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Introduction

Pulmonary cryoablation has been gaining traction in the remote anesthesia setting for patients with non-operable lung lesions in the past decade¹⁻³. It is a minimally invasive procedure in which a cryoprobe is percutaneously inserted into lesions under computed tomography guidance. It destroys cancer cells through rapid freeze-induced cell injury and thawing with high-pressure argon and helium gas, respectively²⁻⁵. Pulmonary cryoablation is a low-risk procedure. However, the ablation can extend beyond the intended zone, leading to severe complications such as hemoptysis, and pneumothorax³⁻⁴. In addition, this procedure is performed under challenging conditions in the remote setting with limited resources and a patient population who are older with multiple comorbidities. Anesthesia providers must be knowledgeable of these procedures, their risks, and complications to optimize patient care in the remote anesthesia setting. This case study will discuss the management for emergent endotracheal clot retrieval after lung cryoablation.

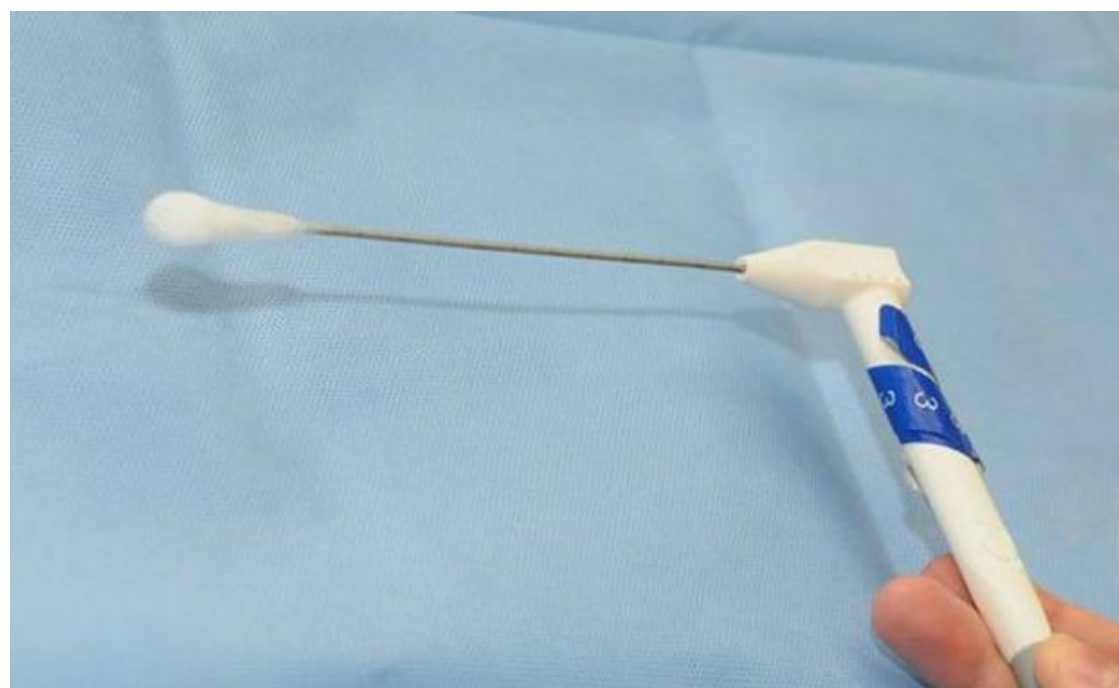


Figure 1: Cryoprobe creating "ice ball"²



Figure 2: Cryoprobe placement in pulmonary lesion under CT guidance²

Case Report

A 73 year old female, diagnosed with metastatic uterine cancer, presented to interventional radiology for left lung cryoablation of five lesions. She previously had a cryoablation for the right lung that was complicated by a pneumothorax. Her physical exam findings included orthopnea, and dyspnea on exertion. A standard general anesthesia was induced, and the airway was secured with a 7.0 mm ETT. Inhalational gas and muscle paralysis were maintained while cryoprobes were advanced under CT guidance. At procedure end, neuromuscular blockade was reversed, and spontaneous ventilation was initiated. Ventilation abruptly halted without presence of ETCO₂ tracing. Manual ventilation was employed with no improvement and high airway pressures. A CT scan showed an occlusive clot at the carina, distal to the tip of the ETT. Anesthetic management was converted to total intravenous anesthesia with propofol. A large intravenous line and an arterial line were placed for invasive monitoring. The ETT was exchanged for an 8.0 mm ETT for bronchoscopy. An interventional pulmonologist was consulted to evacuate the endotracheal clot, using an endobronchial cryoprobe. The cryoprobe was activated at the surface of the clot, triggering cryoadhesion of the clot to the probe. The clot was incrementally evacuated, and adequate tidal volumes with positive ETCO₂ resumed. The patient's hemodynamics and oxygen saturation were stable throughout the procedure. The patient was transferred to the ICU sedated and intubated. The patient was extubated the next day and discharged on postoperative day four.

Discussion

Lung cryoablation is a specialized procedure performed in the remote anesthesia location, requiring specific equipment and expertise. Anesthesia providers are expected to adhere to the same standards of care as the operating room, despite environmental constraints and patient co-morbidities. Therefore, they must familiarize themselves with resources, personnel, and procedural implications to enhance patient care². They must perform risk stratification and careful patient selection for this procedure. This patient's multiple lung lesions, co-morbidities, and previous history of cryoablations places her at higher risk for bleeding and clot formation². Lung cryoablation is a minimally invasive procedure that carries serious complications, such as pneumothorax (38%) and hemoptysis (17% with 4% requiring bronchoscopy)².

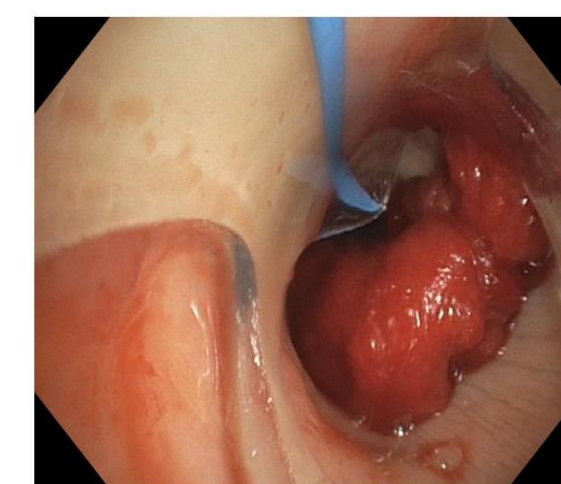


Figure 3: Endotracheal clot



Figure 4: Cryoadhesion of endotracheal clot



Figure 5: Extracted endotracheal clot

Discussion

Anesthesia providers must be knowledgeable of this novel procedure and its anesthesia implications. Therefore, practice guidelines must be developed to standardize and optimize patient care for this novel within the remote setting. Anesthesia providers must prepare and ensure the availability of additional ETT sizes, double lumen tubes and bronchial blocker to isolate the lung from blood contamination in extensive cases². Invasive monitoring and cross matched blood products should be readily available for bleeding emergencies²⁻⁴. With better understanding of procedural implications, anesthesia providers can effectively coordinate an interdisciplinary team approach to address adverse events and improve patient care².

IRB/IACUC Status

This case report poster presentation is exempt from IRB/IACUC review .

References

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