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Pulmonary Vein Thrombosis Complicating Lung Cancer, Case Report and Literature Review

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Case Report: We present a case of a 40-year-old man with a history of metastatic lung cancer diagnosed with PVT through CT scan showing the mass compressing along the right lower pulmonary vein. Transthoracic echocardiography revealed a left atrium compressed by a mediastinal tissue mass with acceleration of pulmonary venous flow on doppler, this patient was treated with low molecular weight heparin associated with palliative treatment of his cancer.

Conclusions: Patients with PVT often may often have a nonspecific clinical presentation. Anticoagulation should be considered in patients with PVT given the life-threatening complications such as peripheral embolization.

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Pulmonary Vein Thrombosis Complicating Lung Cancer, Case Report and Literature Review

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I. INTRODUCTION

Pulmonary vein thrombosis (PVT) is relatively rare and under diagnosed but fatal complication in clinical practice. Etiologies can be classified into surgical-related and non-surgical-related etiologies(1) Surgical PVT can occur as a complication following lung transplantation, lobectomy, and radiofrequency catheter ablation (1) Non-surgical etiologies can be due to cardiac causes such as atrial myxoma, pulmonary venous narrowing, atrial fibrillation, or non-cardiac-related causes such as primary or secondary lung malignancies, polycythemia, and hemoglobinopathies such as sickle cell disease(1–3). Only few reports have been described this lethal complication after open lobectomy(4), lung transplantation or in association with metastatic carcinoma however some cases have been described as idiopathic. Pulmonary venous thrombosis may lead to systemic organ and peripheral artery infarction such as in the brain, kidneys, spleen, and peripheral superior and inferior limbs(5) Its exact incidence is unknown and treatment depends on the etiology.

We report here a case of PVT in metastatic lung cancer and the objective of this work is to draw attention to this rare entity with its potentially fatal complications.

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II. CASE PRESENTATION

This is a 40-year-old man who presented for 1 months dry cough and large effort dyspnea He also reported weight loss of 7 kg in 10 months and hemoptysis complicated by a deterioration of the general condition. As antecedents, he smoked 1–2 packs/ day. On physical examination, the patient the patient was hemodynamically and respiratory stable with blood pressure (BP) =130/70 mmHg; heart rate (HR) =80 bpm; respiratory rate (RR) =16 rpm, cardiac auscultation was normal. Pulmonary auscultation revealed crackling rales in the lower third of the right hemithorax. The laboratory analysis revealed anaemia with a haemoglobin level of 9.8 g/dL (normal: 11. 5–15), leukocytosis of $14.7 \times 10^3/\text{mm}^3$ (normal: $4. 0\text{--}10 \times 10^3$), an elevated C-reactive protein (CRP) level of 75 mg/dL (normal: 0–6)

Chest radiography showed a mass over the right lower lung, A CT scan confirmed the x-ray image with the mass compressing along the right lower pulmonary vein. Transthoracic echocardiography revealed a left atrium compressed by a mediastinal tissue mass (Fig 1) with acceleration of pulmonary venous flow on doppler (Fig 2-3) associated with a low abundance pericardial effusion

The assessment of the extension of his tumor objectified bone and hepatic metastases, after a multidisciplinary consultation including cardiologist oncologist and pulmonologist, this patient was treated with low molecular weight heparin associated with palliative treatment of his cancer. During the next 90 days the clinical conditions worsening and the patients died 5 months after the Diagnosis.

III. DISCUSSION

The PVT is a very rare condition, since the pulmonary circulation has an extensive network of collaterals for pulmonary venous drainage (2). The PVT usually presents in relation to a known antecedent that justifies the direct venous pulmonary lesion, reason why we consider crucial to rule out this entity in the patients with presentation symptoms and signs as hemoptysis, pulmonary infiltrate and/or thoracic pain after a potentially damaging procedure for the pulmonary veins such as venous anastomosis in lung transplant patients, lobectomies and lung carcinomas, among others (4).

Several causes of PVT have been identified, which include surgery involving veins such as lung transplantation or lobectomy; radiofrequency catheter ablation (RFCA) for atrial fibrillation(6); sclerosing mediastinitis; and certain primary or secondary tumors of the lung. Less common causes include: atrial myxoma; congenital pulmonary venous narrowing; and mitral stenosis with an obstructing left atrial clot(7) The case of this patient was discovered during a thoracoabdominal CT scan in the context of his metastatic lung cancer objectifying the PVT.

Any thoracic neoplasm can potentially extend to the pulmonary veins(8). Primary lung neoplasms can give rise to stenosis or invasion of the intrapericardial portion of the pulmonary veins and the left atrium(9)

Extension of a lung neoplasm to the left atrium through a pulmonary vein can result in death caused by cardiac arrest or massive systemic tumor embolization of multiple organs(10)

The most frequent malignant cause of PVT is a primary lung neoplasm (11,12). However, PVT can also occur following a metastatic cancer, such as metastatic sarcoma (11), liposarcoma (13), small cell lung cancer(14), and mantle cell lymphoma of the small intestine(2). Our patient was diagnosed with primary lung cancer

Multiple factors probably contribute to thrombosis in pulmonary veins associated with malignancy. These include a hypercoagulable state and mechanical compression of the veins with resultant stasis and damage to the endothelium. (12) This case presents a mediastinal mass that compresses the pulmonary vein.

The symptoms depend on the number and the severity of affected pulmonary veins, the collaterals and the rate of progression(15). The form of presentation varies widely and may include dyspnea, chest pain, cough or hemoptysis but these nonspecific symptoms are more frequently related to other diseases such as community-acquired pneumonia (CAP), pulmonary arterial infarction or vasculitis (6). Our patient presented with dyspnea complicated by hemoptysis

Because of the PVT is a life-threatening entity and the variability in presenting symptoms, clinicians must have heightened sensitivity to the presence of the condition, although the diagnosis is now simpler given the increase in radiological explorations performed in our patients.

CXR findings could be nonspecific such as pulmonary and interstitial opacities and pleural effusion, so the final diagnosis is usually obtained with transesophageal echocardiogram, magnetic resonance imaging, which can distinguish between tumor and thrombus, or CT after injection of intravenous contrast in the late phase to reduce flow artifacts.(11).

Echocardiography may demonstrate the extension of the thrombus into the atrium; a transesophageal echocardiogram would be preferable over a trans-thoracic echocardiogram (16) Although not all thrombi can be directly visualized with two-dimensional imaging, measurement of the blood flow velocities in the pulmonary veins can indirectly suggest this diagnosis (i.e. pulmonary vein blood flow acceleration indicates venous obstruction) (17)

Pulmonary vein thrombosis can lead to gangrene of the lung and can require a repeat intervention, although development of collateral circulation through the intercostal veins may prevent this complication(18) In addition to pulmonary infarction, PVT can often be complicated by pulmonary edema, and right ventricular failure(19) peripheral embolism can also occur and lead to limb ischemia, stroke and even a renal infarction.(20,21)

Unfortunately, there are no specific guidelines for the treatment of PVT, but anticoagulation and anti-tumor therapy are used in non-resectable tumors(2,7) Other forms of treatment include thrombectomy, which is considered if medical therapy fails and also has been tried successfully for PVT after lobectomy and lung transplant; however, limited data are available in malignancy-induced PVT(22) Lobectomy is considered when PVT is complicated with massive hemoptysis or pulmonary necrosis.

Anticoagulation therapy has been considered to effectively decrease the thrombus and prevent thrombosis formation. In previous reports, approximately 80% of patients with a thrombus in the PV stump received anticoagulation therapy which led to disappearance of the PV thrombus in most of them, without systemic embolization.(20,23) Therefore, anticoagulation therapy should be recommended in patients with a thrombus in the PV stump.

This patient was treated with low molecular weight heparin associated with palliative treatment of his cancer.

IV. CONCLUSION

Pulmonary vein thrombosis presents in a nonspecific manner. The diagnosis is made with echocardiography. Establishing the diagnosis is crucial given the serious adverse outcomes, including peripheral embolization. The treatment remains challenging including anticoagulation in addition to treating the underlying condition



Figure 1: Left atrium compressed by mediastinal mass on transthoracic echocardiography

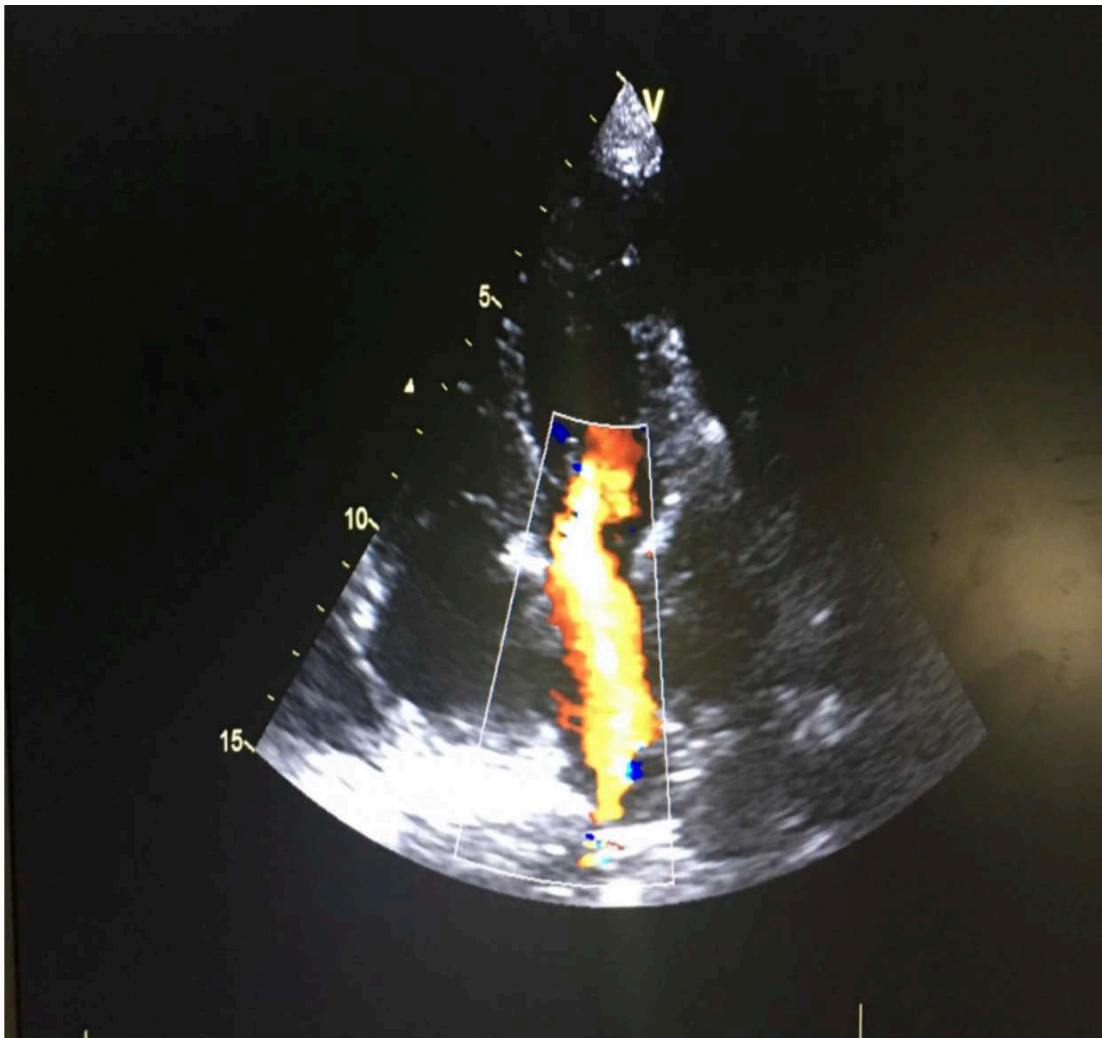


Figure 2: Acceleration of pulmonary venous flow on color Doppler

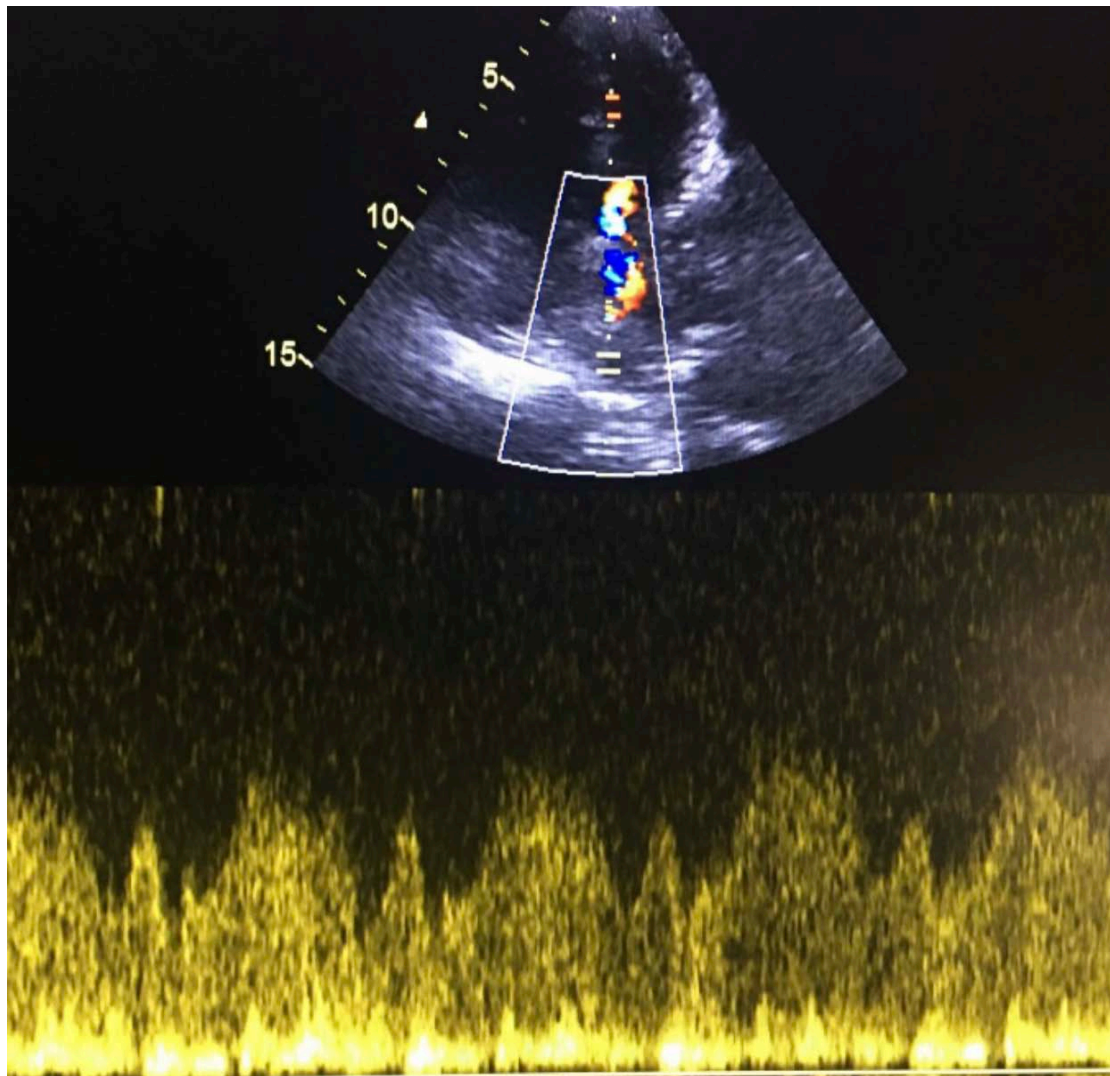


Figure 3: Acceleration of pulmonary venous flow with pulsed Doppler.

BIBLIOGRAPHY

1. Burri E, Duwe J, Kull C, Glaser C, Maurer CA. Pulmonary vein thrombosis after lower lobectomy of the left lung. *J Cardiovasc Surg (Torino)*. oct 2006;47(5):609-12.
2. Chaaya G, Vishnubhotla P. Pulmonary Vein Thrombosis: A Recent Systematic Review. *Cureus* [Internet]. 23 janv 2017 [cité 12 mars 2021]; Disponible sur: <http://www.cureus.com/articles/5343-pulmonary-vein-thrombosis-a-recent-systematic-review>
3. PULMONARY VEIN THROMBOSIS: IT'S NOT ALWAYS PULMONARY EMBOLISM | Journal of the American College of Cardiology [Internet]. [cité 12 mars 2021]. Disponible sur: <https://www.jacc.org/doi/full/10.1016/S0735-1097%2816%2931103-2>
4. Ichimura H, Ozawa Y, Nishina H, Shiotani S. Thrombus Formation in the Pulmonary Vein Stump after Left Upper Lobectomy: A Report of Four Cases. *Ann Thorac Cardiovasc Surg*. 2014; 20(Supplement):613-6.
5. Harada R, Yunoki K, Sugiyama H, Yamamoto H, Kondo J, Watanabe K, et al. Left superior pulmonary venous thrombosis complicated with splenic infarction after video-assisted thoracoscopic left upper lobectomy. *Journal of Cardiology Cases*. juill 2017;16(1):1-4.
6. López-Reyes R, García-Ortega A, Torrents A, Feced L, Calvillo P, Libreros-Niño EA, et al. Pulmonary venous thrombosis secondary to radiofrequency ablation of the pulmonary veins. *Respiratory Medicine Case Reports*. 2018; 23:46-8.
7. Cavaco RA, Kaul S, Chapman T, Casaretti R, Philips B, Rhodes A, et al. Idiopathic pulmonary fibrosis associated with pulmonary vein thrombosis: a case report. *Cases Journal*. déc 2009;2(1):9156.
8. Woodring JH, Bognar B, van Wyk CS. Metastatic chondrosarcoma to the lung with extension into the left atrium via invasion of the pulmonary veins. *Clinical Imaging*. sept 2002;26(5):338-41.
9. Choe DH, Lee JH, Lee BH, Kim KH, Chin SY, Zo JI, et al. Obliteration of the Pulmonary Vein in Lung

- Cancer: Significance in Assessing Local Extent with CT: *Journal of Computer Assisted Tomography*. juill 1998;22(4):587-91.
10. Lin M-T, Ku S-C, Wu M-Z, Yu C-J. Intracardiac extension of lung cancer via the pulmonary vein. *Thorax*. 20 mai 2008; 63(12):1122-1122.
 11. Porres DV, Morenza ÓP, Pallisa E, Roque A, Andreu J, Martínez M. Learning from the Pulmonary Veins. *RadioGraphics*. juill 2013;33(4):999-1022.
 12. Kim NH, Roldan CA, Shively BK. Pulmonary Vein Thrombosis. *Chest*. août 1993;104(2):624-6.
 13. Tamizifar B, Zadeh M, Foroghi E. Pulmonary Vein Thrombosis After Metastatic Liposarcoma. *Med Arh*. 2012; 66(1):68.
 14. Chan V, Neumann D. Small cell lung carcinoma invading the pulmonary vein and left atrium as imaged by PET/CT. *Eur J Nucl Med Mol Imaging*. déc 2005;32(12):1493-1493.
 15. Holmes DR, Monahan KH, Packer D. Pulmonary Vein Stenosis Complicating Ablation for Atrial Fibrillation. *JACC: Cardiovascular Interventions*. avr 2009;2(4):267-76.
 16. Akiode O, Prakash G. Pulmonary Vein Thrombosis Associated With Metastatic Carcinoma. :3.
 17. Cywinski JB, Wallace L, Parker BM. Pulmonary vein thrombosis after sequential double-lung transplantation. *Journal of Cardiothoracic and Vascular Anesthesia*. avr 2005;19(2):225-7.
 18. Genta PR. Pulmonary vein thrombosis after bilobectomy and development of collateral circulation. *Thorax*. 1 juin 2003; 58(6):550-1.
 19. Saoraya J, Inboriboon PC. Pulmonary Vein Thrombosis Associated with a Large Hiatal Hernia. *The Journal of Emergency Medicine*. mars 2013;44(3):e299-301.
 20. Manabe S, Oshima Y, Nakano M, Fujii T, Maehara T, Nitta K, et al. Renal Infarction in a Patient with Pulmonary Vein Thrombosis after Left Upper Lobectomy. *Case Rep Nephrol Urol*. 2014; 4(2):103-8.
 21. Grau AJ, Schoenberg SO, Lichy C, Buggle F, Bock M, Hacke W. Lack of Evidence for Pulmonary Venous Thrombosis in Cryptogenic Stroke: A Magnetic Resonance Angiography Study. *Stroke*. mai 2002; 33(5):1416-9.
 22. Cipriano F, Dessoti LU, Rodrigues AJ, de Andrade Vicente WV, Chahud F, Evora PRB. Report of a lung carcinoma extended to the left atrium through pulmonary vein. *J Thorac Dis*. janv 2018; 10(1):E46-51.
 23. Nakano T, Inaba M, Kaneda H. Recurrent cerebral attack caused by thrombosis in the pulmonary vein stump in a patient with left upper lobectomy on anticoagulant therapy: case report and literature review. *surg case rep*. déc 2017;3(1):101.