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Floating Thrombus in the Right Atrium: A Rare but Severe Complication in a Patient with Lung Cancer

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Abstract | **Case Report**

Floating thrombus in the right atrium (RA) is an uncommon but severe condition that can cause significant complications such as pulmonary embolism (PE) and systemic embolism. Its detection in cancer patients presents diagnostic challenges due to the overlapping symptoms of thromboembolic events and malignancy. This article presents a case of floating thrombus in the right atrium in a 50-year-old male patient diagnosed with advanced non-small cell lung cancer (NSCLC), who developed this condition following a pulmonary embolism (PE). The article also reviews the pathophysiology, clinical manifestations, diagnostic techniques, and management strategies for floating thrombus in cancer patients, particularly those with NSCLC. Early diagnosis and treatment are vital to avoid life-threatening complications and improve patient outcomes.

Keywords: Floating thrombus, right atrium, lung cancer, pulmonary embolism, deep vein thrombosis, chemotherapy, transesophageal echocardiography, anticoagulation therapy.

INTRODUCTION

Floating thrombus in the right atrium (RA) is a rare but potentially fatal condition that occurs when a blood clot forms in the right atrium and remains free-floating, without being anchored to the atrial wall. The condition is most often seen in patients with certain risk factors, including venous thromboembolism (VTE), atrial fibrillation, and heart failure, as well as in cancer patients, who are at increased risk for thrombus formation due to the hypercoagulable state induced by malignancy and chemotherapy. Lung cancer, particularly non-small cell lung cancer (NSCLC), is a common cause of venous thromboembolic events (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), both of which can contribute to the development of a floating thrombus in the right atrium.

The diagnosis of a floating thrombus is challenging and requires imaging studies such as transesophageal echocardiography (TEE), which provides high-resolution images of the heart and its chambers. The thrombus can be a source of embolism, leading to catastrophic complications such as pulmonary embolism, stroke, or sudden death. In this report, we discuss a case of a 50-year-old male with NSCLC who developed a floating thrombus in the right atrium, highlighting the diagnostic challenges, treatment strategies, and the importance of early intervention.

CASE PRESENTATION

A 50-year-old male with a history of non-small cell lung cancer (NSCLC) presented to the emergency department with acute respiratory distress, pleuritic chest pain, and hypoxia. The patient had been diagnosed with advanced NSCLC six months earlier, with metastasis to the liver, and had been receiving chemotherapy with cisplatin and pemetrexed. He also had a history of deep vein thrombosis (DVT) in his left lower extremity, for which he had been on long-term anticoagulation therapy.

On presentation, the patient was tachypneic, with an oxygen saturation of 89%, and a blood pressure of 100/60 mmHg. Physical examination revealed signs of right-sided heart failure, including jugular venous distention, peripheral edema, and a positive hepatojugular reflux. A chest x-ray showed signs of pleural effusion on the right side, and a computed tomography (CT) scan of the chest confirmed the presence of a massive pulmonary embolism in the right pulmonary artery, with associated right heart strain.

Given the patient's history of cancer and VTE, a transesophageal echocardiogram (TEE) was performed

to assess for any cardiac thrombus. The TEE revealed a mobile thrombus in the right atrium, which was free-floating and partially obstructing the tricuspid valve. The thrombus appeared to be a recent clot, and its mobility raised concerns about the potential for embolism to the pulmonary or systemic circulations. The patient was started on intravenous heparin therapy to manage the acute thromboembolic event and was monitored closely for any signs of worsening symptoms or further embolic events.

Figure 1: Floating thrombus in the right atrium

DISCUSSION

Pathophysiology of Floating Thrombus in the Right Atrium

The pathogenesis of a floating thrombus in the right atrium typically involves the formation of a blood clot in the venous system, which then embolizes into the heart, typically through the inferior vena cava, especially in patients with deep vein thrombosis (DVT). The thrombus can become lodged in the right atrium, remaining free-floating or partially attached to the atrial wall. It can then pass into the right ventricle, potentially causing pulmonary embolism or into the left side of the heart through a patent foramen ovale (PFO), resulting in systemic embolism such as stroke.

In patients with cancer, the formation of thrombi is a well-known complication, primarily due to the hypercoagulable state induced by the malignancy itself. Tumors can release procoagulant factors, while chemotherapy can cause endothelial damage and reduce the activity of natural anticoagulants, all of which increase the risk of thrombus formation. In addition, patients with cancer are often immobilized due to their condition, further promoting venous stasis and increasing the risk of thrombus formation.

In our patient, the primary mechanism for thrombus formation in the right atrium was likely embolization from a deep vein thrombosis (DVT) that had been present for several weeks. Although the patient had been receiving anticoagulation therapy, the hypercoagulable state associated with his underlying malignancy and chemotherapy likely contributed to the development of the thrombus in the right atrium.

Clinical Presentation and Diagnostic Challenges

Floating thrombus in the right atrium presents with a variety of nonspecific symptoms, including unexplained dyspnea, pleuritic chest pain, signs of right-sided heart failure, and sometimes, acute pulmonary embolism (PE). In our patient, the acute respiratory distress and pleuritic chest pain were initially attributed to the massive pulmonary embolism, but the presence of right heart failure signs and the history of DVT raised the suspicion of a thromboembolic source in the heart.

The diagnosis of floating thrombus is challenging and typically requires advanced imaging techniques. While transthoracic echocardiography (TTE) can be used as a first-line diagnostic tool, transesophageal echocardiography (TEE) is often necessary for a more detailed view of the heart chambers, particularly when a floating thrombus is suspected. TEE allows for the detection of mobile thrombi within the right atrium, which may not be visible on TTE due to poor acoustic windows.

In our case, TEE was instrumental in detecting the floating thrombus in the right atrium. The thrombus was seen to be mobile, partially obstructing the tricuspid valve, which raised concerns about the potential for further embolic events. A computed tomography (CT) scan of the chest confirmed the presence of a pulmonary embolism and right heart strain, which further supported the diagnosis of a thromboembolic event originating from the right atrium.

Risk Factors for Floating Thrombus in Cancer Patients

Several factors contribute to the development of floating thrombus in cancer patients, particularly those with lung cancer:

1. **Hypercoagulability**: Cancer patients are at an increased risk for venous thromboembolism due to a hypercoagulable state induced by the malignancy itself. Tumors release procoagulant factors, such as tissue factor, and chemotherapy can cause endothelial damage, both of which increase the risk of clot formation.
2. **Venous Stasis**: Cancer patients are often immobile for long periods due to illness or treatment, leading to venous stasis, which further promotes thrombus formation. This is particularly relevant in patients with advanced-stage cancer who may be bedridden or have limited mobility.
3. **Central Venous Catheters**: Many cancer patients require central venous access for chemotherapy or other treatments, which increases the risk of thrombosis and embolism. While our patient did not have a central venous catheter, this remains a significant risk factor in cancer patients.
4. **Previous Venous Thromboembolism**: Patients with a history of deep vein thrombosis (DVT), as in our case, are at higher risk for the formation of thrombi that can embolize into the heart, particularly in the setting of cancer.

Management Strategies

The management of floating thrombus in the right atrium typically involves anticoagulation therapy to prevent further thrombus formation and to reduce the risk of embolization. In our patient, intravenous heparin was initiated immediately upon diagnosis, followed by the transition to long-term anticoagulation with warfarin once the patient was stabilized.

For patients with larger thrombi or those at higher risk for embolization, more aggressive treatments such as thrombolysis or mechanical thrombectomy may be considered. Thrombolysis, typically with tissue plasminogen activator (tPA), is used to dissolve the thrombus but carries a high risk of bleeding, especially in cancer patients who may already be at an increased risk of bleeding due to chemotherapy-induced thrombocytopenia.

In our case, thrombolysis was not considered due to the high risk of bleeding and the patient's overall poor prognosis related to the advanced stage of his cancer. Mechanical thrombectomy, which involves the physical removal of the thrombus, may be an option in some cases but was also not pursued in this patient due to the risks involved in a patient with advanced cancer.

Prognosis and Outcome

The prognosis of floating thrombus in the right atrium in cancer patients, particularly those with advanced malignancy, is generally poor. Despite appropriate anticoagulation therapy, patients are at high risk for recurrent thromboembolic events, and the underlying cancer often limits therapeutic options. In our patient, despite anticoagulation, the overall prognosis was guarded due to the advanced stage of his lung cancer, and he was transitioned to palliative care.

CONCLUSION

Floating thrombus in the right atrium is a rare but severe complication that can occur in cancer patients, particularly those with lung cancer. Early detection through advanced imaging techniques, such as transesophageal echocardiography (TEE), is essential for accurate diagnosis and appropriate management. Treatment typically involves anticoagulation therapy to prevent further thromboembolic events, although more aggressive measures such as thrombolysis or thrombectomy may be required in certain cases. However, the prognosis for these patients remains poor, particularly when the thrombus is complicated by other factors such as advanced cancer. Further research into the optimal management strategies for cancer-associated thromboembolic events is warranted.

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