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EDİTÖRE MEKTUP / LETTER TO THE EDITOR

A case of right atrial pseudoaneurysm with a prediagnosis of COVID-19 pneumonia resulting in severe respiratory failure

COVID-19 pnömonisi öntanısı alan ağır solunum yetmezliği ile sonuçlanan sağ atriyal psödoanevrizma olgusu

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To the Editor,

Cardiac pseudoaneurysms occur when blood collects in the surrounding tissue of the damaged area of the wall as a result of damage to the wall of an atrium or a ventricle. Atrial aneurysms are much less common than ventricular aneurysms. Right atrial pseudoaneurysm (RAP) is a very rare condition that can be seen after cardiac surgery, blunt trauma or pericardial interventions[1-3]. RAP is usually a cystic cavity formed in the pericardium or prolipherative fibrous tissue after local rupture of the heart cavity which is often accompained by mural thrombus. Cardiac pseudoaneurysms have a high risk of rupture and poor prognosis. They can easyly cause cardiac tamponade, so rapid surgical repair is required when the pseudoaneurysm ruptures. RAP presenting with respiratory failure and hemoptysis is very rare. Here, we reported a patient who was hospitalized to the intensive care unit due to respiratory failure and Covid-19 pneumonia. He was diagnosed with RAP as a result of the examinations. Informed consent was obtained from the patient for the publication of the case, while he was hospitalized.

A 36-year-old male patient from Syria was transferred to the pandemic emergency department of our hospital with complaints of hemoptysis and shortness of breath. The patient had been his usual state of health until five days before the current admission. His temperature was 37.7°C, heart rate was 118 beats per minute, respiratory rate was 40 breaths per minute. The arrival saturation was 82%, and the saturation increased up to a maximum of 90% with the reservoir oxygen mask. Levels of electrolytes and results of kidney and liver function tests, viral serology tests, complement and coagulation tests were normal; other laboratory test results are shown in Table-1.

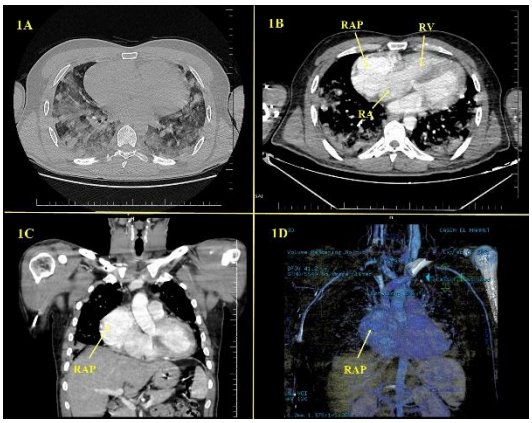

Figure-1. HRCT and Contrast enhanced CT views; A) An axial HRCT image, diffuse mixed ground-glass and consolidative opacities; B) An axial contrast enchanced CT image, large RAP with mural thrombus and bilateral multiple lung nodules; C) A coronal contrast enchanced CT image shows RAP; D) A 3-dimensional CT image shows RAP.

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An electrocardiography showed sinus tachicardia, rightward axis deviation, and nonspesific ST-T wave changes. High resolution computed tomography (HRCT) of the thorax revealed diffuse mixed ground-glass and consolidative opacities involving all lobes of the lungs (Figure-1A). The patient was taken to the pandemic intensive care unit with a preliminary diagnosis of Covid-19 pneumonia and PCR (polymerase chain reaction) test was performed. Noninvasive continious positive airway pressure was initiated. Intravenous vancomycin, piperacillin-tazobactam, levofloxacin and favipiravir were administered ampirically. Next day, the PCR test for Covid-19 pneumonia was negative. The patient was consulted to cardiology for the cardiomegaly shown in HRCT and other differential diagnosis of cardiac causes of hypoxia and hemoptysis. Transthoracic echocardiography (TTE) revealed a large RA-related ruptured cystic cavity in the lateral aspect of the RA with the size of 87*40 mm (Figure-2). Transesophageal echocardiography could not be performed because the patient had respiratory failure. Contrast echocardiography performed with agitated saline showed spontaneous buble transition to the cystic cavity associated with RA which is diagnosed with RAP. Contrast-enhanced CT of the thorax, performed after the administration of intravenous contrast material, ruled out pulmonary embolism but revealed large RAP with mural thrombus associated with bilateral multiple lung nodules (Figure-1B-D).

Table-1. Laboratory data

Variables	On admission	Follow-up value	Reference range
Hemoglobin (g/dL)	8.4	8.3	12-14
Hematocrit (%)	27.8	26.9	39-45
White-cell count (per µL)	14340	11420	4.3-10.3
Neutrophils (%)	68.4	86.3	41-73
Lymphocytes (%)	20.4	9.3	19.4-44.9
Monocytes (%)	10.1	2.1	5.1-10.9
Eosinophils (%)	0.8	2.2	0.9-6.0
Platelet count (per µL)	181000	81000	150000-450000
Procalcitonin (ng/mL)	0.11	0.93	0-0.046
C-reactive protein (mg/L)	41	179	0-5
D-dimer (mg/mL)	1.97	8.88	0-0.5
Ferritin (ng/mL)	859	1707	30-400
Prothrombin time (PT) (s)	11.5	13.0	10-14
Activated partial thromboplastin time (aPTT) (s)	23	20	21-36

We planned to investigate the cause of the patient's lung findings in terms of malignancy. Positron Emission Tomography-Computed Tomography (PET/CT) was planned for the patient who did not have a palpable mass on physical examination and no mass lesion could be detected on whole body CT. No malignancy or metastasis focus was detected in the PET/CT. No rheumatological disease was detected in the blood tests performed in terms of rheumatological diseases. Bronchoscopy and bronchoalveolar lavage were planned for hemoptysis, but the patient's symptoms of hemoptysis decreased. In addition, the patient had to be intubated within 2 days. The bronchoscopy decision was abandoned. In the following days, despite optimal FiO2 and PEEP values in the patient's invasive mechanical ventilator adequate partial pressure of oxygen in arterial blood gas could not be achieved, and the patient died of respiratory failure.

Cardiac pseudoaneurysm is a limited rupture of the myocardium and is a cystic formation in which the pericardium and a fibrous tissue surround the leak area. In true aneurysms, focal dilatation is present in all three layers of the cardiac wall (endocardium, myocardium, and pericardium). On the other hand, pseudoaneurysms are surrounded only by the visseral pericardium and have a high risk of rupture and fatal progression[4, 5]. Most common site of the cardiac pseudoaneurysm is the left ventricle and miyocardial infarction is the most common cause of the cardiac pseudoaneurysm[6].

RAP is very rare. There have been only a few cases of RAP appearing after chest trauma[2], cardiac surgery

and interventions[1, 3], and malignancy[7]. Probably one of the reasons behind the scarcity of reports describing it is the difficulty in its diagnosis and its fatal prognosis. Cardiac rupture in the pseudoaneurysm area usually leads to massive hemorrhage in the pericardium and mortality due to cardiac tamponade.

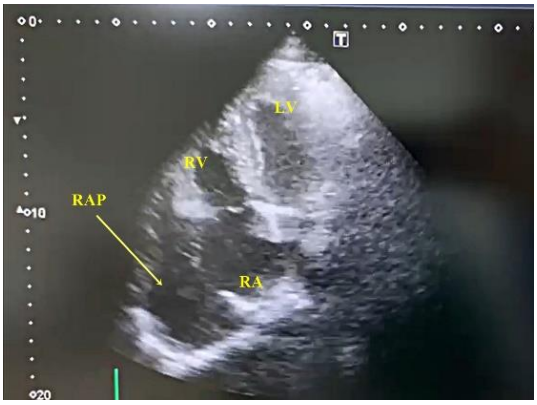

Figure 2. TTE, apical 4-chamber view; 87*40 mm large RA-related ruptured cystic cavity in the lateral aspect of the RA.

Patients with RAP may present with dyspnea, congestive heart failure, and chest pain. Additionally, patients may be asymptomatic[6]. Our case presented with hemoptysis and respiratory failure. Covid-19 pneumonia was suspected firstly due to the first HRCT, but the PCR test for Covid-19 pneumonia was negative. The diagnosis of RAP was confirmed by TTE and the agitated saline contrast echocardiography. The diagnosis was approved with contrast-enhanced thorax CT. In this case, there was no previous history of cardiac operation or intervention. There was no history of chest trauma. Therefore, all abdominal CT and PET-CT were taken, with an emphasis on the possibility of malignancy. However, no primary focus or metastasis area was detected in terms of malignancy. Although bronchoscopic investigations were initially planned for hemoptysis, it was concluded that there would be no additional diagnostic benefit since the diagnosis of RAP. It was concluded that the cause of hemoptysis was embolization to both lungs of mural thrombi, which were primarily in the pseudoaneurysm area. Bilateral lung damage was also attributed to this.

In this case, the main cause of the mortality of the patient was respiratory failure. RAP was diagnosed, but its etiology could not be determined. The hemodynamic status of the patient was stable. There was no pericardial effusion or cardiac tamponade. Therefore, urgent surgical repair was not considered and conservative management was planned. Since the right atrial pressure is low, urgent surgery should not be considered for patients similar to our case who do not develop cardiac tamponade or rupture, and the surgery should be postponed untill the patient's respiratory failure is treated.

In Covid-19 pneumonia, diffuse mixed ground-glass and consolidative opacities can be seen in HRCT. In our patient, Covid-19 pneumonia was also considered according to the HRCT images. Contrast enhanced CT performed after the patient was diagnosed with RAP by TTE, had revealed diffuse nodular opacities in both lungs. Embolization of the thrombi in the RAP lumen to the lungs was considered as the main cause of hemoptysis and respiratory failure in our patient. In every patient who addmitted to the emergency department with respiratory failure, other diagnoses other than Covid-19 pneumonia should be considered.

It should ve kept in mind that trauma, malignancy or cardiac interventions are not only the possible causes of RAP. There may be other unknown diseases in RAP etiology. Not all cardiac pseudoaneurysms require urgent surgery especially those that develop in the chronic process. RAP is one of the diagnoses that should be kept in mind in patients presenting with respiratory failure symptoms. A multidisciplinary manner with a combination of multiple imaging examinations are necessary to diagnose and treate patients whose etiology and pathognesia are unclear, like our case.

Yazar Katkıları: Çalışma konsepti/Tasarımı: VT; Veri toplama: VT; Veri analizi ve yorumlama: VT; Yazı taslağı: VT; İçeriğin eleştirel incelenmesi: VT; Son onay ve sorumluluk: VT; Teknik ve malzeme desteği: VT; Süpervizyon: VT; Fon sağlama (mevcut ise): yok.
Etik Onay: Bu çalışma için olgu sunumu olmasından dolayı etik kurul onayı alınmasına gerek yoktur. Görüntüler de dahil olmak üzere vaka raporunun yayınlanması için hastadan bilgilendirilmiş onam alındı.
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Ethical Approval: Since there is a case report for this study, there is no need to obtain the approval of the ethics committee. Informed consent was obtained from the patient for the publication of the case report including the images.
Peer-review: Editorial review.

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Acknowledgement: Reference values are affected by many variables, including the patient population and the laboratory methods used. The ranges used at Şanlıurfa Education and Research Hospital are for adults.

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