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CASE REPORT AIRWAY MANAGEMENT

Combined use of the GlideScope and flexible fiberoptic bronchoscope after several failed intubation attempts for a retrosternal thyroid mass: a case report

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Abstract

A GlideScope® and a flexible fiberoptic bronchoscope (FOB) were successfully used in combination, to intubate a 73-year-old female patient in which repeated previous intubation attempts with conventional laryngoscope had failed. GlideScope®, and FOB were used sequentially. She had been scheduled for an elective total thyroidectomy to remove a huge retrosternal goiter. A computed tomography (CT) scan revealed a large necrotic mass (measuring 10 x 16 cm) with heterogeneous enhancement involving the thyroid gland and extending to the anterior mediastinum, causing significant tracheal compression and left deviation. Endotracheal intubation was successfully performed while she was awake using a combination of GlideScope and FOB. The operation lasted for two hours and was uneventful. The patient was then transferred to the intensive care unit (ICU) and kept intubated, sedated, and mechanically ventilated overnight. She was awakened and extubated the following day with no airway complications.

Key words: Adult; Failed intubation; Female; Fiberoptic bronchoscope; GlideScope; Humans; Intubation, Intratracheal; Retrosternal thyroid mass

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1. Introduction

Airway management is one of the prime skills learnt by the anesthesiologists, be it to administer general anesthesia, or for mechanical ventilation in an intensive care unit (ICU). This task becomes really a big challenge, when intubation is essential, but is failed on multiple attempts. According to an old study covering over 3 years period, the incidence of failed intubation was 7 out of 1980 obstetric patients, and it was 6 out of 13,380 patients in the surgical patients.[1] Multiple failed intubation attempts make the subsequent success even more difficult. This challenge is a nightmare if it is associated with an anterior mediastinal mass. Awake fiberoptic intubation (FOI) has been successfully used in patients with enlarged thyroids in difficult airway situations.[2,3] While attempts with other commonly used techniques failed, we report a case of successful combined use of GlideScope and fiberoptic bronchoscope (FOB) for tracheal intubation in a patient with huge retrosternal goiter causing significant airway deformity.

2. Case Report

Total thyroidectomy was rescheduled for a 73-year-old female patient with a 12-week history of a growing thyroid mass. The patient was scheduled for an elective thyroidectomy one week back, but the anesthesia team could not intubate the patient with a direct laryngoscope, a GlideScope, or a FOB; hence the case had to be canceled. An ENT consultation was requested in order to perform an awake tracheostomy under local anesthesia, but the procedure was judged to be improbable due to technical difficulties including the inability to identify

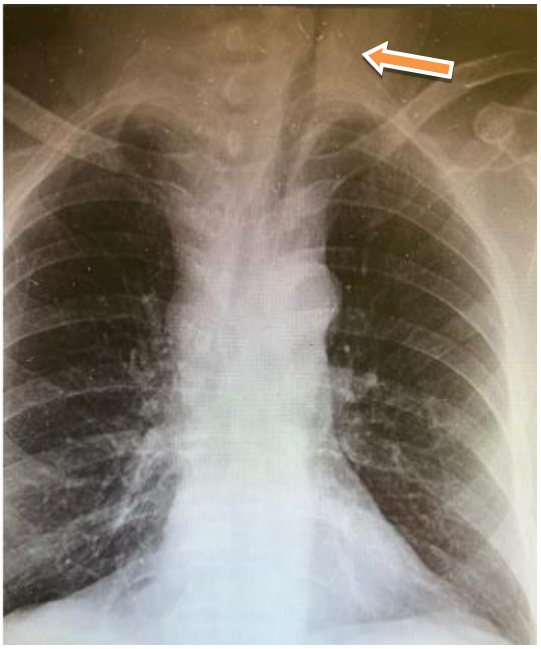

Figure 1: Chest X-ray showed tracheal deviation and narrowing

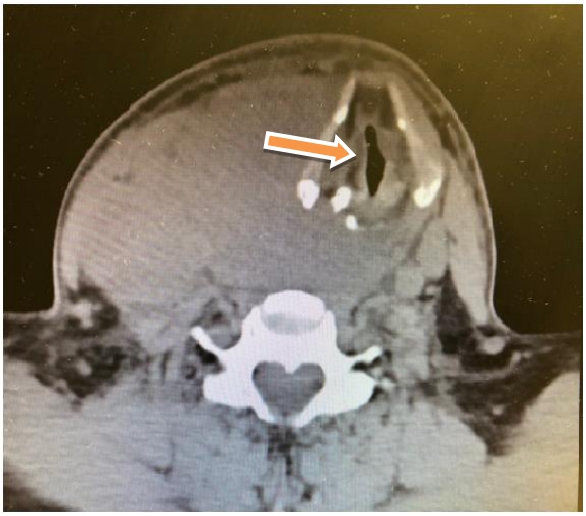

Figure 2: Computed tomography (CT) scan showed a large necrotic mass lesion with heterogeneous enhancement involving the thyroid gland with the mass at the thyroid lobe demonstrating retrosternal extension and causing marked compression and deviation to the trachea.

the trachea from the overlaying enlarged thyroid, and the risk of catastrophic bleeding, and direct oral intubation was deemed the only viable option.

The patient had a history of hypertension and was taking 5 mg of amlodipine daily. She also had type II diabetes and was taking metformin 500 mg twice a day. Except for the inability to identify the thyroid cartilage, the cardiovascular and chest examinations were normal. The laboratory results were within the normal ranges.

A thorough re-assessment of the airway revealed several challenging findings, indicating difficult airway management. The patient was Mallampati class III; the mouth opening was approximately three fingers with loose upper incisors; and the thyromental distance could not be measured. The neck's range of motion was restricted to flexion. Her neck circumference was 40 cm, and she had a massive thyroid goiter that covered the entire anterior portion of her neck. The thyroid cartilage could not be palpated due to the thickness of soft tissues in the neck. A chest X-ray revealed a thyroid mass that was causing significant compression and left deviation of the trachea, reducing the tracheal diameter to almost one third (Figure 1). A computed tomography (CT) scan revealed a large necrotic mass involving the thyroid gland with heterogeneous enhancement, with the mass at the thyroid lobe demonstrating retrosternal extension. This resulted in significant tracheal compression and deviation, as well as displacement and encasement of the ipsilateral neck vessels, with no stenosis and large, necrotic right supraclavicular, cervical, and retropharyngeal lymph nodes (Figure 2).

Considering the presence of multiple factors of definitive difficult airway management, the unsuitability of awake tracheostomy, and the possible risk of complete airway collapse with loss of spontaneous ventilation before intubation, we planned for awake intubation using FOB under conscious sedation combined with GlideScope.

Written informed consent was obtained from the patient. Upon arrival at the receiving area, the patient was premedicated with an IV bolus of 200 µg of glycopyrrolate. Airway anesthesia was achieved by the nebulization of 4 ml of lidocaine 4% over 15 min prior to intubation. A difficult airway cart was readily available in the operating room. The patient arrived at the operating room where standard ASA monitors and right radial invasive blood pressure monitoring were applied. Two large-bore intravenous (IV) cannulas were inserted. We used propofol infusion at a rate of 0.025-0.05 mg/kg/min combined with dexmedetomidine infusion at a rate of 0.3-0.5 µg/kg/h for conscious sedation. There was 10% lidocaine spray available. The patient's vital signs recorded were; heart rate 74 beats/min, blood pressure 110/60 mmHg, respiratory rate 16 breaths/min, and oxygen saturation 99% with a 2 L/min oxygen flow via nasal cannula. We ensured the absence of the gag reflex by touching the uvula with a tongue depressor immediately before beginning the procedure. The GlideScope with a hyper angulated blade size 3 was then inserted to visualize the epiglottis, and the patient tolerated it well. The vocal cords, however,

Picture 1: After tracheal Intubation

could not be identified. While GlideScope remained stationary, the FOB loaded with size 6.5 mm ID armored ETT was slowly advanced. The case was being managed by two anesthesia consultants and two separate fluoroscopes.

The anatomy of the larynx was completely distorted. The vocal cords were seen by FOB on the left side at 11:00 o'clock along with rotation of the larynx. Using the "spray-as-you-go" technique, lidocaine spray was applied to the vocal cords and trachea. The FOB tip was guided towards the glottis, and passed through the vocal cords without causing any trauma to the airway until it reached the carina. The tube was then inserted until its tip was above the carina. Auscultation for bilateral air entry and square wave on capnography confirmed the correct placement of the ETT. We used an armored 6.5 mm ETT that was fixed at the 20 cm mark (Picture 1).

After securing the tube, an IV bolus dose of 100 µg of fentanyl was administrated, and sevoflurane was turned on to achieve an end-tidal concentration of 1. The patient was then given rocuronium 50 mg IV. The surgery lasted for 120 min and was uneventful; the mass was completely removed. The patient was transferred to the ICU and kept sedated on mechanical ventilation overnight. On the following day, the patient was awakened and extubated without complications. She was then transferred to the inpatient ward, where she stayed for three days before being discharged home.

3. Discussion

Huge goiters with retrosternal extension pose a very serious risk of difficult intubation as well as tracheal compression. Although, the incidence of failed intubation was previously found to be 7 out of 1980 obstetric patients, and 6 out of 13,380 patients in the surgical patients,[1] the estimated risk of difficult intubation is significantly higher in goiter patients compared to patients with no other risk factors. (6.8% in cases of goiter vs. 0.9% in non-goiter cases). If other risk factors are associated with goiter, the risk rises to around 45.6%.[4] Older age, a Cormack-Lehane grade of 3 or 4, cancerous goiters, tracheal stenosis on imaging, increased neck circumference, decreased ability to open the mouth, larger goiters, and pathological changes in airway anatomy were identified as independent risk factors.[5,6] Therefore, a comprehensive and detailed pre-operative airway assessment is considered as crucial prior to thyroid surgery in order to identify predictors of difficult intubation and develop an appropriate airway management plan.

For anticipated difficult intubation management, fiberoptic intubation is the gold standard. Videolaryngoscopy, the use of a lighted stylet, or the insertion of a supraglottic airway as a conduit to tracheal intubation are all current intubation rescue techniques.[2] Despite significant advances in the design of airway visualization equipment, managing difficult airways continues to be a big challenge for the clinicians.

Providing adequate sedation, maintaining a patent airway, and ensuring adequate spontaneous ventilation are all major challenges during awake FOI. Benzodiazepines, opioids, dexmedetomidine, propofol, and ketamine are among the drugs that have been used for conscious sedation during awake FOI. Dexmedetomidine is a highly selective and potent agonist of the alpha-2 adrenergic receptor. It can cause profound sedation without causing respiratory depression, reduces salivary secretion, provides optimal intubating conditions, minimum hemodynamic instability, and improves patient tolerance.[7]

The success rate of current rescue techniques varies.[7] The videolaryngoscope (VLS) has a 92% success rate compared to the FOI (78%), supraglottic airway device (78%), lighted stylet (77%), and optical stylet (67%). Because of the higher success rate when used in primary airway management and as rescue after failed direct laryngoscopy, VLS intubation may be more popular than other rescue techniques.[9]

Since the commercialization of the GlideScope in 2001, numerous VLSs with varying features have been developed. The GlideScope, with its miniature video camera at the blade tip and steep blade angulation, allows laryngologists to see around the anatomical 'corner' for

a better glottis view.[10] These features make the GlideScope a valuable tool in difficult airway scenarios. Nevertheless, due to some limitations, such as the inability to pass the ETT, this enhanced view does not guarantee successful intubation. Even with rigid or malleable stylets, the steeper blade angulation of the GlideScope can make ETT placement difficult. Videolaryngoscopy fails as a primary intubation technique in 2% of cases, as a rescue technique after failed direct laryngoscopy in 8% of cases, and as a rescue technique after failed fiberoptic bronchoscopy in 20% of cases. Neck scarring, radiation therapy, and masses are all strong predictors of failed videolaryngoscopy.[9]

Many factors contributed to our final decision to use the awake combined GlideScope-fiberoptic intubation technique. First, it was a known case of proven difficult intubation, with previous failed intubation trials and multiple difficult intubation predictors (e.g., retrosternal goiter, Mallampati class III airway, history of failed intubation, limited neck flexion, loose upper incisors, and tracheal deviation). Second, ENT surgeons rejected the option of awake tracheostomy due to technical difficulties, the inability to distinguish the trachea from the overlying massive thyroid, and the risk of catastrophic bleeding. Third, before inserting the ETT, there was a risk of complete airway collapse with loss of spontaneous ventilation. Finally, we were compelled to employ the combined GlideScope-fiberoptic intubation technique in order to obtain the best possible view by Glidescope while also benefiting from the flexibility of FOB.

Concurrent use of videolaryngoscopy and flexible bronchoscopy can aid in the success of difficult tracheal intubation. A VLS can be used to open the mouth, retract the tongue, and identify anatomical landmarks, whereas a flexible bronchoscope can be used as a steerable bougie or a smart stylet, avoiding airway trauma and facilitating passage through a distorted airway. Saunders et al. described videolaryngoscopy-assisted flexible intubation in the context of exchanging ETT, highlighting the significance of combining techniques to maintain a visible airway throughout the procedure.[11] Greib et al. successfully performed tracheal intubation on 16 patients using a VLS and a flexible bronchoscope.[12] Young et al. reported a case of successful airway management using a McGrath MAC VLS and a flexible bronchoscope in a morbidly obese patient with large goiter.[13]

4. Conclusion

In cases of difficult airway management, awake FOI may be safer. Tongue traction and jaw thrust may improve visualization and make the fiberoptic technique easier. When a single device has failed, the combined use of GlideScope and FOB will improve visualization and increase the chances of successful intubation by using two video screens with different viewing angles, and the tongue will be displaced. It may be beneficial for anesthetists to be trained in this technique so that it can be used effectively, if an unpredictable airway crisis emerges during routine practice.

5. Conflict of Interest

None. No external funding or competing interests were declared.

6. Patient's consent

Case report and the pictures published with the written consent of the patient.

7. Ethical Approval

Patient consent and specific ethical approval were obtained.

8. Author contribution

MSA was the sole author of this case report.

9. References

1. Samsoon GL, Young JR. Difficult tracheal intubation: a retrospective study. Anaesthesia. 1987 May;42(5):487-90. [PubMed] DOI: 10.1111/j.1365-2044.1987.tb04039.x
2. Hariprasad M, Smurthwaite GJ. Management of a known difficult airway in a morbidly obese patient with gross supraglottic oedema secondary to thyroid disease. Br J Anaesth. 2002 Dec;89(6):927-30. [PubMed] DOI: 10.1093/bja/aef274
3. Chakera A, Van Heerden PV, Van Der Schaaf A. Elective awake intubation in a patient with massive multinodular goiter presenting for radioiodine treatment. Anaesth Intensive Care. 2002 Apr;30(2):236-9. [PubMed] DOI: 10.1177%2F0310057X0203000222
4. Voyagis GS, Kyriakis KP. The effect of goiter on endotracheal intubation. Anesth Analg. 1997 Mar 1;84(3):611-2. [PubMed] DOI: 10.1097/00000539-199703000-00027
5. Mallat J, Robin E, Pironkov A, Lebuffe G, Tavernier B. Goitre and difficulty of tracheal intubation. Ann Fr Anesth Reanim. 2010;29:436–439. [PubMed] DOI: 10.1016/j.annfar.2010.03.023
6. De Cassai A, Papaccio F, Betteto G, Schiavolin C, Iacobone M, Carron M. Prediction of difficult tracheal intubations in thyroid surgery. Predictive value of neck circumference to thyromental distance ratio. PloS One. 2019 Feb 27;14(2):e0212976. [PubMed] DOI: 10.1371/journal.pone.0212976
7. Bergese SD, Khabiri B, Roberts WD, Howie MB, McSweeney TD, Gerhardt MA. Dexmedetomidine for conscious sedation in difficult awake fiberoptic intubation cases. J Clin Anesth. 2007 Mar 1;19(2):141-4. [PubMed] DOI: 10.1016/j.jclinane.2006.07.005
8. Aziz MF, Brambrink AM, Healy DW, Willett AW, Shanks A, Tremper T, et al. Success of intubation rescue techniques after failed direct laryngoscopy in adults: a retrospective comparative analysis from the multicenter perioperative outcomes group.

Anesthesiology. 2016 Oct;125(4):656-66. [PubMed] DOI: 10.1097/ALN.0000000000001267

9. Aziz MF, Healy D, Kheterpal S, Fu RF, Dillman D, Brambrink AM. Routine clinical practice effectiveness of the Glidescope in difficult airway management: an analysis of 2,004 Glidescope intubations, complications, and failures from two institutions. Anesthesiology. 2011 Jan 1;114(1):34-41. [PubMed] DOI: 10.1097/ALN.0b013e3182023eb7
10. Liew GHC, Wong TGL, Lu A, Kothandan H. Combined use of the glidescope and flexible fibrescope as a rescue technique in a difficult airway. Proceedings Singapore Healthcare. 2015:117-120. DOI: 10.1177%2F201010581502400208
11. Saunders TG, Gibbins ML, Seller CA, Kelly FE, Cook TM. Videolaryngoscope-assisted flexible intubation tracheal tube exchange in a patient with a difficult airway. Anaesth Rep. 2019 Jan;7(1):22-5. [PubMed] DOI: 10.1002/anr3.12007
12. Greib N, Stojeba N, Dow WA, Henderson J, Diemunsch PA. A combined rigid video laryngoscopy-flexible fibrescopy intubation technique under general anesthesia. Can J Anesth. 2007 Jun;54(6):492-3. [PubMed] DOI: 10.1007/bf03022046
13. Chung MY, Park B, Seo J, Kim CJ. Successful airway management with combined use of McGrath® MAC video laryngoscope and fiberoptic bronchoscope in a severe obese patient with huge goiter-a case report. Korean J Anesthesiol. 2018 Jun 1;71(3):232-6. [PubMed] DOI: 10.4097/kja.d.18.27203

