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Atrial Arrhythmias as a Complication of Cardiac Tamponade. Case Series and Review of Literature

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Abstract Atrial arrhythmias have been associated with a large number of medical conditions such as infection, chronic obstructive pulmonary disease, pulmonary embolism, hyperthyroidism, hypertension, and acute coronary syndrome to name a few. While less common, atrial arrhythmias have also been associated with disease processes causing pericardial inflammation. As such, presentation of atrial fibrillation/atrial flutter (A-Fib/A-Flutter) as a complication of pericardial effusion and the role of pericardiocentesis have not been well described. We report two cases of large pericardial effusions complicated by A-Fib/A-Flutter with immediate conversion to sinus rhythm following pericardiocentesis.

Keywords: *pericardial effusion, Pericardiocentesis, atrial fibrillation*

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1. Introduction

Atrial arrhythmias have been associated with a large number of medical conditions such as infection, chronic obstructive pulmonary disease, pulmonary embolism, hyperthyroidism, hypertension, and acute coronary syndrome to name a few. While less common, atrial arrhythmias have also been associated with disease processes causing pericardial inflammation. As such, presentation of atrial fibrillation/atrial flutter (A-Fib/A-Flutter) as a complication of pericardial effusion and the role of pericardiocentesis have not been well described. We report two cases of large pericardial effusions complicated by A-Fib/A-Flutter with immediate conversion to sinus rhythm following pericardiocentesis.

2. Case 1

A 76-year-old female presented to our hospital for six weeks of progressive dyspnea on exertion.

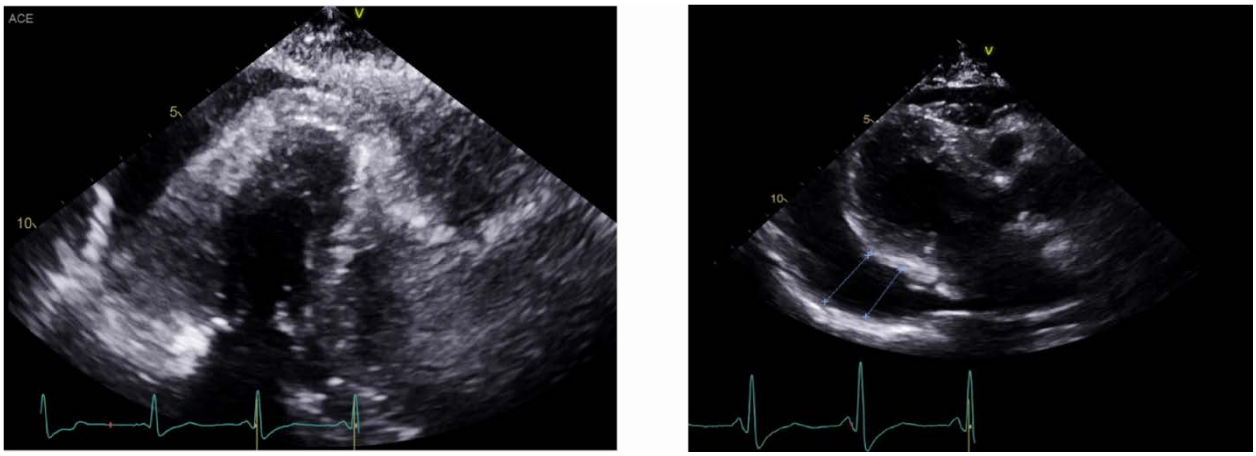

Figure 1. Transthoracic echocardiogram images showed large pericardial effusion with diameter of 2.7 cm and signs of right ventricular early diastolic collapse

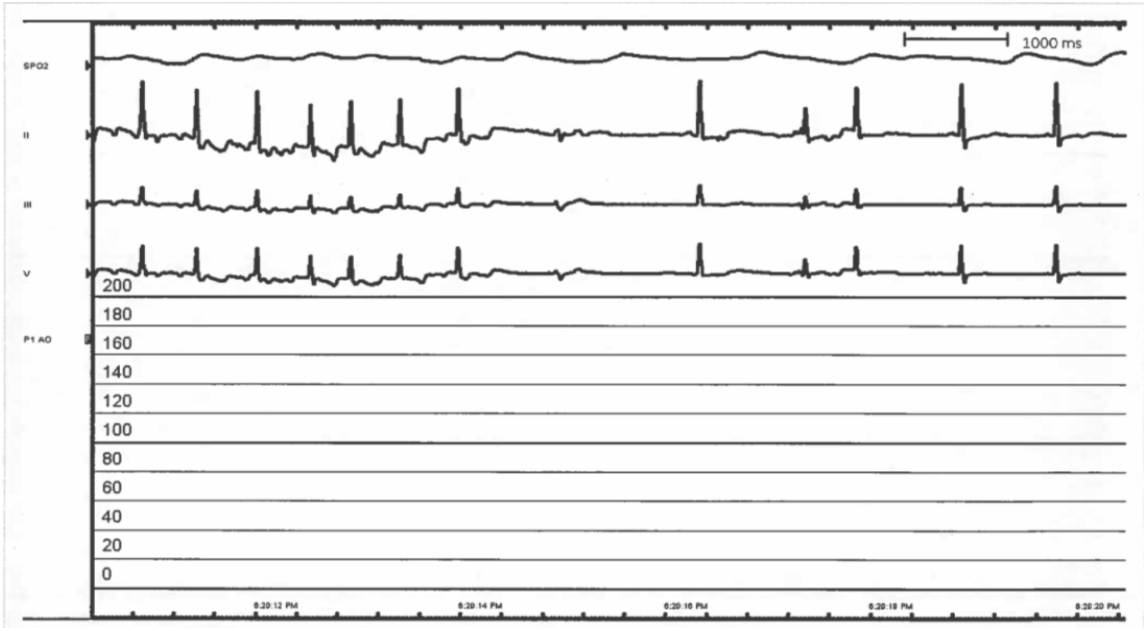

Figure 2. Telemetry tracing showing conversion of atrial fibrillation to sinus rhythm during pericardiocentesis

Her past medical history was significant for mixed connective tissue disease and recurrent lung adenocarcinoma initially treated two years previously with right lower lobe lobectomy without adjuvant chemoradiation therapy. Computerized tomography (CT) imaging revealed a new pericardial effusion further characterized on transthoracic echocardiogram (TTE) as a large circumferential pericardial effusion with signs of impending tamponade (Figure 1). Shortly after presentation, she developed atrial fibrillation (A-fib) with rapid ventricular response (RVR) at 150 bpm and pulsus paradoxus of 15 mmHg. Urgent pericardiocentesis yielded 530 mL of dark maroon colored fluid with immediate conversion back to normal sinus rhythm at 70 bpm (Figure 2) with symptomatic improvement. Cytology of the pericardial fluid confirmed poorly differentiated adenocarcinoma.

3. Case 2

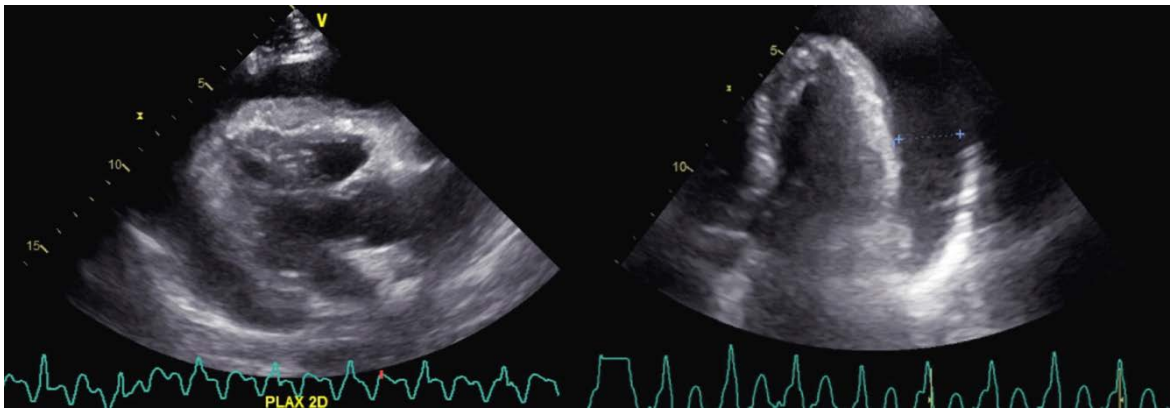

Figure 3. Transthoracic echocardiogram images demonstrating large pericardial effusion.

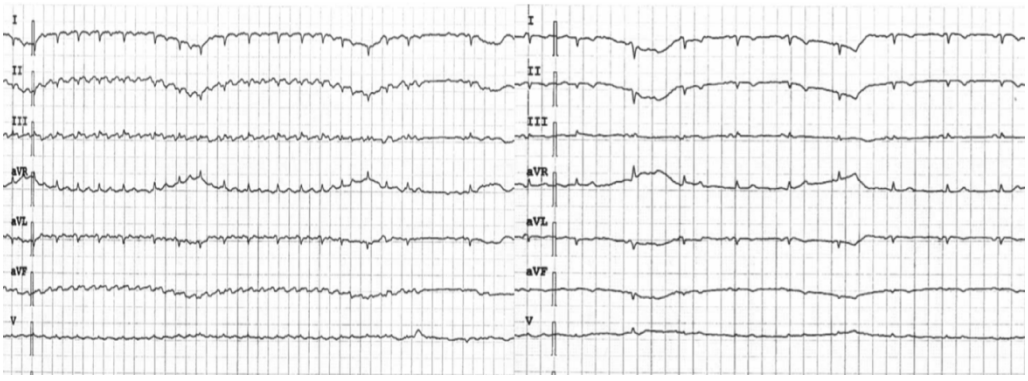

Figure 4. Telemetry tracing demonstrating conversion of atrial flutter to sinus rhythm during pericardiocentesis

A 63-year-old male presented to our hospital for worsening shortness of breath over the previous two-weeks. His past medical history was significant for intravenous drug use in addition to alcohol and tobacco abuse. CT imaging was significant for large right sided pleural effusion and large pericardial effusion later characterized on TTE as a large pericardial effusion with early diastolic collapse of the right ventricle suggesting cardiac tamponade (Figure 3). Patient subsequently developed acute hypoxemic respiratory failure. Thoracotomy with chest tube placement removed three liters of dark maroon colored fluid later confirmed as poorly differentiated adenocarcinoma on cytology. The following day, he developed atrial flutter (AF) with RVR, pulsus paradoxes of 14 mmHg and symptomatic hypotension. Given clinical concern of cardiac tamponade, emergent pericardiocentesis was performed and yielded 760 mL of hemorrhagic fluid with immediate conversion from AF to sinus rhythm and restoration of hemodynamic stability (Figure 4).

4. Discussion

Atrial arrhythmias have been frequently associated with medical conditions such as infection, chronic obstructive pulmonary disease, pulmonary embolus, postoperative state, hyperthyroidism, hypertension, and acute coronary syndrome [1,2,3]. In many cases, treatment of these underlying conditions usually results in termination of the arrhythmia. [4]. In addition, the association between pericardial disease and developing atrial fibrillation is not rare as arrhythmias are usually evident after few days of active pericardial inflammation [5]. In one case report, purulent pericardial effusion presented with atrial fibrillation with rapid rate [6].

The presence of atrial structural abnormalities such as fibrosis, hypertrophy, or dilation can increase susceptibility to atrial arrhythmias [7]. These abnormalities are often seen in the setting of heart failure, chronic hypertension, valvular heart disease, and cardiomyopathy which tend to increase left atrial pressure causing atrial dilation with increased wall stress. Previous cardiac surgery case reports have also demonstrated a role of pericardiocentesis in managing post-operative pericardial effusions with maintenance of sinus rhythm.

We present two cases of atrial fibrillation and atrial flutter developing as a complication of large pericardial effusion with impending tamponade and resolving immediately following pericardiocentesis. It is proposed that increased intra-pericardial pressure leading to increased external pressure on the atria can cause atrial arrhythmias independent of pericardial inflammation, since the restoration of sinus rhythm was immediate after pericardiocentesis, and neither patients received antiarrhythmic or anti-inflammatory medications. We suggest that reducing the pericardial pressure was the primary contributing factor in converting these two cases of unstable A-flutter and A-Fibrillation back to sinus rhythm. Hence, Increased pericardial pressure in the setting of pericardial effusion can be a triggering factor for atrial arrhythmias. It is important to note that in patients with impending tamponade and borderline hemodynamics, atrial arrythmias with rapid ventricular response can lead to hemodynamic decompensation. Although the usual treatment is immediate cardioversion, the concept of relieving the pericardial pressure leading to resolution of atrial arrythmias should be considered.

5. Conclusion

Patients with pericardial effusion and impending tamponade who develop atrial arrhythmias with rapid ventricular response need to be promptly recognized as their clinical situation can quickly deteriorate. Urgent pericardiocentesis plays an important role in reducing the intrapericardial pressure and restoring hemodynamic stability with sinus rhythm.

References

[1] Dunning, J., et al., Guidelines on the prevention and management of de novo atrial fibrillation after cardiac and thoracic surgery. European journal of cardio-thoracic surgery, 2006. 30(6): p. 852-872.

[2] Frost, L., P. Vestergaard, and L. Mosekilde, Hyperthyroidism and risk of atrial fibrillation or flutter: a population-based study. Archives of internal medicine, 2004. 164(15): p. 1675-1678.

[3] Hudson, L.D., et al., Arrhythmias associated with acute respiratory failure in patients with chronic airway obstruction. Chest, 1973. 63(5): p. 661-665.

[4] Rathore, S.S., et al., Acute myocardial infarction complicated by atrial fibrillation in the elderly: prevalence and outcomes. Circulation, 2000. 101(9): p. 969-974.

[5] January, C.T., et al., 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. Journal of the American College of Cardiology, 2014. 64(21): p. e1-e76.

[6] Kathrotia, A. and M.R. Hindupur, Massive purulent pericardial effusion presenting as atrial fibrillation with rapid rate: case report and review of the literature. The American journal of case reports, 2014. 15: p. 504.

[7] Kistler, P.M., et al., Electrophysiologic and electroanatomic changes in the human atrium associated with age. Journal of the American College of Cardiology, 2004. 44(1): p. 109-116.