

Paraplegia after Pneumonectomy – A Rare Complication

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ABSTRACT

Cardiac metastases of lung cancers are common and are associated with serious complications. Locally aggressive lung tumors have the potential to extend into the left atrium via pulmonary veins, which can further complicate by embolizing into the systemic circulation. Pulmonary blastoma (PB) is one of the rare forms of primary lung malignancy and is locally aggressive. We report a rare case of 30 years old male patient who underwent left pneumonectomy for PB. During resection, the tumor was embolized into the descending thoracic aorta, leading to an acute circulatory compromise of both the lower limbs.

Keywords: Embolization, pulmonary blastoma, pulmonary vein, transesophageal echocardiography

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INTRODUCTION

Lung cancer metastasizes to the heart in around 25% of cases.^[1] Primary pulmonary malignancy with left atrial extension via the pulmonary veins has been well documented.^[1-3] Tumor can even embolize into the systemic circulation and can cause further complications.^[4] Pulmonary blastoma (PB) is one of the rare forms of primary lung malignancy and is locally aggressive.^[5,6] We report a case of 30 years old male who underwent left pneumonectomy for PB. In the immediate post-operative period, the patient developed acute circulatory compromise of lower limbs due to tumor embolism into the descending thoracic aorta (DTA). We hereby discuss a few clinical pearls related to the management of this case. Written consent has been obtained from the patient.

CASE PRESENTATION

A 30-year-old male patient presented to our tertiary care institute with the chief complaint of cough with

expectoration for 4 months and was diagnosed to have a PB in the upper lobe of the left lung. He was a chronic smoker and alcoholic for the past 10 years. The chest radiograph (postero-anterior view) showed homogeneous opacification over the left lung field [Figure 1]. Positron emission tomography (PET) scan revealed a mass of $11 \times 11 \times 16 \text{ cm}^3$ in the left upper lobe, abutting to the intercostal muscles antero-laterally and the pericardium medially, causing mediastinal shift to the right. Pre-operative transthoracic echocardiography (TTE) revealed no tumor extension into the heart. Left pneumonectomy was planned after thorough pre-anesthetic evaluation.

On the day of surgery, compliance with implementation of the World Health Organization (WHO) surgical safety checklist was ensured. After applying American Society of Anesthesiologists (ASA) standard monitoring, a 16 G intravenous cannula was inserted on the dorsum of the left hand and right radial artery cannulation was done with a 20 G cannula to monitor invasive blood

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pressure. A 7 French triple lumen central venous catheter was inserted in the right internal jugular vein under dynamic ultrasound guidance. An epidural catheter was placed in the midline at T7-T8 inter-space without any complications. Subsequently, anesthesia was induced with intravenous (IV) fentanyl (100 mcg) and propofol (70 mg). IV vecuronium (7 mg) was used as a muscle relaxant and to facilitate tracheal intubation using a left-sided 39 Fr double lumen endobronchial tube. The correct position of the tube was confirmed using a fiberoptic bronchoscope. Anesthesia was maintained with isoflurane (1–2%) using 50% oxygen with air and intermittent boluses of vecuronium to have no more than single twitch on the train of four (TOF) monitor. After left thoracotomy, tumor appeared to be abutting to the intercostal muscle, pericardium, and left hemi-diaphragm. Spillage of tumor contents occurred due to rupture of the wall during surgical dissection. A transient hypotension developed after the spillage, managed by a single dose of 100 mg IV phenylephrine. Further surgical resection was done after clamping the left pulmonary artery (PA), left pulmonary veins (PVs), and left bronchus. Intra-operatively, the mean arterial pressure was maintained between 65 and 80 mm Hg. Immediately after

surgery, the tracheal extubation was uneventful. However, the patient complains a severe pain in the bilateral lower limbs and was unable to move his lower limbs with a power of 1/5 in both the limbs. On examination, lower limbs were cold and peripheral pulses including pulses at bilateral femoral arteries were not palpable. Color Doppler suggested no blood flow across the bilateral femoral arteries. Computed tomography (CT) brain and CT angiography were done immediately, which revealed a normal CT brain and occlusion of the infra-renal aorta at the L3 level [Figure 2]. Hence, an urgent embolectomy was carried out in the operation theater (OT) under local anesthesia with monitored anesthesia care [Figure 3]. Post-embolectomy flow was restored in the distal arteries. Post procedure, the patient's motor power regained to 5/5 and was shifted back to ICU and discharged from hospital after 4 days without any sequela.

DISCUSSION

Around 25% of lung cancers metastasize to the heart, as reported by some autopsy studies,^[1] but the majority of these cases are clinically silent. Spread to the heart can occur by direct invasion or through the PVs.^[7] Tumor spreads into the left atrium via PVs and can cause various complications like obstruction to PVs, leading to pulmonary edema, left ventricular inflow or outflow obstruction, cardiac arrhythmias, myocardial ischemia, and complications related to systemic embolism. The extension of lung cancers into the PVs can be diagnosed by various modalities like echocardiography, magnetic resonance imaging angiography, and CT angiography.

In the index case, PB was not extended into the PV or other sites, as suggested by pre-operative TTE and PET scan. However, vascular compromise secondary to tumor mass near the L3 level in the infra-renal aorta was noted post-operatively. Acute arterial occlusion can occur in different conditions such as arterial embolus, arterial thrombosis, aortic dissection, thromboangiitis

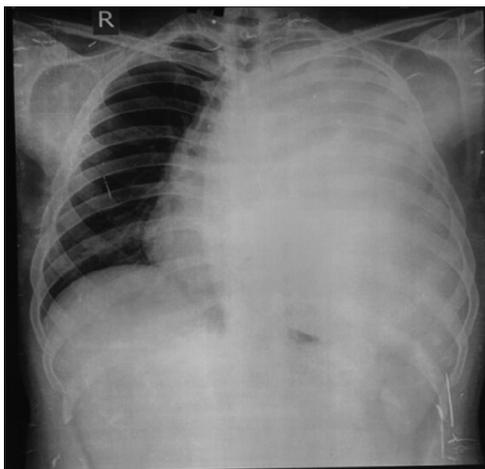


Figure 1: Chest radiograph showing homogeneous opacification of left lung field



Figure 2: Computer Tomography angiography showing occlusion of the infra-renal aorta at L3 level. [red arrows showing vascular occlusion due to tumor mass in antero-lateral view (2a and 2b) and lateral view (2c)]



Figure 3: Surgical specimen of embolus removed from the descending thoracic aorta

obliterans, chronic exertional compartment syndrome, chronic venous insufficiency, and so on. In our case, we hypothesize that the tumor might have embolized into the aorta via PV intra-operatively. Hashimoto *et al.*^[8] did a study in 30 non-small cell lung cancer patients and observed a significant increase in PV circulating tumor cells after surgical manipulation of the tumor-bearing lobe. However, this spread was not significantly associated with the sequence of vessel ligation (PA-first or PV-first).

The extension of tumor or its embolization into the PVs can be detected timely by intra-operative transesophageal echocardiography (TEE). The TEE monitoring is not routinely done in patients undergoing lobectomy or pneumonectomy in our center. We acknowledge that intra-operative TEE, especially during tumor handling, would have detected this complication on time. Intra-operative TEE in lung surgeries for locally aggressive lung tumors can have the following advantages: a) diagnosing tumor extension into the PVs or right atrium, which may decide the surgical plan, b) hemodynamic monitoring while handling the tumor, which can compress the heart, c) timely detection of intra-operative tumor embolization, and d) post-lobectomy or pneumonectomy

right heart assessment. In conclusion, we report a rare case of paraplegia after pneumonectomy for PB. Intra-operative TEE can help in locally aggressive lung tumors undergoing tumor resection in timely detection of serious complications like tumor embolization.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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