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Case Report

Isolated Right Ventricular Myocardial Infarction: An Orphan in Acute Coronary Syndrome Imaging

Abstract

Introduction: Isolated right ventricular myocardial infarction is an uncommon entity in the spectrum of acute coronary syndrome. It is often overlooked during the assessment of patients suspected to have acute coronary syndrome.

Case Presentation: A 58 years old male presented with atypical chest discomfort. The initial ECGs were not supporting. The Echocardiogram revealed an isolated right ventricular myocardial wall motion abonrmality that was initially missed. Coronary angiogram revealed a co-dominant circulation with 100% occlusion of proximal right coronary artery. The distal right coronary artery was receiving collateral from left circulation. Successful angioplasty of right coronary artery was done with almost complete recovery of right ventricular function.

Conclusion: The case emphasizes the importance of looking for isolated right ventricular infarction during echocardiography in all cases of suspected acute coronary syndrome.

Abbreviations

ECG: Electrocardiogram; LV: Left Ventricle; MI: Myocardial Infarction; RCA: Right Coronary Artery; RV: Right Ventricle; RVMI: Right Ventricular Myocardial Infarction;

Introduction

Isolated right ventricular infarction is an uncommon clinical entity. It is often overlooked during the assessment of patients suspected to have acute coronary syndrome. Moreover, assessment of right ventricular wall motion and function has remained a neglected area in imaging of patients with acute coronary syndrome.

Case Presentation

A 58 years old male, non-smoker, non-diabetic, on antihypertensive medication presented with history of episode of pain between the shoulder blades about 60 hours prior to presentation. The pain lasted for one hour when patient was given first aid and admitted to a health facility. The first ECG showed ST elevation in leads III, aVF and V1 with ST depression in leads I and aVL (Figure 1). Patient was conservatively managed for acute coronary syndrome and an echocardiogram was done which was reported to be normal.

Thereafter, patient was seen in our institute. He was hemodynamically stable. There were no additional sounds or pericardial rub. The second ECG, which was done nearly 60 hours after the index event, showed persistent ST elevation in III, aVF and V1 and minimal ST depression in I and aVL (Figure 2). There were no Q waves or inverted T waves. Patient was advised repeat echocardiogram with possibility of acute pericardiatis / acute coronary syndrome.

The echocardiogram revealed no regional wall motion abnormality of left ventricle. Right ventricle (RV) showed dyskinesia of mid part of free wall and hypokinesia of basal part of free wall. The apex was relatively spared (Movies 1,2,3). Indices of right ventricular systolic function were deranged. The tricuspid annular peak systolic excursion was 11mm. Fractional area change was 11%. The right ventricular index of myocardial performance by tissue Doppler imaging was 0.74 with markedly elevated isovolumic relaxation time (Figures 3,4). Diagnosis of isolated right ventricular myocardial infarction (RVMI) was considered.

Troponin I was markedly elevated. Coronary angiogram revealed a normal left sided circulation and 100% occlusion of proximal right coronary artery (RCA) (Movie 4). Right circulation was receiving collaterals from left circulation and distal part of RCA was filling retrogradely in left injection (Movie 5). It was a co-dominant circulation with postero-lateral vessel arising from left circumflex

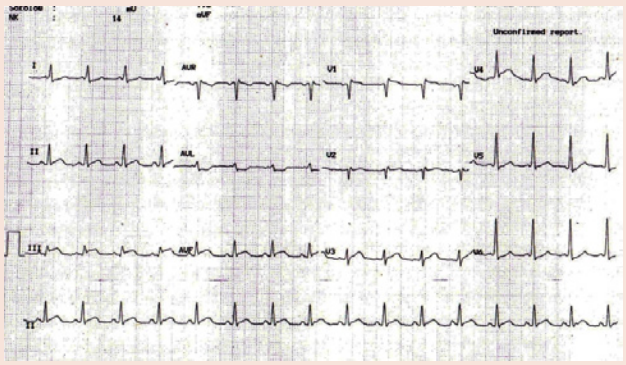


Figure 1: Initial electrocardiogram at time of onset of symptoms.

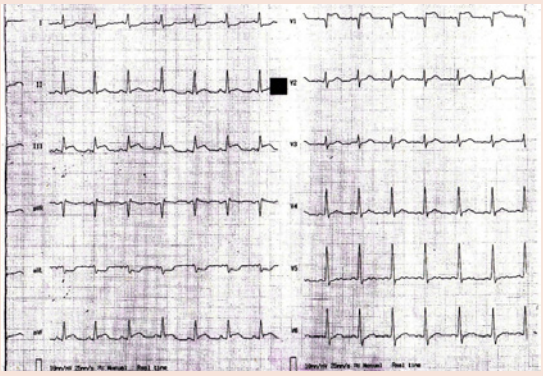
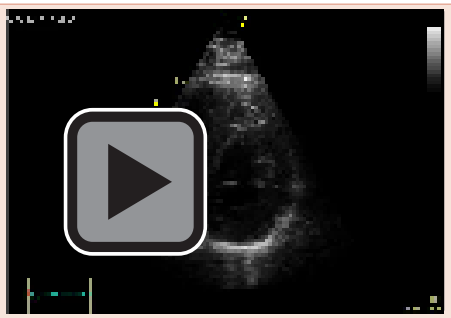
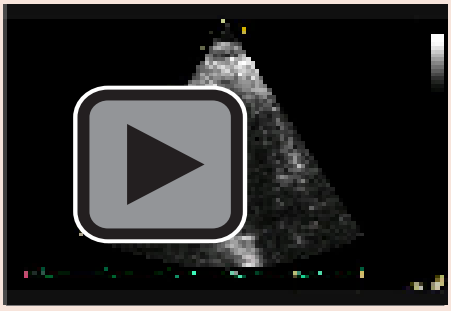


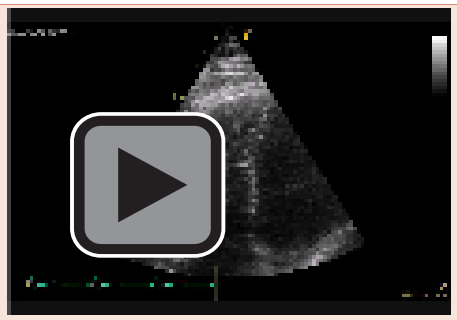
Figure 2: Second electrocardiogram taken 60 hours after the symptoms onset.



Movie 1:



Movie 2:



Movie 3:

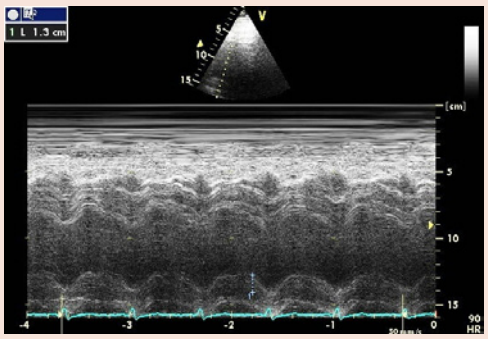


Figure 3: Tricuspid annular peak systolic excursion of right ventricle on M-mode imaging.

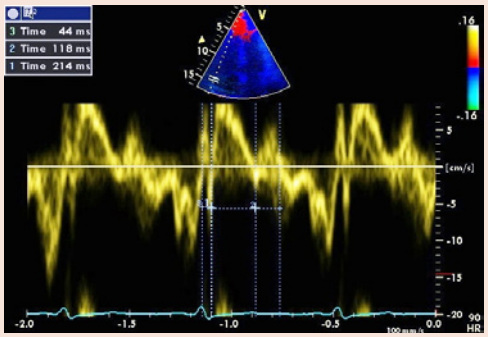
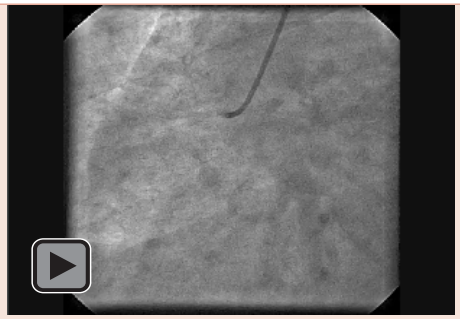
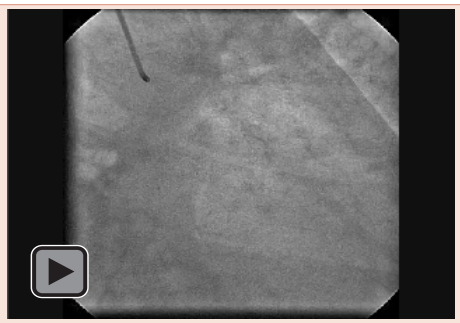


Figure 4: Right ventricular index of myocardial performance by tissue Doppler imaging prior to angioplasty.



Movie 4:



Movie 5:

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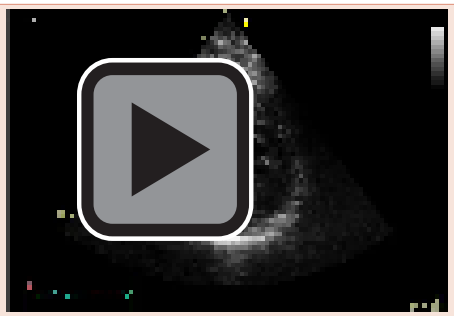
artery and posterior descending artery arising from RCA. The RV branch was a small twig. However, patient had a large acute marginal branch supplying the right ventricle. Successful angioplasty and stenting of RCA was done (Movie 6).

The echocardiogram at first follow-up showed mild hypokinesia of basal part of free wall of RV with recovered systolic function (Movies 7,8). The right ventricular index of myocardial performance by tissue Doppler imaging was 0.51 and fractional area change was more than 0.4 (Figures 5,6).

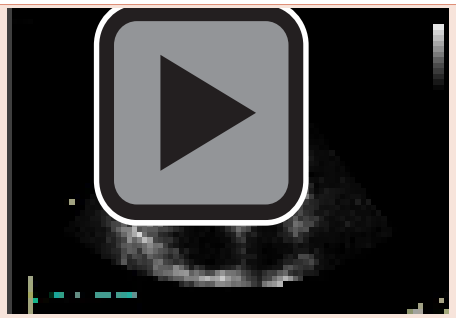
Discussion

Isolated right ventricular infarction is an uncommon entity in the spectrum of acute coronary syndrome. It constitutes less than 3% cases of ST elevation myocardial infarction [1]. Mostly RVMI occurs in association with inferior wall MI. However, reports are available in literature describing isolated RVMI [2]. In a large proportion, the RVMI occurs due to occlusion of large RV branch after percutaneous coronary intervention [3]. Isolated RVMI has also been reported due to proximal occlusion of a non-dominant right coronary artery [4].

Movie 6:



Movie 7:



Movie 8:

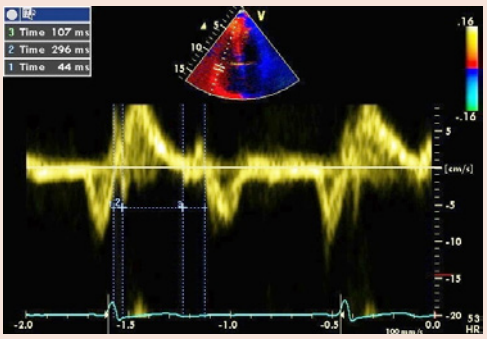


Figure 5: Right ventricular index of myocardial performance by tissue Doppler imaging after angioplasty.

Figure 6: Fractional area change of right ventricle after angioplasty.

Presence of ST elevation in leads V1-V4 with maximum elevation in lead V1 raises the suspicion of isolated RVMI. This may be associated with small degree of ST elevation in inferior leads. Resolution of ST elevation in anterior leads without development of Q waves or reduction in R wave points to RVMI. More importantly, all patients with ST elevation in anterior or inferior leads should be specifically evaluated echocardiographically for isolated RVMI as isolated RVMI may present as ST elevation in inferior /anterior leads without changes in right precordial leads [2,5].

The occlusion of proximal co-dominant right coronary artery leading to isolated RVMI can be explained by the protective effect of co-dominant circulation and collaterals on inferior wall of LV. This patient did not have typical findings of right ventricular infarction like hypotension probably because of sparing of left ventricle and apical segments of right ventricle.

Isolated RVMI should be kept as a possibility while echocardiographically evaluating a suspected case of acute coronary syndrome.

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