*Review*

# Railroading technique: A faster, easier, and definitive method for Double Lumen Tube (DLT) placement

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**Abstract**

**Background**

This article evaluates a novel "railroading" technique for placing double-lumen tubes (DLTs). This method, which uses a fiberoptic bronchoscope as a guide, demonstrated significantly faster insertion times and a higher first-attempt success rate compared to the conventional DLT placement method in patients undergoing thoracic surgery. The paper concludes that the railroading technique is a superior method, enhancing patient safety, improving procedural efficiency, and streamlining operating room workflow.

**Key words:** Double lumen tube; DLT; One lung ventilation; Lung isolation; Railroad technique

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## 1. Introduction

One-lung ventilation (OLV) or lung isolation refers to the mechanical and functional separation of the lungs, allowing selective ventilation of a single lung. Lung isolation and selective ventilation of a single lung using a Double Lumen Endotracheal Tube (DLT) is a crucial airway management technique in thoracic and esophageal surgeries. It enables selective one-lung ventilation (OLV) providing optimal surgical exposure and protecting the non-operative lung from contamination or trauma. A double-lumen tube (DLT) is a specialized endotracheal tube commonly used for independent lung ventilation, as it allows anatomical and physiological isolation of the lungs. DLTs consist of two separate lumens: a bronchial lumen and a tracheal lumen, each capable of ventilating a single lung.

- The bronchial lumen (blue-colored cuff) is longer and has a distal opening designed to be positioned in either the right or left main bronchus.
- The tracheal lumen (transparent cuff) is positioned above the carina.

Each lumen features a color-coded cuff to facilitate identification.

Conventional blind insertion of DLT using a direct laryngoscope often demands subsequent confirmation and correction of tube placement via Fibreoptic Bronchoscope (FOB)

or Video Bronchoscope (VB). However, the process can be time-consuming and challenging, especially when the DLT inadvertently enters lobar bronchi rather than the main bronchus.

**1.1. Challenges with Conventional (Blind) Technique**

- Blind insertion method followed by auscultation for confirmation
- Difficulty in ensuring the bronchial lumen entering the correct main bronchus.
- Misinterpretation of lobar division as the primary carina on FOB/VB.
- To differentiate the true carina from lobar divisions, the DLT often needs to be withdrawn and re-advanced under direct visualization of the primary carina for repositioning
- Increased procedure time and patient airway handling.

**2. The Railroading Technique**

To overcome these limitations, we employed a "Railroading Technique" for DLT placement, where the VB/FOB leads the way, and the DLT is advanced over it. This technique ensures accurate, quick, and visually guided placement of the DLT into the correct main bronchus with minimal airway trauma.

**2.1. Advantages of the Railroading Technique for DLT Placement**

- Early Identification of the Primary Carina: The video bronchoscope (VB) or fiberoptic bronchoscope (FOB) leads through the bronchial tip of DLT, allowing clear visualization of the primary carina before the bronchial tip (lumen) of the DLT is advanced.
- Accurate First-Attempt Placement: The VB/FOB guides the bronchial lumen of the DLT, ensuring it to reach the desired bronchus on the first attempt.
- Direct Confirmation of Cuff Position: The placement of both the bronchial and tracheal cuffs can be directly visualized and confirmed.
- Time Efficiency: The entire procedure can be completed in a significantly shorter duration compared to blind advancement.

**2.2. Our experience with this method spans a range of thoracic procedures including**

- Video-Assisted Thoracoscopic Surgeries (VATS) for esophageal pathology.
- Resection of para-cardiac masses.
- Masses adherent to hemidiaphragm.
- Decortications for empyema.
- Surgery for metastatic recurrence of soft tissue sarcoma involving the chest wall.
- Unilateral lung bullectomy.

- Open procedures such as lobectomy and esophagectomy.

**3. Steps in Railroading Technique**

The railroading technique makes DLT placement comparatively easier and safer. The steps are as follows:

**3.1. Induction**

After routine induction of anaesthesia and administration of a muscle relaxant, direct laryngoscopy is performed.

**3.2. Initial Tube Placement**

The bronchial tip/lumen (blue cuff) of the DLT is gently introduced into the glottis with the curvature of the bronchial lumen facing anteriorly.

Care must be taken to avoid injury to the tracheal cuff, as the patient's incisors may cause rents/tear to tracheal cuff while negotiating the bronchial tip through glottis.


**Figure (1) & (2)**: Incisor induced tracheal rent / tear is taken care off

**3.3. Flexible Video Bronchoscope Insertion**

Once the blue bronchial cuff has crossed the glottis, OD 3.2 mm or OD 2.2 mm flexible video bronchoscope is introduced through the bronchial lumen.

The tracheal rings will be visualised first, followed by the carina as the video bronchoscope is advanced.

**3.4. Guided Advancement (Railroading)**

The bronchoscope is then directed into the left or right main bronchus depending on whether a left- or right-sided DLT is being placed.

Using the bronchoscope as a guiding stylet, the DLT is railroaded over the scope into the desired bronchus.



**Fig (3), (4), (5):** Insertion Procedures

### 3.5. Confirmation of Placement

Once the DLT is advanced into correct bronchus, the bronchoscope is withdrawn.

The tube is connected to the ventilator.

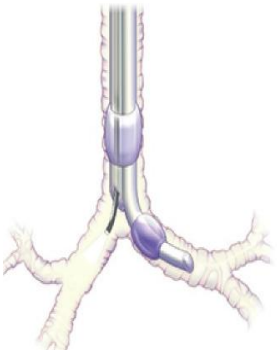
Proper placement is initially confirmed by the presence of $ETCO_2$ and stable $SpO_2$.

### 3.6. Final Position Check

The flexible bronchoscope is then introduced through the tracheal lumen of DLT.

The bronchial cuff should be just visible at the entry of the intended bronchus.

Adjustments are made under direct vision if required.

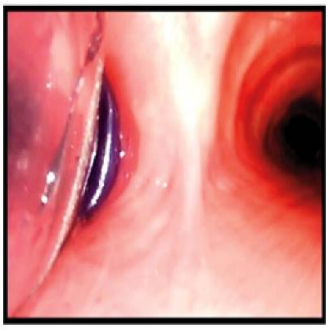


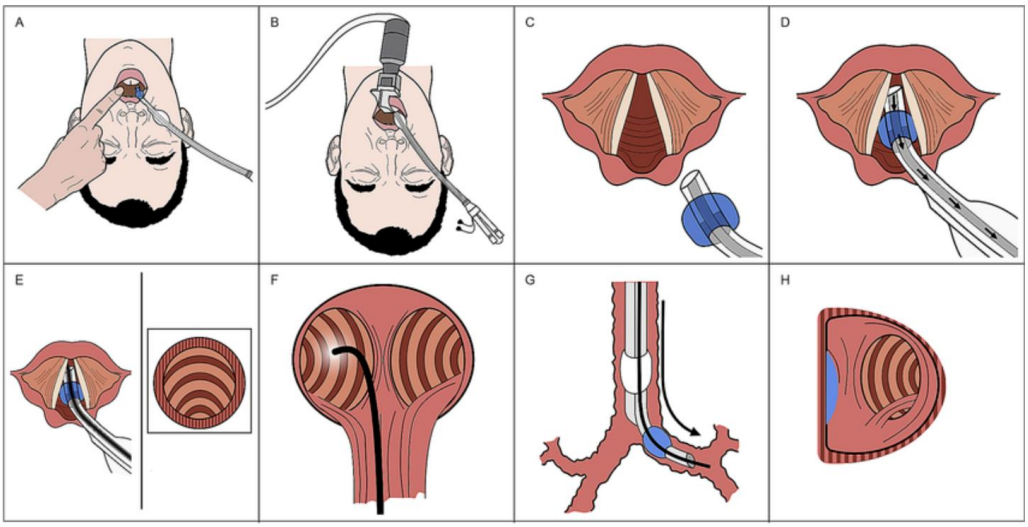
**Fig (5) & (7):** Bronchial cuff (Blue colored) is just visible

### 3.7. Special Consideration for Right-Sided DLTs

The main challenge is that the bronchial cuff may obstruct the right upper lobe bronchus.

This can be easily managed by ensuring the upper lobe bronchus orifice is clearly visualised and unobstructed under bronchoscopy guidance

**Note:** The entire procedure typically takes less than 90 seconds when performed smoothly.




(A) Double lumen endobronchial tube is inserted into the mouth in the midline and then shifted to the right side of the mouth. (B) A video laryngoscope is inserted. (C) The bronchial lumen and bronchial cuff are advanced into the glottis. (D) Once below the vocal cords the stylet is removed from the double lumen endobronchial tube. (E) A fiberoptic scope is introduced into the bronchial lumen and the trachea is imaged. (F) The fiberoptic bronchoscope is advanced into the left mainstem bronchus. (G) The double lumen endobronchial tube is advanced over the fiberoptic scope and the bronchial lumen and cuff are advanced into the left mainstem bronchus. (H) The fiberoptic scope is inserted into the tracheal lumen and final adjustment to the depth of the double lumen endobronchial tube is performed so that a rim of the bronchial cuff can be seen at the carina

## 4. Conclusion

The Railroading Technique of DLT placement, using a VB/FOB-first approach, offers significant advantages over the conventional blind insertion method. It enables rapid, accurate, and safe airway control for lung isolation during thoracic surgeries. This technique improves surgical readiness and may reduce complications related to improper tube positioning.