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Experience of trans-glottic endobronchial ultrasound under general anaesthesia; a novel technique using microlaryngeal tube

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ABSTRACT

Background: Endobronchial ultrasound (EBUS) for diagnostic and therapeutic purposes can be performed under moderate sedation, deep sedation, and general anesthesia. In selected patients, general anesthesia is employed either owing to patient co-morbidities or specific procedural requirements.

Case Presentation: This is the case of a 69-year-old man who required diagnostic EBUS for a right hilar mass, which was abutting and compressing major thoracic vasculature. Owing to requirement of precision for biopsy and background history of chronic obstructive pulmonary disease (COPD), general anesthesia was employed with microlaryngeal tube (MLT) and trans-glottic alongside MLT approach was used for EBUS scope intubation

Conclusion: Trans-glottic EBUS alongside MLT under general anesthesia was successfully used in present case demonstrating technical feasibility.

Keywords: Endobronchial ultrasound, general anesthesia, microlaryngeal tube, trans-glottic approach.

Type of Article: CASE REPORT **Specialty:** Anaesthetics

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Background

Endobronchial ultrasound (EBUS) for diagnostic and therapeutic purposes can be performed under moderate sedation, deep sedation, and general anesthesia. [1] Patient factors and procedural requirements are major influencers in choice of anesthetic technique. Variable and limited data exist to compare diagnostic accuracy, needle passes, and patient complications among different anesthetic techniques. [2] Limited bronchoscopic procedures are routinely performed in moderate sedation.[3] However, prolonged and advance procedures, such as EBUS trans-bronchial needle aspiration (TBNA), diagnostics, staging, and biopsies, need to be performed under deep sedation or general anesthesia. [4,5] Although deep sedation has been safely used for EBUS procedures, yet some patients may poorly tolerate it like patients with obstructive sleep apnea, chronic obstructive pulmonary disease (COPD), high oxygen requirement, or in patients where fine control of biopsy needle is required owing to vicinity of understudy mass to vital structures [6].

Case Presentation

This is the case of a 69-year-old male, known diabetic and hypertensive, active smoker with 40 pack years, established COPD, limited functional capacity (METS 3), anemia (hemoglobin 10.9 g/dl), and hyponatremia (129 mmol/l) who underwent EBUS and biopsy under general anesthesia.

He presented to pulmonology clinic with complaints of persistent cough for the past 2–3 months that was progressively worsening. It was productive in nature and associated with mild hemoptysis. He had also developed dysphagia for solids. There was associated chest pain as well as shortness of breath on exertion. The patient described an unintentional weight loss of 10 kg over 6 months, and no fever was documented.

His computed tomography scan revealed an ill-defined, spiculated heterogeneously enhancing right hilar mass inseparable from confluent nodal mass in sub-carinal location closely abutting and compressing right inferior pulmonary vein, left atrium, as well as encasing and invading visualized lower oesophagus at level T8-9. An additional spiculated lesion was also noted along the

right lower lobe. Findings were concerning for neoplastic disease process.

Patient was initially seen in anaesthesia clinic. There was reduced air entry on right lower zones of chest with resting saturation of 89% at room air. His airway assessment, electrocardiography, and echocardiography were unremarkable. Patient was not receiving oxygen care at home. Pulmonary function tests were not obtained.

After discussion with pulmonologist with consideration of his preoperative status and location of mass, it was mutually decided to proceed under general anaesthesia for EBUS-guided biopsy and diagnostics

He was premedicated with Glycopyrrolate 0.1 mg and Ondansetron 8 mg. Induction of anesthesia was done with midazolam 3 mg, fentanyl 120 mcg, propofol 120 mg, and cisatracurium 12 mg. He was intubated using MAC 3.0 with microlaryngeal tube sized 5 mm, confirmed using ETCO2 and maintained on sevoflurane 1 MAC with 40% oxygen and 60% air up to 2 l/min fresh gas flow in total. Ventilator was set as per his ideal body weight of 70 kg: tidal volume 280 ml (4 ml/kg), respiratory rate 20 b/min, PEEP 5 cmH20, I:E 1:2, and minute ventilation 5600 ml (80 ml/kg). Injection hydrocortisone 240 mg (4 mg/kg), adjusted for actual weight of patient, was given intravenous in order to prevent periprocedure bronchospasm and post procedure laryngospasm. When EBUS scope sized 6.1 mm was passed trans-glottic alongside microlaryngeal endotracheal tube sized 5 mm, ETT cuff was deflated to facilitate intubation with EBUS scope, which was inflated once scope passed carina. The cuff of microlaryngeal tube was positioned proximal to carina and distal to glottis opening under bronchoscope guidance. Ventilation was maintained with microlaryngeal tube due to lack of ventilating bronchoscope for EBUS. There was no significant leak demonstrated by ventilator or clinical parameters even at Ppeak pressure upto 38 cmH20. Patient remained hemodynamically stable. Ppeak was noted to be 38 cmH20; however, Pplateau stayed below 29 cmH20. No episode of desaturation or autopeep was observed during procedure with maximum ETCO2 noted to be 45. Procedure continued for 87 minutes, multiple biopsy samples with staging done comfortably by pulmonologist.

At the end of the procedure, during removal of EBUS scope, obvious tracheo-laryngeal edema was ruled out. When patient started breathing spontaneously and was able to maintain 4 ml/kg of tidal volume, at Train of Four count of 4/4, neostigmine-glycopyrrolate 2.5 mg/0.6 mg was administered for neuromuscular blockade antagonism and then extubated in deep plane of anaesthesia. It was decided to extubate in deep anesthesia with consideration to avoid acute bronchospasm on background of uncontrolled COPD and recent intervention, obious trachea-laryngeal edema had already been ruled out during bronchoscope removal. After extubation, he was observed and monitored in recovery for 1 hour. He remained hemodynamically stable and maintained SpO2 96% on 31% Venturi's mask. Patient was nebulized with ipratropium bromide 0.5 mg and beclometasone 200 mcg once. Once he was able to maintain SpO2 94% at room air, respiratory rate less than 14 b/min, and Modified Aldrete Score MADS 10, he was shifted to day ward. There was no complain of hoarseness of voice, stridor, sore throat, hemoptysis, laryngospasm, bronchospasm, or any oxygen requirement post operatively and was hence discharged the same day. The samples obtained from EBUS samples were conclusive for non-small cell carcinoma and was hence referred to oncological services on follow-up.

Discussion

Cleveland Clinic Foundation recommends use of general anesthesia for advanced EBUS procedures.[7] Laryngeal mask airway, iGel, and endotracheal tubes of larger size have been advocated by various studies [8,9].

Previously trans-glottic bronchoscopy in mechanically ventilated patient has been used for recruitment purpose; however, no case of trans-glottic EBUS with microlaryngeal tube has been reported so far [10].

General anesthesia with supra-glottic airway devices can provide access to tracheobronchial tree, which may be limited in case of endotracheal intubation. However, a common requirement is swivel adaptor for contaminant ventilation during procedure [7].

However, for resource-limited countries and centers where swivel adaptor is not available, trans-glottic approach with endotracheal tube of smaller outer diameter can be used. However, smaller endotracheal tubes have shorter length, which may not be feasible in adults. This problem can be easily overcome by use of microlaryngeal tube as it has been safely used in present case [11].

It may be argued that outer diameter of 5 mm microlaryngeal tube is 6.9 mm when added to outer diameter of EBUS scope 6.1 mm makes about 13 mm of instrumentation into the glottis, which may hypothetically pose more risk of post procedure sore throat and transient hoarseness in comparison of ETT sized 8.0 and 8.5 with outer diameters of 11 and 11.6 mm, respectively. However, it may be noted that double lumen endotracheal tubes of 39 and 41 Fr have outer diameters of 13.2 mm and 13.6 mm, respectively. [12] Although the diameters of the DLT and the of MLT + EBUS scope combination are comparable yet not the only factor to establish conclusive safety of the technique as mechanics of mobile EBUS scope alongside fixed MLT are totally different from a fixed DLT in trachea.

Conclusion

The trans-glottic EBUS alongside microlaryngeal tube technique was technically feasible in presented case. This technique allowed successful and adequate sampling during EBUS under general anaesthesia. However, further

data and experience are required before safety of this technique can be fully established.

Whats new?

Endobronchial ultrasound can be safely performed using trans-glottic approach in patients under general anaesthesia maintained using microlaryngeal tube.

Conflict of interest

The authors declare that they have no conflict of interest regarding the publication of this manuscript.

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Consent for publication

Written consent was taken from the patient for publication and presentation of the study in a journal, online, conferences, and use for educational purposes.

Ethical Approval

Ethical approval was obtained from Institutional Review Board & Ethics Committee of Shifa International Hospital, Islamabad, Pakistan. (IRB#203-26).

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Summary of the case

1	Patient (gender, age)	69 years, male
2	Final Diagnosis	Right hilar mass compressing major vasculature
3	Symptoms	Persistant cough, hemoptysis, dysphagia
4	Medications	General anesthesia
5	Clinical Procedure	Endobronchial ultrasound
6	Specialty	Anesthesia and pulmonology