

# Unexpected Difficult Intubation caused by Undiagnosed Laryngeal Tuberculosis in a Patient Requiring Pericardiectomy for Tuberculosis Pericarditis: A Case Report

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DOI: [10.36347/sjmcr.2023.v11i07.019](https://doi.org/10.36347/sjmcr.2023.v11i07.019)

| Received: 27.06.2023 | Accepted: 20.07.2023 | Published: 25.07.2023

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## Abstract

## Case Report

Airway management is a critical aspect of anesthesia, and difficulties in endotracheal intubation can lead to life threatening complications. While an anticipated difficult intubation can be managed with proper preparation and planning, unexpected difficult intubation can be a challenging situation even to skilled anesthesiologists. We experienced unexpected difficult intubation in a 66-year-old male patient with known tuberculosis pericarditis scheduled for elective pericardiectomy surgery. Multiple intubation attempts were made using various techniques, and successful intubation was achieved with a smaller diameter endotracheal tube. Surgery was uneventful and post-operative evaluation of the airway confirmed laryngeal tuberculosis. This case highlights the importance of vigilance in managing unexpected difficult intubation, especially in patients with a history of tuberculosis or immunosuppressive conditions. Prompt recognition of airway stenosis and appropriate interventions are crucial in securing the airway patency to minimize complications in patients with undiagnosed tuberculosis laryngitis.

**Keywords:** Airway management, Intubation, Laryngeal tuberculosis, Tuberculosis pericarditis.

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## INTRODUCTION

Airway management is one of the most important components in the conduct of general anesthesia, and in cases where difficult airway is anticipated during preoperative examination, various preparations can be made with devices and step-by-step plans that facilitate both ventilation and endotracheal intubation. However, unexpected failure of endotracheal intubation in a patient without significant past medical history nor any abnormal physical findings can be challenging and if not properly responded to, can result in severe hypoxic damage to the patient. Skilled anesthesiologists experience difficult endotracheal intubation in about 0.5-2% of cases with direct laryngoscopy intubation [1]. Possible causes for such unexpected difficult endotracheal intubation include acute airway edema due to anaphylaxis, severe myotonia rigidity, hypertrophy of the lingual tonsils, mucinous cysts of the larynx, and obstruction or compression of the trachea-bronchus [1]. In our case, we experienced unexpected difficult intubation in a 66-year-old male patient with known tuberculosis pericarditis due to the narrowing of the larynx, which

was later confirmed to be secondary to tuberculosis laryngitis.

## CASE PRESENTATION

66-year-old male patient (height 172 cm, weight 72 kg) experienced symptoms of severe dizziness that had worsened over the past 2 weeks. His only medical history includes diagnosis of hypertension 9 years ago that was under control by medication. After series of laboratory testing and imaging studies, he was diagnosed with tuberculosis pericarditis. Subsequently, the patient was prescribed anti-tuberculosis drugs for two weeks and scheduled for elective pericardiectomy surgery.

The patient underwent routine pre-operative evaluations, including electrocardiography and laboratory blood tests, which were all within normal limits. His chest X-ray showed left pleural effusion. Transthoracic echocardiography confirmed normal left ventricular function and moderate level of fluid within the pericardium. The pulmonary function test indicated mild obstructive pattern.

Upon entering the operating room, he was monitored with electrocardiography, non-invasive blood pressure, pulse oximetry, bispectral index, and electromyography. Initial vital signs were all within normal range. After 3 minutes of mask ventilation with 100% oxygen, induction of anesthesia was achieved by propofol 120mg, remifentanyl infusion at 0.11mcg/kg/min, and rocuronium 50 mg. After confirming deep neuromuscular block through train-of-four, an attempt was made for endotracheal intubation using 37-Fr double-lumen endotracheal tube (DLT) (ANKORDLT, Insung Medical) using a video laryngoscope (AceScope, ACE Medical). Video view of the glottis was easily obtained; however, laryngeal narrowing was observed (Fig. 1) and the 37-Fr DLT failed to enter beyond the subglottis. A second attempt was made with a smaller 35-Fr DLT using a video flexible laryngoscope (iS3-F Insighters Flexible Endoscope, Shenzhen Insighters Medical Technology Co.). However, the second attempt also failed to enter the subglottis (Fig. 2) and mask ventilation was performed for additional two minutes.

A more experienced anesthesiologist was summoned for help. After discussion with the cardiothoracic surgeon, a decision was made to use a single lumen reinforced endotracheal tube (ETT). Intubation attempts were made using 7.5- mm and 6.5- mm inner diameter (ID) cuffed reinforced ETT (Shiely™ Lo-Contour, Covidien), however both attempts failed to pass the subglottis. Adequate mask ventilation was still possible, maintaining oxygen saturation above 96% and end tidal CO<sub>2</sub> between 30-40mmHg. While considering awakening the patient, a final intubation attempt was made using 5.0-mm ID ETT. Fortunately, the ETT passed through the subglottis and entered the trachea, leading to a successful intubation. Airway peak pressure maintained below 30 mmHg throughout surgery. The surgery proceeded as planned and was completed without any complications.

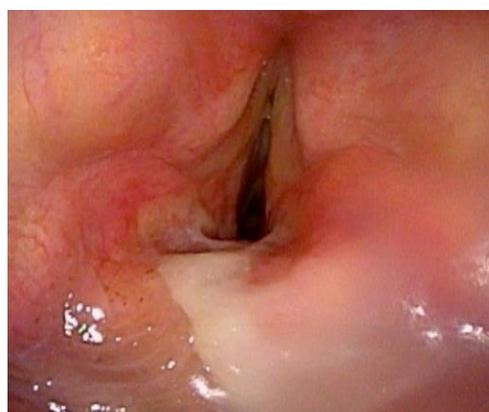


**Figure 1: The rigid video laryngoscopy finding during the initial intubation attempt using 37-Fr double-lumen endotracheal tube shows an edematous epiglottis and a narrow airway due to laryngeal stenosis**



**Figure 2: The flexible endoscopy finding during the second intubation attempt using 35-Fr double-lumen endotracheal tube shows laryngeal edema with swollen supraglottis**

Postoperatively, the otolaryngology department was consulted after the patient had recovered from general anesthesia. Laryngoscopy findings (Fig. 3), it was highly suspected that the patient had laryngeal tuberculosis. The patient did not have any symptoms of sore throat or discomfort. Movement of the left vocal cord was normal, and while movement of the right vocal cord was reduced, paralysis was not observed. Subsequently, biopsy confirmed tuberculosis laryngitis, and the patient was hospitalized for additional two weeks and continued anti-tubercular medications, after which he was discharged without any particular issues.



**Figure 3: The rigid laryngoscopy finding performed in the otolaryngology department after surgery shows ulcerative mucosa of supraglottis and asymmetric vocal fold**

## DISCUSSION

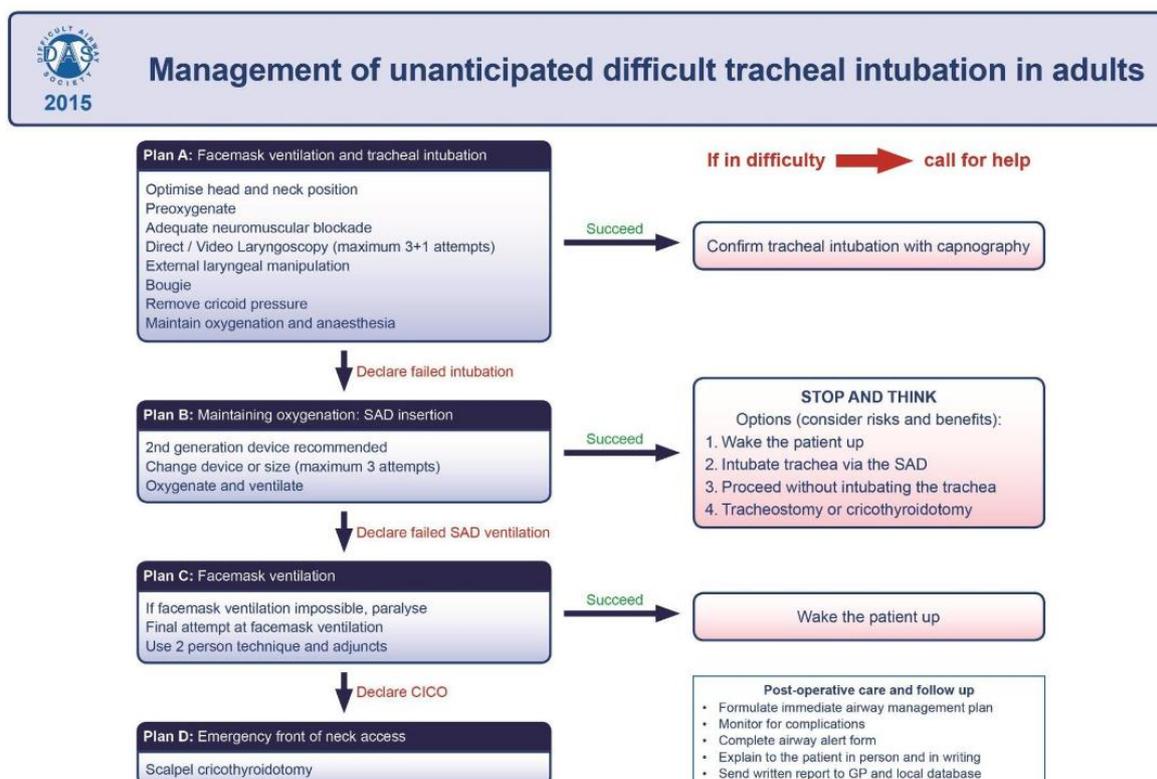
Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*. More than 10 million new cases of tuberculosis occur worldwide annually and is responsible for over 1.8 million deaths each year [2]. Approximately 85% of reported tuberculosis cases manifest as pulmonary tuberculosis, however it also infects organs other than the lungs, resulting in various forms of extra-pulmonary tuberculosis [3]. Of those diagnosed with tuberculosis, only 1-2% of patients present with concomitant tuberculosis pericarditis [4]. Primary tuberculosis pericarditis is rare, and most cases

occur by being infected by retrograde lymphatic spread from the peri-tracheal, peri-bronchial, or mediastinal lymph nodes or by hematogenous spread of a primary tuberculosis infection [5]. In our case, the patient was diagnosed with tuberculosis pericarditis but devoid of pulmonary tuberculosis, indicating a high probability of infection in organs other than the lungs that had remained unrecognized.

Laryngitis caused by tuberculosis infection constitutes less than 5% of all tuberculosis cases [6]. Traditionally, tuberculosis laryngitis was invariably associated with pulmonary tuberculosis. However, recent etiology involving tuberculosis over the past 20 years show increased incidences of tuberculosis laryngitis emerging independently of pulmonary involvement, suggesting an evolving pattern of its clinical presentation [7]. In more than 80% of patients with tuberculosis laryngitis, symptoms such as hoarseness or dysphagia are more prominent than classic tuberculosis symptoms such as low-grade fever, dyspnea, or fatigue [8]. If left untreated, tuberculosis laryngitis can cause laryngeal edema and laryngeal stenosis, potentially leading to unforeseen difficult airway management and challenging endotracheal intubation situations in the operating room [9]. For this reason, if laryngeal tuberculosis is diagnosed or suspected, it is helpful to perform bronchoscopy or imaging studies in advance during preoperative evaluation. However, in our case, because the patient

did not have concurrent pulmonary tuberculosis infection and did not manifest symptoms such as hoarseness or dysphagia, we did not suspect laryngeal tuberculosis. In retrospect, given the presence of tuberculosis pericarditis, the possibility of laryngeal tuberculosis should have been considered.

Evaluation of the airway should be performed for all patients prior to entering the operating room, however, it is not always possible to predict situations involving airway difficulty [10]. Difficult Airway Society (DAS) provides detailed flowchart for unanticipated difficult intubation in adults (Fig. 4). In circumstances when intubation has failed, but facemask ventilation is possible, DAS guideline recommends limiting the number of maximum intubation attempts to three, with consideration given to a different anesthesiologist for additional final attempt [11]. Video laryngoscopy and various adjuncts, including a bougie, stylet, or supraglottic airway devices, should be actively employed to facilitate successful intubation. We encountered unexpected airway difficulty during endotracheal intubation despite the well-visualized airway structures using video laryngoscopy due to the laryngeal narrowing that prevented the entry of the tube. Each attempt was made with a smaller diameter tube: 37-Fr DLT, 35-Fr DLT, 7.5-mm ID ETT, and 6.5-mm ID ETT. Final fifth attempt using 5.0-mm ID ETT was inserted with moderate entry resistance.



This flowchart forms part of the DAS Guidelines for unanticipated difficult intubation in adults 2015 and should be used in conjunction with the text.

**Figure 4: Difficult Airway Society guideline flowchart for the management of difficult intubation [11]. Abbreviations: SAD: Supraglottic Airway device, CICO: Can't intubate, Can't Oxygenate**

In the event of continuous failed intubation, it is crucial to pause and evaluate the optimal course of action. During this period, ensuring adequate oxygenation is important, with mask ventilation or the use of supraglottic airway devices employed to prevent hypoxemia. If needed, actively calling for help for other medical staff should be without hesitation. In cases where both endotracheal intubation and supraglottic airway device insertion are unsuccessful, awakening the patient becomes the primary consideration [11]. Since we had recognized laryngeal narrowing from the beginning, we did not use forceful maneuver when attempting to insert the tube, and fortunately, each attempt was fully visible under a video laryngoscope or flexible video endoscope, thereby confirming that there were no noticeable swelling or edema. However, had there been a situation where even mask ventilation was impossible, it could have led to a major complication.

In our case, successful mask ventilation allowed us for multiple attempts at intubation without serious complications. According to the algorithm, it would have been appropriate to awaken the patient, limiting the number of intubations attempts to 3+1. However, since there were no problems with oxygen supply, we proceeded with a fifth attempt using a much smaller 5.0-mm IDETT. Repeated intubation attempts can result in airway edema, bleeding, and potential difficulty in mask ventilation. Additionally, stimulation from the endotracheal tube can cause direct airway injury. If the final attempt had also failed, it would have been appropriate to postpone the surgery and awaken the patient based on clinical judgment.

## CONCLUSION

This case highlights the importance of preparedness and vigilance in managing unexpected difficult intubation, especially in patients with a history of tuberculosis or immunosuppressive conditions. Prompt recognition of the cause of difficult intubation, such as airway narrowing, and appropriate interventions following difficult intubation guidelines are crucial in securing airway patency to minimize complications in patients with undiagnosed tuberculosis laryngitis.

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