CASE REPORT

Difficult intubation and utility of technology in a patient with carcinoma left upper alveolus having a large thyroid mass

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Airway management of the patient with carcinoma left upper alveolus and a large thyroid mass. **Background, Aims, and Objectives:** Patients presenting with 2 times difficult airway due to oromaxillofacial cancer and a large thyroid mass also offer a unique opportunity for anesthesiologists to skillfully manage their airway in the operating room with the right equipments and maneuvers. We aim to discuss such a scenario in which we managed a double difficult airway with the aid of ultrasonography and fiberoptic bronchoscope. We also discuss the challenges that could be anticipated in a patient with oral cancer along with a large neck mass. **Results:** It is crucial to carefully prepare how to handle challenging airways and provide perioperative care during a planned extubation after ensuring there is no airway compromise. Appropriate anesthetic plan is made possible by thorough airway examination and identification of challenging airway predictors. Usage of latest technology in the form of ultrasonography and fiberoptic bronchoscopy in the field of anesthesia is a major boon for the anesthesiologists and patients. **Conclusion:** Therefore, utilizing technological advancements in the field of anesthesia and their subsequent availability in healthcare centers are necessary to tackle difficult and nearly impossible tracheal intubation successfully.

KEY WORDS: Awake fiberoptic intubation, difficult airway, large thyroid mass, trans-tracheal block

INTRODUCTION

An essential part of anesthesia is airway management, which is essential for both patient safety and effective surgical results. It has been determined that 1 in 22,000 people experience major airway problems after general anesthesia, and 1 in 29,000 people require intensive care unit (ICU) hospitalization as a result of airway morbidities.[1] A multimodal strategy is needed to address the difficulties caused by the difficult airway.[2] The best airway management plan is determined by taking into account a number of factors, including the patient's ability to open their mouth and slide their mandible, the degree of tongue displacement, the mandibular space and floor of the mouth, Mallampati grade, and any potential intubation issues.[3] While airway management is frequently simple and necessary for safe anesthesia delivery, it has long been recognized that airway management can have major repercussions.[4]

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In patients with oromaxillofacial cancer, there are multiple factors which are responsible for difficult airway. The presence of cancerous development, structural changes, and fibrosis from prior radiation or surgical treatment, a lengthy surgical procedure, a large flap for reconstruction, edema surrounding the airway from surgical manipulations, the risk of bleeding, mostly from surgical causes or repeated attempts at airway manipulation, and the potential for pulmonary aspiration are the factors that cause patients with oral cancer to have difficulty breathing during the perioperative phase.[5] Along with that, when faced with a large neck mass with oromaxillofacial cancer in the same patient, airway management becomes challenging

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2 times where awake fiberoptic intubation (FOI) becomes the best way to carefully manage the airway.[6] We describe a successful intubation scenario with such twofold increase in difficulty that utilized awake fiberoptic bronchoscopy aided by ultrasound-guided airway blocks.

CASE REPORT

A 77-year-old male patient came to Rohilkhand Cancer Institute with chief complaints of ulcer and pain in the left upper jaw since the past 1 month. He had no medical history of diabetes mellitus, hypertension, tuberculosis, bronchial asthma, blood transfusion, any drug allergy, any kind of surgery and any stay in the ICU. He had been a beedi smoker for 30 years and an alcoholic and tobacco chewer for 5 years. Physical examination revealed a weight 78 kg, height 174 cm, body mass index 25.8 kg/m^2 (overweight). The patient's initial vitals in pre-anesthetic check-up clinic were blood pressure of 192/94 mmHg, pulse rate of 117 beats/min, respiratory rate of 17/min, and oxygen saturation maintaining at 98% on room air. He was later started on medication to optimize blood pressure with Tab Telmisartan 40 mg OD, Tab Amlodipine 5 mg OD, Tab Metoprolol 25 mg OD and Tab Chlorthalidone 6.25 mg OD after consulting medicine team.

He had a grossly enlarged neck swelling on the left side measuring approximately 12 × 12 cm which had started growing since he was 20 years old. He had no complaints regarding the huge neck swelling hidden behind long beard [Figure 1]. It extended from below mandible to the lower border of the neck on the left side. The swelling was firm in consistency and immobile. No distended veins were visualized on the neck except a small bleeding ulcer on the skin on the anterior surface of the swelling. There were no complaints of dyspnea, orthopnea, any change in voice nor any history suggestive of hypothyroidism or hyperthyroidism.

Airway examination revealed mouth opening of two fingers, Mallampati grading of 4, adequate neck extension, and limited neck flexion due to thyroid mass. The patient was edentulous and bearded. His METS score was >4 and breath holding test was 35 s. Systemic examination was all normal except bilateral air entry was found to be decreased on chest auscultation. X-ray chest/neck revealed radio opacity on the left side of the neck, grossly displacing trachea toward the right side [Figure 2]. Contrast-enhanced computerized tomography (CECT) face indicated ill-defined heterogeneously enhancing soft-tissue density lesion measuring 3.4 × 2.4 × 1.6 cm (AP × CC × TR) involving the left superior gingivobuccal sulcus which was causing superomedial erosion of the adjacent left alveolar process and floor of the left maxillary sinus with extension into the lumen of left maxillary sinus.

Along with this finding, CECT face also indicated a large well defined heterogeneous density lesion measuring 10.9 × 11.8 × 11.6 cm (AP × TR × CC) in the left lobe of the thyroid gland which was reaching superiorly up to the left submandibular region and inferiorly up to the thoracic inlet with no significant retrosternal extension seen [Figure 3]. The lesion was displacing the left common carotid artery and internal jugular vein posterolaterally on the left side. On the same side, the lesion was also displacing the left sternocleidomastoid muscle laterally while strap muscles were displaced anteriorly. There was displacement of larynx, trachea, and esophagus toward the right side causing compression of trachea with reduction in its transverse diameter. At its narrowest site at C5 level, trachea measured 13 mm diameter anteroposteriorly and 10 mm diameter transversely [Figure 4]. Thyroid function test was within normal limits. All other blood investigations were within normal range. 2D ECHO revealed ejection fraction to be 64% and the presence of Grade 1 left ventricular dysfunction.

We anticipated difficult bag and mask ventilation, laryngoscopy, and intubation due to the large size and long history of the thyroid mass along with decreased mouth opening, awake FOI was planned. The procedure was explained to the patient and consent in writing was acquired. Deep breathing exercise and incentive spirometer were advised. Tablet Ranitidine 150 mg and tablet Alprazolam 0.25 mg were given on the night before and the morning of surgery. In the pre-operative room on the day of surgery, patient's airway was anesthetized with 4% Lignocaine nebulization, and posterior pharyngeal wall was sprayed with 10% Lignocaine spray. Inj glycopyrrolate 0.2 mg IM was administered to minimize the secretions.

In the operation theatre, all the standard monitors were connected, and the baseline vitals were noted down. Blood pressure and pulse rate were found to be 130/70 mmHg and 92 beats/min, respectively. Xylometazoline drops were inserted into each nostril to help clear the nasal passages and allow the fiber optic bronchoscope to later pass through without causing damage to the mucosa. Patient was connected to O_2 support through nasal prongs on 4 L/min. Inj Fentanyl 50 mcg and Inj Midazolam 1 mg was injected intravenously. Due to the large neck mass and tracheal deviation in this patient, we were unable to appreciate the cricothyroid membrane with landmark guidance and hyoid was impossible to palpate. Thus, we performed ultrasound-guided trans-tracheal block with 3 mL of 4% Lignocaine, whose needle placement was confirmed with the presence of air bubbles upon negative aspiration before injecting the drug [Figures 5 and 6]. The patient was asked to cough after the administration of the drug to spread above the vocal cord.

Flexometallic endotracheal tube of 7 mm was railroaded in fiberoptic bronchoscope (FOB). We placed epidural catheter in the port of FOBs to give lignocaine spray through spray-as-you-go technique [Figure 7]. The result was an effective post-airway block therefore no additional effort was needed. The FOB was inserted through the right nostril and advanced util above carina successfully. The thyroid mass was physically manipulated and held in the hands of the assistant to aid the insertion of the FOB and the flexometallic endotracheal tube and then the flexometallic tube was pushed down the bronchoscope nasally. $ETCO_2$ was attached and tube position was again confirmed. Analgesia, induction, and neuromuscular blockade were accomplished by intravenous injections of

Fentanyl 150 mcg, Propofol 120 mg, and Vecuronium 5 mg, respectively. The endotracheal tube was secured firmly, and the patient was draped, cleaned and the surgeon mares the necessary markings for the procedure [Figure 8]. Anesthesia was intraoperatively maintained with oxygen, nitrous oxide, isoflurane and intermittent Inj vecuronium. The left lobe of thyroid gland was surgically removed and sent to laboratory for further investigations [Figure 9]. Patient underwent composite resection, comprehensive neck dissection, reconstruction with temporalis flap and hemithyroidectomy successfully without any intraoperative complications [Figure 10]. The patient was given reversal agents Inj Neostigmine 4 mg and Inj Glycopyrrolate 0.8 mg and then extubated after the return of spontaneous breathing efforts, spontaneous eye opening, and following verbal commands. Leak test was performed, and vocal cords movement

Figure 1: Patient revealing the gross neck swelling under the beard

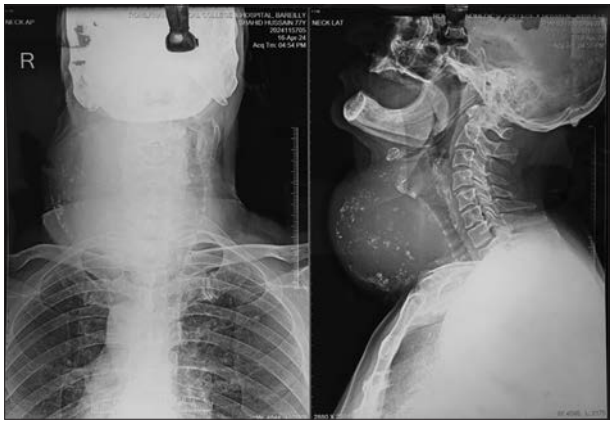

Figure 2: Chest and Neck X-ray showing radiopacity on left side of the neck and gross displacement of trachea towards right side.

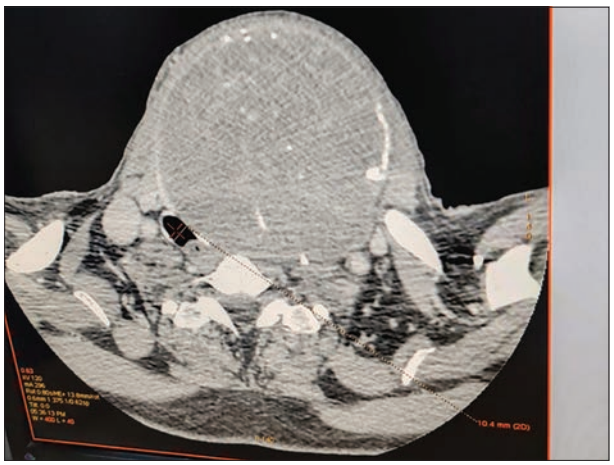

Figure 3: CECT face showing lesion in left thyroid gland lobe

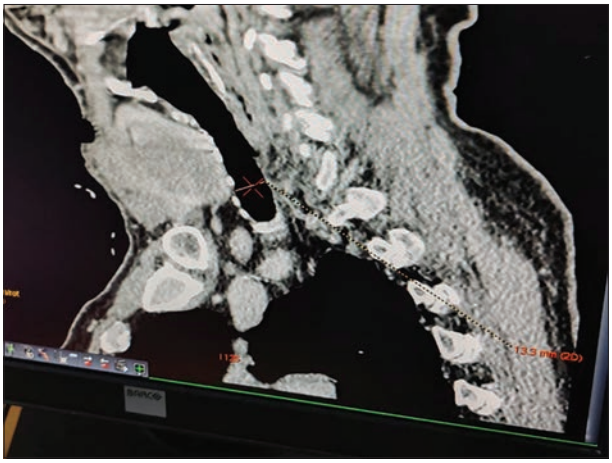

Figure 4: Narrowest site in the trachea at C5 level 13 mm AP and 10 mm transversely.

Figure 5: Ultrasound guided trans-tracheal block

Figure 6: Ultrasound guided trans-tracheal block

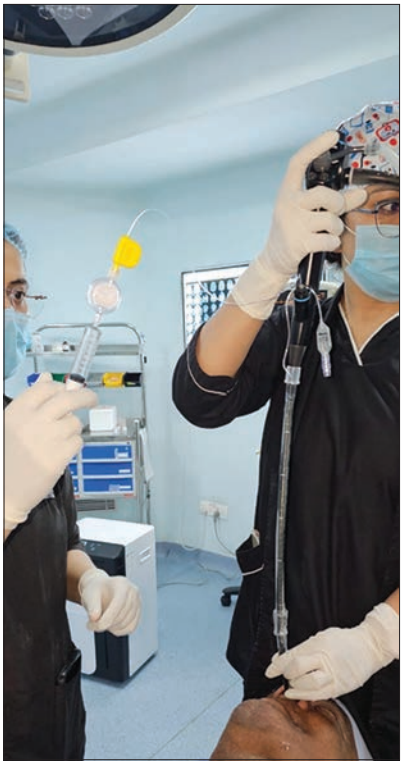

Figure 7: Fiber optic bronchoscope (FOB) with lignocaine loaded epidural catheter for spray-as-you-go technique

Figure 8: Patient draped, cleaned and markings drawn for the procedure after the ETT was secured

was visualized through a direct laryngoscope after reversal and before removal of the endotracheal tube. No complications were observed after extubation, and the patient was shifted to post-operative room for observation before being shifted to the ward.

DISCUSSION

The cervico-maxillo-facial region presents a significant level of difficulty for anesthesiologists due to the great density of structures in a relatively small area, whether the tumors are benign or malignant. The oro-maxillo-facial surgical intervention has the highest rate of potentially challenging intubation

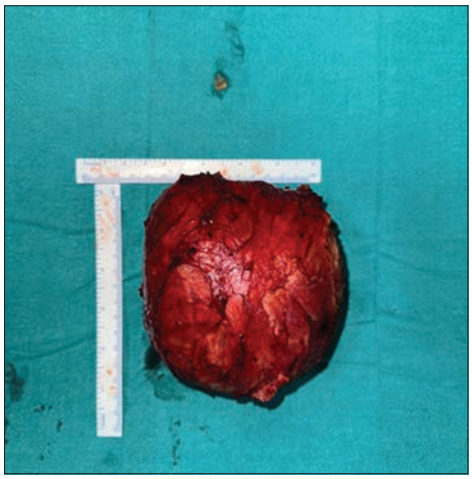

Figure 9: Surgically removed specimen showing the thyroid mass after hemithyroidectomy

Figure 10: Patient underwent composite resection, comprehensive neck dissection, reconstruction with temporalis flap, and hemithyroidectomy.

out of all surgical intervention types. The comorbidities that may be identified by the assessment of the related pathology are pulmonary emphysema, ischemic coronary disease, high blood pressure, toxic-etiology chronic hepatopathy, and coagulopathies linked to the oncological condition. Tumor sites cause discomfort or make deglutition impossible result in serious nutritional issues including dyselectrolytemia, anemia, and weight loss. The tumor itself can be the cause of a difficult airway; it may partially occupy the lumen or influence extrinsic compression by volume. In an attempt to reduce the extent of the cancer, pre-operative radiation therapy has side effects that include increased vascular fragility and the beginning of a certain degree of local fibrosis.[7] In addition, an enlarged thyroid gland also produces tracheal compression, deviation, or both that can be a reason for difficult intubation.[8] Obstruction of the upper airway by thyroid mass has been documented in up to 31% of cases, and difficult intubation in 11% of cases.[9] Induction of general anesthesia in such cases is risky because it may precipitate complete airway closure and make mask ventilation and tracheal intubation nearly impossible. Pressure on the trachea exerted by a long-standing neck mass can cause laxity to the parts of tracheal wall, which can lead to a complete collapse of the airway with muscle relaxation.

FOI, safely and promptly secures the airway and has been recommended for airway management in patients with such

difficult airways. Since the trachea was substantially deviated and there existed both obstructive and compressive symptoms associated with the buccal mucosal cancer and the enlarged neck mass in this patient, we proceeded with ultrasound-aided airway block and awake FOB-guided intubation.

Malhotra and Sodhi have described plans for managing the airways of thyroid patients, which include awake FOI, tracheotomy, semi-supine or semi-seated inhalation induction with sevoflurane, or ventilation with a rigid bronchoscope.[10] Various drawbacks associated with FOI are trauma, bleeding, failure to visualize the glottis, and laryngospasm.[11] However, there is less chance of losing the airway than with inhalation induction.[12] Because the patient's muscle tone may deteriorate beneath deeper planes, induction with inhalational anesthesia may not always be safe. While awake tracheostomy has been successfully used in the emergency room for patients with impaired airways, there are a number of disadvantages, including poor patient compliance, challenges with technology, and bleeding.[13] Some anesthesiologists recommend thyroidectomy under local anesthesia due to the respiratory complications associated with thyroid illness.[14] However, since the landmarks cannot be detected, a patient with a large thyroid mass that compromises their airway also poses a significant limitation to this procedure.

The decision to intubate while the patient was awake, was made to preserve spontaneous breathing, prevent aspiration, maintain patency of the upper airway, and preserve the protective airway reflex. Flexible fiberoptic is recommended for patients with limited mouth opening because it reduces the need for three-axis alignment, allows for multiple positioning, reduces the risk of dental and airway trauma, and is well-tolerated in awake patients, therefore lowering the risk of tachycardia and hypertension.[15] Our patient had good procedural tolerance as there were no notable hemodynamic alterations, which can occasionally happen during awake intubation.

The difficult airway algorithm evaluates the probability and clinical significance of common management issues, such as challenging tracheostomy, difficult intubation, difficult ventilation, and challenging patient participation or consent. Supplemental oxygen should also be aggressively administered during the challenging airway management procedure. The management and result of the procedure are significantly influenced by the anesthesiologist's experience and challenging airway algorithms. In our case, a favorable outcome was made possible by the early identification of all likely possibilities and the utilization of technology available at our disposal.

CONCLUSION

It is crucial to carefully prepare how to handle challenging airways and provide perioperative care during a planned extubation after ensuring there is no airway compromise. Appropriate anesthetic plan is made possible by thorough airway examination and identification of challenging airway predictors. It is critical to identify problematic airways as soon as possible. Usage of the latest technology in the form of ultrasonography and fiberoptic bronchoscopy in the field of anesthesia is a major boon for the anesthesiologists and patients. Direct observation of the block needle tip, the diffusion of local anesthetic, and peripheral nerves is made possible by ultrasound imaging. For tracheal intubation of patients who are awake or under anesthesia, flexible FOB has proven to be an indispensable instrument. Therefore, utilizing such technological advancements in the field of anesthesia and their subsequent availability in healthcare centers are necessary to tackle such difficult and nearly impossible tracheal intubation successfully. The management and result of the procedure are significantly influenced by the anesthesiologist's experience and challenging airway algorithms. It is impossible to overlook the high learning curve associated with awake bronchoscopic intubation, nevertheless. A fully qualified and outfitted anesthesiologist who can provide quick support for emergency airway surgery is a must for doing awake bronchoscopic intubation.

Consent

Informed and written consent was taken.

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