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Review

EAMS webinar March 2021: Pragmatic guide to awake videolaryngoscope guided intubation

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ABSTRACT

Awake tracheal intubation remains the gold standard for managing a predicted difficult airway. There is emerging evidence that supports the use of videolaryngoscope guided awake intubation. Videolaryngoscopes have become widely available and consequently easy to use and familiar to anaesthetists, allowing for observed tube placement and fixed wide view of the glottis throughout the intubation procedure. This article summarizes the key points and provides answers to the main audience questions from the EAMS March 2021 Webinar. Topics discussed include optimal patient and operator positioning, techniques of applying topical anaesthesia to the airway, testing for adequacy of airway anaesthesia, videolaryngoscope blade insertion and tracheal tube placement and sedation for awake intubation.

Contents

Awake tracheal intubation remains the gold standard for managing predicted difficulties in airway management [1]. Successful performance of awake tracheal intubation is related to experience [2], therefore, teaching and training of that core competence in airway management is needed. On-side educational workshops have been difficult to provide during the COVID-19 pandemic worldwide. As an alternative, evidence supports the use of online videos for procedural-skill knowledge acquisition and retention [3]. The European Airway Management Society (EAMS) has given a webinar on the March 31, 2021. Dr. Iljaz Hodzovic, Senior Lecturer

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and Consultant at the University of Cardiff, UK, showed an educational video on awake videolaryngoscopic tracheal intubation [4]. After the webinar, nearly all of the attendees expressed their confidence to perform an awake videolaryngoscopic tracheal intubation as shown in the video. This article summarizes the key points and provides answers to the main questions from the webinar's audience.

1. Awake videolaryngoscopic tracheal intubation

Awake videolaryngoscope guided intubation offers several advantages [5,6] over established awake flexible endoscopic tracheal intubation:

- Anaesthetists are familiar and experienced with laryngoscopes and these devices are widely available, much more than flexible endoscopes.
- Videolaryngoscopy is considered easier to learn than flexible endoscope and easier to maintain the skill [7].
- It creates a larger “working space” In the upper airway, e.g. facilitating effective suctioning of secretions or blood under direct vision [8,9].
- It provides a wide view of the anatomical landmarks, even in distorted anatomy [10].
- The fixed, wide view of the laryngeal structures enables the operator to topicalize the glottis and trachea guided by the view from videolaryngoscope.
- Videolaryngoscopy enables the direct observation of the passage of the tube between the vocal cords and easy visual confirmation of tracheal placement [11],
- The use of an intubation guide (e.g. Frova introducer) facilitates tube placement.

More frequent use of awake videolaryngoscope guided intubation to manage predicted difficult airway is likely to remove the “dogma” that flexible endoscope awake intubation is the gold standard for awake intubation [7,12]. Awake videolaryngoscope-guided intubation can be applied in any predicted difficult airway, including airway tumours providing there is no space occupying lesion in the oral cavity competing for space with the videolaryngoscope blade [13,14]. Awake endoscopic Intubation through the nasal route is reserved for the patients where it is anatomically impossible to pass the scope orally, this could be considered technically easier to the operator but less comfortable for the patient. Passing the scope through the nose and railroading the tube over the scope can be quite uncomfortable irrespective of the adequacy of the topicalization of the nasal mucosa.

Mendonca et al. compared Pentax Airway Scope with flexible fibrescope for awake intubation and found significantly shorter overall intubation time when using the videolaryngoscope. They found no difference in procedural difficulty or patient acceptance [15]. Furthermore, Alhormary M. et al., compared in their meta-analysis the time needed to perform awake tracheal intubation using videolaryngoscopy and fibreoptic bronchoscopy. Videolaryngoscopy was associated with a shorter intubation time and similar success rate and safety profile as fibreoptic bronchoscopy [6].

2. Ergonomics and positioning

Before starting awake videolaryngoscope guided intubation, it is necessary to take a few minutes to organize the operating theatre space [1], monitor, anaesthetic machine and videolaryngoscope position in relation to the patient (Fig. 1). The administration of supplemental oxygen during the entire procedure, using high flow nasal oxygen if available [16] is strongly recommended. Every effort should be made to assemble the proper team. Have a second anaesthetist in the room, especially if sedation is being used. Furthermore, skilled assistance is extremely important as well. The UK based Difficult Airway Society (DAS) issued awake tracheal intubation (ATI) guidelines clarify this and give further specifics of the anaesthetic assistants’ involvement during awake tracheal intubation [1].

There is no convincing evidence to support any particular patient or operator position. Patient may be in a supine or sitting position. However, there are a number of advantages to having a patient sitting up for awake endoscopic tracheal intubation, as the pharynx is structurally less collapsible during sitting than during supine posture in patients with obstructive sleep apnoea [17].

Face to face is possible doing awake videolaryngoscope guided intubation, especially with channelled videolaryngoscopes with the tube mounted onto the blade (e.g. Airtraq or KingVision). It is advisable to try it first on a mannequin and on anaesthetised patients from the front, but it is possible that the effort required to intubate awake face to face with a videolaryngoscope outweighs the benefit of this position. The authors prefer for an awake videolaryngoscope guided intubation standing at the head end of the patient.

3. Topicalization of the upper airway preparing for awake intubation

Topicalization is crucial especially for awake videolaryngoscopy, as videolaryngoscopes are bulkier and less forgiving compared to flexible scopes, when topical anaesthesia is not adequate.

Lidocaine 10% solution using an atomizer seems to be highly effective applied to the oropharynx, the tonsillar pillars, and the base of the tongue, keeping in mind a total dose of 9 mg/kg of lean body mass (DAS ATI guidelines recommendation) [1]. As during topicalization a significant portion of local anaesthetic is lost in the atmosphere, or swallowed and cleared through first-pass metabolism, the evidence indicates that up to 9 mg/kg can be used safely in healthy patients [18]. Lowering the dose of local anaesthetics is advised for patients with cardiac and hepatic insufficiency [19].

There is not enough evidence to suggest one topicalization technique over the other. Using mucosal atomisation devices does not appear to offer any advantage over any other technique [20].

Applying the local anaesthetic during inspiration is advantageous as it spreads the droplets of local anaesthetic to the larynx and to the trachea. Coughing is a good indicator that the local anaesthetic was spreading down the upper airway. Using a device that can atomise local anaesthetic and allow for shaping it to the contour of the airway (MADgic®, Teleflex Medical, Athlone, Ireland) (Fig. 2) is likely to be helpful when topicalizing the base of the tongue and vallecula. Once oral cavity is adequately anaesthetised use the view from videolaryngoscope to guide administration of local anaesthetic to the glottis and trachea. Solutions of 4% or 2% lidocaine might be used, as no evidence suggests one concentration over the other, however the onset with higher concentration is faster [21]. The deciding factor is driven by the maximum dose for the specific patient. In a low lean body mass patient, it would be advisable to use 2% Lidocaine to topicalize with a higher volume of local anaesthetic solution.

Such topicalization rarely takes longer than 5 min to perform. A comparison of the overall time (topical anaesthesia and intubation time) spent on awake endoscopic intubation or videolaryngoscopic guided awake intubation found significantly shorter durations for the videolaryngoscope [15]. It is important to remember that the onset time of topical lidocaine is seconds but the most common reason for waiting is patient comfort (IH personal experience).

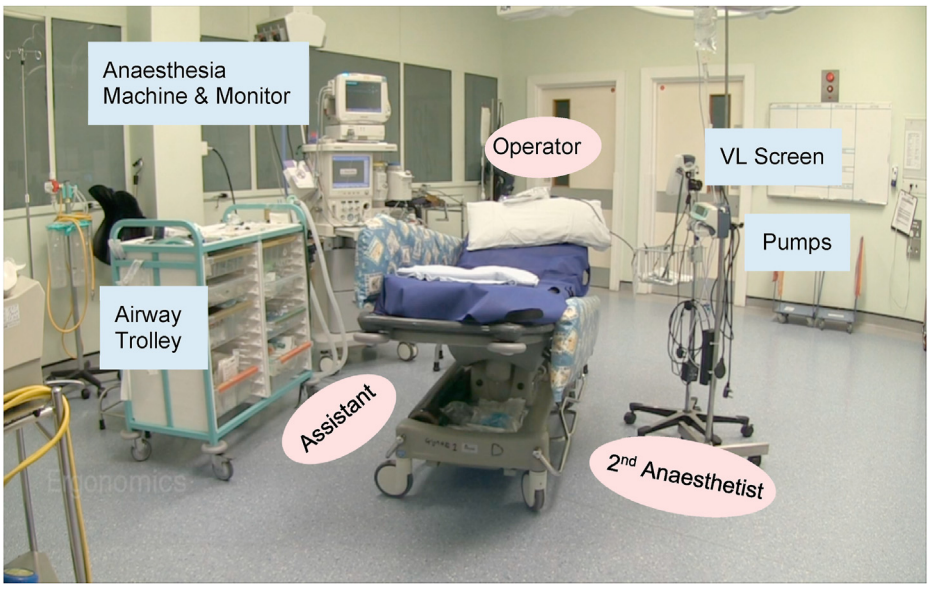

Fig. 1. Operating theatre setup and ergonomics to perform awake Videolaryngoscopic-intubation.

Fig. 2. Mucosal Atomisation Device ((MADgic®, Teleflex Medical, Athlone, Ireland) shaped to the airway contour)).

Fig. 3. Testing adequacy of topicalization with a suction device.

A

B

Fig. 4. Insertion of the VL blade under direct vision first (A) and then guided by the VL monitor for the final positioning (B).

Other options for administering local anaesthetic are worth considering in the absence of mucosal atomisation devices. Nebulisers are able to deliver 10% or 4% lidocaine solutions. However, as absorption is variable [22] a higher overall dose of local anaesthetic may be considered to compensate for this if this is the sole method of topicalization. Delivery of topical anaesthesia using this technique is relatively short lived and combination with other techniques of topicalization is advised. The technique of asking patients to gargle Lidocaine jelly for a period of time has been used with variable success. Glossopharyngeal and superior laryngeal nerve blocks are effective but are associated with lower patient comfort and a higher risk of local anaesthetic toxicity [23,24]. Transcricoid injection of local anaesthetics can effectively topicalize the larynx and trachea but not the oral cavity. This technique may work well in situations where oral access to the larynx is compromised with space occupying lesions in the oral cavity. However, it is an invasive technique that some patients find uncomfortable and needs proper training [25].

4. Testing

Testing for adequacy of topicalization before attempting an awake intubation is strongly recommended (Fig. 3). Adequate topical anaesthesia is likely to avoid negative outcomes on patient's comfort and operator's confidence during laryngoscopy. Coughing and gagging during airway instrumentation are associated with inadequate topicalization, and both are more likely to result in a cardiovascular response than the response to the pressure of the videolaryngoscope blade on the tissues (IH observation from running awake intubation courses and personal experience). However, gentle and measured insertion of this rigid device and styletted tube (if used) is needed to avoid discomfort during insertion. Having a patient inserting the videolaryngoscope into the airway is one way of avoiding undue pressure on the tissues. Patient biting is often a sign of inadequate topicalization and/or oversedation.

The adequacy of topicalization should be tested without traumatizing the mucosa. Appropriate devices are a spatula, a Yankauer suction catheter, or another soft suction catheter with suction off [26] (. No gagging when applied to the base of the tongue is an indicator of good topicalization.

5. Scope insertion

Following gentle insertion of the scope in the oropharynx and after obtaining a view of the glottis (Fig. 4) further topicalization can be applied under direct vision of the inserted cannula as explained above (Fig. 5).

There is currently no evidence supporting one videolaryngoscope design over the others for awake intubation. Channelled videolaryngoscopes may have some advantage over non-channelled blade designs in selected patients [27]. The device of choice would be the one that is available in the operator's institution, that is most commonly used in anaesthetised patients and the operator is most familiar with. Therefore, either channelled videolaryngoscopes with a preloaded tube or non-channelled videolaryngoscopes with a styletted tube can be used.

6. Tracheal tube placement

The tube should be inserted in the mouth under direct view, then the device's monitor is used to guide tracheal placement (Fig. 6). Confirmation of tracheal placement using two-point check is required before induction of anaesthesia: First, visualization of the tube passing through the vocal cords and second, capnography trace. Using a videolaryngoscope for awake intubation has the advantage of providing the operator a constant view of the laryngeal opening throughout the process of tube placement. Therefore, the suggested use of a catheter through tracheal tube to obtain a quicker capnography trace, would not add much to the safety of the procedure. When doing tracheal intubation with a flexible scope, there is perhaps a place for it as the railroading part of the tube placement is blind.

Fig. 5. Inserted scope and with topicalization cannula in the oral cavity. Glottis and tip of cannula can be seen on the VL screen.

7. Sedation

Sedation is designed to reduce patient anxiety and discomfort. However, good topicalization may remove the need for sedation [28]. Sedation should not be used to compensate for inadequate topicalization as the risk of over sedation and loss of airway is significant.

If sedation is carried out, it should be administered cautiously to achieve a sedation state in which the patient is responding to verbal commands without prompting, as over-sedation and consequential respiratory depression and loss of airway are commonly reported complications of awake intubation [29,30]. Having a second anaesthetist responsible for titrating sedation and monitoring the patient adds significantly to patient safety and operator's confidence.

An excellent overview of the sedation techniques and dosages are given at Table 3 of the DAS Awake Intubation Guidelines [1] and in a recent systematic review [20]. When choosing a sedation agent, using a single agent would provide a good margin of safety. Remifentanil or dexmedetomidine have low risk of over-sedation and would be appropriate single agents to use [28,31]. Propofol, on the other hand, is associated with a greater risk of over-sedation and airway obstruction [32]. If using a combination of agents then remifentanil and midazolam may offer good margin of safety as both agents are reversible. A number of studies were published evaluating the use of Remifentanil only for awake tracheal tube placement [33–35]. Those studies reported successful use of remifentanil with minimal complications [33].

A study comparing combinations of dexmedetomidine and propofol with ketamine and propofol for sedation during awake intubation showed adequate intubation conditions in the group receiving ketamine and propofol producing faster onset of sedation, shorter intubation time, stable hemodynamic profile, without increased side effects when compared with dexmedetomidine and propofol [36].

A recent systematic review and meta-analysis of the safety and efficacy of remifentanil and dexmedetomidine for awake fiberoptic endoscope intubation revealed that both remifentanil and dexmedetomidine are effective for awake intubation and well-tolerated [37]. However, dexmedetomidine may be more effective in reducing the incidence of hypoxemia and memory recall [37].

Sedation during awake intubation carries all the risks of over sedation, respiratory depression and airway obstruction in a patient with a possible difficult airway. In places with limited resources it should be easier to obtain local anaesthetic and atomising devices rather than agents for sedation. Lack of availability of local anaesthetic and atomising devices or lack of proper training in awake tracheal intubation should not be the reason for use of sedation only techniques.

8. Summary

Videolaryngoscopes offer advantages to guide awake tracheal intubation because they provide a wide view on the laryngeal structures and create a larger working space. Popularity comes also from the fact that videolaryngoscopes are very familiar to anaesthetists from their daily clinical practice. Successful awake videolaryngoscope assisted tracheal intubation requires appropriate patient and theatre space set up and presence of an awake intubation team that includes a skilled assistant and in case of using sedation a second anaesthetist. Meticulously topicalization is the key to success with lidocaine (max. 9 mg/kg of lean body mass). Correct tube placement should always be confirmed by capnography after observing the tube entering the trachea.

Conflict of interest

PC is a member of the extended board of EAMS and organized the EAMS webinars. MS is president of EAMS and is a member of the working group of PUMA. MS has received honoraria and consulting fees from Verathon Medical, Teleflex Medical and MSD Italy. RG is treasurer of EAMS, organizes and manages the EAMS webinars, and is a member of the working group of PUMA. IH is secretary of EAMS.

Fig. 6. A:The styletted tube (or tube/bougie/styletted tube) is inserted in the mouth under direct view. B: Then the device's monitor is used to guide tracheal placement.

Declaration of competing interest

Paula Chiesa is a member of the extended board of EAMS and organized the EAMS webinars. Massimiliano Sorbello is president of EAMS and is a member of the working group of PUMA. Massimiliano Sorbello has received honoraria and consulting fees from Verathon Medical, Teleflex Medical and MSD Italy. Robert Greif is treasurer of EAMS, organizes and manages the EAMS webinars, and is a member of the working group of PUMA. Iljiaz Hodzovic is secretary of EAMS.

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References

[1] I. Ahmad, K. El-Boghdadly, R. Bhagrath, I. Hodzovic, A.F. McNarry, F. Mir, et al., Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults, Anaesthesia 75 (2020) 509–528.
[2] K. El-Boghdadly, D.N. Onwochei, J. Cuddihy, I. Ahmad, A prospective cohort study of awake fibreoptic intubation practice at a tertiary centre, Anaesthesia 72 (2017) 694–703.
[3] K. Srinivasa, Y. Chen, M.A. Henning, The role of online videos in teaching procedural skills to post-graduate medical learners: a systematic narrative review, Med. Teach. 42 (2020) 689–697.
[4] EAMS hq. [cited 1 Jun 2021]. Available: https://www.eamshq.net/.

[5] A. Moore, T. Schricker, Awake videolaryngoscopy versus fiberoptic bronchoscopy, Curr. Opin. Anaesthesiol. 32 (2019) 764–768.
[6] M. Alhomary, E. Ramadan, E. Curran, S.R. Walsh, Videolaryngoscopy vs. fibreoptic bronchoscopy for awake tracheal intubation: a systematic review and meta-analysis, Anaesthesia 73 (2018) 1151–1161.
[7] E. Fitzgerald, I. Hodzovic, A.F. Smith, "From darkness into light": time to make awake intubation with videolaryngoscopy the primary technique for an anticipated difficult airway? Anaesthesia (2015) 387–392.
[8] M.C. Lee, K.Y. Tseng, Y.C. Shen, C.H. Lin, C.W. Hsu, H.J. Hsu, et al., Nasotracheal intubation in patients with limited mouth opening: a comparison between fibreoptic intubation and the Trachway®, Anaesthesia 71 (2016) 31–38.
[9] A. Kramer, D. Müller, R. Pförtner, C. Mohr, H. Groeben, Fibreoptic vs videolaryngoscopic (C-MAC(®) D-BLADE) nasal awake intubation under local anaesthesia, Anaesthesia 70 (2015) 400–406.
[10] J.-B. Paolini, F. Donati, P. Drolet, Review article: video-laryngoscopy: another tool for difficult intubation or a new paradigm in airway management? Can. J. Anaesth. 60 (2013) 184–191.
[11] I. Hodzovic, O. Bedreag, Awake videolaryngoscope - guided intubation - well worth adding to your skill-mix, Rom. J. Anaesth. Intens. Care 26 (2019) 5–7.
[12] I. Ahmad, C.R. Bailey, Time to abandon awake fibreoptic intubation? Anaesthesia (2016) 12–16.
[13] I.H. Mari Davies, Videolaryngoscopy post COVID-19, Trends Anaesthes. Crit. Care 36 (2021) 49.
[14] L. Markova, T. Stopar-Pintaric, T. Luzar, J. Benedik, I. Hodzovic, A feasibility study of awake videolaryngoscope-assisted intubation in patients with periglottic tumour using the channelled King Vision®videolaryngoscope, Anaesthesia (2017) 512–518, https://doi.org/10.1111/anae.13734.
[15] C. Mendonca, A. Mesbah, A. Velayudhan, R. Danha, A randomised clinical trial comparing the flexible fibrescope and the Pentax Airway Scope (AWS)(®) for awake oral tracheal intubation, Anaesthesia 71 (2016) 908–914.
[16] S. Badiger, M. John, R.A. Fearnley, I. Ahmad, Optimizing oxygenation and intubation conditions during awake fibre-optic intubation using a high-flow nasal oxygen-delivery system, Br. J. Anaesth. 115 (2015) 629–632.
[17] Y. Tagaito, S. Isono, A. Tanaka, T. Ishikawa, T. Nishino, Sitting posture decreases collapsibility of the passive pharynx in anesthetized paralyzed patients with obstructive sleep apnea, Anesthesiology 113 (2010) 812–818.
[18] K. El-Boghdadly, A. Pawa, K.J. Chin, Local anesthetic systemic toxicity: current perspectives, Local Reg. Anesth. 11 (2018) 35–44.
[19] N. Milman, M. Laub, E.P. Munch, H.R. Angelo, Serum concentrations of lignocaine and its metabolite monoethylglycinexylidide during fibre-optic bronchoscopy in local anaesthesia, Respir. Med. 92 (1998) 40–43.
[20] L. Cabrini, M. Baiardo Redaelli, L. Ball, M. Filippini, E. Fominskiy, M. Pintaudi, 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. 128 (2019) 971–980.
[21] F.S. Xue, H.P. Liu, N. He, Y.C. Xu, Q.Y. Yang, X. Liao, et al., Spray-as-you-go airway topical anesthesia in patients with a difficult airway: a randomized, double-blind comparison of 2% and 4% lidocaine, Anesth. Analg. 108 (2009) 536–543.
[22] C. O'Callaghan, P.W. Barry, The science of nebulised drug delivery, Thorax 52 (Suppl 2) (1997) S31–S44.
[23] J.R. Wiles, J. Kelly, S.M. Mostafa, Hypotension and bradycardia following superior laryngeal nerve block, Br. J. Anaesth. 63 (1989) 125–127.
[24] B.T. Sitzman, G.F. Rich, J.J. Rockwell, G.S. Leisure, M.E. Durieux, C.A. DiFazio, Local anesthetic administration for awake direct laryngoscopy. Are glossopharyngeal nerve blocks superior? Anesthesiology 86 (1997) 34–40.
[25] T. Heidegger, H.J. Gerig, B. Ulrich, G. Kreienbühl, Validation of a simple algorithm for tracheal intubation: daily practice is the key to success in emergencies—an analysis of 13,248 intubations, Anesth. Analg. 92 (2001) 517–522.
[26] P. Kundra, S. Kutralam, M. Ravishankar, Local anaesthesia for awake fibreoptic nasotracheal intubation, Acta Anaesthesiol. Scand. 44 (2000) 511–516.
[27] P.B. Richardson, I. Hodzovic, Awake tracheal intubation using videolaryngoscopy: importance of blade design, Anaesthesia (2012) 798–799, author reply 799.
[28] K.D. Johnston, M.R. Rai, Conscious sedation for awake fibreoptic intubation: a review of the literature, Can. J. Anaesth. 60 (2013) 584–599.
[29] T.M. Cook, N. Woodall, C. Frerk, Fourth National audit project. 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. 106 (2011) 617–631.
[30] E.P.C. van Schaik, P. Blankman, W.A. Van Klei, H.J.T.A. Knape, P.H.H.B. Vaessen, S.A. Braithwaite, et al., Hypoxemia during procedural sedation in adult patients: a retrospective observational study, Can. J. Anaesth. (2021), https://doi.org/10.1007/s12630-021-01992-6.
[31] U. Yadav, J.B.S. Yadav, D. Srivastava, S. Srivastava, A randomized controlled study comparing dexmedetomidine-midazolam with Fentanyl-midazolam for sedation during awake fiberoptic intubation in anticipated difficult airway, Anesth. Essays Res. 14 (2020) 271–276.
[32] M.R. Rai, T.M. Parry, A. Dombrovskis, O.J. Warner, 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. 100 (2008) 125–130.
[33] W. Puchner, P. Egger, F. Pühringer, A. Löckinger, J. Obwegeser, H. Gombotz, Evaluation of remifentanil as single drug for awake fiberoptic intubation, Acta Anaesthesiol. Scand. 46 (2002) 350–354.
[34] M. Caron, A. Parrot, A. Elabbadi, S. Dupeyrat, M. Turpin, T. Baury, et al., Pain and dyspnea control during awake fiberoptic bronchoscopy in critically ill patients: safety and efficacy of remifentanil target-controlled infusion, Ann. Intensive Care 11 (2021) 48.
[35] C. Motamed, R. Roubineau, J.-P. Depoix, F. Servin, G. Roche, V. Billard, Efficacy of target controlled infusion of remifentanil with spontaneous ventilation for procedural sedation and analgesia (Remi TCI PSA): a double center prospective observational study, J. Opioid Manag. 17 (2021) 69–78.
[36] M.B. El Mourad, M.R. Elghamry, R.F. Mansour, M.E. Afandy, Comparison of intravenous dexmedetomidine-propofol versus ketofol for sedation during awake fiberoptic intubation: a prospective, randomized study, Anesthesiol. Pain Med. 9 (2019), e86442.
[37] Z.-H. Tang, Q. Chen, X. Wang, N. Su, Z. Xia, Y. Wang, et al., A systematic review and meta-analysis of the safety and efficacy of remifentanil and dexmedetomidine for awake fiberoptic endoscope intubation, Medicine 100 (2021), e25324.