Rev Bras Anestesiol. 2020;70(4):434–439

Brazilian Journal of ANESTHESIOLOGY
Revista Brasileira de Anestesiologia

Sociedade Brasileira de Anestesiologia

CASE REPORT

Use of video laryngoscope for tracheal intubation in patient with oral cavity mass: case report

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Received 20 February 2019; accepted 22 March 2020
Available online 20 June 2020

KEYWORDS
Videolaringoscope;
Difficult airway;
Airway management;
Anesthesia

Abstract
Background and objectives: When planning the management of a predicted difficult airway, it is important to determine which strategy will be followed. Video laryngoscopy is a major option in scenarios with factors suggesting difficult airway access. It is also indicated in rescue situations, when there is tracheal intubation failure with direct laryngoscopy. The objective of the present report was to show the efficacy of using the video laryngoscope as the first device for a patient with a large tumor that occupied almost the entire anterior portion of the oral cavity.
Case report: An 85 year-old male patient, 162 cm, 70 kg, ASA Physical Status II, Mallampati IV classification, was scheduled for resection of an angiosarcoma located in the right maxillary sinus that invaded much of the hard palate and the upper portion of the oropharynx. He was conscious and oriented, with normal blood pressure, heart and respiratory rates and, despite the large tumor in the oral cavity, he showed no signs of respiratory failure or airway obstruction. After intravenous cannulation and monitoring, sedation was performed with 1 mg of intravenous midazolam, and a nasal cannula was placed to provide oxygen, with a flow of 2 L min^{-1}. Then, the target-controlled infusion of remifentanil with an effect site concentration of 2 ng mL^{-1} was initiated, according to Minto's pharmacokinetic model. Ventilation was maintained spontaneously during airway handling. A trans-cricothyroid block was performed, with 8 mL of 1% lidocaine solution injected into the tracheal lumen. Slight bleeding did not prevent the use of an optical method for performing tracheal intubation. The entire oral cavity was sprayed with 1% lidocaine. The McGraph video laryngoscope with the difficult intubation blade was used, and an armored tube with a guide wire inside was used for tracheal intubation, performed on the first attempt with appropriate glottis visualization.

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https://doi.org/10.1016/j.bjane.2020.06.011

Conclusion: The video laryngoscope occupies a prominent position in cases in which access to the airway is difficult. In the present case it was useful. It can be used as first choice or as a rescue technique. The video laryngoscope is an appropriate alternative and should be available for facing the ever-challenging difficult airway patient.

PALAVRAS-CHAVE
Videolaringoscópio;
Via aérea difícil;
Manejo de via aérea;
Anestesia

Uso de videolaringoscópio para intubação traqueal em paciente com massa tumoral na cavidade oral: relato de caso

Resumo
Justificativa e objetivos: No planejamento da abordagem a uma via aérea difícil prevista, é importante determinar qual será a estratégia a ser seguida. A videolaringoscopia é uma ótima opção em situações em que existam fatores indicadores de dificuldade de acesso à via aérea. Também é indicada em situações de resgate, quando houve insucesso na tentativa de intubação com a laringoscopia direta. O objetivo deste relato é mostrar a eficácia da utilização do videolaringoscópio como primeiro dispositivo diante de paciente com grande tumor que ocupava quase a totalidade da porção anterior da cavidade oral.
Relato do caso: Paciente com 85 anos, sexo masculino, 162 cm, 70 kg, estado físico ASA II, classificação de Mallampati IV, foi escalado para a ressecção de um angiossarcoma localizado no seio maxilar direito que invadia grande parte do palato duro e da porção superior da orofaringe. Apresentava-se lúcido, consciente e orientado, com valores de pressão arterial, frequência cardíaca e respiratória normais e, apesar do grande tumor na cavidade oral, não apresentava nenhum sinal de insuficiência respiratória ou de obstrução das vias aéreas. Após venóclise, foi feita monitorização e sedação com 1 mg de midazolam, por via venosa, e colocado cateter nasal para administração de oxigênio, com fluxo de 2 $L.min^{-1}$. Em seguida, foi iniciada a infusão alvo-controlada de remifentanil com concentração efeito de 2 $ng\,mL^{-1}$, segundo o modelo farmacocinético de Minto. A ventilação foi mantida em espontânea durante a manipulação da via aérea. Foi realizado bloqueio transcricotireóideo, sendo injetados 8 mL de solução de lidocaína a 1% na luz traqueal. Um pequeno sangramento não impediu que um método óptico fosse utilizado para realizar a intubação traqueal. Toda a cavidade oral recebeu o *spray* de lidocaína tópica a 1%. Foi utilizado o videolaringoscópio McGraph, com a lâmina de intubação difícil; e um tubo aramado, com fio guia no seu interior, foi utilizado para a intubação traqueal, que foi realizada na primeira tentativa, com boa visualização da glote.
Conclusão: O videolaringoscópio ocupa uma posição de destaque nos casos em que o acesso à via aérea é difícil. No presente caso, a sua utilização foi útil. Ele pode ser utilizado como primeira opção ou como técnica de resgate. Nas condições sempre preocupantes diante de um paciente com via aérea difícil, o videolaringoscópio deve estar disponível, constituindo-se uma boa opção.

Background

The attention and dedication given by the anesthesiologist to the airway is crucial for successful management of the surgical patient. Access to the airway is always a delicate time that requires technique, knowledge, strategy and appropriate equipment for each case and each patient. Over a year, it is estimated that over 1 million surgeries are performed in tracheal intubated patients. Tracheal intubation is a procedure that can lead to complications, from the most common, such as arterial hypertension, to hypoxemia or death.[1]

According to a systematic review published by Cochrane, the rate of difficult tracheal intubation ranges from 1% to 6%, and of tracheal intubation failure from 0.1% to 0.3%, being more common during intubation attempts in the ICU or in emergency rooms.[1] According to the NAP4 study, it is possible to state that the delay or failure in performing tracheal intubation are causes of more serious airway complications.[2]

The advantage of using the video laryngoscope in relation to the Macintosh metal blade is that there is no need to align the pharyngeal and laryngeal axes during the laryngoscopy maneuver. Therefore, the video laryngoscope is a great option in scenarios in which there are factors suggesting

the presence of difficult airway. It is also indicated in rescue situations after tracheal intubation failure with direct laryngoscopy.[1]

There are publications dealing with the management of a predicted difficult airway, such as the guideline of the American Society of Anesthesiology that highlights six issues that may occur during airway management. It is interesting to note the need to establish safe and well-determined strategies to be followed to reduce risks and achieve satisfactory success rates. The possible problems mentioned in the guideline can occur alone or together, and are the following: difficulty in cooperation or for consent; difficult face mask ventilation; difficult supraglottic device placement; difficult laryngoscopy, difficulty in tracheal intubation and surgical access to difficult airway. It is important to know that these problems can occur, and it is the duty of the anesthesiologist to remain alert and prepared to always have other options when performing tracheal intubation.[3]

The management plan for a predicted difficult airway must also determine which strategy to be followed. Considerations regarding adverse clinical situations, characteristics, and reliability should be determined before the procedure starts, and choices must be made. In face of a predicted difficult airway case, the option is to perform an awake tracheal intubation or to intubate the trachea after induction of general anesthesia, using non-invasive techniques or invasive techniques such as percutaneous cricothyrotomy, the use of an optical video-assisted device, such as video laryngoscope or the use of direct laryngoscopy, and choose between maintaining or stopping spontaneous breathing ventilation.[3] These decisions must be made before airway management starts, and are parts of anesthetic technique planning.

The difficult airway management protocol is clear and distinctly states that both a primary and an alternative strategy must be established. Invasive airway access should always be considered if the established primary strategy fails, or it can even be chosen as the primary strategy. In the present case report, the primary strategy was tracheal intubation with the patient awake using a video laryngoscope. The second alternative, in case of failure, would be invasive airway access via cricothyrotomy.

The objective of this case report was to show that establishing the video laryngoscope as the primary alternative in the management of a predicted difficult airway patient is in fact a good choice, as the video laryngoscope reduces risks and is successful in the first attempt of orotracheal intubation.

Case report

An 85 year-old male patient, 162 cm, 70 kg, ASA Physical Status II, Mallampati IV classification, was scheduled for resection of an angiosarcoma located in the right maxillary sinus that invaded much of the hard palate and the upper portion of the oropharynx (Fig. 1). The patient was lucid, conscious and oriented. He complained of severe gastritis treated with daily pantoprazole and reported a history of neuralgia of the left trigeminal nerve that was well controlled with daily oral pregabalin. He had a previous history of prostate carcinoma treated by radical prostatectomy.

Figure 1 Angiosarcoma in the right maxillary sinus invading much of the hard palate and the upper portion of the oropharynx.

In the pre-anesthetic evaluation, the patient was lucid, conscious, and oriented, with normal blood pressure, heart and respiratory rates and, despite a large tumor in the oral cavity, he did not show any sign of respiratory failure or airway obstruction.

Upon inspection of the oral cavity, a large mass occupied the upper portion of the hard palate, involving the posterior face of the upper teeth on the right side of the maxilla, from the upper central incisor teeth, and the space between the upper dental arch and the lip. The entire mass produced bulging of the right anterior region of the face. According to the patient, the tumor had presented an important growth in three weeks, and he only sought treatment when it became visible in the oral cavity.

The patient had fetid halitosis with a friable tumor mass and minor bleeding during feeding and teeth brushing. The voice was pasty due to the impossibility of adequate movement of the tongue. There were no other predictors of difficult airways. The thyromental and sternomental distances were within appropriate values, and the mouth opening was greater than 4 cm, but the tumor mass occupied almost the entire anterior portion of the oral cavity. Upon inspection of the nostrils, no significant changes were observed, therefore, in the initial planning of the anesthetic technique, intubation with nasal fibroscopy became the most appropriate and safe option. Laboratory and cardiac tests were normal and compatible with the patient's biological age. Laboratory tests showed hemoglobin of 14.9 g dL^{-1}, hematocrit of 43.4%, 229,000 platelets, fasting glucose of 99 mg/dL, creatinine of 1.01 mg dL^{-1}, urea of 23 mg dL^{-1}, and normal electrolytes. Other clinical patient data obtained from the physical examination were normal and there was no sign of cognitive impairment.

The patient received a comprehensive explanation on the possibility of managing the airway with slight sedation, the entire procedure of oral cavity visualization, the structures of the oral cavity and the tumor lesion. Information pertinent to the performance of anesthesia was duly provided and explained. The patient agreed to the entire procedure and, at the end of the pre-anesthetic evaluation, filled out the informed consent form for anesthesia.

The pre-anesthetic evaluation was performed four days before the date of the surgery, and when the patient arrived to the operating room, a small bleeding in the oral cavity was observed. The patient arrived to the operating room holding some sheets of absorbent paper with small blood stains. Asked about the bleeding, he reported that the day after the preoperative evaluation, he observed a small amount of spontaneous bleeding, which took longer to stop than in the previous days. When asked if he had experienced nausea or vomiting from the start of oral bleeding, with the elimination of darkened gastric contents, the patient reported that there had been no major changes, but the bleeding from the tumor mass was greater than in previous days.

In the operating room, when planning the anesthetic technique in conjunction with the surgical team, the surgeon requested that tracheal intubation be performed orally, so that the entire maxilla could be manipulated, and not just the right maxilla. Therefore, the nasal fiberoptic tracheal intubation option was abandoned and replaced for the use of the McGraph video laryngoscope.

After being placed in supine position and an 18G venous cannula inserted, the patient was monitored with continuous ECG in the DII and V5 leads, pulse oximetry, heart rate, and a non-invasive blood pressure device. Initially, IV sedation was performed with 1 mg of midazolam and a nasal catheter was placed for 2 $L.min^{-1}$ O_2 administration. Then, the target-controlled infusion of remifentanil with an effect concentration of 2 ng mL^{-1} was started, according to Minto's pharmacokinetic model. In planning the anesthetic technique, the objective was to keep the patient on spontaneous breathing during airway management. The patient was fasting and, when he reached a state of conscious sedation, he was positioned in hyperextension of the neck to perform the trans cricothyroid membrane block. The cricothyroid membrane was punctured with a 22G catheter and 8 mL of 1% lidocaine solution was injected into the tracheal lumen. The patient coughed and the local anesthetic solution was able to disperse cranially and caudally into the trachea.

The minor bleeding reported by the patient did not prevent using the optical method to perform tracheal intubation. The McGraph video laryngoscope with the dedicated difficult intubation blade and an armored tracheal tube with preloaded wire guide inside were used for tracheal intubation. With the patient in a state of conscious sedation, the entire oral cavity was sprayed with 1% topical lidocaine. Tracheal intubation was performed on the first attempt, with appropriate glottis visualization, and the minor bleeding did not hamper the optical method used. The patient did not cough or move in any way that could prevent tracheal tube progression. There were also no significant changes in heart rate and blood pressure at the time of orotracheal intubation.

After tracheal intubation, the propofol infusion, according to the Fast-Marsh Model, with the Ke0 of 1.21, in the effect mode, was titrated until the hypnosis point was reached. As the patient was elderly, the mode of induction of general intravenous anesthesia was slow, with infusion beginning with a target concentration of 5 mcg mL^{-1}. The target was gradually increased every 0.5 point in the effect concentration, until the patient lost auditory and eyelid reflexes (hypnosis point) with a 1.7 mcg mL^{-1} propofol effect concentration. Immediately thereafter, 30 mg of rocuronium were administered intravenously, and mechanical ventilation was adjusted to maintain P_{ET} CO_2 between 35 to 45 mmHg.

The effect concentration of remifentanil varied according to the surgical stimulus, reaching an effect concentration of 8 mcg mL^{-1}, adjusted to the moments of greater or lesser surgical stimulus. Propofol effect concentration was not changed, given the hypnosis point was determined very carefully. Given the patient was elderly, postoperative analgesia was performed with 0.05 mg kg^{-1} of methadone (4 mg) intravenously, administered immediately after the induction of total intravenous anesthesia.

The surgery lasted approximately 120 minutes, and the entire right maxilla and the right portion of the hard palate and upper dental arch were removed. There was no major blood loss during surgery. Volume replacement was performed with balanced saline solution, without requiring transfusion of blood products.

At the end of the procedure, the neuromuscular blocker was reversed with a 2 mg kg^{-1} dose of sugammadex. Then, the patient was extubated without requiring tracheostomy, and taken to the Intensive Care Unit (ICU), where he remained for four days. After being discharged from the ICU, he remained hospitalized for two more days and was discharged without complications. It is important to note that the patient remained with his wife throughout the hospitalization, with no signs of postoperative cognitive dysfunction.

Discussion

In scenarios in which the major challenge in planning the anesthetic technique is access to the airway, there are cases that the option is to access the airway with the patient awake, or slightly sedated. In addition to the alternatives, techniques and use of the equipment, the experience of the anesthesiologist involved in the procedure is essential. Safety is directly related to the experience of the anesthesiologist and success rate obtained in previous cases. Obviously, in the face of different situations from daily and usual cases, it is prudent always have the help of other colleagues so that the risks and the time for decision making be decreased.

A recent study states that failure to identify patients with difficult airways is the main factor that contributes to the scenario can't intubate and can't ventilate. According to the study, can't intubate and can't ventilate cases have an incidence of 1 in 5,000 elective procedures and, in this scenario, there is a need to perform a rescue method in 1 in every 50,000 cases. Even though it is an uncommon event, it can lead to serious consequences, and it is associated with increased long-term morbidity and with 25% of cases of anesthesia-related deaths. In the same study mentioned, different methods to predict difficult tracheal intubation were compared. The clinical data that obtained the best correlation with difficult tracheal intubation was the patient's ability to bite the upper lip with the lower dental arch.[4] In our reported case, the patient was unable to bite his upper lip, as he was unable to close his mouth completely due to the large tumor mass, justifying the awake intubation.

In a case series published by Gaszynsky, the author described eight difficult tracheal intubation patients. Six

patients had laryngeal tumors, one presented respiratory failure, and one patient had hoarseness. All patients were awake while tracheal intubation was performed using a C-MAC video laryngoscope followed by general anesthesia. This same study stated that the video laryngoscope was also useful in tracheal intubation of obese patients, and in critically ill patients in the ICU.[5]

Kramer compared C-MAC video laryngoscope with fiberscope for awake tracheal intubation. The study demonstrated that the methods are comparable regarding the tracheal intubation success rate, and the degree of satisfaction of the professionals performing the procedure and of patients. The study concluded that video laryngoscope is an alternative to nasal fiberscope for patients with predicted difficult tracheal intubation.[5] In the case reported, the initial plan was to perform awake intubation nasal fibroscopy. However, due to the extension of the surgery, the surgeon requested avoiding nasal tracheal intubation, and therefore the best option was to perform oral tracheal intubation with the patient awake, and use the video laryngoscope. Another alternative would be surgical airway access. Surgeons were prepared, but tracheal intubation was performed successfully.

A systematic review published by Cochrane in 2017[1] compared direct laryngoscopy with video laryngoscopy in patients who underwent tracheal intubation. The primary study objective was to evaluate situations in which using the video laryngoscope reduced risk of complications and tracheal intubation failure compared to tracheal intubation by direct laryngoscopy. It also assessed real benefits and risks of tracheal intubation using video laryngoscope in subgroups, such as obese patients, critically ill ICU patients, in emergency room settings, and in predicted difficult airway patients. The systematic review's primary outcomes were to: identify failures in intubation or change of device required for tracheal intubation; identify hypoxemia in the time interval between the initial intubation maneuver and the time O_2 treatment was provided to patient. Among the secondary outcomes, nine items were assessed: 30-day mortality, severe airway complications such as aspiration pneumonia, laryngeal or airway trauma, odynophagia, hoarseness, rate of first attempt tracheal intubation, and number of tracheal intubation attempts. The conclusion of the study clearly shows that tracheal intubation performed with a video laryngoscope reduced the incidence of tracheal intubation failure with a moderate level of evidence, including patients who had predictive factors of difficult airway (Odds Ratio – OR = 0.35 with 95% Confidence Interval – 95% CI 0.19–0.65). The results show data favorable to video laryngoscope use compared to direct laryngoscopy. In the analysis of subgroups, in patients with predictive factors of difficult airway, data were also favorable toward the use of video laryngoscope, a fact that was not observed in patients in whom difficult airway was not suspected. Another conclusion was that there was less laryngeal and airway trauma and less hoarseness associated with video laryngoscope use than with direct laryngoscopy. Regarding the occurrence of hypoxemia and the other variables assessed, there was no statistically significant difference between the devices compared.[1] The results of this recent systematic review supports the approach adopted to establish the appropriate anesthetic technique, reducing the risks to the patient of our case report.

A study assessed the feasibility of performing awake tracheal intubation using the video laryngoscope in 25 patients with peri glottic tumors. The anesthetic technique consisted of conscious sedation using midazolam and remifentanil followed by topical airway anesthesia. Of the 25 patients, 23 were intubated awake. Of the latter, 17 patients were intubated on the first attempt. Five patients were intubated on the second or third attempts, and only two patients did not tolerate awake tracheal intubation. In these cases, the explanation was failure of topical anesthesia of the oropharynx.[6]

A multicenter, retrospective and observational study assessed the rate of tracheal intubation success using a video laryngoscope as a rescue device after tracheal intubation failure. The study was performed at seven hospitals and assessed 346,861 patients submitted to tracheal intubation. There were 1,427 cases of tracheal intubation failure associated with direct laryngoscopy. The study compared five tracheal intubation rescue techniques: video laryngoscope, tracheal intubation using a supraglottic device, flexible bronchoscopy, lighted stylet, and optical stylet. The results showed that video laryngoscope was a superior tracheal intubation rescue technique compared to the other methods. Of the total, 1,427 tracheal intubation failures, 90% of the patients (1,032) had the trachea subsequently intubated with the video laryngoscope.[7]

In an analysis from 2004 to 2012, rescue methods used after tracheal intubation failure were assessed. The data showed a considerable increase in video laryngoscope use as a rescue method for tracheal intubation failure. In 2004, video laryngoscope was used in 30% of cases. Over the years, the use of this rescue method grew very much, and in 2004 it was used in approximately 90% of cases. During the period of time analyzed, the growth of video laryngoscope use in rescue situations was 80%. The study also provided additional relevant data. First, use of video laryngoscope is associated with highly significant success rates of tracheal intubation as rescue technique compared to the other methods. Second, video laryngoscope also had a high rate of tracheal intubation success in patients difficult to ventilate with face mask ventilation, and thus at greater risk. Third, only 28% of the 1,427 patients presented two or more difficult airway predictors. All these data indicate that the video laryngoscope should be available during routine hospital care of patients, and that it can be used in a wide range of clinical scenarios. The study reported pharyngeal injury in only 1% of cases associated with video laryngoscope use.[7]

These data, obtained from systematic review studies and multicenter studies involving large populations, show that access to optical devices for tracheal intubation has gained great popularity. Video laryngoscope is an easy-to-use device, even easier to use than direct laryngoscopy, not requiring extended training, and has a more affordable cost compared to the fiberscope.

In the present case report, nasal fibroscopy was not performed because the surgeon requested the nostrils to be free due to surgical manipulation. Fibroscopy could even have been performed through the oral cavity and was available in the operating room. In the initial airway management plan, nasal fiberoptic intubation was the first option. However, in

response to the surgeon's request that the nostrils should remain free due to surgical access; the alternative was to use the video laryngoscope. It is important to note that there was a small amount of blood in the oral cavity and that, due to the location of the tumor in the anterior portion of the hard palate; it would not be possible to place any supraglottic device to guide fibroscopy, which would certainly make it difficult to access the airway. In addition, the tumor was very friable, soft, and avoid touching it would decrease the risk of bleeding. In view of this scenario, the airway management plan was to use the video laryngoscope.

In this case report, therefore, the video laryngoscope was used as the first method of accessing the airway. In planning the anesthetic technique, the main objective was to perform orotracheal intubation while maintaining the patient breathing spontaneously, decreasing risks, and preventing hypoxemia during tracheal intubation.

In conclusion, as shown by the literature, the video laryngoscope occupies a prominent position in cases where access to the airway is difficult. Video laryngoscope can be used as first choice for tracheal intubation or as a rescue technique. Facing the ever-challenging scenario of a difficult airway patient, the video laryngoscope must be part of the available resources that enable the anesthesiologist to perform tracheal intubation safely.

Conflicts of interest

The authors declare no conflicts of interest.

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