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| RESEARCH ARTICLE

The Bloody Pericardium: Cardiac Tamponade Unmasking an Undiagnosed Malignancy: A Case Report

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| ABSTRACT

We report the case of a 58 year old male who presented to the emergency department with progressive shortness of breath, generalized weakness, and chest heaviness over one week, culminating in acute deterioration on the day of admission. He had no known history of malignancy but was a former smoker with a background of hypertension. On arrival, he appeared acutely unwell, with hypotension, tachycardia, and labored breathing. Physical examination revealed jugular venous distension, soft heart sounds, and reduced peripheral perfusion, raising concern for hemodynamic compromise. Initial electrocardiogram showed sinus tachycardia without ischemic changes, while chest radiography demonstrated marked enlargement of the cardiac silhouette suggestive of a large pericardial effusion. Urgent bedside echocardiography confirmed moderate to severe pericardial effusion with right sided chamber collapse, consistent with cardiac tamponade. The patient underwent immediate ultrasound guided pericardiocentesis, yielding approximately 400 milliliters of hemorrhagic fluid, with rapid clinical improvement in symptoms and hemodynamic parameters. A pericardial drain was left in situ for continued drainage. Laboratory analysis of the pericardial fluid revealed malignant cells. Subsequent imaging identified a suspicious lung lesion with mediastinal lymphadenopathy, suggestive of primary lung malignancy with pericardial involvement. The patient stabilized clinically following intervention and was discharged with plans for oncological evaluation and further diagnostic workup. This case highlights cardiac tamponade as a rare initial presentation of lung cancer and emphasizes the importance of early bedside echocardiography, prompt pericardial drainage, and consideration of malignancy in unexplained hemorrhagic pericardial effusion.

| KEYWORDS

Malignant Pericardial Effusion, Malignancy, Pericardium, Tamponade, Cytology, Lung Cancer, Metastasis

| ARTICLE INFORMATION

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Introduction

Cardiac tamponade is a life threatening condition that is encountered in emergency and critical care settings. It occurs when fluid accumulates within the pericardial space to a degree that impairs normal cardiac filling. As intrapericardial pressure rises, the heart becomes compressed, leading to reduced ventricular filling, decreased cardiac output, and eventually circulatory collapse if not treated promptly. Although the condition can develop from a variety of causes, rapid recognition and early intervention remain the most important factors in determining patient outcome. Delay in diagnosis may result in significant morbidity or sudden death, especially in patients who present with subtle or atypical symptoms [10,12]. Pericardial effusion refers to the presence of excess fluid within the pericardial sac. Small amounts of fluid may be well tolerated, particularly when accumulation occurs gradually. However, even a modest volume can lead to tamponade if it develops rapidly. The clinical impact therefore depends not only on the amount of fluid but also on the rate of accumulation and the underlying cause. Patients may present with nonspecific symptoms such as shortness of breath, chest discomfort, fatigue, or lightheadedness. In more advanced cases, features of shock may develop, including hypotension, tachycardia, and altered mental status [12,15]. The classical clinical findings of cardiac tamponade include hypotension, elevated jugular venous pressure, and muffled heart sounds. These findings, often described as Beck triad, may not always be present, particularly in early or subacute cases. As a result, clinicians must maintain a high index of suspicion, especially in patients with risk factors for pericardial disease. Additional signs such as pulsus paradoxus, tachypnea, and peripheral edema may provide further clues. However, these findings can be subtle and easily overlooked, particularly in critically ill patients where multiple conditions may coexist [10,13]. The causes of pericardial effusion and tamponade are diverse. Common etiologies include infection, autoimmune disease, trauma, uremia, and malignancy. In many parts of the world, malignancy has become one of the leading causes of large pericardial effusions requiring intervention. Malignant pericardial effusion may result from direct invasion of the pericardium, metastatic spread, or lymphatic obstruction. Tumors such as lung cancer, breast cancer, and hematological malignancies are among the most frequently implicated. In some patients, pericardial involvement may be the first manifestation of an otherwise undiagnosed cancer [1,14]. Malignant pericardial effusion is often associated with poor prognosis, particularly when it presents late in the course of disease. However, in certain cases, it may be the initial clue that leads to the diagnosis of an underlying malignancy. Patients may present with cardiac tamponade without any prior history of cancer, creating a diagnostic challenge for clinicians. In such situations, the pericardial fluid itself may provide important diagnostic information through cytological analysis, which can reveal malignant cells and help identify the primary source [1,3]. The pathophysiology of cardiac tamponade involves progressive accumulation of fluid within a relatively fixed pericardial space. As fluid volume increases, intrapericardial pressure begins to exceed intracardiac pressures, particularly during diastole. This leads to impaired ventricular filling and reduced stroke volume. Compensatory mechanisms such as tachycardia and peripheral vasoconstriction may initially maintain blood pressure. However, as the condition progresses, these mechanisms become insufficient, resulting in hemodynamic instability and shock. Without timely intervention, tamponade can rapidly become fatal [12,15]. In malignant cases, the fluid within the pericardium is often hemorrhagic, reflecting tumor related vascular involvement and inflammation. The presence of bloody pericardial fluid should raise suspicion for malignancy, although other causes such as tuberculosis and trauma must also be considered. In clinical practice, distinguishing between different etiologies can be challenging, particularly in the acute setting where immediate management takes priority over definitive diagnosis [6,14]. Diagnosis of pericardial effusion and tamponade relies on a combination of clinical assessment and imaging. Echocardiography is the most important and widely used tool for confirming the diagnosis. It allows visualization of pericardial fluid and assessment of its hemodynamic impact, including chamber collapse and respiratory variation in ventricular filling. Computed tomography and magnetic resonance imaging may also provide additional information, particularly when evaluating for underlying malignancy or other structural abnormalities [10,15]. Electrocardiography and chest radiography may provide supportive findings but are not sufficient to establish the diagnosis. ECG changes such as low voltage complexes or electrical alternans may be seen in some patients with large effusions. Chest imaging may show an enlarged cardiac silhouette, although this finding is typically associated with more chronic fluid accumulation. In acute tamponade, imaging findings may be less obvious, further emphasizing the importance of clinical suspicion and bedside echocardiography [12,13]. Management of

cardiac tamponade is a medical emergency that requires prompt drainage of the pericardial fluid. Pericardiocentesis is the most commonly performed procedure and can be life saving when performed in a timely manner. In some cases, surgical drainage may be required, particularly when there is recurrent effusion or when tissue biopsy is needed to establish a diagnosis. Supportive care, including fluid resuscitation and hemodynamic monitoring, is also essential during the acute phase of management [2,12]. In patients with malignant pericardial effusion, treatment does not end with drainage alone. Management of the underlying malignancy is crucial to prevent recurrence and improve overall prognosis. Depending on the type of cancer, treatment options may include chemotherapy, radiotherapy, or targeted therapy. Despite these interventions, recurrence of effusion is common, and some patients may require repeated drainage procedures or more definitive surgical approaches such as pericardial window creation [2,3]. The clinical presentation of malignant pericardial effusion can vary widely. Some patients present with slowly progressive symptoms, while others develop acute tamponade with rapid deterioration. This variability can make early diagnosis difficult, particularly in patients without a known history of cancer. In such cases, the diagnosis may only become apparent after pericardial fluid analysis or further imaging studies reveal an underlying malignancy. This highlights the importance of considering cancer as a potential cause in patients presenting with unexplained pericardial effusion [1,7]. Several case reports and reviews have described cardiac tamponade as the initial presentation of different malignancies, including lung cancer, breast cancer, and lymphoma. These reports emphasize that pericardial involvement may occur even in the absence of other obvious signs of cancer. In some patients, cardiac tamponade may be the first and most prominent clinical feature, leading to the eventual diagnosis of malignancy after further investigation [4,6]. The presence of hemorrhagic pericardial effusion often raises concern for malignant or tuberculous causes. In regions where tuberculosis is prevalent, it remains an important differential diagnosis. However, in many modern clinical settings, malignancy is increasingly recognized as a leading cause of bloody pericardial effusion. Careful evaluation, including microbiological and cytological studies, is therefore essential to establish the correct diagnosis and guide appropriate management [14,15]. From a clinical perspective, patients presenting with cardiac tamponade require rapid stabilization and coordinated care. Emergency physicians, cardiologists, intensivists, and oncologists may all be involved in the management process. Early recognition, timely intervention, and appropriate diagnostic evaluation are key elements in improving patient outcomes. Failure to identify the underlying cause may lead to recurrence or delayed treatment of serious conditions such as malignancy [10,12]. Case reports play an important role in highlighting unusual presentations and rare clinical scenarios. Although malignant pericardial effusion is well described in the literature, cases in which cardiac tamponade is the first indication of an undiagnosed malignancy remain relatively uncommon. These cases can present significant diagnostic challenges, particularly when the initial presentation is acute and life threatening. Documentation of such cases contributes to increased awareness and may help clinicians recognize similar presentations in the future [3,6]. The coexistence of acute cardiac tamponade with previously undiagnosed malignancy underscores the need for a broad differential diagnosis when evaluating patients with pericardial effusion. While immediate management focuses on relieving hemodynamic compromise, attention must also be directed toward identifying the underlying etiology. This often requires a combination of imaging, laboratory studies, and pathological evaluation of pericardial fluid or tissue [1,3]. In summary, cardiac tamponade is a critical condition that requires prompt recognition and intervention. Malignancy represents an important and sometimes overlooked cause, particularly when it presents without prior diagnosis. The presence of bloody pericardial fluid should raise suspicion for malignant involvement, although other causes must also be considered. Through careful clinical assessment and appropriate investigations, clinicians can identify the underlying cause and guide further management. The present case report describes a patient who presented with cardiac tamponade as the first manifestation of an undiagnosed malignancy. The case highlights the diagnostic challenges associated with this presentation and emphasizes the importance of maintaining clinical awareness when evaluating patients with pericardial effusion.

Case Presentation

This case involves a 58 year old male who was brought to the emergency department by his family due to progressive shortness of breath and generalized weakness over the past one week. The patient lived with his wife and was independent in his daily activities prior to this illness. According to his family, he had been in his usual state of health until approximately ten days before presentation, when he began to complain of mild fatigue and reduced exercise tolerance. Over the following days, his symptoms gradually worsened, and he developed increasing shortness of breath, initially on exertion and later at rest. Three days prior to presentation, the patient started to experience a sensation of chest heaviness that he described as constant and non radiating. It was not related to exertion and was not relieved by rest. He also reported difficulty lying flat and had been sleeping with multiple pillows. His family noted that he appeared more fatigued than usual and had reduced oral intake. On the day of presentation, his symptoms worsened significantly, and he became noticeably breathless even at rest. He also appeared pale and lethargic, prompting his family to bring him to the hospital. There was no history of fever, cough, or recent upper respiratory

symptoms. The patient denied any history of trauma. There was no history of known malignancy. He did not report weight loss, night sweats, or loss of appetite prior to this illness, although his family mentioned that his appetite had decreased slightly over the past few days. There was no history of tuberculosis exposure. He denied any recent travel or sick contacts. His past medical history was significant for hypertension, for which he was on regular medication. He had no known history of ischemic heart disease, chronic lung disease, or renal disease. He had never undergone any major surgical procedures. He was a former smoker with a smoking history of approximately twenty pack years but had quit several years ago. There was no significant family history of cardiac disease or malignancy. Upon arrival to the emergency department, the patient appeared acutely unwell. He was alert but looked fatigued and breathless while speaking. He was immediately placed on a monitor, and initial assessment was started. His vital signs showed a blood pressure of 92 over 60 millimeters of mercury, heart rate of 118 beats per minute, respiratory rate of 24 breaths per minute, temperature of 36.7 degrees Celsius, and oxygen saturation of 95 percent on room air. He appeared tachycardic and mildly hypotensive. He was sitting upright on the bed and appeared uncomfortable when asked to lie flat. Peripheral perfusion appeared slightly reduced with cool extremities. There was no obvious cyanosis. The nursing staff noted that he required assistance with minimal movement due to shortness of breath. On focused cardiovascular examination, heart sounds were noted to be soft on auscultation. There was no obvious murmur. Peripheral pulses were present but felt weak. Jugular venous distension was noted while the patient was in a semi upright position. Respiratory examination showed reduced air entry at the lung bases bilaterally, but no obvious wheeze or crackles were appreciated. His breathing appeared labored but without overt signs of respiratory failure. Abdominal examination was unremarkable. There was no tenderness or distension. No peripheral edema was noted in the lower limbs. Neurological examination was grossly normal, with the patient being oriented and able to follow commands, although he appeared fatigued. Given his presentation with hypotension, tachycardia, and shortness of breath, the initial differential diagnosis included acute coronary syndrome, pulmonary embolism, and possible pericardial pathology. An electrocardiogram was performed shortly after arrival and showed sinus tachycardia without clear ischemic changes. There was no evidence of ST elevation or significant arrhythmia. As part of the initial workup, a chest radiograph was obtained. The imaging demonstrated marked enlargement of the cardiac silhouette, giving the appearance of massive cardiomegaly (Figure 1). The lung fields did not show clear focal consolidation. There was no obvious pneumothorax. The radiographic appearance raised suspicion for a large pericardial effusion among other possible causes of an enlarged cardiac silhouette.

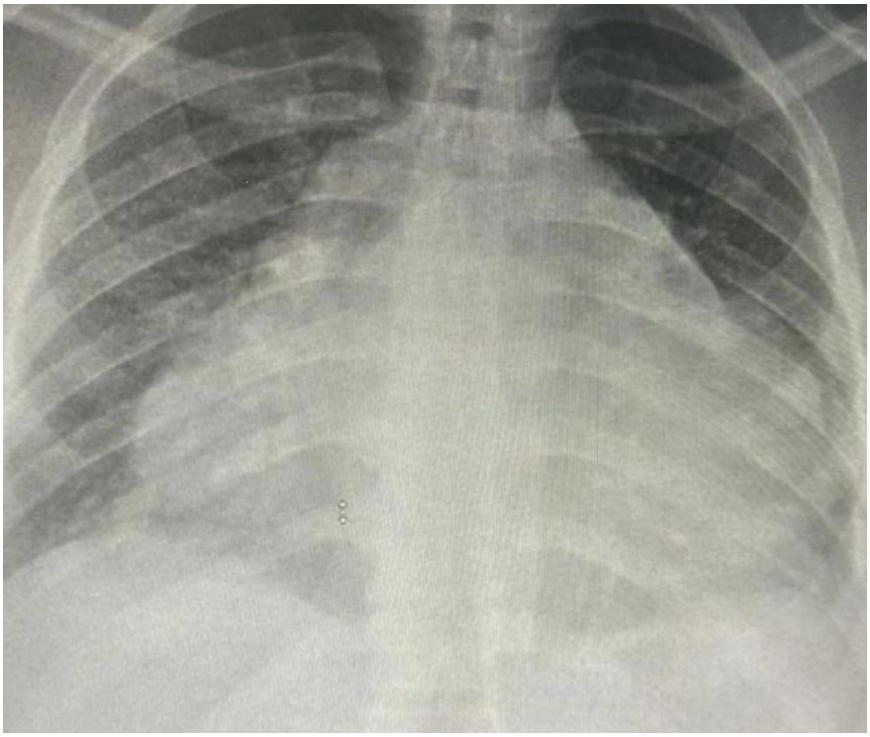

Figure 1: Chest radiograph demonstrating marked enlargement of the cardiac silhouette suggestive of massive cardiomegaly, raising concern for pericardial effusion.

In view of the clinical picture and chest x ray findings, a bedside echocardiogram was performed in the emergency department. The study revealed a moderate to severe pericardial effusion with evidence of right atrial and right ventricular collapse during diastole, consistent with cardiac tamponade physiology (Figure 2). The inferior vena cava appeared dilated with reduced respiratory variation. These findings supported the diagnosis of hemodynamically significant pericardial effusion.

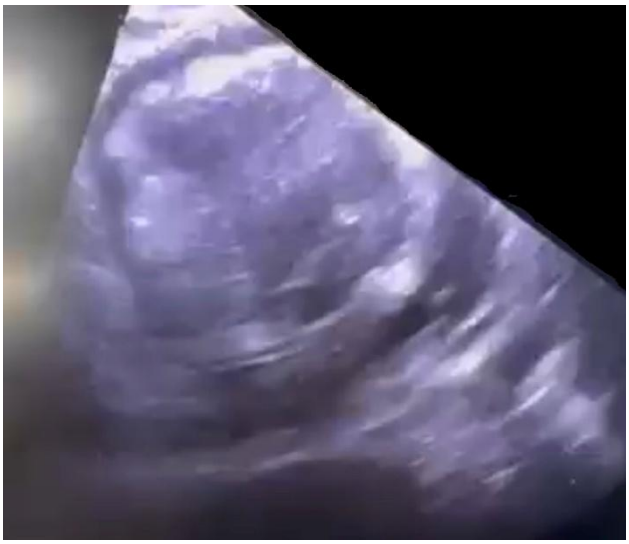

Figure 2: Bedside echocardiography showing moderate to severe pericardial effusion with features suggestive of tamponade physiology.

At this stage, the patient's clinical condition was concerning for evolving cardiac tamponade. He remained hypotensive with persistent tachycardia despite initial fluid resuscitation. Given the echocardiographic findings and clinical instability, the decision was made to proceed with urgent pericardiocentesis. The procedure was performed at the bedside under ultrasound guidance. Standard aseptic precautions were followed. Upon insertion of the needle into the pericardial space, dark blood was aspirated immediately. Approximately 400 milliliters of hemorrhagic fluid was drained during the initial procedure, with noticeable improvement in the patient's symptoms and hemodynamic status.

Figure 3: Aspirated syringe demonstrating hemorrhagic pericardial fluid obtained during pericardiocentesis.

Following the procedure, the patient reported improvement in his breathing. His blood pressure improved to 108 over 70 millimeters of mercury, and heart rate decreased to around 96 beats per minute. He appeared more comfortable and was able to lie back with less distress. Continuous monitoring was maintained, and a pericardial drain was left in place for ongoing drainage.

The presence of hemorrhagic pericardial fluid raised concern for an underlying malignant or less commonly infectious cause. Samples of the fluid were sent for laboratory analysis, including cytology, microbiology, and biochemical studies. Initial laboratory investigations obtained in the emergency department showed a hemoglobin level of 11.2 grams per deciliter, white blood cell count of 12,800 cells per microliter, and platelet count of 310,000 per microliter. Renal function and electrolyte levels were within acceptable limits. Liver function tests were unremarkable. Cardiac enzymes were not significantly elevated. Inflammatory markers were mildly raised. These findings were nonspecific but supported an ongoing systemic process.

Given the absence of a prior diagnosis of malignancy and the acute presentation with hemorrhagic pericardial effusion, further evaluation was planned to identify the underlying cause. A computed tomography scan of the chest, abdomen, and pelvis was arranged after initial stabilization to look for a possible primary malignancy or metastatic disease. During the early hospital course, the patient remained under close observation in a monitored setting. The pericardial drain continued to yield blood stained fluid over the next several hours. Repeat bedside echocardiography showed a reduction in the size of the effusion with improvement in cardiac filling. Over the following days, cytological analysis of the pericardial fluid revealed malignant cells suggestive of an underlying carcinoma. Further imaging later identified a suspicious lesion in the lung, raising the possibility of a primary lung malignancy with pericardial involvement. This case illustrates a patient presenting with cardiac tamponade as the initial manifestation of an undiagnosed malignancy. The presentation was acute, with nonspecific symptoms that rapidly progressed to hemodynamic compromise. The diagnosis required a combination of clinical suspicion, imaging, and procedural intervention. The finding of hemorrhagic pericardial fluid played a key role in raising concern for malignancy and guided further diagnostic evaluation. The case highlights the importance of early bedside echocardiography in unstable patients and the need to consider malignant causes in patients presenting with unexplained pericardial effusion, even in the absence of a known cancer diagnosis.

Management course

Management of the patient began immediately after confirmation of cardiac tamponade on bedside echocardiography. At that stage, the main concern was hemodynamic instability due to compression of the heart by the pericardial fluid. The patient was managed jointly by the emergency medicine and cardiology teams, with early involvement of intensive care given the risk of sudden deterioration. Initial management in the emergency department focused on stabilization. The patient was placed on continuous cardiac monitoring and frequent blood pressure checks. Two peripheral intravenous lines were secured to allow rapid administration of fluids and medications. Supplemental oxygen was given through nasal cannula to maintain adequate oxygenation. He was kept in a semi sitting position as he was unable to tolerate lying flat. A cautious fluid bolus with isotonic saline was started in an attempt to support preload and maintain cardiac output. Despite this, his blood pressure remained borderline low, and he continued to have tachycardia. Given the clinical picture and echocardiographic findings, the decision was made to proceed with urgent pericardiocentesis without delay. The procedure was performed at the bedside under ultrasound guidance by the cardiology team. Standard sterile precautions were followed. After local anesthesia, a needle was advanced into the pericardial space, and immediate return of dark hemorrhagic fluid was obtained. A catheter was then placed, and approximately 400 milliliters of fluid was drained initially. The patient showed noticeable clinical improvement during the procedure, with better breathing and improved blood pressure. Following drainage, the patient was kept under close observation. The pericardial catheter was left in place and connected to a drainage system to allow continued drainage of fluid. Serial monitoring of vital signs showed gradual stabilization. His blood pressure improved, and heart rate decreased over the next few hours. Repeat bedside echocardiography confirmed a reduction in the size of the effusion and improvement in cardiac filling. After initial stabilization, the patient was admitted to a monitored bed for ongoing care. The focus at this stage shifted to identifying the underlying cause of the hemorrhagic pericardial effusion. Fluid obtained during pericardiocentesis was sent for laboratory analysis, including cell count, cytology, bacterial culture, and acid fast bacilli testing. Empirical treatment was not started immediately as there were no clear signs of infection such as fever or strong clinical suspicion of sepsis. Instead, the plan was to guide further treatment based on investigation results. Daily review of the drain output was performed, and the amount of fluid gradually decreased over the next two days. Further imaging was arranged once the patient became hemodynamically stable. A computed tomography scan of the chest was performed to evaluate for possible malignancy or other structural causes. The imaging revealed a suspicious mass in the right lung with associated mediastinal lymphadenopathy. There was no large pleural effusion. These findings raised strong suspicion for an underlying lung malignancy with pericardial involvement. During his hospital stay, the patient remained clinically stable. He continued to improve symptomatically, with resolution of shortness of breath and improved exercise tolerance. The pericardial drain output reduced significantly and became minimal by day three. A repeat echocardiogram showed only a small residual effusion without features of tamponade. Based on the clinical improvement and low drain output, the pericardial catheter was removed. The patient tolerated the removal without complications. He was

monitored for recurrence of symptoms, and no immediate reaccumulation of fluid was noted. Cytology results of the pericardial fluid became available during admission and showed malignant cells consistent with carcinoma. This finding confirmed that the pericardial effusion was secondary to an underlying malignancy. In view of the imaging findings and cytology results, the working diagnosis was malignant pericardial effusion likely secondary to primary lung cancer. At this stage, the oncology team was consulted for further evaluation and management. Additional investigations were planned, including tissue biopsy to confirm the primary source and determine the histological type of the tumor. The patient and his family were informed about the findings in a clear and gradual manner, with explanation of the need for further tests. Supportive care continued during the remainder of his hospital stay. His blood pressure remained stable without the need for vasopressors. Oral intake improved, and he was able to mobilize with minimal assistance. Pain was not a significant issue, and no strong analgesia was required. Before discharge, arrangements were made for outpatient follow up with oncology for further workup and management of the suspected malignancy. A referral was sent to a specialized oncology center for continuation of care, including biopsy, staging, and discussion of treatment options depending on final diagnosis.

The patient was discharged in stable condition with clear instructions to return immediately if he developed recurrence of shortness of breath, chest pain, or dizziness. He was also scheduled for follow up with cardiology to monitor for possible recurrence of pericardial effusion. This case reflects a serious presentation where cardiac tamponade was the first clinical indication of an underlying malignancy. Early recognition, prompt intervention with pericardiocentesis, and coordinated multidisciplinary care were essential in stabilizing the patient and guiding further management toward definitive diagnosis and oncological treatment.

Discussion

Cardiac tamponade represents one of the most time sensitive cardiovascular emergencies, characterized by impaired cardiac filling due to accumulation of fluid within the pericardial space. Although commonly associated with trauma or idiopathic pericarditis, malignancy remains a major non traumatic cause, particularly in advanced cancer. The present case illustrates an important and often under recognized clinical scenario in which lung cancer first manifests as cardiac tamponade. This mode of presentation, while uncommon, carries significant diagnostic and prognostic implications and requires a high index of suspicion, especially when patients present with otherwise unexplained hemodynamic compromise. Malignant pericardial effusion accounts for a substantial proportion of large pericardial effusions encountered in clinical practice. Epidemiological data suggest that malignancy is responsible for approximately 15 to 25 percent of all pericardial effusions, with lung cancer being the most frequent primary source, followed by breast cancer and hematological malignancies [3,14]. Among patients with known malignancy, pericardial involvement may occur in up to 10 to 20 percent of cases, although clinically significant tamponade develops in a smaller subset. Importantly, in a notable proportion of patients, estimated at around 20 to 30 percent in some series, pericardial effusion may be the initial presentation leading to the diagnosis of an underlying cancer [7,8]. This highlights the importance of considering malignancy in the differential diagnosis of new onset pericardial effusion, particularly when no obvious benign cause is identified. Lung cancer has a particular predilection for pericardial involvement due to its anatomical proximity and propensity for lymphatic and hematogenous spread. Direct invasion, lymphatic obstruction, and metastatic seeding of the pericardium all contribute to fluid accumulation. Adenocarcinoma is the histological subtype most commonly associated with malignant pericardial effusion. The development of tamponade in this context often reflects advanced stage disease and is associated with poor overall prognosis, with reported median survival ranging from 2 to 6 months depending on response to oncological therapy [6,14]. Despite this, early recognition and appropriate management can provide meaningful symptomatic relief and, in selected cases, prolong survival. The clinical presentation of cardiac tamponade can be subtle and variable, particularly in malignant cases where fluid accumulation is often gradual. Classic findings such as hypotension, elevated jugular venous pressure, and muffled heart sounds, commonly referred to as Beck triad, are present in a minority of patients. More frequently, patients present with nonspecific symptoms including progressive dyspnea, chest discomfort, fatigue, and tachycardia. In oncological patients, these symptoms may be mistakenly attributed to primary pulmonary disease or general cancer related decline, leading to delayed diagnosis. This diagnostic challenge is well described in the literature, where delayed recognition of malignant pericardial effusion has been associated with worse outcomes [8]. From a pathophysiological standpoint, the hemodynamic impact of pericardial effusion depends not only on the volume of fluid but also on the rate of accumulation and pericardial compliance. Rapid accumulation of even a small volume can lead to tamponade, whereas slow accumulation may allow the pericardium to stretch and accommodate larger volumes before critical pressure is reached. In malignant effusions, the process is often subacute, allowing significant fluid buildup before overt hemodynamic collapse occurs. However, once intrapericardial pressure exceeds intracardiac filling pressures, diastolic collapse of cardiac chambers ensues, resulting in reduced stroke volume and compensatory tachycardia. If untreated, this can progress to obstructive shock and death. Echocardiography remains the cornerstone of diagnosis and is recommended as the first line imaging modality in all suspected cases of pericardial effusion and tamponade according to contemporary guidelines [10,13]. Key echocardiographic

findings include right atrial and right ventricular diastolic collapse, respiratory variation in transvalvular flow, and inferior vena cava plethora. In the present case, early use of echocardiography was critical in confirming the diagnosis and guiding urgent intervention. Computed tomography may also provide additional information, particularly in identifying underlying malignancy or associated thoracic pathology such as lung masses or lymphadenopathy. Current guideline directed management of cardiac tamponade emphasizes immediate hemodynamic stabilization followed by urgent drainage of pericardial fluid. Pericardiocentesis is the preferred initial intervention and is associated with rapid symptomatic improvement in most patients [12,13]. In malignant effusions, however, recurrence rates after simple pericardiocentesis are relatively high, reported in up to 40 to 50 percent of cases. Therefore, additional strategies such as prolonged catheter drainage, intrapericardial sclerotherapy, or creation of a surgical pericardial window may be considered to reduce recurrence risk [3,11]. The choice of intervention should be individualized based on patient condition, expected survival, and available expertise. An important clinical insight highlighted by this case is the need to pursue etiological diagnosis following initial stabilization. Pericardial fluid analysis, including cytology, plays a central role in confirming malignant involvement. Cytological examination has a sensitivity ranging from 60 to 80 percent, and repeat sampling may increase diagnostic yield [14,15]. In cases where cytology is inconclusive, pericardial biopsy or advanced imaging may be required. Identification of the underlying malignancy is essential not only for diagnosis but also for guiding subsequent oncological management.

The integration of oncological therapy with pericardial drainage has been shown to improve outcomes in selected patients. Systemic chemotherapy, targeted therapy, or immunotherapy directed at the primary tumor can reduce recurrence of effusion and may prolong survival. For example, case reports and small series have demonstrated successful control of malignant pericardial effusion with combined pericardiocentesis and cancer specific treatment, particularly in lung adenocarcinoma with actionable mutations [2]. This underscores the importance of early multidisciplinary involvement, including cardiology, oncology, and cardiothoracic surgery teams. Another important consideration is the differential diagnosis of pericardial effusion in cancer patients. Not all effusions in this population are malignant. Alternative causes include radiation induced pericarditis, chemotherapy related toxicity, infection, and autoimmune processes. Distinguishing between malignant and non malignant causes has important therapeutic and prognostic implications. Clinical context, imaging features, and fluid analysis all contribute to accurate diagnosis. The prognostic significance of malignant pericardial effusion should not be underestimated. Its presence generally indicates advanced disease and is associated with reduced survival compared to patients without pericardial involvement. However, prognosis varies depending on tumor type, extent of metastasis, and response to therapy. Lung cancer associated tamponade tends to have a poorer prognosis compared to breast cancer or hematological malignancies. Nevertheless, prompt recognition and management can significantly improve quality of life by relieving symptoms such as dyspnea and chest discomfort.

From a practical clinical perspective, this case reinforces several key diagnostic cues. First, unexplained hypotension or tachycardia in a patient with respiratory symptoms should prompt consideration of cardiac causes, including tamponade. Second, the presence of enlarged cardiac silhouette on chest imaging in conjunction with dyspnea should not be dismissed and warrants further evaluation with echocardiography. Third, clinicians should maintain a low threshold for performing bedside ultrasound in unstable patients, as this can rapidly identify life threatening conditions and guide immediate management. In addition, this case highlights the evolving role of point of care ultrasound in emergency and critical care settings. Bedside echocardiography allows rapid assessment of pericardial effusion and cardiac function, facilitating early diagnosis even before formal imaging is available. Incorporation of focused cardiac ultrasound into routine evaluation of hemodynamically unstable patients has been strongly advocated in recent clinical practice recommendations [10]. The literature also emphasizes the importance of recognizing atypical presentations of malignancy. Cardiac tamponade as the first manifestation of lung cancer is rare but well documented. Such presentations may lead to initial evaluation by cardiologists or emergency physicians rather than oncologists, which can delay definitive diagnosis if malignancy is not considered early. Awareness of this possibility can improve diagnostic efficiency and ensure timely referral for further evaluation. Finally, the management of malignant pericardial effusion exemplifies the need for a patient centered approach that balances acute life saving interventions with overall prognosis and goals of care. In patients with advanced malignancy and limited life expectancy, the focus may shift toward symptom control and quality of life rather than aggressive invasive procedures. Shared decision making with patients and their families is therefore an essential component of care. In summary, this case demonstrates a clinically significant and potentially life threatening presentation of lung cancer as cardiac tamponade. It underscores the importance of early recognition of tamponade physiology, prompt use of echocardiography, and urgent pericardial drainage in accordance with current guidelines. It also highlights the need to investigate underlying causes, particularly malignancy, in patients with unexplained pericardial effusion. Integration of cardiological and oncological management strategies is essential for optimizing patient outcomes. Increased awareness of such atypical presentations can enhance clinical vigilance and improve the timeliness of diagnosis and treatment in similar cases.

Conclusion

This case underscores several important clinical lessons in the evaluation and management of pericardial disease. Cardiac tamponade may present with nonspecific symptoms such as dyspnea and fatigue, making early recognition challenging. Simple

bedside findings including hypotension, tachycardia, and jugular venous distension should raise suspicion and prompt urgent imaging. Bedside echocardiography remains a critical diagnostic tool that allows rapid confirmation and guides immediate management. Hemorrhagic pericardial effusion should always prompt evaluation for malignancy, even in patients without a prior cancer diagnosis. Early pericardiocentesis is life saving and provides both therapeutic and diagnostic benefit. This case also highlights the importance of a multidisciplinary approach involving emergency, cardiology, and oncology teams to ensure timely diagnosis and continuity of care. Clinicians should maintain a broad differential diagnosis in acute presentations and remain alert to atypical manifestations of malignancy, as early detection can significantly impact patient outcomes and guide appropriate long term management.

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