

CASE REPORT / ПРИКАЗ БОЛЕСНИКА

## Acute ST elevation myocardial infarction (STEMI) in a patient with a single coronary artery successfully treated with primary percutaneous coronary intervention

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### SUMMARY

**Introduction** A single coronary artery (SCA) is defined as a coronary artery that arises from the sinus of Valsalva and supplies the entire heart. This is a rare congenital anomaly occurring in approximately 0.04–0.13% of the population. SCA can be diagnosed during life by coronary angiography and multislice cardiac computed tomography. There are many anatomical variations of single coronary arteries.

**Case outline** A 50-year-old man presented with acute ST elevation myocardial infarction (STEMI). Coronary angiography revealed the case of an SCA with left anterior descending artery and circumflex artery arising separately from the right coronary artery which was occluded proximally to their taking-off. Successful primary percutaneous coronary intervention was performed and is reported here in details. This is the first described case of an SCA (classified as R-III and R-III-C by Lipton and Yamanaka, respectively) with a clinical presentation as STEMI. A description of the undertaken management is also provided.

**Conclusion** Coronary artery anomalies require accurate recognition in order to help cardiologists plan appropriate management of these patients.

**Keywords:** single right coronary artery; acute myocardial infarction; primary PCI

### INTRODUCTION

A single coronary artery (SCA) is defined as a coronary artery that arises from the sinus of Valsalva and supplies the entire heart [1–5]. This is a rare congenital anomaly occurring in approximately 0.04–0.13% of the population [2, 6]. An SCA can be diagnosed during life by coronary angiography and multislice cardiac computed tomography [2]. There are many anatomic variations of SCAs. The presence of a single right coronary artery supplying the entire left coronary artery is rare [7]. Most commonly, SCA is asymptomatic and found on autopsy, but spectrum of clinical symptoms ranging from stable angina to sudden cardiac death may occur [8]. We report a patient with R-III Lipton classification, and R-III-C Yamanaka classification.

### CASE REPORT

A 50-year-old man, with a history of smoking, was admitted to our hospital because of a typical chest pain, which appeared three hours before the first medical contact in our institution. ECG demonstrated ST segment elevation in leads D2, D3, and aVF, and ST depression in leads aVL, and V1 to V6 (Figure 1). The patient was immediately sent for a primary percutaneous coronary intervention (pPCI).

Coronary angiography revealed the left anterior descending artery and circumflex artery (LAD and Cx) arising separately from the proximal part of right coronary artery (RCA). LAD and Cx were without any significant stenosis. RCA was hyperdominant and occluded proximally after take-off of the LAD and Cx (Figure 2). We used an AR 1 6F (Medtronic Inc., Fridley, MN, USA) guide catheter, which gave us excellent support, and Asahi Rinato (Asahi Intecc Co., Ltd., Nagoya, Japan) guide-wire which passed easily through the occlusion. The thromboaspiration and pre-dilatation with Sprinter Legend (Medtronic) 2 × 20 mm balloon was performed. During the procedure, a temporary pacemaker was inserted since an AV block type III started to develop. Successful primary PCI was performed with the implantations of 3.5 × 23 mm and 3.5 × 18 mm Multi-Link Vision stents (Abbott Vascular Inc., Santa Clara, CA, USA) (Figure 3A, 3B).

Echocardiography showed slight hypokinesis of the apical inferior wall, with an overall estimated ejection fraction of 60%. The temporary pacemaker was removed the second day of hospitalization. Laboratory workout showed only alterations of cardiac biomarkers (creatinase kinase and high sensitive troponin I) which were normalized at the end of hospitalization.

After the discharge, the patient was free of symptoms, and on the six-month follow-up, the stress echo test was negative.

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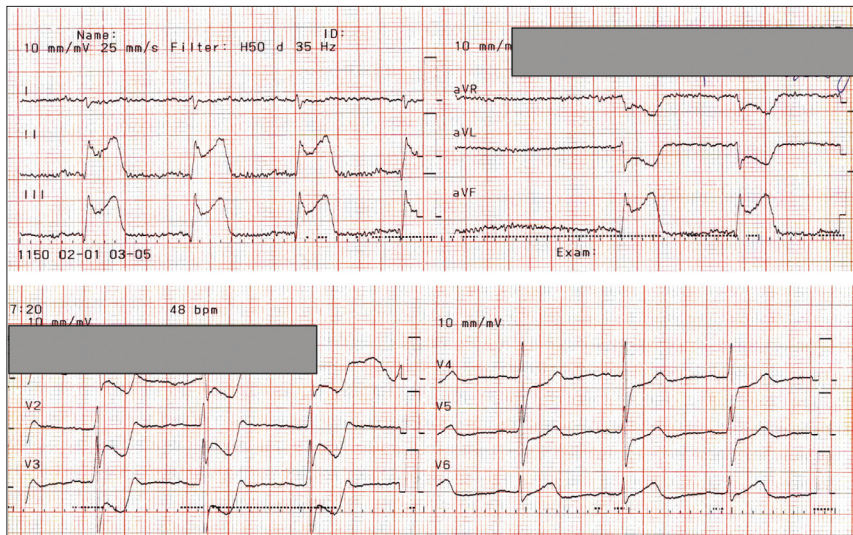
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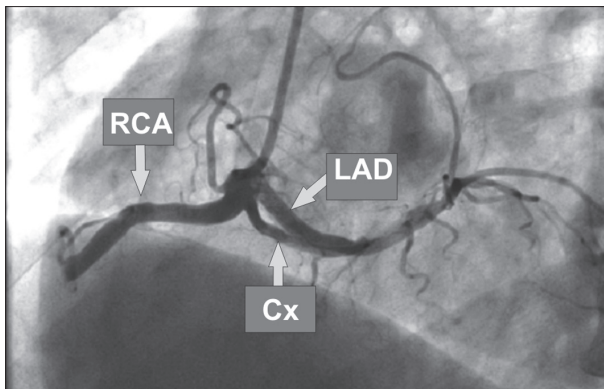
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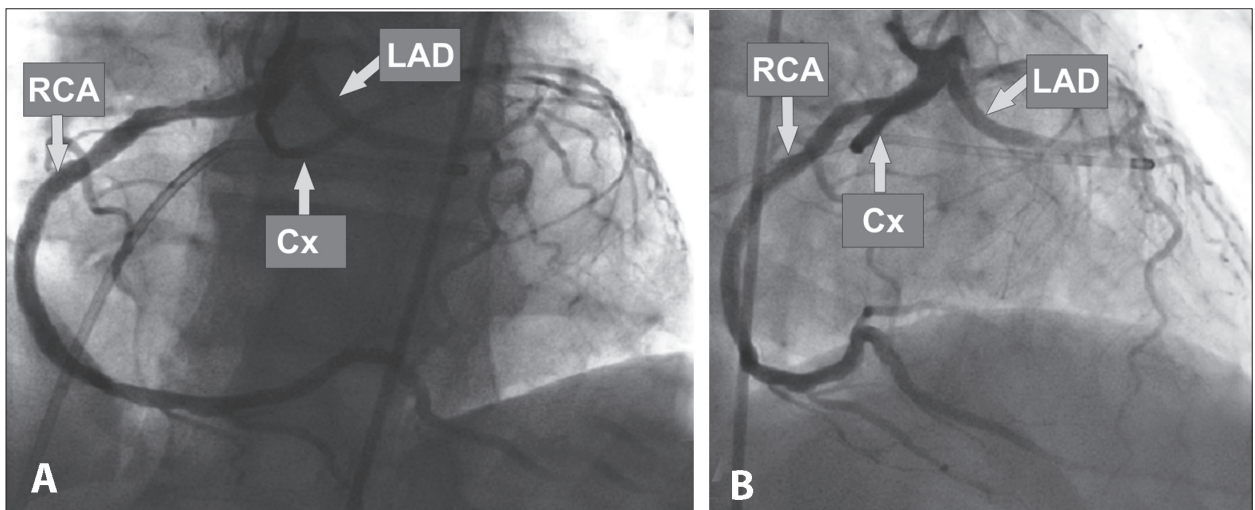
**Figure 1.** Acute ST elevation myocardial infarction of the inferoposterior wall



**Figure 2.** The left anterior descending artery and the circumflex artery (LAD and Cx) occur separately from the proximal part of the right coronary artery and proceed anterior and between the aorta and the pulmonary artery. LAD and Cx were without any significant stenosis; RCA occluded LAD and Cx proximally below the occurrence

**DISCUSSION**

An SCA is a rare coronary artery anomaly, particularly in the absence of a structural heart disease. The first systematic classification of SCA was given by Lipton et al. [3], and subsequently further elaborated by other authors [2]. In a series of 50,000 angiography reports from Belgium, the incidence of SCA was 0.066% [4]. Moreover, only one patient with such an anomaly was found among 125,000 cases from Cleveland Clinic’s series [2]. Lipton et al. [3] reported that typical angina did not occur in patients with SCA without coexisting coronary artery disease or aortic stenosis. On the other hand, other authors described anteroseptal ischemia in a patient with SCA arising from the right coronary artery [8]. This ischemia was a consequence of inadequate perfusion by diminutive LAD, despite the absence of obstructive coronary artery disease. The patient was treated by beta-blockers and nitrates with improvement in patient’s functional capacity to the point that the patient was angina-free most of the day [7]. Jian



**Figure 3.** The final result after primary percutaneous coronary intervention in two projections; A: RAO 0.5, CRA 0.0; B: RAO 30.8, CRA 0.0

et al. reported on a patient with SCA R-I who underwent percutaneous intervention in the posterolateral branch for an acute coronary syndrome [1]. In literature there is a guideline for the percutaneous treatment of the right coronary artery arising from the left circumflex artery (L-type SCA) [9], as well as for a single coronary trunk arising from the ascending aorta [10], but literature data for treating acute STEMI in patients with SCA are very scarce.

Therefore, we presented here a unique case of a patient with an RIII-C subtype SCA and acute STEMI, which was successfully treated by primary percutaneous coronary intervention. Technical guidelines for the treatment of these patients are difficult to draw up due to low frequency and huge number of anatomic variations of this anomaly. On the other side, coronary artery anomalies require accurate recognition in order to help cardiologists plan appropriate management of these patients.

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## Акутни инфаркт миокарда са елевацијом СТ сегмента код пацијента са „single“ коронарном артеријом лечен примарном перкутаном коронарном интервенцијом

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### САЖЕТАК

**Увод** „Single“ коронарна артерија (СКА) дефинише се као коронарна артерија која полази из Валсалвиног синуса и прекрива цело срце. Она представља ретку конгениталну аномалију у 0.04–0.13% опште популације. СКА може бити дијагностикована током живота коронарном ангиографијом или мултислајсном компјутеризованом томографијом. Постоје многе анатомске варијације „single“ коронарних артерија.

**Приказ болесника** Приказан је 50-годишњи мушкарац који је примљен у болницу због акутног инфаркта миокарда са СТ елевацијом инфериорне локализације. Коронарна ангиографија је показала постојање једне коронарне (десне) артерије са левом предњом десцендентном артеријом

и циркумфлексном артеријом које се одвајају посебно од десне коронарне артерије која је оклудирана у свом проксималном сегменту. Примарна перкутана коронарна интервенција је учињена успешно. Ово је први приказан случај „single“ десне коронарне артерије (Lipton R-III односно Yamanaka R-III-C типа класификације) са клиничком презентацијом акутног инфаркта миокарда са СТ елевацијом.

**Закључак** „Single“ коронарне артерије представљају конгениталне аномалије које захтевају адекватно препознавање како би помогле у прављењу стратегије за адекватно лечење ових болесника.

**Кључне речи:** „single“ десна коронарна артерија; акутни инфаркт миокарда; примарна перкутана коронарна интервенција