The Double Use of a Double Lumen Tube with an Integrated High-Resolution Camera: Continuous Airway Monitoring can Facilitate the Surgical Steps for a Bronchoplasty

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Background:
Bronchial sleeve resection is a curative surgical procedure for tumors invading the airway, allowing clear surgical margins with a lesser resection than a pneumonectomy. Double lumen tubes (DLT) with integrated high resolution cameras allow continuous visualization of the carina and right mainstem bronchus, reducing the need for confirmatory fiberoptic bronchoscopy. We describe the case of a right upper lobectomy with endobronchial resection and reconstruction facilitated by real time continuous visualization using a DLT with integrated high-resolution camera.

Case Description:
A 66-year-old man (162 cm, 72 kg) with adenocarcinoma of the right upper lobe (RUL) presented for a right exploratory thoracoscopy and right upper lobectomy with bronchoplasty and lymph node dissection via thoracotomy under general anesthesia. Past medical history was significant for hemoptysis, investigated with flexible bronchoscopy and biopsy, gastroesophageal reflux, benign prostatic hypertrophy and depression. He reported smoking four cigars per week for more than 20 years, but no cigarette use. Contrast-enhanced computed tomography of the chest revealed a 37 x 14 mm lobulated mass arising from the RUL bronchus. On the day of surgery, a thoracic epidural was placed at T6 in the preoperative holding area after light sedation without complication. In the operative suite, ASA standard monitors were placed and general anesthesia induced with 1.3 mg/kg of propofol and 0.7 mcg/kg of fentanyl. A continuous infusion of propofol was used for anesthesia maintenance and titrated to a Bispectral Index monitoring of 60 with analgesia achieved via an epidural infusion of bupivacaine 0.05% and hydromorphone 8 mcg/cc (6 cc/hr), IV Ketorolac (15 mg) and IV Acetaminophen (1000mg). After administration of 0.7 mg/kg of rocuronium, a supraglottic airway device was placed for a repeat bronchoscopy by the surgical team. A 37Fr DLT with integrated high-resolution camera was placed atraumatically via direct laryngoscopy with a MAC 3 blade, and positioned under direct vision via the integrated high-resolution camera. The position of the DLT was continuously monitored during positioning in left lateral decubitus position and throughout the remainder of the case. The integrated high-resolution camera allowed the surgeon to conduct a circumferential resection of the airway followed by bronchoplasty under direct endobronchial visualization. No strictures were noted at the end of the reconstruction. No air leak was noted prior to resuming two-lung ventilation. At the end of the surgery, the patient was awakened, extubated, and taken to the postanesthesia care unit in stable condition. Postoperative course was complicated by urinary tract infection requiring IV antibiotics and supraventricular
tachycardia responding to beta-blockers. He was discharged in stable condition on postoperative day 7.

Discussion:
Lung isolation is routinely used for anatomical lung resection, usually via DLT. DLTs with integrated high-resolution camera were initially developed to facilitate placement and monitoring of the DLT position. However, their use can be extended to guide right side surgical resection and reconstruction, especially when there is endobronchial involvement.