

Acute Thrombotic Occlusion of Non-Dominant Right Coronary Artery Presenting as Acute Coronary Syndrome and Hemodynamic Instability

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ABSTRACT

It is generally believed that the occlusion of a nondominant right coronary artery is not associated with significant consequences. Atherosclerotic disease of non-dominant right coronary in the absence of significant left coronary artery disease is rare, and the prevalence is substantially lower as compared to dominant Right Coronary Artery. We report a case of a young male presenting with acute coronary syndrome and hemodynamically significant atrial fibrillation. Coronary angiography showed thrombotic occlusion of the nondominant right coronary artery. After the stenting of this artery, the patient improved hemodynamically with complete resolution of ECG changes.

Key words: Non-dominant Right Coronary Artery; Occlusion; Acute coronary syndrome

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INTRODUCTION

It is usually presumed that the occlusion of a non-dominant Right coronary artery (NDRCA) is not associated with serious complications. Non-dominant RCA is small in diameter and supplies right atrium (RA), right ventricle (RV) and sino-atrial (SA) node. Although a significant atherosclerotic disease of NDRCA in the absence of significant left coronary artery disease is rare, isolated occlusion of NDRCA has been described in past. It can present as an acute coronary syndrome, hemodynamically significant arrhythmias, isolated right

ventricle infarction and sudden cardiac death. Electrocardiography pattern can mimic inferior wall ischemia or anterior wall ischemia. We report a case of a young male presenting with acute coronary syndrome and hemodynamically significant atrial fibrillation. Electrocardiogram showed changes of inferior wall infarction. Coronary angiography showed thrombotic occlusion of the non dominant right coronary artery. After the stenting of this artery, the patient improved hemodynamically with complete resolution of ECG changes.

CASE REPORT

30-year-old male presented with chest pain since 2 hours. Not a known case of any major illness, nonsmoker / alcoholic. On examination pulse was 150/min irregularly irregular; blood pressure was 90/56 mmHg. ECG showed atrial fibrillation with fast ventricular rate, ST elevation in II, III and aVF (Figure 1). DC shock of 50 J was given. Sinus rhythm was restored (Figure 2). Again

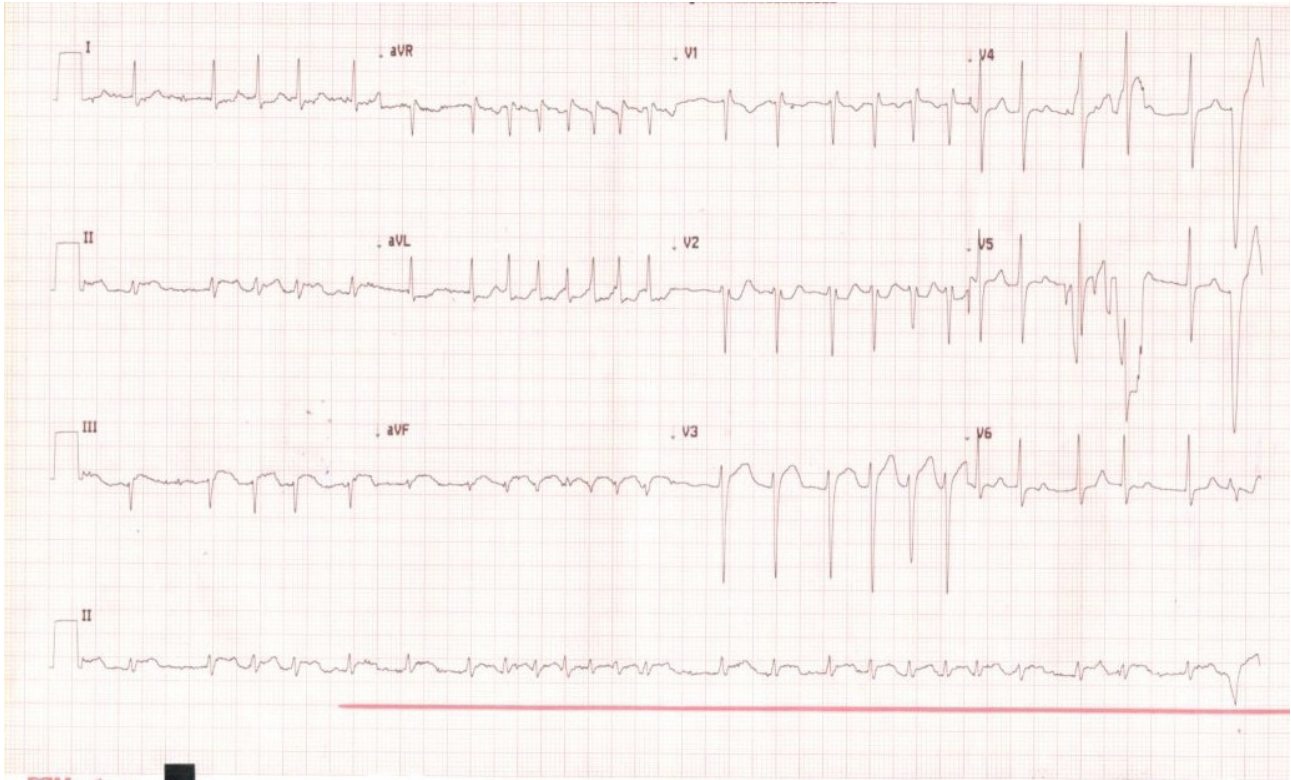


Figure 1 ECG on admission showing Atrial Fibrillation with rapid Ventricular rate.

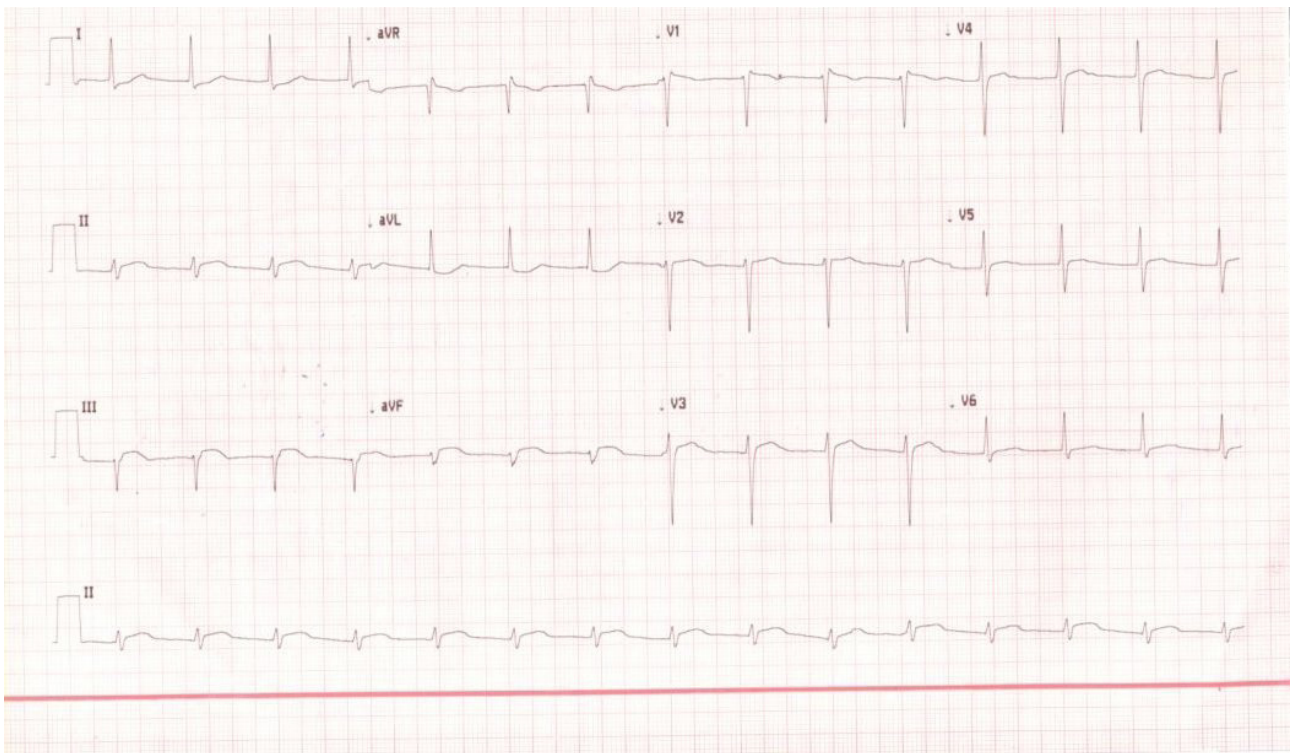


Figure 2 ECG after DC shock showing Sinus rhythm with ST elevation in II, III, and aVF.

developed atrial fibrillation with a blood pressure of 90/60 mmHg, again DC of 100 J shock was given. Qualitative Troponin T was positive. 2d echo showed no regional wall motion abnormalities, Left ventricle ejection fraction of 60%. Right ventricle size was normal in four chamber view (Figure 3). Routine blood investigations and serum electrolyte levels were normal. In view of ongoing chest pain and recurrent atrial fibrillation, he was taken for coronary angiography. Coronary angiography showed a left dominant system with normal LAD and LCX (Figure 4). RCA was 100% occluded in the proximal segment (Figure 5).

The patient was having ongoing chest pain and recurrent hemodynamically significant atrial Fibrillation. Hence it was decided to open RCA. The lesion was crossed with FIELDER FC wire with the support of 1.5 × 6 mm balloon followed by dilatation with 2 × 12 mm balloon. As the flow was TIMI II in RCA after balloon dilatation and patient was developing intermittent atrial fibrillation, it was decided to stent the diseased segment. The lesion was stented with 2.5 × 18 mm Everolimus-eluting stent (Figure 6). After the procedure patient's hemodynamics stabilized and sinus rhythm was restored. There was complete resolution of ST segments in II, III, aVF (Figure 7). Patient was kept in ICCU for 24 hours; there was no episode of

atrial fibrillation. Patient was discharged after 72 hours. Patient is asymptomatic at 2-month follow-up.

DISCUSSION

The term coronary dominance is based on the origin of posterior descending Artery (PDA) and postero-lateral left ventricle (PLV) branches from right coronary artery or left circumflex artery. In Left dominant coronary artery system PDA and PLV branches arise from left circumflex artery. Left ventricle is supplied by left coronary system with no contribution from RCA. Left dominant system has a prevalence of about 7% to 8% in the general population. Right coronary artery in left dominant system is small in diameter, short in length and supplies mainly right atrium, right ventricle and SA node. Isolated atherosclerotic disease of this artery in left dominant system is rare. Even if the NDRCA is small, its thrombotic occlusion can

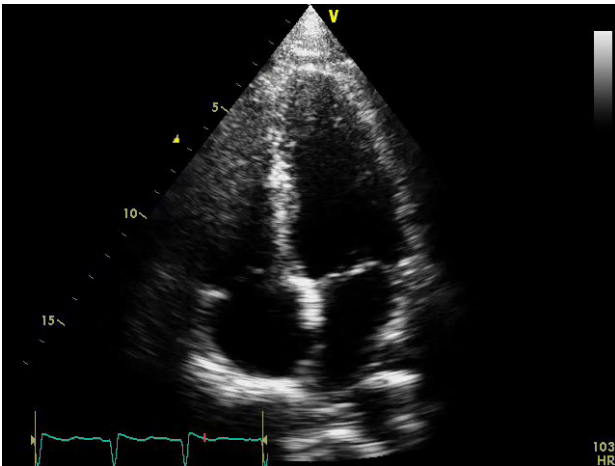


Figure 3 2D echocardiography apical four chamber view showing normal chamber size.

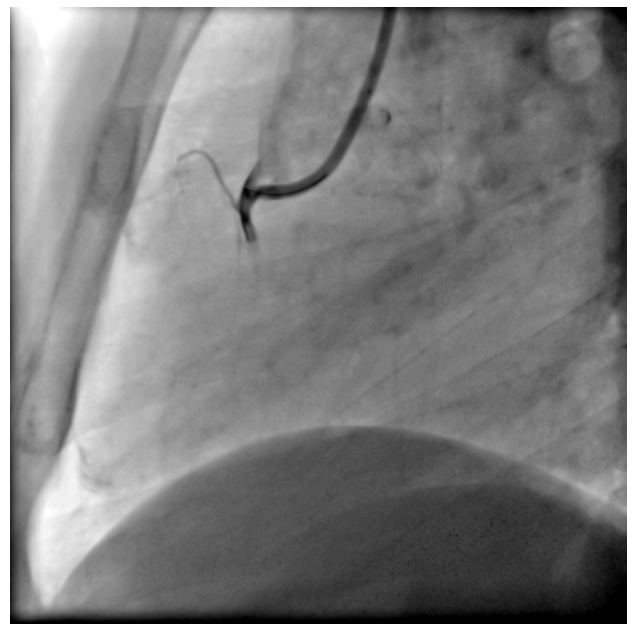


Figure 5 Left lateral view showing Proximal RCA total occlusion.



Figure 4 LAO cranial view showing Left dominant system and normal LAD and LCX arteries.

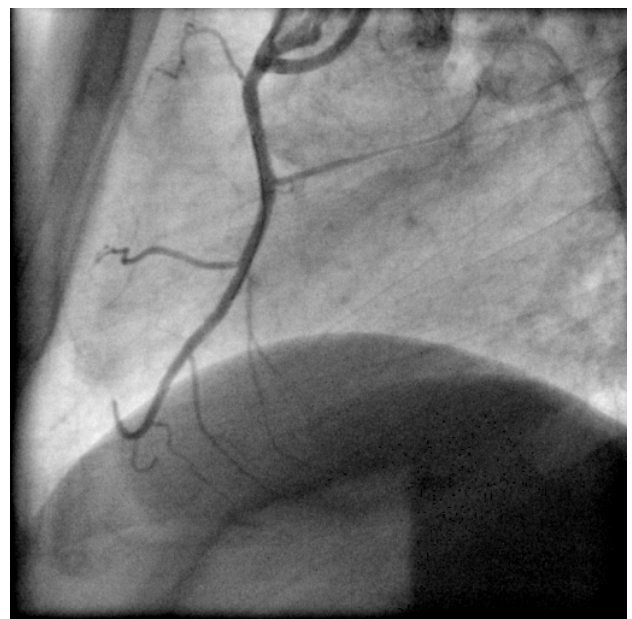


Figure 6 Left lateral view after stenting of Non-dominant Right coronary Artery showing good result.

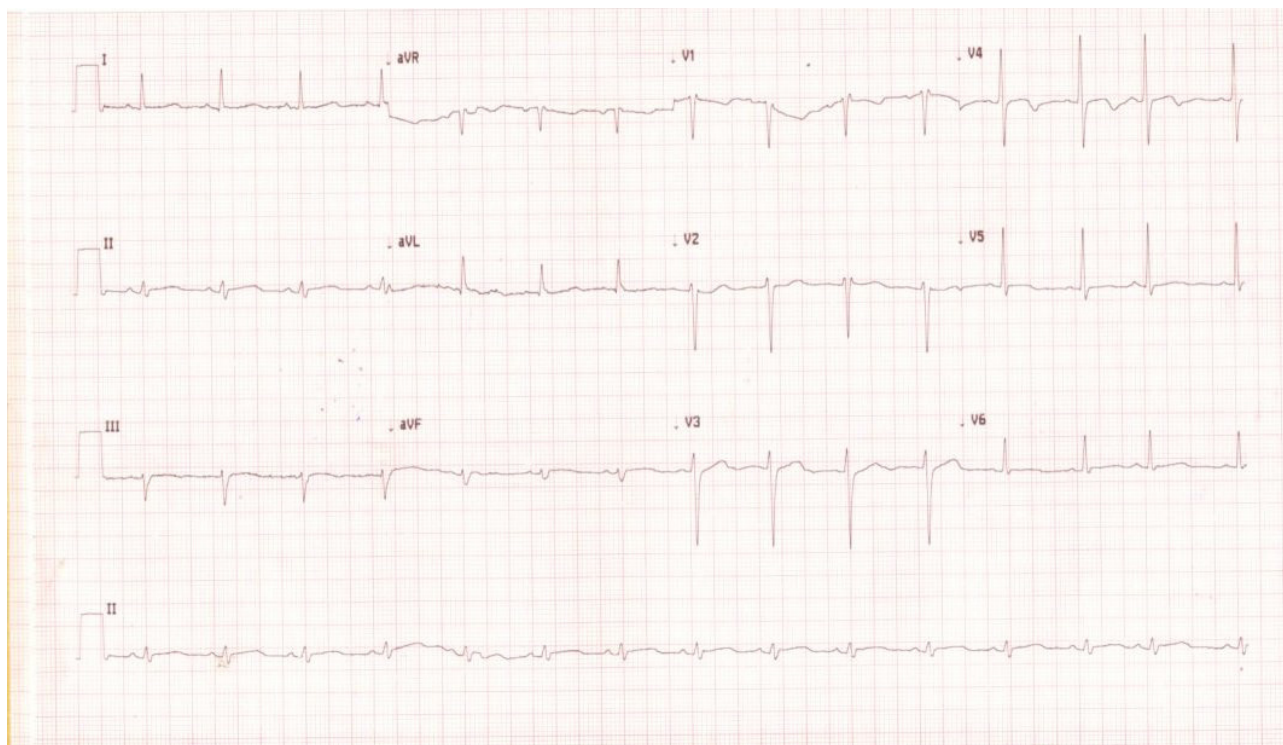


Figure 7 ECG immediately after PCI of non - dominant RCA showing sinus rhythm and complete resolution of ST-segment changes in II, III and aVF.

cause serious complications. Acute thrombotic occlusion of NDRCA can present as an acute coronary syndrome, isolated right ventricular infarction, ventricular tachycardia or sudden cardiac death.

Isolated right ventricular infarction is a most common presentation of acute thrombotic occlusion of NDRCA. Moreyra *et al* reported a case of total occlusion of NDRCA resulting in isolated RV infarction and ventricular fibrillation^[1]. Rao *et al* reported a case of recurrent ventricular fibrillation due to subtotal occlusion on NDRCA^[2]. Vural *et al* reported a case of isolated RV infarction and severe tricuspid regurgitation due to occlusion of nondominant RCA^[3]. Karim *et al* reported a case of a patient who presented with sudden cardiac death secondary to a subtotal occlusion of a small non-dominant right coronary system^[4].

Electrocardiogram can mimic Inferior wall or anterior wall ischemia and infarction. Anterior ST elevation mimicking anterior wall MI has been described in thrombotic occlusion of NDRCA by vural *et al*^[3], Carrol *et al*^[5], Franco *et al*^[6], Collins *et al*^[7] and Ilia *et al*^[8]. Moreyra *et al* reported ST elevation in both anterior and inferior leads^[1]. Rao *et al* reported ST elevation in inferior leads associated with occlusion of NDRCA^[2]. Our patient also had ST elevation in inferior leads. These ECG patterns are the consequence of proximal obstruction of NDRCA and not necessarily of isolated RV infarction. These ECG changes lead to misdiagnosis.

The prevalence, clinical characteristics, and treatment of the severe isolated NDRCA disease in a cohort of 35 catheterized patients have been described by Ilia *et al*^[9]. The incidence of isolated NDRCA disease was 0.08%, with only 35 cases described over 18 years^[9]. The most common indication of coronary angiography was acute coronary syndrome^[9]. Our patient presented with the acute coronary syndrome and atrial fibrillation. Atrial fibrillation associated with occlusion of NDRCA has not been described in the above cases. The right ventricular function was good, which was mainly due to the early presentation. Atrial fibrillation in our case may be attributed to right atrial ischemia or infarction. Early cardiac catheterization followed by stenting of the non-dominant right coronary artery lead

to resolution of arrhythmia and abolition of chest pain.

CONCLUSION

In a patient with the left dominant system, RCA is a small artery supplying the right ventricle and right atrium. Although NDRCA appears relatively small, its acute thrombotic occlusion may have significant clinical and hemodynamic impact. The above case showed the importance of non-dominant RCA. Even if RCA is not supplying the left ventricle, it may present with acute coronary syndrome. Associated arrhythmias (Atrial fibrillation and fast ventricular rate) may lead to hemodynamically unstable patient. However, the above procedure on the RCA helped to stabilize the patient symptomatically with the abolition of recurrent AF and resolution of the ST segment changes.

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