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Myocardial infarction associated with anomalous origin of the right coronary artery from the pulmonary trunk

Short title: Myocardial infarction associated with ARPACA

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A 38-year-old-woman with no chronic diseases presented to the hospital with severe chest pain lasting 90 minutes. She reported symptoms of a respiratory tract infection for three days prior to admission. The electrocardiogram showed ST-segment elevation of 2–3 mm in leads I, aVL and V2–6. Due to the angiography equipment malfunction to avoid transfer-related delays, emergent coronary angiography was performed using C-arm imaging. This revealed an aneurysmal dilation of the left anterior descending artery (LAD) with suspected distal LAD occlusion. The right

coronary artery (RCA) was not visible from the aortic sinus but became apparent after LAD contrast administration (Supplementary material, *Video S1*). The patient received unfractionated heparin and an intracoronary glycoprotein IIb/IIIa inhibitor bolus followed by intravenous continuous infusion, after which her symptoms resolved. Transthoracic echocardiography demonstrated mildly reduced left ventricular ejection fraction of 45% with akinesis of the apical cap and apical segments of the anterior wall and septum. The echocardiogram suggested that the RCA originated from the pulmonary trunk (Figure 1A). Given the unclear coronary artery visualization, the patient was transferred to a reference center for multislice computed tomography coronary angiography. This study confirmed proximal LAD aneurysmal dilation without obstruction (Figure 1B) and verified RCA origin from the pulmonary trunk (Figure 1C). Concurrent pneumonia was also diagnosed (Figure 1D). Due to suspected acute coronary syndrome without luminal stenosis of coronary arteries, cardiac magnetic resonance imaging was performed, confirming new ischemic damage in the akinetic regions and revealing microvascular obstruction (Figure 1E–F). Given the possible thrombotic etiology, initial treatment consisted of triple antithrombotic therapy (aspirin, clopidogrel, and therapeutic doses of low molecular weight heparin), transitioning after one week to dual therapy with clopidogrel and rivaroxaban. Following thorough discussion at a joint cardiology and cardiothoracic meeting, the patient was scheduled for surgical RCA reimplantation onto the aorta and discharged pending surgery.

Coronary anomalies encompass anomalous aortic origin of coronary arteries, anomalous coronary arteries from the pulmonary artery, and coronary fistulae [1, 2]. Anomalous origin of the RCA from the pulmonary artery (ARCAPA) is a rare congenital cardiac lesion that occurs in 0.002% of the population and represents 0.12% of coronary anomalies. Its presentations range from asymptomatic murmur to sudden cardiac death [3]. The absence of symptoms until adulthood is attributed to progressive collateralization between the LAD and RCA, resulting in LAD and RCA dilatation, retrograde RCA flow into the pulmonary artery, and coronary steal syndrome [2]. While ARCAPA rarely presents as acute myocardial infarction, patients with coronary artery ectasia or aneurysm without underlying coronary artery obstruction may develop thrombosis with distal embolization, the likely mechanism for acute coronary syndrome in such cases [4]. Typically, thrombosis initiates within the aneurysm, propagates, and occludes microcirculation through embolization [4]. Concurrent inflammation may further promote thrombosis development [5]. In cases with ambiguous angiographic findings, non-invasive imaging techniques such as multislice

computed tomography coronary angiography and cardiac magnetic resonance imaging prove crucial for diagnostic confirmation and treatment planning. Cardiac surgery remains the primary treatment modality for symptomatic patients with ARCAPA [3].

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

Article information

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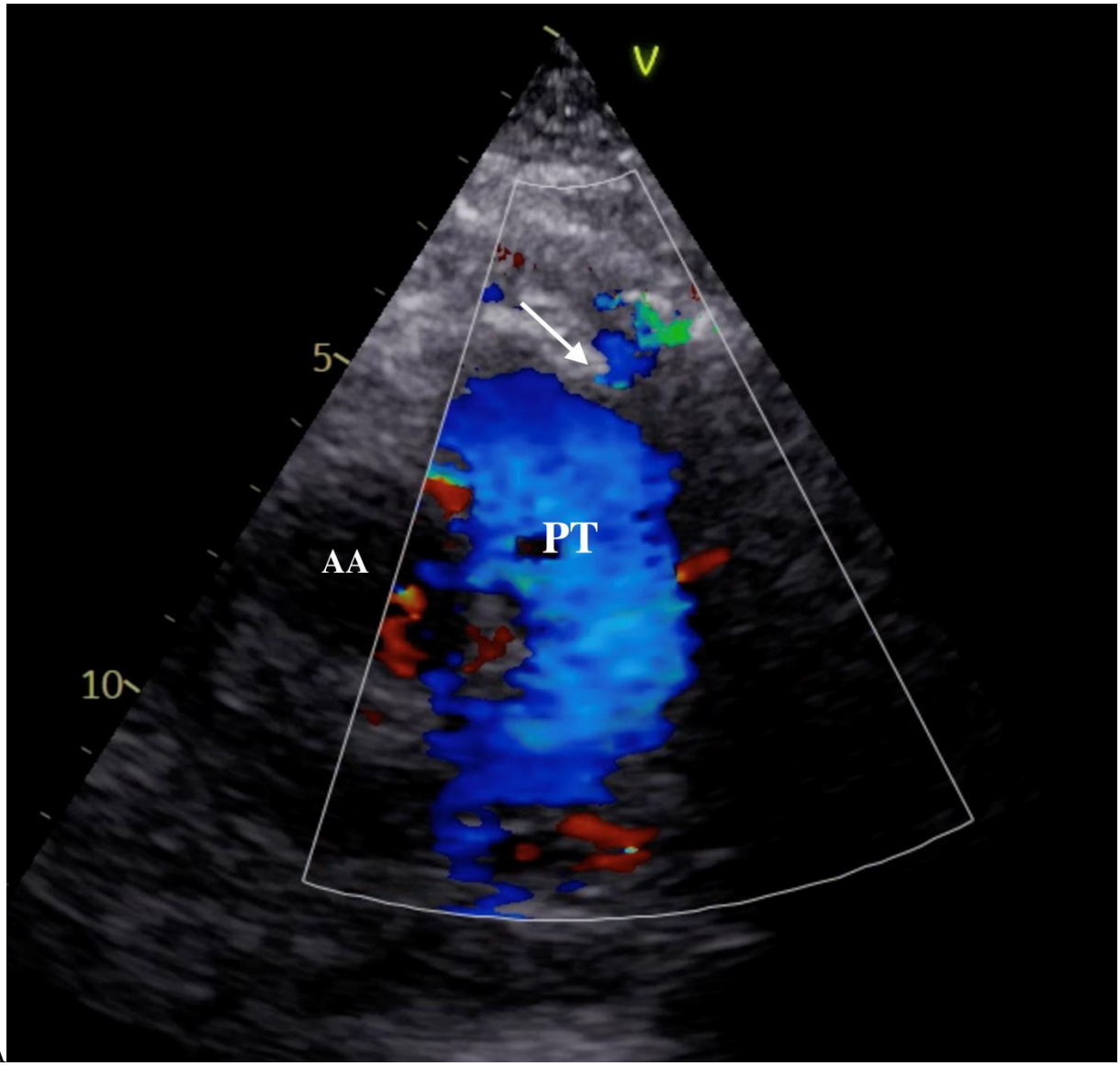

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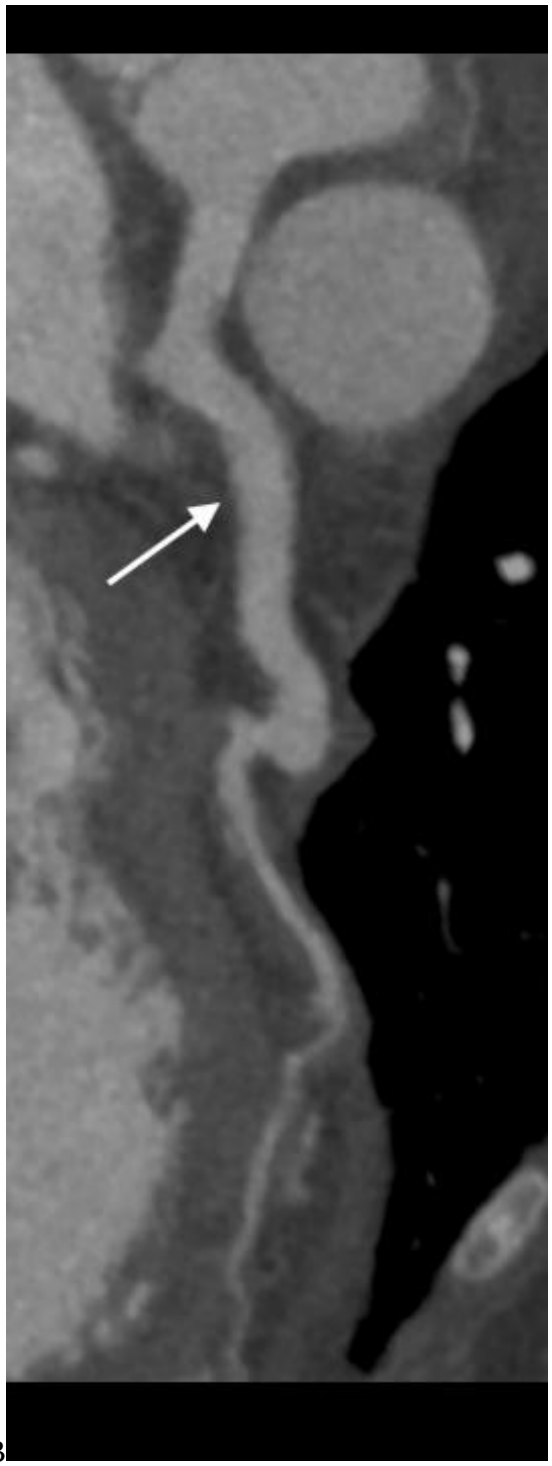

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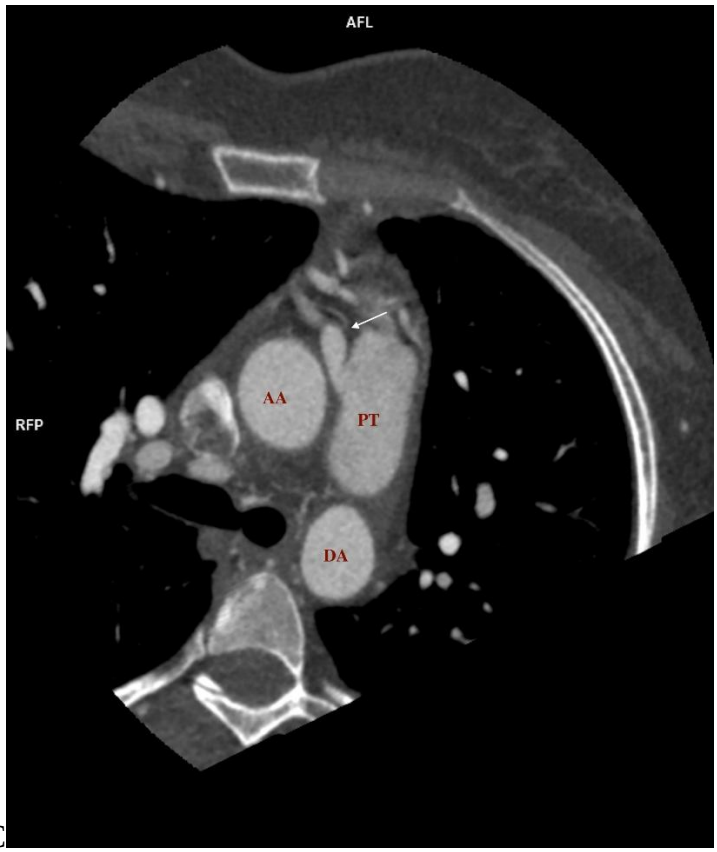

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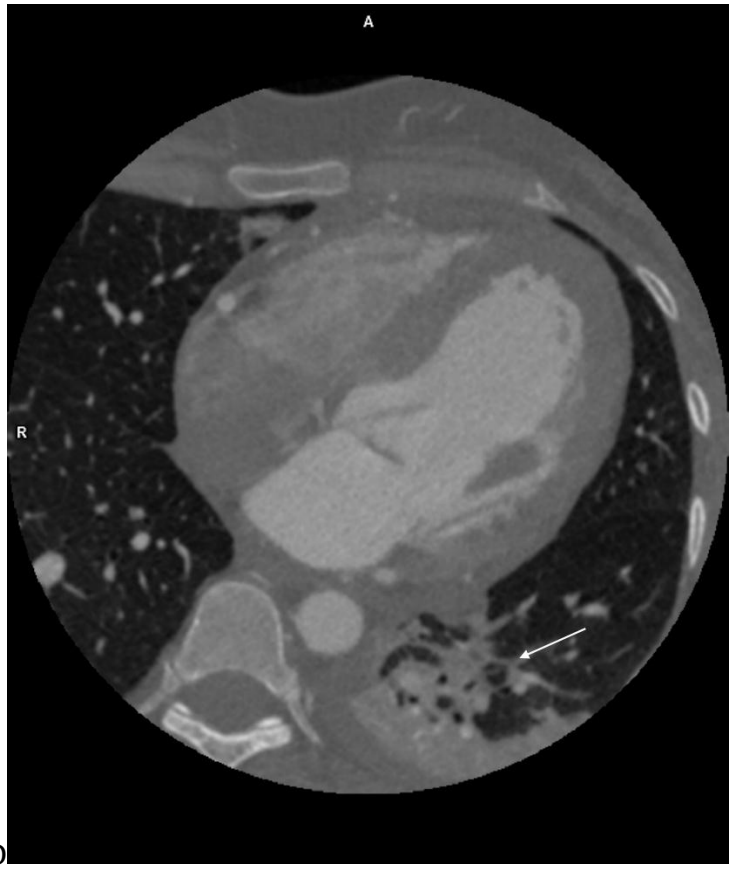

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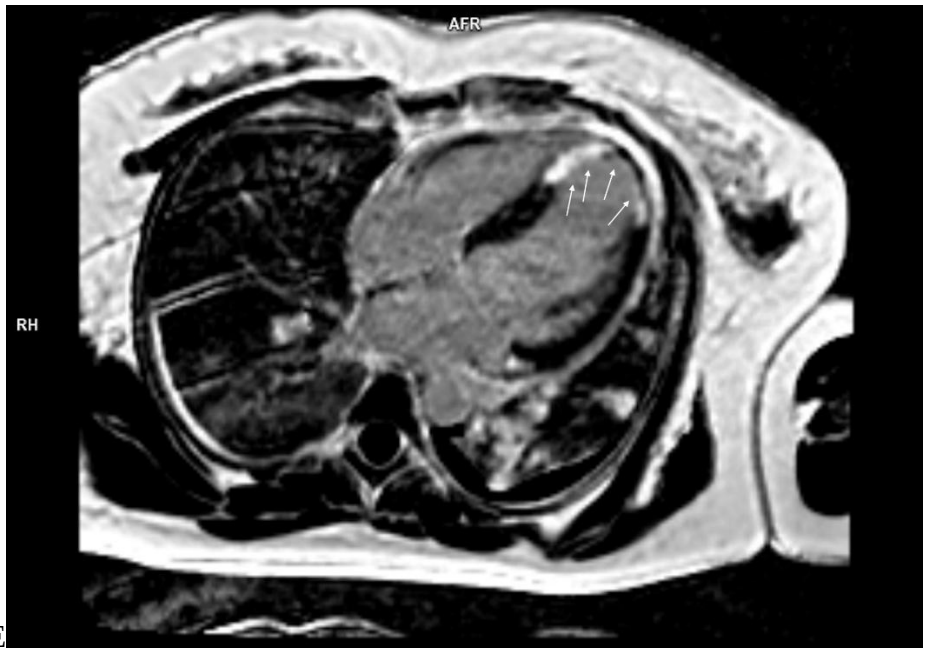

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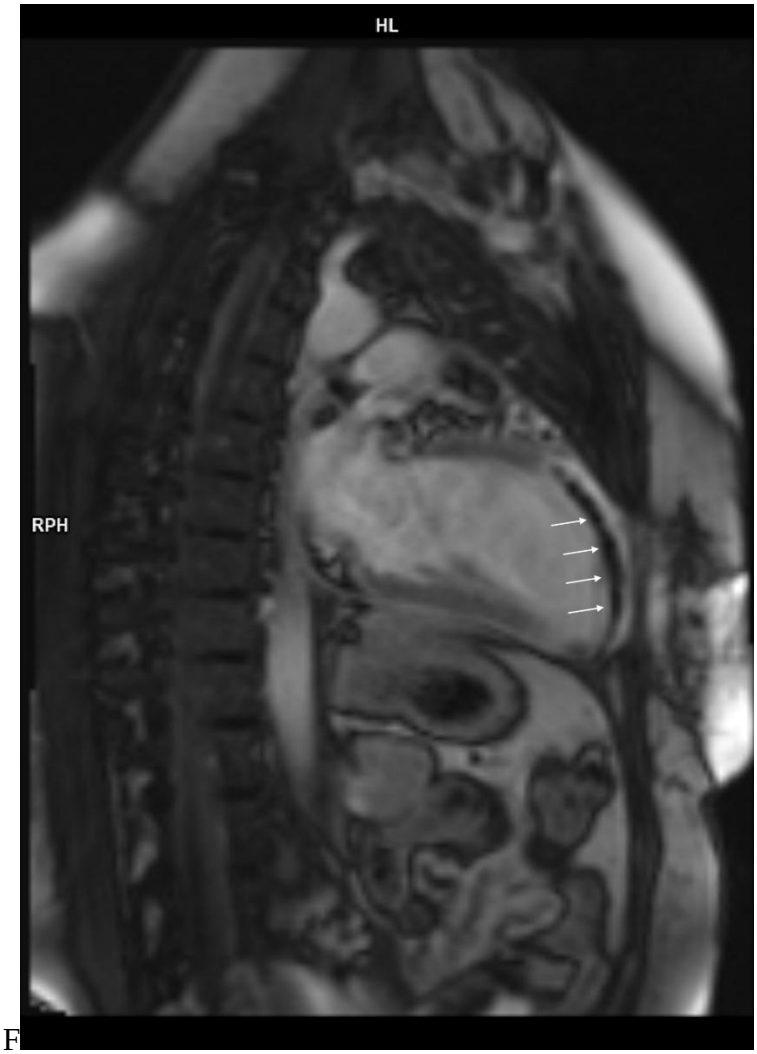

Figure 1. A. Transthoracic echocardiography showing RCA originated from the pulmonary trunk (arrow). **B.** MSCT showing the proximal left anterior descending artery aneurysmal dilation without obstruction (arrow). **C.** MSCT showing RCA origin from the pulmonary trunk (arrow). **D.** MSCT detected pneumonia (arrow). **E.** CMR imaging confirming new ischemic damage in the apical cap and apical segments (arrows) observed in late gadolinium enhancement. **F.** CMR imaging showing microvascular obstruction observed in the early gadolinium enhancement (arrows)

Abbreviations: AA, ascending aorta; CMR, cardiac magnetic resonance; DA, descending aorta; MSCT, multislice computed tomography coronary angiography; PT, pulmonary trunk; RCA, right coronary artery