

THIRD-DEGREE ATRIOVENTRICULAR BLOCK AND ASYSTOLE AFTER LUNG RESECTION: A RARE COMPLICATION

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Abstract

Introduction: Surgical resection remains the optimal therapeutic option for early-stage operable NSCLC. Despite significant advances in recent years related to anesthetic and surgical techniques, cardiopulmonary complications remain major causes for postoperative morbimortality.

In this paper we present a case of a patient who developed complete AV block followed by asystole after lung resection surgery. The patient underwent surgery via right VATS and the procedure was uneventful. On the first post-operative day patient developed a third-degree atrioventricular block followed by 6 seconds asystole. Implementation of a permanent pacemaker occurred on the third post-operative day, without complications. The remaining postoperative course was uneventful and the patient was discharged home on the sixth post-operative day.

It is the objective of the authors to report and highlight this rare and potencial fatal complication of lung resection.

Keywords: Complete atrioventricular block, asystole, lung resection surgery, pacemaker, complication, cardiac conduction disorders.

INTRODUCTION

Lung cancer remains the leading cause of malignancy-related deaths worldwide. Nowadays, surgical resection is the optimal therapeutic option for early-stage operable NSCLC. Despite significant advances in recent years related to anesthetic and surgical techniques and the prevention and management of complications related to the procedure, cardiopulmonary complications remain major causes for postoperative mortality and morbidity.

Complete auriculoventricular (AV) block followed by asystole is a rare but potentially life-threatening complication that can occur following lung resection surgery.

This paper aims to provide a comprehensive overview of this condition, including its etiology, risk factors, clinical presentation, and management strategies.

CASE REPORT

We present a case of a 45 year-old female, never-smoker, diagnosed with lung atypical adenomatous hyperplasia

proposed for right middle lobectomy. She had a preceding general anesthesia for saphenectomy without complications and a history of drug allergy to penicillin. Patient had no history of cardiac disease and preoperative exams were all normal, including a resting 12-lead electrocardiogram (ECG) with normal sinus rhythm. The patient underwent surgery via right uniportal video-assisted thorascoscopy. The procedure was uneventful and performed in 45 minutes. On the first post-operative day patient developed a third-degree atrioventricular block followed by 6 seconds pause. Patient was proposed for implementation of a permanent pacemaker in DDDR mode. Implantation occurred on the third post-operative day, without complications. The remaining postoperative course was uneventful and the patient was discharged home on the sixth post-operative day.

DISCUSSION

According to the literature, cardiovascular complications after major lung resection occur in 10–15% of patients. Cardiac arrhythmias are widely known complications after thoracic surgery, atrial fibrillation being the most common. Complete

AV block following lung resection surgery however, is a rare complication, with limited reported cases in the literature.^{1,2}

Current evidence-based guidelines support the use of the Thoracic Revised Cardiac Risk Index (ThRCRI) as a stratification tool to assess the risk of cardiovascular complications in patients undergoing lung resection. Our patient was included in Class A of ThRCRI therefore having a risk of major cardiac morbidity of 0,9%.^{1,3} Additionally, she had no preoperative risk factors for development of perioperative heart block, no preexisting heart disease neither was under chronic medication that prolongs AV node conduction. ECG and laboratory tests were normal, excluding underlying conduction system disease and electrolyte or metabolic imbalance.

Following lung resection surgery, several factors may contribute to the development of AV block. Surgical manipulation, particularly in the vicinity of the mediastinum, can disrupt the cardiac conduction system and lead to AV block. The extent of pulmonary resection will determine the extent of the damage to the anatomic structures: an extensive pulmonary resection is inevitably accompanied by a dissection of the pulmonary hilum, which includes both sympathetic (from cervical and upper thoracic sympathetic-trunk ganglia) and parasympathetic (from three vagal cardiac branches from the vagal nerve) cardiac nerve fibers. The significant risk associated with an extensive pulmonary resection might be partially explained by damage done to the nerve tissue responsible for cardiac pacing.^{4,5}

Another possible mechanism is through vagus nerve stimulation: vagus nerve can be stimulated during surgery, leading to increased parasympathetic tone, which may result in bradycardia and AV block. Inflammation of atrium, pulmonary hypertension, dilation of the right side of the heart and hypoxemia occurring perioperatively could also be contributors to arrhythmia. [4][6] We ruled out hypoxia-induced bradyarrhythmia by pulse oximetry. Furthermore, a postoperative echocardiography was done and revealed no structural relevant heart diseases.

Additionally, anesthesia-related factors must be taken in account, as certain anesthetic agents and techniques may have proarrhythmic effects on the heart, increasing the risk of conduction disturbances. Possible anesthetic causes of AV node blockade include medications frequently used, such as ondansetron and metoclopramide with potential to prolong the QT interval, and also propofol and opioids, which have vagotonic properties. Notwithstanding, evidence is still lacking and studies suggest that anesthetics only have significant negative dromotropic effects on AV conduction when used in high doses.⁷

Prompt recognition is crucial, as delayed diagnosis and management can lead to fatal outcomes.

Once the diagnosis is confirmed, management of AV block includes pharmacological and electrical therapy. Guidelines for management recommend implantation of a permanent pacemaker in patients in sinus rhythm with permanent or paroxysmal high-degree AV block, irrespective of symptoms (Class I recommendation).⁸ After discussion with the electrophysiology colleagues, our team decided for a permanent pacing. The patient was subsequently evaluated in a cardiology consultation at 3 months, with no new events recorded, which may indicate

over-treatment in these patients.

It is the objective of the authors to report and highlight this rare and potential fatal complication of lung resection. Although the exact mechanisms are not fully understood, clinicians should be vigilant about this potential complication. Patients in the postoperative period of major thoracic surgery require intensive cardiorespiratory monitoring, especially within the first twenty four hours after surgery.

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