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CASE REPORT **AIRWAY MANAGEMENT**

Dexmedetomidine administration in a laryngeal cancer patient with emergency tracheostomy: a case report

Filiz Kaya [1], Evren Selma Evirgen [2], Eda Uysal Aydin [3], Sümeyye Kocagil [4], Ezgi Erkiliç [5]

Author affiliations:

1. Filiz Kaya, Department of Anaesthesia, Ankara Bilkent City Hospital, Üniversiteler, 1604. Cd No. 9, 06800 Çankaya/Ankara, Türkiye; E-mail: filizbulut5@gmail.com; {ORCID:0000-0002-2006-4832}
2. Evren Selma Evirgen, Department of Anaesthesia, Ankara Bilkent City Hospital, Üniversiteler, 1604. Cd No. 9, 06800 Çankaya/Ankara, Türkiye; E-mail: evrenyucel_@hotmail.com; {ORCID:0000-0001-5031-4540}
3. Eda Uysal Aydın, Department of Anaesthesia, Ankara Bilkent City Hospital, Üniversiteler, 1604. Cd No. 9, 06800 Çankaya/Ankara, Türkiye; E-mail: dredauysal@gmail.com; {ORCID:0000-0002-1309-1648}
4. Sümeyye Kocagil, Department of Anaesthesia, Ankara Bilkent City Hospital, Üniversiteler, 1604. Cd No. 9, 06800 Çankaya/Ankara, Türkiye; E-mail: kcglsmyye.00@gmail.com; {ORCID:0009-0006-3238-1313}
5. Ezgi Erkılıç, Department of Anaesthesia, Ankara Bilkent City Hospital, Üniversiteler, 1604. Cd No. 9, 06800 Çankaya/Ankara, Türkiye; E-mail: eerkilic72@yahoo.com; {ORCID:0000-0002-1211-9354}

Correspondence: Ezgi Erkiliç; **E-mail:** eerkilic72@yahoo.com; **Phone:** +90 5053663491

ABSTRACT

The maintenance of vital functions in any patient depends upon the preservation and maintenance of airway patency. Conditions that may cause difficult airway, such as a laryngeal mass, require rapid and expert intervention. We briefly review the current knowledge on this subject by presenting the report of a patient who required emergency airway intervention and in whom a tracheostomy had to be resorted to under sedation. A 59-year-old male patient who was scheduled for total laryngectomy and neck dissection due to laryngeal cancer was taken to the operating room with the decision of emergency tracheostomy after developing respiratory distress. Nasoendoscopic visualization of the patient showed an exophytic lesion starting from the root of the tongue on the left and extending to the chordae. Inj fentanyl and dexmedetomidine were administered to the patient for sedation and dexmedetomidine infusion was continued after the loading dose. When the thyroid isthmus was encountered during the surgical intervention, a tracheostomy was made at 45 min. A 7.5 mm cuffed tube was inserted and respiratory control was achieved. This case report stresses that a combination of dexmedetomidine and fentanyl can be used safely in such cases.

Keywords: tracheostomy, dexmedetomidine, diffuculut airway

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1. INTRODUCTION

Upper airway obstruction that occurs with stridor and develops secondary to neoplasms are situations that require urgent tracheostomy intervention. Protecting the airway during sedation in patients with compromised airways is a very challenging task for anesthesiologists.[1-2] Awake tracheostomy may be used to secure the airway in some situations where other methods are not suitable. However, applying sedation to the patient may make the difficult airway even more critical.[3] For this reason, the type and dosage of the selected anesthetic agent becomes important.

Dexmedetomidine, an α2 adrenoceptor agonist, is an agent with anxiolytic and analgesic properties without causing respiratory depression. In addition to reducing salivary secretions, it has an important cardiovascular depressant effect that causes bradycardia and hypotension.[4-6] Fentanyl is a potent and selective μ-opioid agonist with an analgesic effect. It has a relatively high margin of safety, but it may depress respiration.[7] In this publication, we wanted to present a case in which we

used the combination of dexmedetomidine and fentanyl during emergency tracheostomy in a patient with difficult airway.

2. CASE REPORT

A 59-year-old male patient, 66 kg, 165 cm tall, who was hospitalized in the ear, nose and throat service with plans for total laryngectomy and neck dissection due to laryngeal cancer. He was sent to our on-duty anesthesia team to be evaluated for a tracheostomy due to sudden onset of stridor. The patient's medical history included hypertension, coronary artery disease, hyperlipidemia, diabetes mellitus, asthma and hepatitis B carrier status, and a 40 pack-year smoking history. On physical examination, he was evaluated as Mallapati III. Previously, it was evaluated as medium-high risk in the evaluations of chest and cardiology consultations while preparing for surgery. Neck MRI depicted the epiglottis to be edematous and thick in the evaluable part of the larynx. A mass was observed extending from the anterior part of the vocal cords to the subglottic area. The tonsils were markedly hypertrophic and the oropharyngeal passage was narrowed. In the nasoendoscopic image taken during respiratory distress, an exophytic lesion was seen on the left, starting from the base of the tongue and extending to the cord. The rimal opening was not sufficient (Picture 1). The patient was taken into surgery with ASA 4E status.

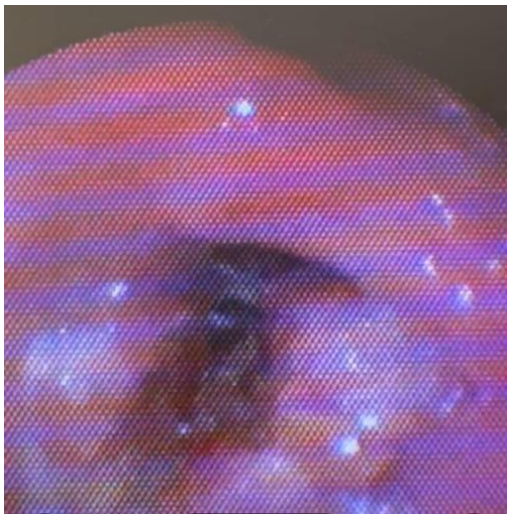

Figure 1: Abnormal thickening of the glottic tissues and a narrow glottic opening

When the patient came to the operating room, his Gloskow Coma Scale (GCS) was 15 and he had tachypneic respiration, stridor, hoarseness and oropharyngeal hypersecretion. Initial non-invasive blood pressure (NIBP) was evaluated as 161/95 mmHg, heart rate (HR) was 94/min, oxygen saturation (SpO_2) was 95% (he was receiving 4 L/min oxygen through nasal cannula).

Following routine ASA monitoring, a 20-gauge intravenous (IV) catheter was placed on the back of the left hand. Bispectral index (BIS) monitoring was performed to monitor the sedation level. Oxygen administration was continued at 4 L/min via nasal cannula. Inj dexamethasone 8 mg IV was administered before the operation. For sedation, a bolus of fentanyl 50 µg was administered, and followed by dexmedetomidine 0.5 µg/kg loading dose within 10 min. Then, dexmedetomidine infusion was started at the rate of 0.3-1 µg/kg. Meanwhile, the patient was prepared by the surgical team and the procedure was started. When the surgical team encountered a thyroid isthmus during the procedure, a partial isthmectomy was performed. Then, the tracheostomy procedure was performed without any problems in the 45th min. A 7.5 mm cuffed tube was inserted and respiratory control was achieved, the operation was terminated. The patient was followed up in the postoperative recovery room and transferred to the ward.

3. DISCUSSION

The location of our patient's laryngeal lesion and the insufficient glottic opening in the nasoendoscopic view lead us to decide to secure the airway with tracheostomy under sedation and thus avoid the possibility of 'failure to intubate, failure to ventilate' situatiom. When the literature is reviewed, fiberoptic intubation, awake or asleep, is presented as a useful option in cases with these characteristics. In a study conducted by Ranjita et al. in 2022, they intubated 68 patients with ASA-1 and 2 characteristics, who had oral cancer or dental surgery and expected difficult intubation, with awake fiberoptic bronchoscopy.[5] Similarly, in their study, Urvashi et al. performed elective awake nasal fiberoptic intubation under conscious sedation in 30 patients with ASA Class I and II and anticipated difficult airway.[4] While the cases selected in these studies by Ranjita and Urvashi were patients between the ages of 18-65 y with stable cardiac and respiratory functions, the situation in our patient was both urgent and high risk.

Dexmedetomidine is a sedation-inducing, wake-modulating drug that involves activation of the endogenous sleep-promoting pathway through postsynaptic α-2 receptors in the locus ceruleus.[8] Moreover, while activation of α2 receptors in the medulla leads to bradycardia and hypotension, stimulation of α2 receptors at the supraspinal level and substantia gelatinosa in the spinal cord leads to analgesia without causing respiratory depression.[2] The literature is rich about the use of dexmedetomidine in anesthesia. However, studies regarding its use in difficult airway

have been increasing in the recent years. There are many different medications and combinations used in difficult airway management.

Godlevski et al. provided sedation with dexmedetomidine to a pregnant woman with spinal muscular atrophy (SMA Type 2), enabling a smooth tracheostomy to be performed. SMA disease makes pregnancy difficult due to lung disease and severe scoliosis. In this case, the fact that the patient was pregnant with SMA made her respiratory functions even more critical.[9]

Tomohiro et al. performed awake fiberoptic intubation under continuous infusion of remifentanil 0.1-0.2 µg/kg/min, to a 48-year-old patient diagnosed with cavernous hemangioma of the hypopharynx and larynx extending into the trachea and mediastinum. Tracheostomy could not be completed due to surgical complications, but they performed successful awake intubation under remifentanil sedation.[10]

Roger et al. applied sedation to a 50-year-old male patient with tracheal carcinoma with 0.7 µg/kg/h dexmedetomidine and 2 mg/kg ketamine induction. Surgeons were then able to completely shrink the tumor and examine the airway down to the carina. They wanted to show that the combined use of ketamine and dexmedetomidine can be applied in cases where deep sedation and spontaneous ventilation are required.[11]

Ahmad et al. performed awake tracheal intubation using propofol and remifentanil in a 54-year-old male patient with large squamous cell carcinoma at the base of the tongue and suspected Covid-19. After airway control was achieved, a surgical tracheostomy was performed under general anesthesia.[12]

We preferred dexmedetomidine, which does not cause respiratory depression, and fentanyl, which has a good analgesic effect, in our patient. In a study by Ranita et al. in which they compared dexmedetomidine alone with dexmedetomidine plus fentanyl randomly during awake fiberoptic intubation in patients with difficult airways, the first group received IV dexmedetomidine 1 µg/kg; the second group was given dexmedetomidine IV 0.5 µg/kg and fentanyl 1 µg/kg. As a result of the study, they showed that low-dose dexmedetomidine-fentanyl combination provided more satisfactory conditions than dexmedetomidine alone, thus avoiding bradycardia, hypotension and sedation.[5] In our case, hemodynamic parameters remained stable during the use of dexmedetomidine and fentanyl combination.

In a case report in which they used a combination of sevoflurane and dexmedetomidine to provide rapid sedation and transtracheal injection to a 6-year-old patient whose airway was blocked due to diphtheria, Omega et al. used dexmedetomidine at a dose of 0.5 µg/kg/h and sevoflurane in a dose of 1 MAC. They also performed transtracheal injection of 3 mL lidocaine 2% and bilateral cervical superficial block with 4 mL lidocaine 2% on both sides.[13]

BIS monitor (a monitoring device with an algorithm based on changes in EEG according to the level of consciousness along with clinical symptoms), has been proven to be reliable in evaluating the hypnotic effects of various anesthetic drugs and sedatives. However, the reliability of the BIS value in evaluating the sedation effects of dexmedetomidine is still controversial.[14-16] In a study, Seunghee et al. confirmed that BIS can be used to evaluate the hypnotic depth of a patient under dexmedetomidine sedation.[15] We performed a tracheostomy under conscious sedation using BIS monitoring in our patient whose respiratory functions were critical.

4. CONCLUSION

As in every emergency tracheostomy case, our priority was to ensure a safe airway for the patient. We used fentanyl, which has a good analgesic effect, together with dexmedetomidine, which does not depress respiration, for sedation in this patient with narrowed upper airway; we ensured that the surgical procedure was performed comfortably, safely and under conscious sedation.

5. Conflict of interests

None declared by the authors.

6. Ethical issues

Written informed consent for publication in the academic interest was obtained from the patient.

7. Authors contribution

FK: Concept, Design, Data Collection, Literature Review, Writer

SEE: Analysis and/or Interpretation, Writer, Supervision

EUA: Analysis and/or Interpretation, Materials, Literature Review

SK: Concept, Analysis and/or Interpretation, Literature Review, Materials

EE: Concept, Design, Supervision, Analysis and/or Interpretation

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