

## Lung Isolation in a Patient with Sub Mucosal Fibrosis: Anaesthesiologist Perspective

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### Abstract

21-year-old male was diagnosed to have left lower lobe hydatid cyst and was planned for lobectomy. He had a mouth opening of 2 cm due to sub mucosal fibrosis. Anaesthesia was induced and adequate mask ventilation was assured. Check laryngoscopy was not possible. But Macintosh blade was used to lateralize the tongue to left side to create space within the oral cavity and also acted like a bite block. Then a bougie was placed in the trachea under the guidance of nasal fibre optic bronchoscope. Then a univent tube of size 6.5 mm ID was threaded over the bougie atraumatically under FOB guidance. Then the bougie was withdrawn and FOB was passed through uninvent and the bronchial blocker was placed in the left main bronchus under vision. The tube was firmly secured and excellent lung isolation was achieved.

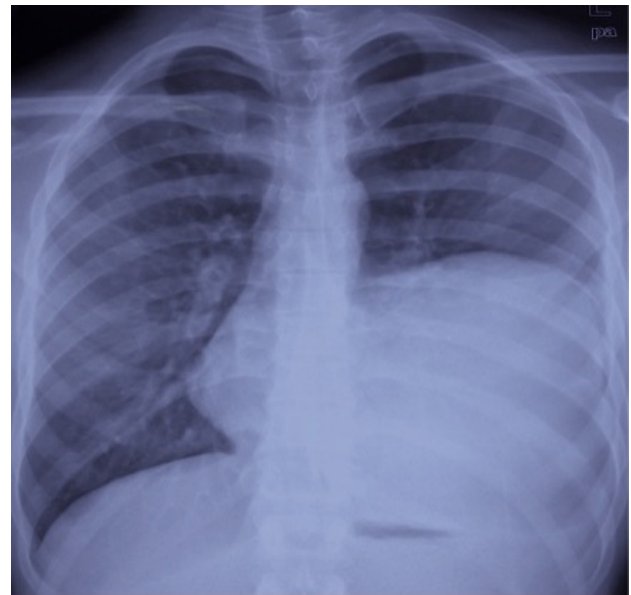
**Keywords:** Sub mucosal fibrosis; Lung isolation; Univent

### Introduction

With increasing complexity of diseases, the anaesthesiologist is expected to face many challenges, to make anaesthesia safer. Lung isolation in difficult airway patient poses added difficulty. The equipment's for managing difficult airway might not be available in all centers. A few may require tracheostomy if airway could not be established. Though many authors propose many algorithms [1], we feel that the attending anaesthesiologist is the best person to assess the scenario in real time and manage airway bound to his skills and logistics.

### Case Description

A 21-year-old man, weighing 50 kg (BMI 19.2 kg/m<sup>2</sup>) came to our institute with the complaints of recurrent respiratory tract infection and shortness of breath on exertion. In addition, he was a chronic smoker (10 cigarette pack years) and tobacco chewer. There was no other significant history. On evaluation, he was diagnosed with large hydatid cyst involving the entire left lower lobe of lung. The chest roentgenogram is depicted as Figure 1. After intravenous antibiotic therapy to treat lower respiratory tract infection, the patient was posted for thoracotomy and left lung lower lobectomy. His general and systemic examination was normal. When the patient was asked to open his mouth for airway assessment, he couldn't open his mouth. Moreover, the inter incisor distance was only 2 cm and rest of the airway parameters were reassuring. Dental surgery opinion was sought, and a diagnosis of sub mucosal fibrosis (SMF) was made. As hydrated cyst has the risk of rupture, the patient was posted for surgery and planned for SMF treatment later on. As airway difficulty was obvious, patient was counselled for an awake fibre optic bronchoscopy and tracheal intubation. But patient rejected it out rightly even after repeated counselling emphasizing his safety. Patient was ready for tracheostomy even, but refused any procedure in awake state.



**Figure 1:** The chest roentgenogram.

Plan was inhalational induction and maintenance of spontaneous ventilation, which will be followed by Fibre optic bronchoscope guided oral univent placement. Otorhinolaryngologist was requested stand by for emergency tracheostomy if required.

Operating room (OR) was prepared; anaesthesia workstation checked anaesthetic and emergency drugs were prepared. Patient was taken inside the OR and standard American Society of Anaesthesiologist (ASA) monitors were attached. Then anaesthesia was induced with sevoflurane in 100% oxygen. A nasal airway of 8mm internal diameter (ID) was placed into the right nostril for continuing

sevoflurane anaesthesia during airway manipulation. After ensuring adequate assisted ventilation succinylcholine was administered to decrease patient movement and to prevent laryngospasm during airway manipulation. Nasal univent was not considered in fear of nasal trauma. Macintosh blade was used to lateralize the tongue to left side and to create space within the oral cavity. Oral FOB and introduction of stiff Univent over FOB orally seemed difficult. So FOB was passed through the left nostril and adult ventilating gum elastic bougie of 85 cm length was passed orally into the trachea under the guidance of nasal fibre optic bronchoscope. Later a univent tube of size 6.5 mm ID was threaded into the trachea over the bougie under FOB guidance. Then the bougie was withdrawn and FOB was passed through the univent tube and the bronchial blocker was placed in the left main bronchus and cuff of the blocker inflated as shown in Figure 1. The tube was firmly secured and patient was positioned in right lateral position for surgery. Tube and blocker position was confirmed by FOB in lateral position. Excellent lung isolation was achieved throughout the surgery. The rest of the surgery was uneventful.

At the end of surgery neuro muscular block was reversed and trachea was extubated once the standard criteria for extubation were met. Patient was shifted to high dependency unit for further monitoring, pulmonary rehabilitation and postoperative pain management.

The patient was discharged on day 5 from hospital on oral analgesics. Patient doing well on recent follow up and is following up in dental surgery for treatment of sub mucosal fibrosis.

## Discussion

Oral Sub mucosal fibrosis (OSMF) is a chronic condition, involving the oral cavity sometimes even the pharynx and is associated with decreased mouth opening [2,3]. It is an inflammation, which occurs in the sub mucosal region, leading on to fibrosis and decreasing the supple nature of oral mucosa. It is a premalignant condition. It is predominant in South East Asia, especially Indian subcontinent. Over years, the prevalence has increased to >6% [4]. There are more than five million OSMF cases in India, predominantly seen in men (Male: Female ratio is 4.9:1) [5]. Most common age group for OSMF is 20–40 years [6]. Areca nut and gutka chewing are the most important risk factors for the development of OSMF. Number of pathogenetic mechanisms are described in literature [7].

- Areca alkaloids cause fibroblast proliferation
- Arecoline causes elevated collagen synthesis by OSMF fibroblasts compared to normal fibroblasts (Clonal selection)
- Stabilization of collagen structure by tanins and catachins
- Inhibition of collagen phagocytosis
- High copper content in areca nut
- Increased expression of fibrogenic cytokines
- Up regulation of COX-2 inflammatory changes
- Stabilization of extracellular matrix
- Immunological factors
- Nutritional deficiencies

Treatment begins with cessation of areca nut and gutka chewing. Topical steroids, hyaluronidase, pentoxifylline therapy are prescribed medical therapy. Surgical options include placement of human placental extracts, laser therapy, cryotherapy, coronoidectomy, placement of acellular dermal matrix [8] and excision with flap cover of the raw area [9].

A number of options exist for lung isolation in general. Options become limited and require flexibility of standard techniques when it comes to a patient with coexistent difficult upper airway. Options for lung isolation in difficult airway scenario are shown in Table 1.

Nasal	Single lumen tube and bronchial blocker [14] Endobronchial tube [12] Univent tube [15]
Oral	Single lumen tube & bronchial blocker Endobronchial tube Univent tube Double lumen tube Supraglottic airway and bronchial blockers [16]
Tracheostomy	Single lumen tube & bronchial blocker Tracheostomy tube and bronchial blocker [17] Endobronchial tube Univent tube Double lumen tube [18] Laryngeal Mask Airway and a Bronchial Blocker in a Patient With a Recent Tracheostomy [19]

**Table 1:** Options for lung isolation in difficult airway scenario.

Patient consent and cooperation is required for successful awake fibreoptic intubation. Absence of which is a contraindication for awake intubation [10,11].

Bronchial blocker and normal endotracheal (ET) tube, both placed nasally would have been the best bet. However, unfortunately that was not available in proper size with us. Single lumen endobronchial tubes if available can be used. Double lumen tube (DLT) is the gold standard for lung isolation, but it is much stiffer. Movement or reposition of a DLT requires movement of the tube en bloc, which will be difficult in a patient with small mouth opening. Even though univent tubes are stiff with larger outer diameter, it does not require en bloc movement of the tube during repositioning. Moreover, the blocker is stable in a univent tube when compared to other bronchial blockers. Univent tube can also be kept for postoperative ventilation after deflating and withdrawing the bronchial blocker, whereas a double lumen tube cannot be kept for postoperative ventilation.

Though nasal univent has been reported in the literature, we avoided it in view of nasal mucosal trauma and bleeding [12], and the outer diameter of 6.5 mm ID univent tube is 10.5 and 11.5 mm in sagittal and transverse planes respectively [13]. This outer diameter corresponds to 8.0 mm ID (outer diameter 11 mm) tube or more.

This case demonstrates successful peri-operative management of a patient with difficult airway, due to OSMF. To our knowledge, this is the first report of lung isolation in a patient with OSMF.

Lung isolation and airway management in special situations require knowledge and flexibility of techniques. Combined use of available airway devices can avoid surgical airway.

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