Title: Carinal hook in the right bronchial lumen after a double-lumen endotracheal intubation: a case report

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Abstract

**Background:** Carinal hooks increases difficulty at endotracheal intubation.

Amputation of the carinal hook during passage and malpositioning of the tube to the hook are some of the potential problems related with left-sided Carlens double-lumen tube (DLT). This article report an amputation of the hook during a difficult selective intubation and aimed at calling the attention to complications associated with the DLTs.

**Case presentation:** A 68 year-old woman was scheduled for right-sided thoracotomy in whom blind DLT insertion was performed. The first attempt failed, DLT was promptly removed and amputation of the carinal hook occurred. Fiberoptic bronchoscopy removed the foreign body from the right mainstem bronchial lumen. Successful outcome was achieved, however we failed to achieve proper positioning with fiberoptic equipment.

**Conclusion:** Insertion of DLTs with carinal hook is associated with technical problems and potentially life-threatening hazards have discouraged their use. Amputation of the carinal hook, although not reported so far, is a potential problem, to which clinicians should be alert. As opposed to the blind placement technique, the fiberoptic bronchoscopy is considered the gold standard for placement and confirming the positioning of the DLT.
Background

Double-lumen tubes with fixed carinal hooks facilitated proper placement and minimized further tube advancement during positioning. However, potential problems and complications were associated with carinal hooks. These included a higher incidence of insertion difficulty, laryngeal trauma and amputation of the hook during placement\(^1,2\). Several methods for proper placement and positioning of DLTs are available\(^3,4,5,6\). We describe a case of a carinal hook’s amputation after blind insertion of left-sided polyvinylchloride Carlens DLT(SUMI\(^\text{®}\), Portex Inc., Mexico). The foreign body was removed from the right mainstem bronchial lumen with a fiberoptic-guided technique and, although a successful outcome was achieved, we failed the placement of DLT with fiberoptic bronchoscopy.

Case Report

A 68 year-old woman (weight 74kg, height 162 cm) with a pathological fracture of the fourth thoracic vertebrae (T4) was scheduled to undergo total removal of the vertebrae by a right transthoracic approach. Her past medical history included hypertension controlled with 20 mg enalapril once a day. Preoperative airway examination revealed a class II Mallampati with a normal mouth opening, a thyromental distance of 6.0 cm and limited neck extension. Paralysis of distal members was present but no other abnormalities were detected on physical examination. All laboratory values, chest x-ray and 12-lead electrocardiogram were normal. The patient was premedicated with 10 mg diazepam on the night before surgery along with overnight fasting. After adequate preoxygenation, anesthesia was induced with 50 µg fentanyl, TIVA of propofol and remifentanil, and muscle
relaxation was achieved with 50 mg rocuronium. Conventional direct laryngoscopy was performed to insert a 37F left-sided polyvinylchloride Carlens DLT (SUMI®, Portex Inc., Mexico) using standard technique, although difficult to achieve because of a narrowed trachea. The patient’s lung was ventilated through both lumens of the tube, with tracheal cuff inflated, but a resistance at manual ventilation was felt immediately after intubation. Chest auscultation revealed bilaterally equal and diminished breath sounds with pulse oximetry saturation decreasing from 99% to 96%. DLT was removed and before a second left endobronchial intubation attempt, examination of the DLT showed no carinal hook (Figure 1). An 8-single lumen endotracheal tube was placed until fiberoptic bronchoscopy was performed. An increased in pulse oximetry saturation (from 95% to 99%) with normal chest auscultation was noted. The fiberoptic examination showed the carinal hook located in the right mainstem bronchial lumen, which was removed. Two unsuccessful insertions of the DLT with the aid of fiberoptic bronchoscopy were attempted. Thoracotomy was performed in left position with an 8-single endotracheal tube. The patient’s hemodynamics was stable throughout this period. Her postoperative period was uneventful.

Conclusions
Potential problems with carinal hook have been observed1,2, however this is the first case reported of amputation of the carinal hook in a 37F left-sided polyvinylchloride Carlens DLT (SUMI®, Portex Inc., Mexico).
The exact mechanism leading to the amputation of the carinal hook is obscure. Rigid structures, narrow passages (e.g. teeth and vocal cords) and manufacturing defect are possible\(^7\).

In this case, desaturation and resistance to manual ventilation have alerted to a probably malpositioned DLT. In fact, tracheal narrowing was visualized by conventional laryngoscopy and insertion of the DLT occurred with some difficulties. Although fiberoptic bronchoscopy is the accepted standard for appropriate positioning and confirmation of DLT\(^8\), it was not performed in the first attempt. Prompt action to remove the airway foreign body by bronchoscopy solved the patient’s problem without adverse consequences.

The present case report has demonstrated that carinal hooks can be hazardous and Carlin DLT as a close survival\(^9,10\). Selective intubation is a procedure to be carefully performed. The authors wish to alert routine of fiberoptic bronchoscopy to achieve proper DLT positioning.

**Consent**

Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

**Competing interests**

The authors declare they have no competing interests.
Authors’ contributions
ACR collected data and drafted the manuscript. MGM collected the data and helped to write the manuscript. LIS and JMN review the final manuscript. All authors read and approved the final manuscript.

References


**Figure legend**

**Figure 1** - Amputation of the carinal hook (arrows) in a left-sided polyvinylchloride Carlens DLT (SUMI®, Portex Inc., Mexico).
Figure 1