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Case report

Simultaneous presentation of pulmonary embolism and pericardial effusion as complications of cancer: a case report

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Summary

We report the case of a 62-year-old woman who was admitted to Vilnius University Hospital Santaros klinikos suffering from week-long shortness of breath during minimal physical activity. Computed tomography angiography and echocardiogram findings led to a diagnosis of pulmonary embolism and large pericardial effusion. The patient was previously diagnosed with a base of tongue cancer with lung metastasis. The patient received low-molecular-weight-heparin, and pericardiocentesis was performed. As a result, the patient's general condition improved, and she was discharged from the hospital. In this case, pulmonary embolism and pericardial effusion coincided as complications of malignancy. The concurrent presentation of these conditions is rare and poses a clinical dilemma regarding the treatment, including anticoagulant therapy.

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Keywords: pulmonary embolism, pericardial effusion, malignancy, cancer

Highlights

- In this case, pulmonary embolism and pericardial effusion occurred at the same time as complications of malignancy.
- The concurrent presentation of pulmonary embolism and pericardial effusion is rare and pose a clinical dilemma regarding the best treatment option. Existing guidelines do not indicate whether anticoagulation should be used in such a case.
- The patient received low-molecular-weight-heparin, and pericardiocentesis was performed. The patient's general condition improved, and she was discharged.

Introduction

Pulmonary embolism (PE) and pericardial effusion are common and potentially fatal urgent medical conditions. Often these conditions can result from the underlying malignancy [1]. Patients with malignancies tend to develop a hypercoagulable state leading to PE. Venous thromboembolism risk varies according to the type of tumour. The risk associated with head and neck cancer is considered low (0.16–3.125%), but few data are available, thus it is challenging to state the risk [2]. Some studies have indicated that venous thromboembolism occurs in 15% of all oncological patients and has a 30% risk of mortality if not treated [3,4]. In patients with malignancies, pericardial effusion can develop for many reasons: direct pericardial extension due to neoplasm or metastasis, impaired lymphatic drainage, infectious causes, after treatment with radiotherapy or chemotherapy, etc. [1]. The neoplastic pericardial disease occurs in up to 12% of cancer patients and indicates a poor prognosis [5].

However, it is uncommon for PE and pericardial effusion to co-occur. This rare phenomenon poses a clinical dilemma about the best treatment option. In this report, we present concomitant PE with pericardial effusion as complications of malignancy and discuss possible treatment.

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Case presentation

In August of 2021, a 62-year-old woman came for a regular visit for immunotherapy with nivolumab, and she complained of shortness of breath during minimal physical activity and general weakness. Laboratory tests showed elevated levels of D-dimers, and lung metastases appeared on chest x-ray. The computed tomography angiogram (CTA) revealed an embolus in the subsegmental pulmonary artery of the right lower lobe and also a large 34-mm pericardial effusion (Fig. 1). The echocardiogram showed tricuspid regurgitation, dilated right ventricle with systolic dysfunction, and pericardial effusion up to 33-mm around the left ventricle and up to 12-mm around the right ventricle (Fig. 2). The patient was admitted to the cardiology department.

In 2013 a patient was diagnosed with base of tongue cancer. Histology revealed squamous cell carcinoma and stage III cT2pN1cM0. The patient underwent chemotherapy with radiotherapy. In 2015 disease progression was seen and the left side cervical lymph node was removed. In 2020 a surveillance computed tomography scan showed lung lesions suspicious for metastatic disease and biopsy of lung lesion confirmed high-grade squamous cell carcinoma, and the patient underwent chemotherapy with 6 cycles of cisplatin/5-fluorouracil and biological therapy with cetuximab. In February 2021 disease progression was seen, and immunotherapy with nivolumab was initiated (the last dose was on 12 July 2021). The patient also has hypothyroidism and rheumatoid arthritis.

Physical examination: patient weight 58 kg (BMI 24.1), blood pressure 120/80 mmHg, heart rate 69 beats/min, heart sounds were rhythmic with muffled tones, respiratory rate was 16 breaths/min, lung sounds were clear bilaterally, oxygen saturation was 98% by pulse oximetry while breathing room air, the abdomen was soft and painless, bilateral oedema in the ankles was noted. Blood tests showed anaemia (red blood cells 3.5×10^{12}/L, haemoglobin 96 g/L, haematocrit 0.29), normal range of B-type natriuretic peptide (80.3 ng/L) and troponin (2 ng/L), normal liver function, slightly elevated creatinine (112 μmol/L) and reduced glomerular filtration rate (45 mL/min/1.73 m^2), slightly elevated C-reactive protein (16.4 mg/L), slightly elevated thyroid-stimulating hormone (9.6 mU/L), normal range of electrolytes. An ECG showed low voltage.

The patient received low-molecular-weight-heparin nadroparin 0.6 mL injections twice per day (the dose was reduced according to the patient's renal function). Novel oral anticoagulants and warfarin were not used because of pericardial effusion and a high risk of bleeding. The patient also received furosemide 40 mg IV and later torasemide 10 mg PO, omeprazole 20 mg, levothyroxine 50 mcg and diclofenac 75 mg. Pericardiocentesis was performed – 840 mL of dark blood colour fluid was aspirated, and an additional 490 mL of fluid was drained over the following 96 hours (in total 1330 mL). In the histological examination of punctate single histiocytes and no atypical cells were observed. In the cytological examination of punctate a high number of erythrocytes and macrophages, few leukocytes and reactive mesothelial cell clusters, and no atypical cells were found.

The patient's general condition improved and she was discharged. However, due to the active cancer nadroparine should be continued for a

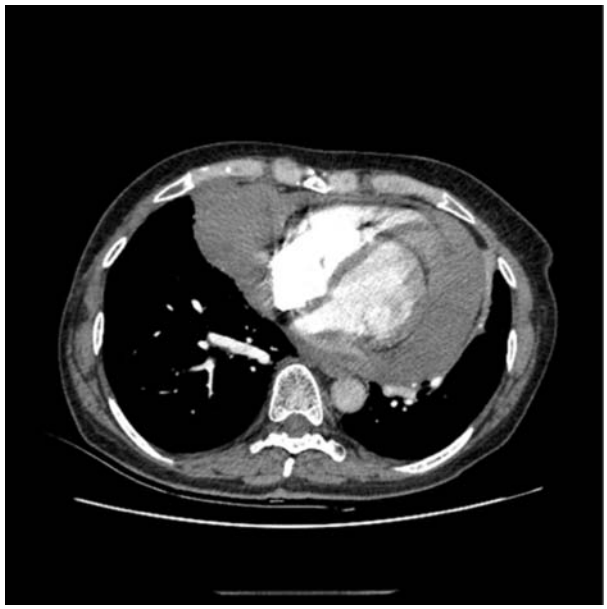

Figure 1. The computed tomography angiogram showing pulmonary embolism in the subsegmental pulmonary artery of the right lower lobe.

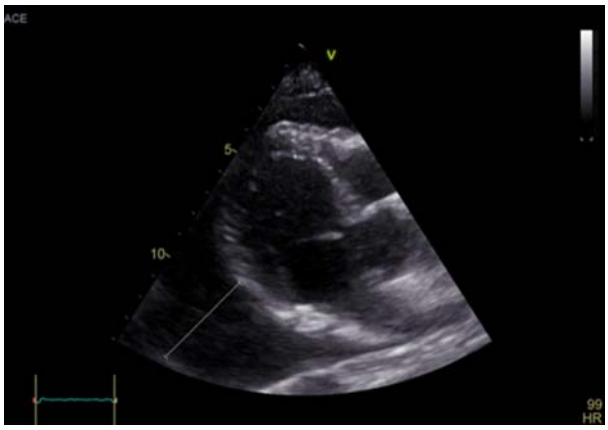

Figure 2. The echocardiogram showing large pericardial effusion.

Table 1.
Patients received treatment with anticoagulant and their outcomes

Patient	Anticoagulant	Outcome	Reference
I	not specified	not clear	[14]
II	heparin	survived	[15]
III	not specified	survived	[16]
IV	heparin	died after pericardiocentesis	[18]
V	heparin, and after 5 days low-molecular-weight-heparin enoxaparin sodium	survived	[19]
VI	heparin, and after novel oral anticoagulants	survived	[20]
VII	low-molecular-weight-heparin	died after 3 months	[23]

prolonged time. Also patient will continue treatment with torasemide, omeprazole, and levothyroxine.

Discussion

The management of pericardial effusion can require pericardiocentesis or surgery. The decision on whether to treat patients immediately is based on the symptoms and evidence of tamponade physiology [6]. Anticoagulation increases the risk of bleeding. In addition, anticoagulant treatment increases the risk of pericardial bleeding recurrence, especially in patients with malignant diseases who are already inclined to pericardial bleeding [7].

The standard treatment of acute pulmonary embolism is long-term anticoagulation therapy. The mortality rate from untreated PE can be as high as 30%. This risk is significantly reduced by prompt initiation of anticoagulant therapy. Therefore, treatment must be initiated as soon as possible [3].

Although PE is generally treated with anticoagulation therapy, pericardial bleeding is considered a contraindication to anticoagulation therapy. Existing guidelines do not indicate whether anticoagulation should be used in patients with PE and pericardial effusion [8–11].

In our case, patient received immunotherapy based on the nivolumab clinical trial for head and neck tumours. Regarding adverse effects, PE and pericardial effusion were not reported [12]. However, immunotherapy should constantly be monitored for possible pseudo-progression and pericardial fluid. In this case, surveillance computed tomography scans showed no fluid in the pericardium.

We performed the literature review and found 11 previously documented cases of pericardial effusion and pulmonary embolism as concomitant cancer complications from 2000 to 2022 [13–23].

Ten out of eleven patients had been diagnosed with malignancy only after simultaneous presentation of PE and pericardial effusion and admission to the hospital [13–18,20–23]. The co-occurrence of pericardial effusion and PE should prompt clinicians to look for undiagnosed active malignancies. Our patient had been diagnosed with metastatic base of tongue cancer prior to admission. Clinicians caring for patients with diagnosed cancer should be aware and cautious of these concomitant complications.

Ten patients (91%) had pericardiocentesis or surgery during hospitalization [13–18,20–23]. Seven patients (64%) received treatment with anticoagulants. Four of seven patients survived (the survival rate is 57%), one died after pericardiocentesis (14%), one died after 3 months (14%), and one outcome is not clear (14%) [14–16,18–20, 23] (Table 1). From those four patients who did not receive treatment with anticoagulants: one of them survived (25%), one died after 6 weeks (25%), and two outcomes are not clear (50%) [13,17,21,22]. Our patient was given anticoagulation and survived. Anticoagulation therapy could be life-saving in a patient with malignancy that presents with both a PE and a pericardial effusion. The risk-benefit ratio should be considered for each patient's case to improve clinical outcomes.

Conclusions

This clinical case demonstrates that pulmonary embolism and pericardial effusion, relatively common complications of cancer, can co-occur. It is essential to remember both these conditions when dealing with the context of previously diagnosed or undiagnosed malignancy. Anticoagulation therapy might be considered an appropriate treatment. Additional prospective studies should be carried out to establish the best treatment.

Declarations

Funding and competing interests

No funding was received to assist with the preparation of this manuscript. The authors have no competing interests to declare that are relevant to the content of this article.

Ethics approval

Approval was obtained from the institution of Vilnius University Hospital Santaros klinikos (approval number SR-6970). The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Consent to participate and consent to publish

Informed consent was obtained from participant included in the study. The participant has consented to the submission of the case report to the journal.

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