



Rare Case of Right Ventricular Perforation during Pericardiocentesis: A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Iatrogenic cardiac injuries are potential complications arising from diagnostic and therapeutic procedures in cardiology, including interventions like cardiac catheterization, coronary angioplasty, and pacemaker implantation [1,2]. Pericardial tamponade can occur, with a prevalence of 0.12%, often requiring urgent intervention such as pericardiocentesis.

Patients with chronic pericardial effusion and signs of tamponade may adapt to gradual fluid accumulation, but vigilance for iatrogenic injuries remains crucial. Transthoracic echocardiography aids in rapid diagnosis and guides timely interventions [3]. Therefore, the right ventricular perforation seems to be one of these complications, and it may occur during pericardiocentesis.

Surgical approaches for acute tamponades vary, with median sternotomy enabling comprehensive

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exploration [4]. Echocardiographic monitoring can signal clinical deterioration, necessitating prompt fluid management and early intervention to optimize outcomes. Although, the therapies in right ventricular perforation are variable. In our case, we emphasize about the conservative approach.

Keywords: Ventricular perforation; Iatrogenic cardiac injuries; pericardiocentesis; cardiac trauma.

1. INTRODUCTION

Cardiac trauma necessitating immediate surgical intervention stands as a pivotal clinical concern within cardiac surgery, with delayed intervention being a leading cause of both iatrogenic and non-iatrogenic cardiac injuries. Iatrogenic incidents are predominantly observed in healthcare settings, notably during pericardiocentesis procedures which inherently bear the risk of cardiac injury. Among these injuries, right ventricular trauma emerges as a common occurrence during pericardiocentesis. Decisive early surgical intervention is guided significantly by frequent transaortic echocardiography assessments in urgent tamponade scenarios. Particularly in emergency diagnoses, timely transport and expedited surgical exploration serve as life-saving measures for these patients."

2. CASE PRESENTATION

55-year-old male patient, without modifiable cardiovascular risk. The patient presented to the emergency department for acute dyspnea stage

IV (New York heart association). He underwent pericardiocentesis once before due to pericardial effusion, presenting with recurrent fluid formation came in the emergency department.

Patient was monitored via, chest x-ray, echocardiography, one central venous catheter, and urinary catheter and followed.

Patient vital values were Blood Pressure: 88/41 mmHg, HR: 128 beats/min. Patient's echocardiography showed cardiac tamponade. Chest x-ray had massive pericardial effusion. The ECG showed a sinus tachycardia at 128 bpm, inverted T waves in the anterior territory and low QRS voltage.

Pericardiocentesis, under low sedation, was performed with the evacuation of 300cc of pericardial non clotting fluid.

At the end the patient moved brutally causing an injury by the 6F catheter.

The echocardiography showed right ventricular (RV) perforation with formation of a blood clot at the apex of the right ventricle Fig. 1.

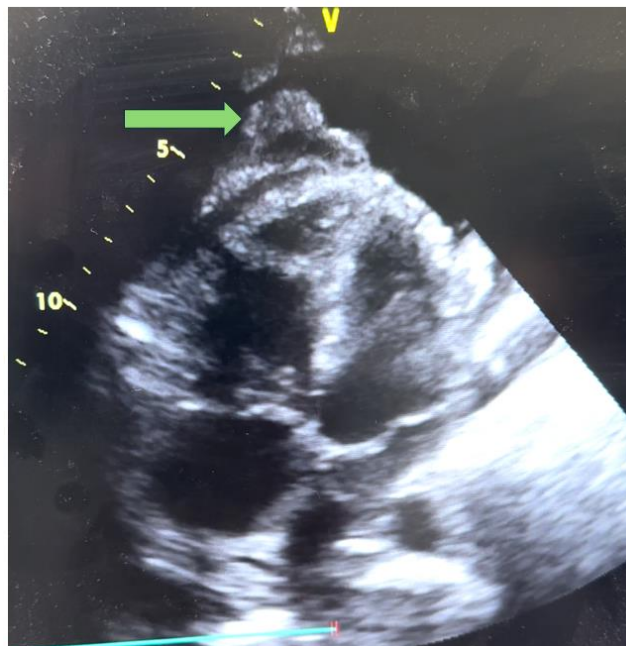


Fig. 1. Echocardiography showed the formation of a blood clot at the apex of the right ventricle

A day later the patient became unstable, so due to the evidence of a cardiac tamponade, the deterioration of the hemodynamic state, he was presented an informed consent and was moved to the emergency operating room.

The surgery went under median sternotomy and 1500cc of hemorrhagic liquid was drained with the removal of the local hematoma and the perforation on sharp edge of the side facing the bottom of the right ventricle was controlled by pressing fingers. The post operative followings were simple.

Post op followings were simple.

3. DISCUSSION

Iatrogenic cardiac injuries can arise from diagnostic and therapeutic procedures in cardiology. These injuries can occur during various interventions such as cardiac catheterization, coronary angioplasty, stent placement, pacemaker implantation, balloon valvuloplasty, or during cardiopulmonary resuscitation, leading to sternum and rib fractures. Moreover, cardiac damage can be precipitated during new surgical procedures due to factors like pericardial adhesions causing infections, previous radiotherapy, or prior surgical interventions [5].

Pericardiocentesis is a commonly utilized intervention for the diagnosis and treatment of substantial pericardial effusion, proving to be a vital life-saving measure, especially in cases of cardiac tamponade [6,7]. The overall major complication rate associated with pericardiocentesis is 3%, with iatrogenic ventricular rupture occurring in 1% of instances. Surgical exploration and primary repair are typically favored as the initial approach for managing these significant complications [8].

In a distinct investigation focusing on iatrogenic cardiac injury, a cohort of over 25,000 patients was scrutinized. The prevalence of pericardial tamponade was determined to be 0.12%. Among these occurrences, 17 cases were identified during procedures in the catheterization laboratory, with an additional 14 cases detected after a 4-hour interval [9].

The iatrogenic perforation rate during pericardiocentesis or interventional procedures involving the right ventricle varies from 0.3% to 5%. Approximately half of these incidents have been linked to the onset of tamponade or

circulatory collapse. In contrast, the iatrogenic perforation rate for procedures involving the left ventricle ranges between 0.1% and 3.3% [10].

Patients presenting with chronic pericardial effusion and signs of tamponade can undergo a gradual progression, enabling adaptation to the pace of pericardial fluid accumulation and parietal pericardium stretching. However, we stress the critical importance of remaining vigilant regarding iatrogenic injuries. The severity of clinical outcomes hinges on the size of the perforation. Implementing repetitive transthoracic echocardiography at frequent intervals within the intensive care unit setting plays a pivotal role in preserving lives, as illustrated in this case. Echocardiography is adept at detecting swift escalations in pericardial fluid, signaling the imperative for immediate intervention sans the delay for further diagnostic measures.

The approach to managing rapidly developing tamponades resulting from cardiac injury lacks universal standardization. Nonetheless, median sternotomy is frequently favored due to its ability to facilitate comprehensive exploration of all cardiac regions [11].

In the iatrogenic injury case described herein, the swift escalation of pericardial fluid in the right heart, as detected by echocardiography, coupled with a rapid increase in central venous pressure, underscored the patient's swift clinical deterioration. At this juncture, swift fluid resuscitation, early transfer, and exploratory procedures emerge as life-saving interventions.

Mobility of patients experiencing bleeding and tamponade can exacerbate issues of instability [12].

4. CONCLUSION

In conclusion, our case highlights the rare but potentially life-threatening complication of right ventricular injury following pericardiocentesis. The presentation of such injuries underscores the importance of meticulous procedural planning, careful patient selection, and immediate recognition of complications during and after pericardiocentesis. Early diagnosis through imaging modalities like echocardiography, coupled with prompt surgical intervention when indicated, plays a crucial role in optimizing patient outcomes. This case underscores the necessity for ongoing vigilance and adherence to best practices in

pericardiocentesis procedures to minimize the risk of RV injury and its associated morbidity and mortality.

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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