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Isolated Right Ventricular Myocardial Infarction from Occlusion of a Dominant Right Coronary Artery Mimicking Anterior Myocardial Infarction

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Isolated right ventricular infarction is a rare entity, previously attributed to isolated acute occlusion of right ventricular marginal branch during percutaneous coronary intervention [1], acute occlusion of a non-dominant right coronary artery [2], or acute occlusion of the proximal RCA with a coronary patent bypass graft protecting the distal RCA [3]. We present a very unusual case of isolated RV infarction due to total obstruction of a proximal dominant RCA in the presence of collateral flow from the native left coronary system.

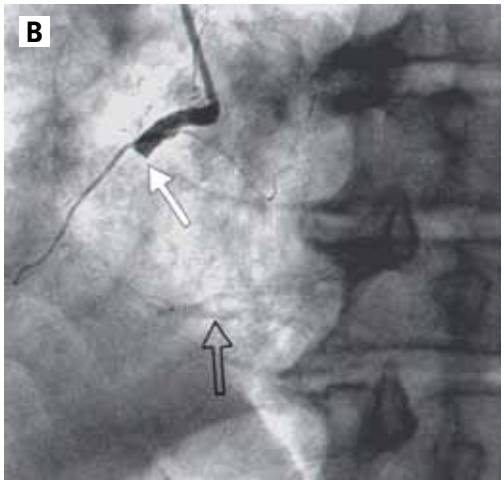
RCA = right coronary artery
RV = right ventricular

PATIENT DESCRIPTION

A 63 year old man without a past history of cardiovascular disease arrived at the emergency department with severe precordial pain during the previous 2½ hours. His blood pressure was 157/90 mmHg and heart rate 75 beats/minute. Electrocardiogram on admission showed ST-segment elevation in leads V1–V6 and left axis deviation of the QRS. The patient developed ventricular fibrillation at the time of ECG performance [Figure A] that converted to normal rhythm with one DC shock. With a diagnosis of anterior myocardial infarction the patient was referred for primary PCI. Coronary angiography demonstrated a totally occluded proximal part of a dominant RCA and retrograde filling of the posterior descending artery and distal part of the RCA from multiple collaterals originating from the ramus medianus, without any flow in the mid-part of the RCA [Figure B]. There was no significant disease of the left coronary system. PCI with stent implantation restored normal flow in the RCA, including a large right ventricular acute marginal branch [Figure C] with subsequent resolution of ST-segment elevation [Figure D]. Transthoracic echocardiography demonstrated normal left ventricular contraction with paradoxical movement of the basal interventricular septum, normal size of the left ventricle, and significant dilatation of the right ventricle with hypokinesis of the free RV wall [Figure E]. The patient was discharged uneventfully 5 days later.

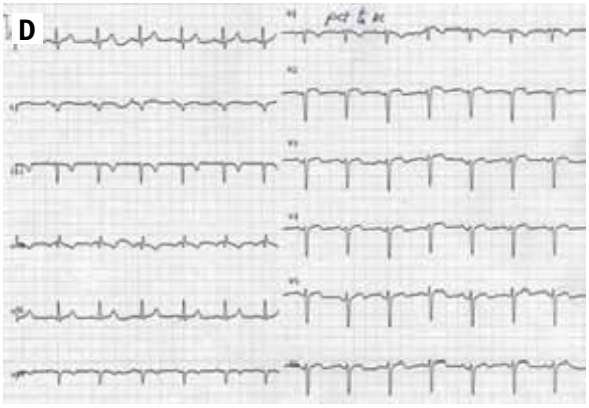
PCI = percutaneous coronary intervention

[A] The ECG on admission showing precordial leads ST-elevation and ventricular fibrillation

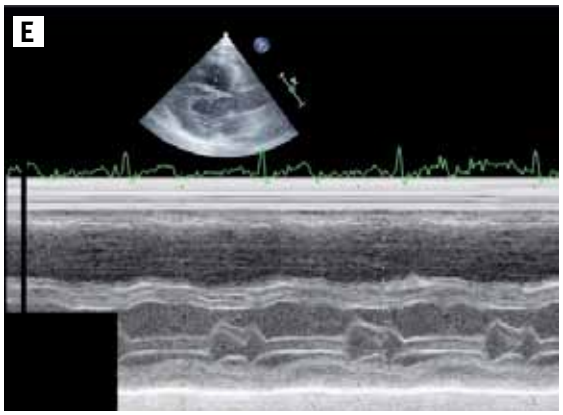


[B] Coronary angiography showing an occluded proximal RCA (white arrow) and retrograde filling of the distal RCA (black arrow) from the left coronary system

[C] Patent RCA post-PCI with a large RV branch (arrow) now appearing



[D] The ECG-post PCI



[E] M-mode echocardiography showing a dilated and hypokinetic right ventricle

COMMENT

Anterior ST-segment elevation is the hallmark ECG finding indicating occlusion of the left anterior descending coronary artery. The case described here illustrates that diffuse ST-segment elevation in the precordial leads may occur due to the occlusion of the RCA or its branches. It is important to recognize this scenario, since the treatment of left ventricular myocardial infarction differs from that of RV myocardial infarction, where maintaining adequate preload and avoiding vasodilators to preserve RV stroke volume is crucial.

RVMI usually occurs with simultaneous inferior wall infarction. The dominant electric forces generated by the ischemia of the inferior wall suppress the changes caused by the ischemia of the right ventricle. This is because the inferior wall has a larger mass of myocardium compared with the thin RV wall; therefore, the precordial ECG manifestations of RVMI are absent in most patients [4].

Isolated RVMI accounts for 0.4–2.4% of acute ST-segment elevation myocardial infarction [5]. Our patient is unique because the isolated RVMI occurred spontaneously, without the presence of a protective bypass graft to the distal RCA.

In conclusion, this case highlights the fact that the differential diagnosis of diffuse precordial ST-segment elevation should include isolated RVMI in addition to anterior wall myocardial infarction. Early recognition of this scenario and subsequent initiation of the appropriate management may change the outcome in these patients.

RVMI = right ventricular myocardial infarction

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"Flatter me, and I may not believe you. Criticize me, and I may not like you. Ignore me, and I may not forgive you. Encourage me, and I will not forget you"

William Arthur Ward (1921-1994), American college administrator and one of the most quoted writers of inspirational maxims