Preparation	Yes — vasoconstrictors (e.g., xylometazoline), lubrication	No
Topical Anesthesia	Nasal mucosa + oropharynx + larynx	Oropharynx + larynx
Visualization (e.g., via fiberoptic scope)	Usually more straightforward anatomy; better midline approach	Tongue may obscure view; jaw thrust or airway adjuncts may help
Patient Tolerance	Often better tolerated (less gag reflex stimulation)	May trigger gag reflex or discomfort
Risk of Trauma	Nasal bleeding, turbinate or septal injury	Dental trauma, lip/laryngeal injury
Contraindications	Coagulopathy, basilar skull fracture, nasal obstruction or deformity	Severe trismus, unstable cervical spine (relative)
Airway Patency	May be more stable once placed (less biting risk)	Tube may be at risk of kinking or biting
Common Uses	Oral or maxillofacial surgery, imited mouth opening	General anesthesia setup, anticipated difficult airway
Special Considerations	Requires more nasal preparation and time	Easier setup; often faster

presents several common challenges that must be carefully managed to ensure a successful procedure. It is important to be aware of these challenges and to be flexible in our medical management and within troubleshooting.

One of the most frequent issues is the presence of excessive secretions, which can obstruct the airway and hinder the intubation process. This can be managed effectively with the use of anticholinergic agents such as glycopyrrolate, which help to reduce salivation and keep the airway clear[57], combination with frequent gentle suction through mouth and/or nose.

Another challenge is patient intolerance, as many individuals find the procedure uncomfortable or anxiety-inducing. To address this, optimal sedation is necessary, alongside patient coaching to help them remain calm and cooperative. Stepwise desensitization techniques, such as gradually numbing the airway and providing reassurance, are also essential for minimizing discomfort and facilitating a smoother intubation process.

Airway obstruction can further complicate awake intubation, especially in patients with anatomical variations or existing airway issues. Proper patient positioning, along with the use of nasal airway adjuncts, can help open the airway and provide better access for intubation. Additionally, an incremental approach to advancing the intubating device can prevent undue trauma and reduce the risk of obstruction. By addressing these challenges with the right techniques and equipment, awake intubation can be performed more safely and effectively, ensuring a successful airway management outcome.

Special Considerations

Special considerations in awake intubation are important to ensure the procedure is safe and effective, particularly when dealing with specific patient populations or challenging airway conditions. In the following part we will discuss some of the more common elements to keep in to consideration whilst deciding on the most efficient way of (awake) intubation.

Obese population

Starting with the first special consideration we can state that within obese patients, the increased airway collapsibility and reduced functional residual capacity present unique challenges. These factors require careful attention to sedation and patient positioning to ensure the airway remains patent[65,66]. HFNO is often used in such cases to improve oxygen reserves and reduce the risk of peri-intubation hypoxia, providing additional support during the procedure.

Pediatric patients

In addition, we note that in case of pediatric patients, awake intubation requires specialized equipment and sedation techniques tailored to their unique physiology. Since children's airways are smaller and more sensitive, atomized lidocaine is commonly used to achieve effective local anesthesia[67], while low-dose dexmedetomidine is often employed to provide safe sedation without significantly impairing respiratory drive[68]. Both these agents help to ensure that the child remains comfortable and cooperative during the procedure, which is crucial for successful intubation. Pediatric patients are not usually suitable for ATI, but individual assessment of the ability to cooperate is needed.

Awake tracheostomy

In cases of extreme airway obstruction where intubation is not feasible, awake tracheostomy may be considered as a life-saving alternative[69]. This approach is typically used when other methods of securing the airway have failed or are impossible due to the severity of the obstruction. While technically demanding, awake tracheostomy can be a crucial intervention for patients in critical conditions, ensuring that a secure airway is established when traditional intubation methods are not an option[70]. The procedure is usually performed by an ENT-surgeon.

Nevertheless, the presence of a qualified ENT surgeon, familiar with the patient's underlying pathology, is essential in the ward or operating room during an ATI procedure. This ensures that, in the event of complications, a surgical tracheostomy can be promptly and safely performed.

Conclusion

In conclusion, awake intubation remains a safe, accessible, and manageable approach to airway management, particularly in patients with challenging or difficult airways. While the procedure may seem daunting at first, it is an invaluable tool for securing the airway while allowing the patient to remain conscious, ensuring their safety throughout. Through advancements in technique, equipment, and sedation, awake intubation has become a more precise and comfortable procedure, with multiple methods available to address patient-specific needs and conditions. Awake intubation therefore remains a cornerstone in difficult airway management. Proper

patient selection, sedation, and airway anesthesia are key to success. Emerging technologies promise to further refine awake intubation techniques, improving patient safety and clinician confidence.

The integration of technologies such as video laryngoscopy, fiberoptic bronchoscopy, and even potential future developments like AI and robotic-assisted intubation further enhance its safety and effectiveness. Meticulous preparation of the patient and equipment, and good communication between all those involved in the patient's care is the key to the procedure's success.

As such it can be a highly reliable option for managing airways, offering reassurance that it is not only feasible but also a well-established practice.

We hope this narrative review has helped demystify the process, providing confidence in using awake intubation when necessary.

Conflicts of interest: None.

References

1. Ahmad I, El-Boghdadly K, Bhagrath R, Hodzovic I, McNarry AF, Mir F, et al. Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. Anaesthesia. 2020;75(4):509-28.
2. Cook TM. Strategies for the prevention of airway complications - a narrative review. Anaesthesia. 2018;73(1):93-111.
3. Warwick E, Yoon S, Ahmad I. Awake Tracheal Intubation: An Update. Int Anesthesiol Clin. 2024;62(4):59-71.
4. Wiles MD, Iliff HA, Brooks K, Da Silva EJ, Donnellon M, Gardner A, et al. Airway management in patients with suspected or confirmed cervical spine injury: Guidelines from the Difficult Airway Society (DAS), Association of Anaesthetists (AoA), British Society of Orthopaedic Anaesthetists (BSOA), Intensive Care Society (ICS), Neuro Anaesthesia and Critical Care Society (NACCS), Faculty of Prehospital Care and Royal College of Emergency Medicine (RCEM). Anaesthesia. 2024;79(8):856-68.
5. Kim H, So E, Karm MH, Kim HJ, Seo KS. Learning fiberoptic intubation for awake nasotracheal intubation. J Dent Anesth Pain Med. 2017;17(4):297-305.
6. Collins SR, Blank RS. Fiberoptic intubation: an overview and update. Respir Care. 2014;59(6):865-78; discussion 78-80.
7. Law JA, Morris IR, Brousseau PA, de la Ronde S, Milne AD. The incidence, success rate, and complications of awake tracheal intubation in 1,554 patients over 12 years: an historical cohort study. Can J Anaesth. 2015;62(7):736-44.
8. Nørskov AK, Rosenstock CV, Wetterslev J, Astrup G, Afshari A, Lundstrøm LH. Diagnostic accuracy of anaesthesiologists' prediction of difficult airway management in daily clinical practice: a cohort study of 188 064 patients registered in the Danish Anaesthesia Database. Anaesthesia. 2015;70(3):272-81.
9. Wang Z, Jin Y, Zheng Y, Chen H, Feng J, Sun J. Evaluation of preoperative difficult airway prediction methods for adult patients without obvious airway abnormalities: a systematic review and meta-analysis. BMC Anesthesiol. 2024;24(1):242.
10. Mosier JM, Joshi R, Hypes C, Pacheco G, Valenzuela T, Sakles JC. The Physiologically Difficult Airway. West J Emerg Med. 2015;16(7):1109-17.
11. Knudsen K, Nilsson U, Högman M, Pöder U. Awake intubation creates feelings of being in a vulnerable situation but cared for in safe hands: a qualitative study. BMC Anesthesiol. 2016;16(1):71.
12. Cabrini L, Baiardo Redaelli M, Ball L, Filippini M, Fominskiy E, Pintaudi M, et al. Awake Fiberoptic Intubation Protocols in the Operating Room for Anticipated Difficult Airway: A Systematic Review and Meta-analysis of Randomized Controlled Trials. Anesth Analg. 2019;128(5):971-80.
13. Practice Guidelines for Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration: Application to Healthy Patients Undergoing Elective Procedures: An Updated Report by the American Society of Anesthesiologists Task Force on Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration. Anesthesiology. 2017;126(3):376-93.
14. Carreira G, Pascoal M, Ferreira C. Mitigating Aspiration Risk With Awake Intubation: A Case of Intrathoracic Stomach. Cureus. 2024;16(11):e73709.
15. Weinger MB, Vredenburgh AG, Schumann CM, Macario A, Williams KJ, Kalsher MJ, et al. Quantitative description of the workload associated with airway management procedures. J Clin Anesth. 2000;12(4):273-82.
16. Rall M, Dieckmann P. Safety culture and crisis resource management in airway management: general principles to enhance patient safety in critical airway situations. Best Pract Res Clin Anaesthesiol. 2005;19(4):539-57.
17. Davis M, Hignett S, Hillier S, Hames N, Hodder S. Safer anaesthetic rooms: Human factors/ergonomics analysis of work practices. J Perioper Pract. 2016;26(12):274-80.
18. Cook TM, Woodall N, Frerk C. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: anaesthesia. Br J Anaesth. 2011;106(5):617-31.
19. Higgs A, McGrath BA, Goddard C, Rangasami J, Suntharalingam G, Gale R, et al. Guidelines for the management of tracheal intubation in critically ill adults. Br J Anaesth. 2018;120(2):323-52.
20. van Zwam JP, Kapteijns EF, Lahey S, Smit HJ. Flexible bronchoscopy in supine or sitting position: a randomized prospective analysis of safety and patient comfort. J Bronchology Interv Pulmonol. 2010;17(1):29-32.
21. Ling IT, Piccolo F, Mulrennan SA, Phillips MJ. Posture influences patient cough rate, sedative requirement and comfort during bronchoscopy: An observational cohort study. Cough. 2011;7:9.
22. Klein AA, Meek T, Allcock E, Cook TM, Mincher N, Morris C, et al. Recommendations for standards of monitoring during anaesthesia and recovery 2021: Guideline from the Association of Anaesthetists. Anaesthesia. 2021;76(9):1212-23.
23. Karmali S, Rose P. Tracheal tube size in adults undergoing elective surgery - a narrative review. Anaesthesia. 2020;75(11):1529-39.
24. Nabecker S, Ottenhausen T, Theiler L, Braun M, Greif R, Riva T. Prospective observational study evaluating the C-MAC Video Stylet for awake tracheal intubation: a single-center study. Minerva Anestesiol. 2021;87(8):873-9.
25. Zhang T, Zhao KY, Zhang P, Li RH. Comparison of video laryngoscope, video stylet, and flexible videoscope for transoral endotracheal intubation in patients with difficult airways: a randomized, parallel-group study. Trials. 2023;24(1):599.
26. Ramachandran SK, Kumar AM. Supraglottic airway devices. Respir Care. 2014;59(6):920-31; discussion 31-2.

27. Benumof JL. Management of the difficult adult airway. With special emphasis on awake tracheal intubation. Anesthesiology. 1991;75(6):1087-110.
28. Campo SL, Denman WT. The laryngeal mask airway: its role in the difficult airway. Int Anesthesiol Clin. 2000;38(3):29-45.
29. Zasso FB, You-Ten KE, Ryu M, Losyeva K, Tanwani J, Siddiqui N. Complications of cricothyroidotomy versus tracheostomy in emergency surgical airway management: a systematic review. BMC Anesthesiol. 2020;20(1):216.
30. Woodall NM, Harwood RJ, Barker GL. Complications of awake fibreoptic intubation without sedation in 200 healthy anaesthetists attending a training course. Br J Anaesth. 2008;100(6):850-5.
31. Rosenstock CV, Thøgersen B, Afshari A, Christensen AL, Eriksen C, Gätke MR. Awake fiberoptic or awake video laryngoscopic tracheal intubation in patients with anticipated difficult airway management: a randomized clinical trial. Anesthesiology. 2012;116(6):1210-6.
32. Alhomary M, Ramadan E, Curran E, Walsh SR. Videolaryngoscopy vs. fibreoptic bronchoscopy for awake tracheal intubation: a systematic review and meta-analysis. Anaesthesia. 2018;73(9):1151-61.
33. Badiger S, John M, Fearnley RA, Ahmad I. Optimizing oxygenation and intubation conditions during awake fibre-optic intubation using a high-flow nasal oxygen-delivery system. Br J Anaesth. 2015;115(4):629-32.
34. Rozario L, Sloper D, Sheridan MJ. Supplemental oxygen during moderate sedation and the occurrence of clinically significant desaturation during endoscopic procedures. Gastroenterol Nurs. 2008;31(4):281-5.
35. Reshef R, Shiller M, Kinberg R, Rennert H, Rennert G, Herskovits M, et al. A prospective study evaluating the usefulness of continuous supplemental oxygen in various endoscopic procedures. Isr J Med Sci. 1996;32(9):736-40.
36. Hinkelbein J, Lamperti M, Akeson J, Santos J, Costa J, De Robertis E, et al. European Society of Anaesthesiology and European Board of Anaesthesiology guidelines for procedural sedation and analgesia in adults. Eur J Anaesthesiol. 2018;35(1):6-24.
37. Practice Guidelines for Moderate Procedural Sedation and Analgesia 2018: A Report by the American Society of Anesthesiologists Task Force on Moderate Procedural Sedation and Analgesia, the American Association of Oral and Maxillofacial Surgeons, American College of Radiology, American Dental Association, American Society of Dentist Anesthesiologists, and Society of Interventional Radiology. Anesthesiology. 2018;128(3):437-79.
38. El-Boghdadly K, Onwochei DN, Cuddihy J, Ahmad I. A prospective cohort study of awake fibreoptic intubation practice at a tertiary centre. Anaesthesia. 2017;72(6):694-703.
39. Johnston KD, Rai MR. Conscious sedation for awake fibreoptic intubation: a review of the literature. Can J Anaesth. 2013;60(6):584-99.
40. Liu GP, Xue FS, Sun C, Yang GZ. Comparing Sedation Regimens for Awake Fiberoptic Intubation. Chin Med J (Engl). 2016;129(4):502-3.
41. Tang ZH, Chen Q, Wang X, Su N, Xia Z, Wang Y, et al. A systematic review and meta-analysis of the safety and efficacy of remifentanil and dexmedetomidine for awake fiberoptic endoscope intubation. Medicine (Baltimore). 2021;100(14):e25324.
42. Bano N, Singh P, Singh D, Prabhakar T. A Comparative Study of Midazolam Alone or in Combination with Dexmedetomidine or Clonidine for Awake Fiberoptic Intubation. Anesth Essays Res. 2019;13(3):539-46.
43. Rai MR, Parry TM, Dombrovskis A, Warner OJ. Remifentanil target-controlled infusion vs propofol target-controlled infusion for conscious sedation for awake fibreoptic intubation: a double-blinded randomized controlled trial. Br J Anaesth. 2008;100(1):125-30.
44. Bergese SD, Patrick Bender S, McSweeney TD, Fernandez S, Dzwonczyk R, Sage K. A comparative study of dexmedetomidine with midazolam and midazolam alone for sedation during elective awake fiberoptic intubation. J Clin Anesth. 2010;22(1):35-40.
45. Song JW, Kwak YL, Lee JW, Chang CH, Kim HS, Shim YH. The optimal effect site concentration of remifentanil in combination with intravenous midazolam and topical lidocaine for awake fibreoptic nasotracheal intubation in patients undergoing cervical spine surgery. Minerva Anestesiol. 2012;78(5):521-6.
46. Kolb B, Lewis T, Large J, Wilson M, Ode K. Remimazolam sedation for awake tracheal intubation. Anaesth Rep. 2024;12(1):e12298.
47. Zhou L, Huang Y, Zhou R, Liu S. Comparison of Remimazolam and Dexmedetomidine for Sedation in Awake Endotracheal Intubation in Scoliosis Surgery: A Retrospective Analysis. Med Sci Monit. 2024;30:e944632.
48. El-Boghdadly K, Desai N, Jones JB, Elghazali S, Ahmad I, Sneyd JR. Sedation for awake tracheal intubation: A systematic review and network meta-analysis. Anaesthesia. 2025;80(1):74-84.
49. Mishima G, Sanuki T, Sato S, Kobayashi M, Kurata S, Ayuse T. Upper-airway collapsibility and compensatory responses under moderate sedation with ketamine, dexmedetomidine, and propofol in healthy volunteers. Physiol Rep. 2020;8(10):e14439.
50. El-Boghdadly K, Pawa A, Chin KJ. Local anesthetic systemic toxicity: current perspectives. Local Reg Anesth. 2018;11:35-44.
51. Ingrande J, Lemmens HJ. Dose adjustment of anaesthetics in the morbidly obese. Br J Anaesth. 2010;105 Suppl 1:i16-23.
52. Kumar L, Abbas H, Kothari N, Kohli M, Dhasmana S. Effect of 4% nebulized lignocaine versus 2% nebulized lignocaine for awake fibroscopic nasotracheal intubation in maxillofacial surgeries. Natl J Maxillofac Surg. 2020;11(1):40-5.
53. Pirlich N, Lohse JA, Noppens RR. Topical Airway Anesthesia for Awake-endoscopic Intubation Using the Spray-as-you-go Technique with High Oxygen Flow. J Vis Exp. 2017(119).
54. Techanivate A, Leelanukrom R, Prapongsena P, Terachinda D. Effectiveness of mouthpiece nebulization and nasal swab stick packing for topical anesthesia in awake fiberoptic nasotracheal intubation. J Med Assoc Thai. 2007;90(10):2063-71.
55. Zheng J, Du L, Du B, Zhang W, Zhang L, Chen G. Airway nerve blocks for awake tracheal intubation: A meta-analysis of randomized control trials and trial sequential analysis. J Clin Anesth. 2023;88:111122.
56. Chatrath V, Sharan R, Jain P, Bala A, Ranjana, Sudha. The efficacy of combined regional nerve blocks in awake orotracheal fiberoptic intubation. Anesth Essays Res. 2016;10(2):255-61.
57. Brookman CA, Teh HP, Morrison LM. Anticholinergics improve fibreoptic intubating conditions during general anaesthesia. Can J Anaesth. 1997;44(2):165-7.
58. Ali-Melkkilä T, Kaila T, Kanto J. Glycopyrrolate: pharmacokinetics and some pharmacodynamic findings. Acta Anaesthesiol Scand. 1989;33(6):513-7.
59. Dellinger RP. Fiberoptic bronchoscopy in adult airway management. Crit Care Med. 1990;18(8):882-7.
60. Schenk A, Markus CK, Kranke P. [Awake fiberoptic intubation - gold standard for the anticipated difficult airway]. Anasthesiol Intensivmed Notfallmed Schmerzther. 2014;49(2):92-9.
61. Morris IR. Fibreoptic intubation. Can J Anaesth. 1994;41(10):996-1007; discussion -8.
62. Long B, Gottlieb M. Video laryngoscopy versus fiberoptic bronchoscopy for awake tracheal intubation. Acad Emerg Med. 2025;32(1):98-100.

63. Lohse J, Noppens R. [Awake video laryngoscopy - an alternative to awake fiberoptic intubation?]. Anasthesiol Intensivmed Notfallmed Schmerzther. 2016;51(11-12):656-63.
64. Utada S, Okano H, Miyazaki H, Niida S, Horiuchi H, Suzuki N, et al. Awake intubation with videolaryngoscopy and fiberoptic bronchoscope. Clin Case Rep. 2022;10(1):e05274.
65. Ababneh O, Bsisu I, El-Share AI, Alrabayah M, Qudaisat I, Alghanem S, et al. Awake Nasal Fiberoptic Intubation in Lateral Position for Severely Obese Patients with Anticipated Difficult Airway: A Randomized Controlled Trial. Healthcare (Basel). 2023;11(21).
66. Moore AR, Schricker T, Court O. Awake videolaryngoscopy-assisted tracheal intubation of the morbidly obese. Anaesthesia. 2012;67(3):232-5.
67. Xue FS, Luo MP, Xu YC, Liao X. Airway anesthesia for awake fiberoptic intubation in management of pediatric difficult airways. Paediatr Anaesth. 2008;18(12):1264-5.
68. Lee S. Dexmedetomidine: present and future directions. Korean J Anesthesiol. 2019;72(4):323-30.
69. Ananiev EP, Korotkov DS, Goryachev AS, Polupan AA, Pashin AA, Shkarubo AN, et al. [Awake percutaneous tracheostomy in neurosurgical patients: clinical cases and literature review]. Zh Vopr Neirokhir Im N N Burdenko. 2022;86(4):66-74.
70. Kaufman MR, Alfonso KP, Burke K, Aouad RK. Awake vs Sedated Tracheostomies: A Review and Comparison at a Single Institution. Otolaryngol Head Neck Surg. 2018;159(5):830-4.

doi.org/10.56126/76.S.06