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**Table 5:** Additional Workup

| ANA | RF | CRP | ESR | Anti- CCP | C3 | C4 | SSB | SSA/SS B |
|---|---|---|---|---|---|---|---|---|
| Positive 1:320 | <15 | 10.5 | 2 | | 91 | 24 | 4.0AU/ml | 5Au/ml -normal |

**Abbreviations:** ANA - Antineutrophil antibody, SSA/SSB- Sjogren syndrome antibody, CRP- C reactive protein, ESR- Erythrocyte sedimentation rate, C3/C4– Complement 3/Complement 4, RF– Rheumatoid Factor, CCP – Cyclic Citrulinated peptide

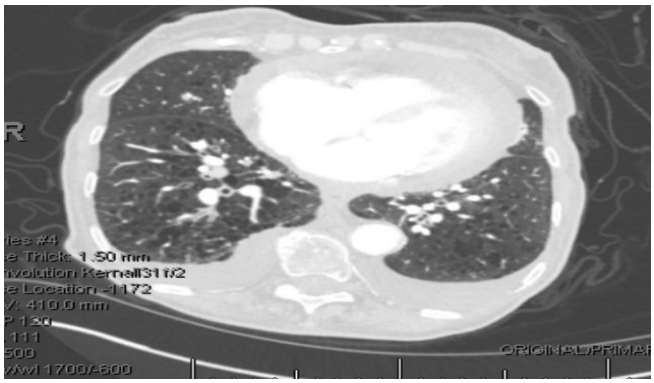

**Figure 1:**CT(computed tomography) of the chest showing moderate pericardial effusion. Image 121/160— 1.5 cm nodule

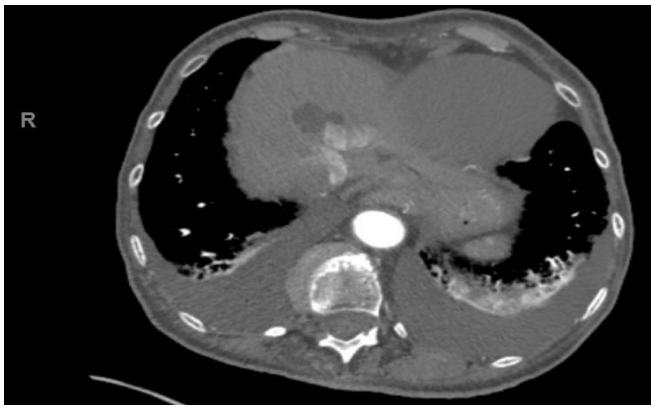

**Figure 2:**CT(computed tomography) chest showing bilateral pleural effusions

with 6L by nasal cannula. TTE(transthoracic echocardiogram) showed a moderate pericardial effusion and the patient subsequently had a subxiphoid pericardial window, bronchoscopy and a right chest tube insertion. During this hospitalization, her respiratory status deteriorated and she necessitated 100% FiO2(Fraction of inspired oxygen) while on average volume assured pressure support. Due to the recent diagnosis of metastatic adenocarcinoma and her overall poor prognosis, her family decided to pursue comfort care. Life prolonging treatments were withdrawn and the patient passed away a couple of hours later.

## Discussion

This is the case of an 85 year old woman who was found to have lung adenocarcinoma only after she presented to the hospital with SOB and was discovered to have a moderate pericardial effusion.

Pericardial effusions in the western world are commonly idiopathic, but can be malignant in nature, affecting about 10% of cancer patients, one third of which will be fatal [2]. Per previous case series and meta-analysis, these malignancies can include lung cancers, breast cancers and lymphoma/ leukemia [4]. In the case of our patient, it happened to be a lung adenocarcinoma causing her pericardial effusion.

Metastatic malignancies are the most likely culprits rather than primary malignancies. However, the mechanism of formation of a pericardial effusion in a patient with a malignancy can be a product of metastasis to the pericardium [5], obstruction of the lymphatic drainage, chemotherapeutic drugs [6] or radiation therapy [2]. The ability to differentiate between these various causes rest on the results of the pericardial fluid analysis. Pericardial fluid cytology has been shown to have a sensitivity of about 95% and a specificity of about 100% in the diagnosis of malignant pericardial effusions. [7,8] Other studies like Kyriaki et al [9] showed a sensitivity of 82.76%, while Dragoescu et al [10] reported a false negative rate of 14.7%. Although pericardial fluid cytology remains a major cornerstone for the diagnosis of pericardial metastasis, false negative results may occur [10,11], meaning a one time negative pericardial fluid cytology sample does not equate to a definitive non-malignant pericardial effusion.

Malignant pericardial effusions can present in a variety of ways. In our patient, the chief complaint was only shortness of breath. However, depending on the acuity or the chronicity of the effusion build up, some patients can present with manifestations of a cardiac tamponade including tachycardia, hypotension, pulsus paradoxus, jugular venous distension, and muffled heart sounds [12].

The management of malignant pericardial effusion with echocardiographic signs of cardiac tamponade is quite straightforward. Emergent pericardiocentesis is the absolute treatment strategy in these patients [13]. However, in patients with pericardial effusions with no signs of hemodynamic instability, a decision has to be made regarding conservative management versus decreasing the risk of the effusion leading to a pericardial tamponade. The current questions for which recommendations are needed from cardiology boards are: When do we intervene in patients with moderate to large pericardial effusions? When are intrapericardial therapies like cisplatin needed [14]? When are invasive diagnostic techniques like a pericardial window and biopsy indicated?

In patients in whom pericardiocentesis is needed, the surgical approach via a subxiphoid incision is the preferred method for pericardial fluid drainage and it also allows for the possibility of pericardial tissue biopsy [15].

Unsurprisingly, the prognosis associated with malignant pleural effusions is abysmal. This is expected because the presence of malignant cells in the pericardium usually implies these patients have Stage IV cancers, considering the cancer has spread to neighboring organs. In this patient, from her first hospitalization to her death was about 26 days. Cullinane et al. [16] showed a similar median survival rate of about 3.2 months. In this study by Cullinane et al, a preoperative diagnosis of non-small cell carcinoma, the presence of a pleural effusion and a positive pathological finding correlated negatively with survival. Unfortunately, this patient had all three of these indices.

## Conclusion

Pericardial effusions are predominantly idiopathic in origin but malignancy remains a strong possibility to be considered in these cases. Recommendations regarding when to intervene in patients with moderate pericardial effusions, without signs of cardiac tamponade or hemodynamic instability remain unclear. Hence, it is important to put the entire clinical picture into context when making the decision of whether pericardiocentesis is needed or not.

Pericardial fluid cytology has a high sensitivity for the diagnosis of malignant pleural effusions, in fact, it has a greater sensitivity than pericardial histology. In the future, clear recommendations are also needed regarding the use of intrapericardial therapies like cisplatin and the utilization of surgical methods to prevent the recurrence of malignant pericardial effusions.

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