

A case series of malignant pericardial effusion

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ABSTRACT

The most common primary malignancies that affect the pericardium are lung cancers. Typically, pericardial involvement stays undiagnosed, with almost 1-20% of all tumor-related autopsies revealing invasion of the pericardium. Pericardial effusions are seldom the first location of metastasis and presentation of a primary malignancy. Malignant pericardial effusions are usually silent, although they cause dyspnea, chest discomfort, arrhythmias, cough, and, in rare cases, pericardial tamponade. In a patient with tamponade, a high index of tumor-related suspicion is crucial to rule out cancer. Emergency pericardiocentesis is indicated based on the clinical presentation, however, the patient frequently has a bad prognosis regardless of whether treatment is administered or not. In this case series, we report five cases of non-small cell lung cancer (NSCLC) with pericardial effusion as an initial presentation.

Keywords: Lung carcinoma, malignant pericardial effusion, NSCLC, pericardiocentesis

Introduction

The collection of fluid in the pericardial sac around the heart is referred to as a pericardial effusion. The pericardial sac in a healthy person contains between 15 and 50 mL of serous fluid.^[1] Pericardial effusion is usually discovered as an unintentional observation during echocardiography or after a diagnostic imaging scan in symptomatic patients. When the pericardial effusion is discovered, the first task is to decide its size, hemodynamic consequence, and any related disorders. The relative incidence of various causes is determined by the local epidemiology, the hospital settings, and the investigative approach used. Many cases in developed countries are still idiopathic, but TB is the most common cause in underdeveloped countries. Other reasons include viral or bacterial infections, neoplasms, Systemic Lupus Erythematosus, renal failure, Dressler syndrome, post pericardiotomy syndrome, and

medications, particularly hydralazine and procainamide. There are still several causes that could produce a pericardial effusion. As majority of the patients comes to a primary care practitioner first before going to a specialist, there is need to have knowledge on the pericardial effusion, different etiologies, and complications to avoid delay in diagnosis and initiation of treatment.

Non-cardiac malignancies are more likely to cause malignant pericardial effusion than primary cardiac tumors. In postmortem examinations, malignant pericardium involvement is seen in 1 to 20% of cancer cases.^[2] Although unusual, it can be the first sign of a primary tumor and, in some cases, the first site of metastasis.^[2] Malignant pericardial effusion occurs in rare instances in patients with malignant tumors, the most prevalent of which are cancerous lung tumors.^[3] The second most prevalent aetiology of malignant pericardial effusion is breast cancer.^[4] Mediastinal lymphoma, mesothelioma, melanoma, and renal cell carcinoma are other common malignancies included. The pathogenesis is assumed to be mostly by local lymphatic invasion, with direct invasion to the mediastinum and occurring less frequently by hematogenous route.^[5]

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Cardiac tamponade is a potentially fatal condition that develops when pericardial effusion pressure compromises ventricular filling, resulting in the diastolic collapse of ventricles and reduced cardiac output.^[6] Massive pericardial effusion is a rare presentation in NSCLC with an exceedingly bad prognosis and is regarded as a “pre-terminal event”.^[7] Despite interventions, the median survival time in such a situation is about three months or less.^[6] As a result, therapy focuses primarily on relieving symptoms. Regardless of the final diagnosis, critical care and surgical intervention are commonly used as early treatments rather than chemotherapy regimens. Once the patient has been stabilized, a long-term strategic therapy plan is to be developed. In this case series, we include five cases of pericardial effusion as the first manifestation of lung cancer, as well as their prognosis.

Case 1

A 67-year-old male patient came to OPD with complaints of recurrent episodes of hemoptysis in the past three months, MMRC grade I initially which progressed to grade III in three months and cough with mucoid expectoration for three months. He had no other significant complaints and no comorbidities. He was a chronic smoker (40 pack-years). On examination, pulse-110/minute, respiratory rate 22/minute, BP- 90/60 mm of Hg and spO₂ -95% on room air. On general examination, pallor and grade I Clubbing were present. There was no other finding in the general examination. Respiratory system examination revealed reduced breath sounds on right lower chest regions. Examination of all other systems appeared to be normal. Chest X-ray PA view revealed hyperinflation of the right lung with a round opacity with irregular margin in the right lower lobe. CT thorax [Figure 1] with contrast revealed irregular heterogeneously enhancing soft tissue density lesion with spiculated margin in the right lower lobe. ECG had low voltage complexes and electrical alternans for which 2D Echo was done which revealed massive pericardial effusion and pigtail catheter was inserted immediately and 1200 ml of hemorrhagic pericardial fluid was drained

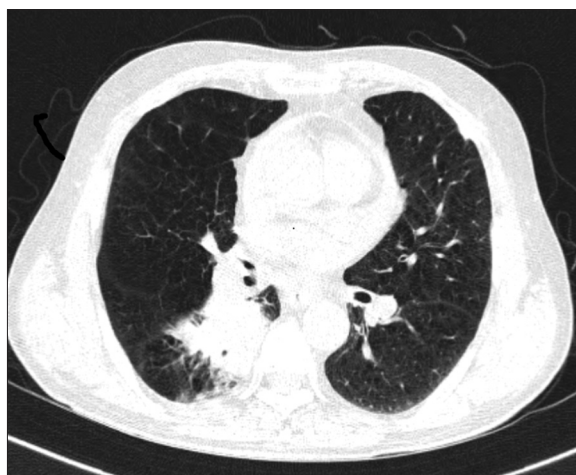


Figure 1: CT thorax lung window showing irregular heterogeneously enhancing soft tissue density lesion with spiculated margin in the right lower lobe

over three days and pigtail was removed on 4th day. Pericardial fluid cytology revealed infiltrates of squamous cell carcinoma. Bronchoscopy was done which revealed narrowing in the apical segment of the right lower lobe and transbronchial biopsy and brush cytology were inconclusive. A repeat transbronchial biopsy revealed squamous cell carcinoma. As per his staging T3N1M1a squamous cell carcinoma, he received three cycles of chemotherapy with carboplatin and cisplatin three weekly. Despite treatment, his condition deteriorated and the patient expired after four months.

Case 2

A 30-year-old male patient presented to the emergency department with complaints of breathlessness MMRC grade I for four months which progressed to grade III-IV in the last two weeks, low-grade fever, right-sided chest pain and dry cough for four months, loss of appetite and loss of weight around 5-6 kg in last three months. He had no comorbidities. He is a non-smoker but a chronic alcoholic for 10 years. He had a history of thoracentesis for right-sided pleural effusion one month back and he was started on Antitubercular drugs. On examination, pulse-110/minute, respiratory rate-28/minute, BP- 100/60 mm of Hg and spO₂ -95% on room air. General examination revealed only pallor. Respiratory system examination revealed absent breath sounds on the right side. Chest X-ray PA view correlated with the auscultation finding suggesting a right-sided massive pleural effusion with tracheal and mediastinal shift to the left side. The chest tube was put immediately on the right side and fluid was drained over 10 days. Pleural fluid cytology later revealed infiltrates of adenocarcinoma. CECT thorax revealed right-sided bronchus cut-off sign with the collapse of the right lung bronchogenic carcinoma with right moderate pleural effusion with mediastinal lymphadenopathy. 2D Echo was done based on finding on CT with contrast which revealed massive pericardial effusion and pigtail catheter was inserted immediately and a total of 1500 ml of hemorrhagic pericardial fluid was drained in four days and it was removed on 5th day after the 2D Echo [Figure 2] confirmed that pericardial

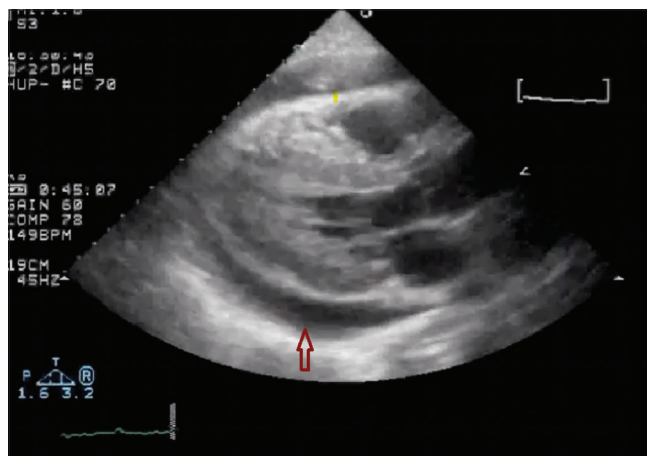


Figure 2: 2D Echo showing pericardial effusion indicated by red arrow

effusion resolved. Pericardial fluid and pleural fluid cytology revealed infiltrates of adenocarcinoma. He has been diagnosed with stage T3N1M1a adenocarcinoma. He expired after one month of diagnosis of disease even though he received one cycle of chemotherapy with carboplatin and paclitaxel.

Case 3

A 45-year-old male patient came to OPD with complaints of breathlessness MMRC grade II-III and cough with mucoid expectoration for two months. He had no comorbidities. He was a nonsmoker. On examination, pulse – 110/minute, BP-100/60 mm of hg, respiratory rate-26/minute and SpO₂- 88%on room air. Pallor and grade II clubbing was found on general examination. A single left supraclavicular lymph node was palpable which was 2 × 2 cm in size, a firm with irregular margins and non-tender. Respiratory system examination revealed bilateral decreased breath sounds. Unlike the other two cases, the cardiovascular system examination showed raised JVP and muffled heart sounds. Abdominal examination and CNS examination was within normal limits. Chest X-ray PA view showed mild bilateral pleural effusion with small opacity in the left lower lobe. HRCT thorax [Figure 3] was done which revealed bilateral pleural effusion with lung mass in left lower lobe with pericardial effusion. 2D Echo was revealed massive pericardial effusion and a pigtail catheter was inserted immediately. Around 600 ml of bloody fluid was drained through the catheter in 4 days period. Pericardial fluid was negative for any malignant conditions. His bronchoscopy was planned for diagnosis of lung mass. But within four days of admission patient's condition further deteriorated and he expired before even obtaining a proper tissue diagnosis from the lung mass.

Case 4

A 73-year-old male patient came to OPD with c/o cough with mucoid expectoration and chest pain for 15 days and breathlessness MMRC grade II-III in the last 5 days. He was

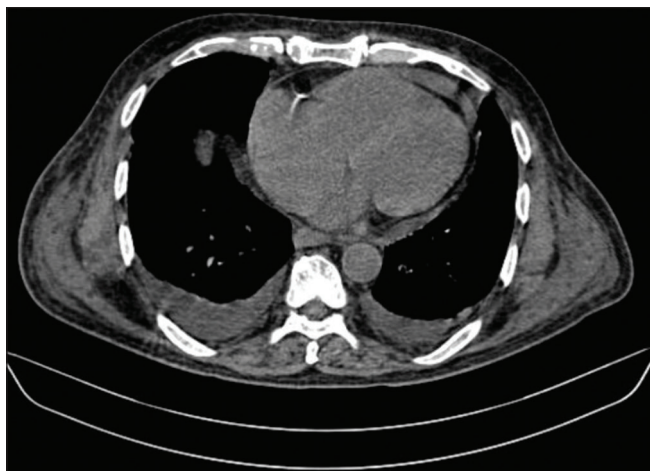


Figure 3: CT thorax mediastinal window showing bilateral pleural effusion with pericardial effusion

diagnosed with adenocarcinoma of the lung two years back and he had received three cycles of chemotherapy with carboplatin and paclitaxel. At the time of initial presentation, his HRCT thorax showed lung mass in the left lower lobe of the lung with mild pericardial effusion and mild bilateral pleural effusion. One year later, he developed metastasis to the left distal radius and USG guided FNAC from the cystic lesion in the left distal radius showed deposits of adenocarcinoma and radiotherapy as palliative therapy was given. At the presentation, to OPD his examination revealed pulse-110/minute, respiratory rate 22/minute, BP-130/70 mm of Hg and spO₂-95% on room air. He had pallor and grade III Clubbing. Respiratory system examination revealed bilaterally reduced breath sounds. Cardiovascular system examination revealed muffled heart sounds. Abdominal and nervous system examination was normal. His present chest X-ray [Figure 4] showed lymphangitis carcinomatosa with the left collapse of the lung with pleural effusion. His current CT Thorax with contrast revealed an ill-defined mass lesion in the left lung with lymphangitis carcinomatosa with bilateral moderate pleural effusion with pericardial effusion. His present 2D Echo revealed moderate pericardial effusion. Cardiologist opinion was taken for moderate pericardial effusion for which pericardiocentesis was not advised. Pleural fluid tapping was done from the right side and pleural fluid cytology revealed infiltrates of adenocarcinoma. Palliative care and supportive therapy were given to the patient as relatives denied palliative chemotherapy. Despite having mild pericardial effusion in the initial presentation of adenocarcinoma of the lung which did not progress to that extent where he required an intervention for it, he expired two years after the initial diagnosis.

Case 5

A 50-year-old male patient presented with complaints of dry cough for the last six months, breathlessness MMRC grade II for the past two months which aggravated to MMRC grade III in seven days, hoarseness of voice and chest pain for the last one month, loss of appetite and loss of weight (7-8 kg)



Figure 4: Chest X-ray AP view showing lymphangitis carcinomatosa of right lung with left collapse of lung with bilateral pleural effusion

in two months. He had no comorbidities. He was a chronic smoker (30 pack-year). On examination, pulse-110/minute, respiratory rate-26/minute, BP-120/70 mm of Hg and spo2-94% on room air. He had grade III clubbing. Respiratory system examination revealed left side decreased breath sounds with bilateral rhonchi. Cardiovascular, abdominal, and central nervous system examination had no abnormal findings. CT thorax with contrast revealed soft tissue mass in the superior lingular segment of the left upper lobe with the bronchial cut off sign. Bronchoscopy revealed left vocal cord palsy with growth on the left main bronchus and transbronchial biopsy was revealed adenocarcinoma of the lung. He received one cycle of chemotherapy with carboplatin and paclitaxel. One month later, his condition deteriorated. On examination, he had tachycardia with low BP, raised JVP, and muffled heart sounds. ECG revealed [Figure 5] low QRS voltage and sinus tachycardia. 2D Echo revealed massive pericardial effusion for which pericardiocentesis was done with pigtail catheter that a total of 1500 ml of hemorrhagic fluid was drained over a period of four days and pigtail catheter was removed once 2D Echo confirmed resolution. Pericardial fluid cytology was negative for malignancy. Despite chemotherapy and timely management of massive pericardial effusion, he expired after two weeks.

Discussion

Approximately 90% of non-cardiac tumors generating malignant pericardial effusion are asymptomatic at presentation and therefore usually discovered on autopsy.^[2] The most frequent pathogenesis by which primary tumors cause pericardial invasion is by metastatic involvement via blood or lymphatic vessels. The most common solid tumors are lung cancers, especially NSCLC, the most common being adenocarcinoma lung, followed by squamous cell carcinoma lung, breast carcinoma, melanoma, and gastrointestinal adenocarcinomas (esophageal, colorectal, and gastric).^[8] In our case series, adenocarcinoma of the lung most commonly had a location in lobes near to the heart,^[4,9] that a direct invasion affects pericardium rather than hematogenous invasion, as in most of the patients in our case series.^[10]

Diagnosis needs a high level of suspicion due to the diverse nature of the presentation. Physical examination signs such as hypotension, elevated jugular venous pressure (JVP), muffled heart

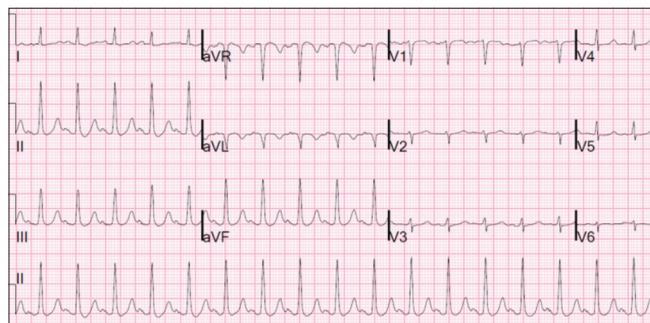


Figure 5: ECG showing low voltage complexes and sinus tachycardia

sounds, and pulsus paradoxus are indicative of cardiac tamponade but mild pericardial effusions are asymptomatic.^[11] Chest radiography revealing cardiomegaly and low amplitude complexes or electrical alternans on an ECG is also nonspecific observation. The primary imaging for diagnosis is still echocardiography, which shows the effusion with or without tamponade. General practitioners must have good knowledge on massive pericardial effusion, its presentation and investigative findings to identify the condition promptly to avoid the delay in initiation of proper treatment and specialist referral. In our case series, most patients at the time of initial presentation had massive pericardial effusion except in one case where there was mild pericardial effusion which did not need any intervention. In malignant pericardial effusion, hemorrhagic pericardial effusions are more prevalent than in benign aetiology of effusion.^[12] According to Ben-Horin *et al.*,^[13] cytology of pericardial fluid in malignancy has a 51% sensitivity and can range from 66.7 to 92% in other studies.^[4,13]

Treatment is determined by the size of the effusion and the clinical presentation. Emergent pericardiocentesis is recommended in situations of tamponade with hemodynamic instability because it gives rapid relief.^[9] Non-emergent open or percutaneous pericardiectomy is to be considered in stable patients.^[14] Although prolonged pericardiocentesis has a lower complication rate, the investigative yield and recurrence rates are comparable to pericardiectomy.^[14] Labbé *et al.*^[15] observed a 2.5-month survival rate with both pericardiectomy and pericardiocentesis. Since TB is an important cause of pericardial effusion in our country, generally anti-tubercular treatment is initiated without complete workup which results in a delay in the diagnosis. When a patient with massive pericardial effusion is being investigated, treating doctor must take in to consideration all the possible etiologies of pericardial effusion to avoid the delay in diagnosis and initiation of correct therapy.

Malignant pericardial effusion has an extremely bad prognosis, particularly in individuals with a known cancer history before the current presentation,^[4,9] which is a likely suggestion of the extent of the tumor. But all patients in this case series had pericardial effusion in their initial presentation except in case 5. Four cases had massive pericardial effusion which required pericardiocentesis and one case had mild pericardial effusion that required no intervention. Patient with mild pericardial effusion in case 4 survived for two years. In case 1, the patient had massive pericardial effusion for which pericardiocentesis was done received chemotherapy, and survived for four months. In case 2, the patient had massive pericardial effusion for which pericardiocentesis was done and received chemotherapy, but he survived for one month. In case 5, the patient developed massive pericardial effusion one month after diagnosing adenocarcinoma of the lung and receiving chemotherapy and his survival was one month. Patients with mild pericardial effusion had a better survival rate than those with massive pericardial effusion in the case of NSCLC. Long-term survival was attained in patients with SCLC who had pericardial effusion but no distant metastases and successfully received chemoradiotherapy, according to Seiji Niho *et al.*^[16] Survival of NSCLC patients with pericardial

effusion is less compared to the survival rate of small cell lung cancer patients with pericardial effusion. Thus, it was clear that the prognosis of NSCLC presenting with massive pericardial effusion is poor despite pericardiocentesis and chemotherapy are given or not, it does not alter the prognosis.

Conclusion

A high degree of suspicion is required to avoid the delay in diagnosing massive pericardial effusion in patients with acute cardiac failure and hypotension of unknown aetiology. Primary care practitioner should be able to identify the clinical features and investigative findings of massive pericardial effusion for its early detection, treatment, and specialist referral as majority of patient-first approaches them. Hemorrhagic pericardial effusions associated with tamponade are commonly due to malignancy. Malignant pericardial effusions, which are widely agreed to be a slowly progressing and clinically silent condition, can rarely appear with hemodynamic instability and constitute the initial manifestation of an underlying malignancy. In this case series, we report the five cases of lung carcinoma who had pericardial effusion at the initial presentation. Emergency pericardiocentesis may be done depending on the size of the pericardial effusion. We conclude that patients with massive pericardial effusion in NSCLC whether chemotherapy given or not have a poor prognosis.

Take home message

Pericardial effusions are rarely the first site of metastasis and presentation of a primary malignancy. The most common primary malignancies that affect the pericardium are lung cancers. Malignant pericardial effusion is a slowly progressing clinically silent condition, can rarely appear with hemodynamic instability, and constitute the initial manifestation of an underlying malignancy. A high degree of suspicion is required to avoid the delay in diagnosing massive pericardial effusion in patients with no other known etiology. Treatment is determined by the size of the effusion and the clinical presentation. Emergent pericardiocentesis is recommended in situations of tamponade with hemodynamic instability because it gives rapid relief. Prognosis of lung carcinoma presenting with massive pericardial effusion is poor despite pericardiocentesis and chemotherapy are given or not it doesn't alter the prognosis.

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.

References

- Sharma NK, Waymack JR. Acute Cardiac Tamponade. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2022.
- Shapiro LM. Cardiac tumours: Diagnosis and management. *Heart* 2001;85:218-22.
- He B, Yang Z, Zhao P, Li YJ, Wang JG. Cytopathologic analysis of pericardial effusions in 116 cases: Implications for poor prognosis in lung cancer patients with positive interpretations. *Diagn Cytopathol* 2017;45:287-93.
- Strobbe A, Adriaenssens T, Bennett J, Dubois C, Desmet W, McCutcheon K, *et al.* Etiology and long-term outcome of patients undergoing pericardiocentesis. *J Am Heart Assoc* 2027;6:e007598.
- Tamura A, Matsubara O, Yoshimura N, Kasuga T, Akagawa S, Aoki N. Cardiac metastasis of lung cancer. A study of metastatic pathways and clinical manifestations. *Cancer* 1992;70:437-42.
- Wang PC, Yang KY, Chao JY, Liu JM, Perng RP, Yen SH. Prognostic role of pericardial fluid cytology in cardiac tamponade associated with non-small cell lung cancer. *Chest* 2000;118:744-9.
- Li BT, Pearson A, Pavlakis N, Bell D, Lee A, Chan D, *et al.* Malignant cardiac tamponade from non-small cell lung cancer: Case series from the era of molecular targeted therapy. *J Clin Med* 2015;4:75-84.
- Imazio M, Colopi M, De Ferrari GM. Pericardial diseases in patients with cancer: Contemporary prevalence, management and outcomes. *Heart* 2020;106:569-74.
- Refaat MM, Katz WE. Neoplastic pericardial effusion. *Clin Cardiol* 2011;34:593-8.
- Burazor I, Imazio M, Markel G, Adler Y. Malignant pericardial effusion. *CRD* 2013;124:224-32.
- Sternbach G. Claude Beck: Cardiac compression triads. *J Emerg Med* 1988;6:417-9.
- Atar S, Chiu J, Forrester JS, Siegel RJ. Bloody pericardial effusion in patients with cardiac tamponade: Is the cause cancerous, tuberculous, or iatrogenic in the 1990s? *Chest* 1999;116:1564-9.
- Ben-Horin S, Bank I, Guetta V, Livneh A. Large symptomatic pericardial effusion as the presentation of unrecognized cancer: A study in 173 consecutive patients undergoing pericardiocentesis. *Medicine (Baltimore)* 2006;85:49-53.
- Patel N, Rafique AM, Eshaghian S, Mendoza F, Biner S, Cercek B, *et al.* Retrospective comparison of outcomes, diagnostic value, and complications of percutaneous prolonged drainage versus surgical pericardiotomy of pericardial effusion associated with malignancy. *Am J Cardiol* 2013;112:1235-9.
- Labbé C, Tremblay L, Lacasse Y. Pericardiocentesis versus pericardiotomy for malignant pericardial effusion: A retrospective comparison. *Curr Oncol* 2015;22:412-6.
- Niho S, Kubota K, Yoh K, Goto K, Ohmatsu H, Nihei K, *et al.* Clinical outcome of small cell lung cancer with pericardial effusion but without distant metastasis. *J Thor Oncol* 2011;6:796-800.