

Anesthetic Considerations for a Patient with Intralobar Pulmonary Sequestration Supplied by an Aberrant Aneurysmal Branch

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Introduction

Pulmonary sequestration is a congenital malformation of the lower respiratory tract characterized as embryonic lung tissue often supplied by an aberrant branch of the descending aorta [1]. Pulmonary sequestration is believed to encompass 0.15-6.45% of all congenital pulmonary malformations, making it extremely rare [2, 3]. While numerous case reports of pulmonary sequestration have been published, most describe the presence of an aberrant artery extending into the pulmonary vasculature [2]. We present a case of a 41-year-old male with intralobar pulmonary sequestration of his right lower lobe, supplied by an aneurysmal branch of the thoracic aorta, undergoing a right thoracotomy, aneurysm resection, and right lower lobectomy.

Case Report

A 41-year old male with past medical history significant for intrapulmonary sequestration presented to us with an infected, aberrant, aneurysmal, partially-thrombosed vessel originating from the distal thoracic aorta identified on chest CT,

measuring 12.5 cm x 5.2 cm x 5.8 cm in the right lower lobe. The patient initially complained of fevers, night sweats, dry cough, and unintentional weight loss 2 months after having an arteriogram with coiling performed in light of the aneurysm (Figure 1). As a result, the decision was made to perform a resection of the aneurysm and a right lower lobectomy via thoracotomy. Preoperatively, an 18-gauge peripheral intravenous catheter and a radial arterial catheter were placed to facilitate induction of general anesthesia and hemodynamic monitoring, respectively. The patient was thereafter taken to the operating room where standard ASA monitors were utilized. In addition, for the duration of the case, cardiopulmonary bypass was on standby in the event of inadequate hemostasis. Anesthesia was then induced with fentanyl, propofol, and vecuronium. A left-sided 37-French double lumen endotracheal tube was inserted under direct laryngoscopy to secure the airway and prevent cross-contamination of the left lung. A right-sided 9-French introducer was preemptively placed in the internal jugular vein under ultrasound guidance for resuscitation. A transesophageal echocardiogram probe was also utilized to identify the thrombosed aneurysm (Figure 2) and monitor the patient's volume status. Shortly after incision, one-lung ventilation was utilized to improve surgical visualization. Upon exposure, the right lower lobe appeared purulent, and pus was noted in the bronchial lumen of the endotracheal tube. The

aberrant artery was identified in the right inferior pulmonary ligament and was characterized as a 12-cm non-pulsatile, thrombosed vessel extending into the right lower lobe, and draining into the left atrium via a tortuous pulmonary vessel. The aneurysm was then clamped, and the right lower lobe was resected. Figure 3 shows the purulent aneurysm with surrounding lung tissue after resection.

Figure: 1



Figure: 2

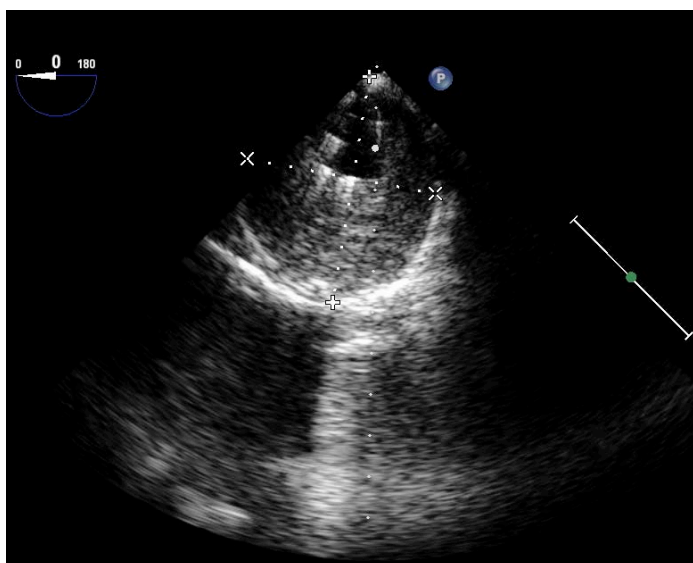
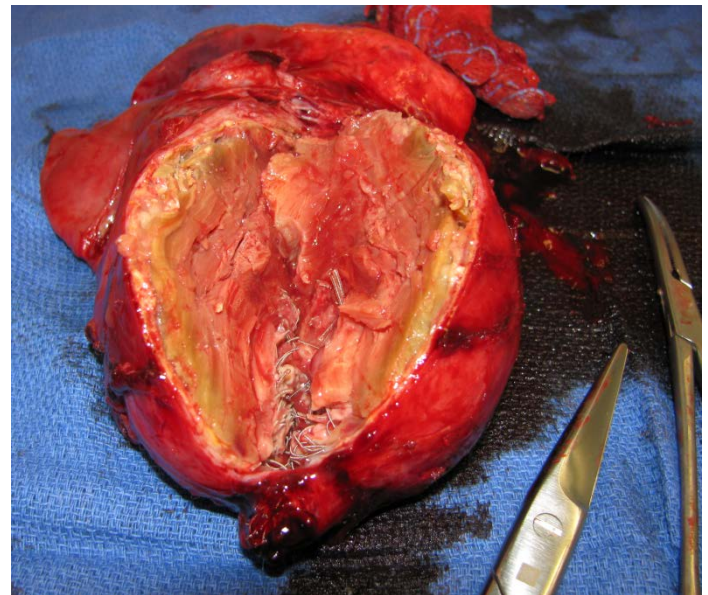


Figure: 3



Throughout the case, the patient remained normotensive, with transient periods of tachycardia and hypertension, presumably due to a light plane of anesthesia. This was successfully treated with intravenous fentanyl. Muscle paralysis was antagonized with neostigmine and glycopyrrolate, and the patient was extubated in the operating room at the end of the case. He was then taken to the intensive care unit for further monitoring and discharged home after 2 days, with an uneventful hospital stay.

Discussion

Pulmonary sequestration may be classified as intralobar or extralobar, based on its location and presence of visceral pleura [3]. Intralobar sequestration comprises 75% of these cases and is located within a normal pulmonary lobe, lacking its own visceral pleura [4]. Typically, intralobar sequestration presents in adulthood with recurrent infections and is most often found on routine imaging [3]. In the majority of these cases, blood supply is by an aberrant branch of the descending aorta, and venous drainage is by the pulmonary veins. Rarely, this arterial supply may become aneurysmal [1, 2]. Initial treatment of this lesion includes coiling via arteriogram. However, sequestrectomy or lobectomy is indicated if there is evidence of chronic infection. It is hypothesized that connections through an incomplete sequestration or the pores of Kohn cause migration

of bacteria into the sequestration, and chronic infection ensues due to a lack of bronchial drainage [5, 6]. Due to these inflammatory changes, lobectomy is the definitive treatment of choice for intralobar sequestrations in adults [3]. However, due to the rarity of this anomaly, and its potential complications during surgery, widely accepted anesthetic techniques are limited. Our case was unique in the fact as the patient had already underwent an arteriogram with coiling and presented to us at an older age with infection of his preexisting aneurysm, which was also found to be partially-thrombosed. Anesthetic considerations, given the circumstance, focused on maintenance of intravascular volume and prevention of septicemia.

Volume resuscitation in this case was a concern in the event of inadequate hemostasis given the feeding vessel of the sequestration was a branch of the thoracic aorta. Massive bleeding and hemothorax as a result of a sequestration's feeding vessel has been described [6, 7]. As a result, a 9F introducer was placed in the event that vasoactive substances, blood products, or rapid volume expansion were required. In addition, a cardiac surgeon assisted the thoracic surgeon during exposure and resection of the vessel, and cardiopulmonary bypass was on standby throughout the case. Given the wide spectrum of possibilities, an arterial line and transesophageal echocardiogram were deemed necessary for hemodynamic monitoring and to guide resuscitation as needed.

Prevention of septicemia was also a concern in this patient presenting with recurrent and chronic infections. Due to the patient's purulent sequestration, neuraxial technique, for intraoperative and postoperative analgesia, was a relative contraindication. As a result, systemic opioid therapy in the form of intravenous fentanyl was used. In addition, lung isolation was necessary, not only to improve surgical exposure, but to avoid contralateral lung contamination, which could potentially be catastrophic. Postoperative monitoring for signs

of sepsis, given the lesion and nature of surgery, was also an important measure to mitigate bacterial seeding, should it occur. Overall, this technique was effective in providing a safe anesthetic and perioperative environment for the patient, given the unique circumstances.

References

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