IMAGES IN CLINICAL RADIOLOGY

A

B

C
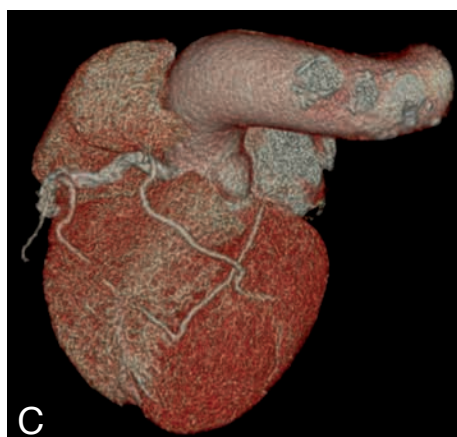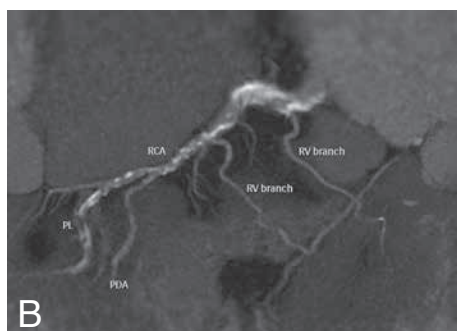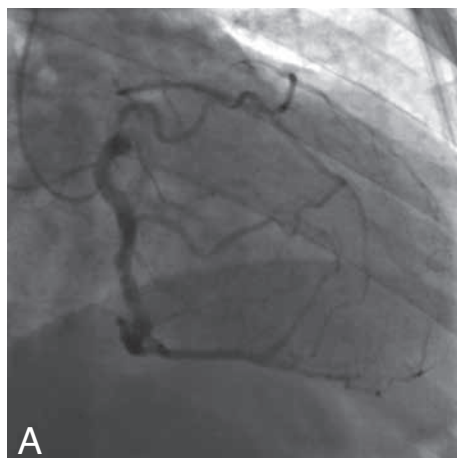
The single right coronary artery

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An asymptomatic obese 60-year-old man with an increased cardio-vascular risk profile (arterial hypertension and hypercholesterolemia) was checked prior to hip surgery. Resting ECG was normal. Exercise test was not possible. A dipyridamole myocardial perfusion scintigraphy showed inferolateral ischemia and a preserved left ventricular (LV) function. Coronary angiography demonstrated moderate atherosclerosis in the proximal segment of the right coronary artery (RCA) and a moderate stenosis in the distal segment of the posterolateral branch (Fig. A). The left anterior descending artery (LAD) and diagonal branches were visualized simultaneously. No additional coronary ostium could be found. The contrast enhanced cardiac CT was performed and it confirmed the absence of a left coronary ostium and a single RCA with two large right ventricular (RV) branches continuing to the left coronary artery (LCA). The first RV branch continued to the diagonal branch. The second RV branch continued to the LAD. Interestingly, in the anterior interventricular sulcus, the LAD had a bidirectional course proximally and distally, with proximally the emergence of an hypoplastic left circumflex artery (LCX) (Fig. B, C). None of the branches were running between the pulmonary artery and the ascending aorta, corresponding with a R-II A classification according to Lipton/Yamanaka.

Comment

A single RCA is an extremely rare congenital anomaly with an estimated incidence of 0.066% of the population. In a single coronary artery (SCR) by definition only one coronary artery originates from the aortic trunk and supplies the entire heart. The current classification system was introduced by Lipton et al. and modified by Yamanaka et al. In this classification the origin of the SCA from the right sinus of Valsalva is defined as 'R' and from the left sinus of Valsalva as 'L'. The normal anatomical course of the SCA is defined as 'I'. The type 'II' SCA provides the contralateral coronary artery and crosses the base of the heart to assume its inherent normal position. In the type 'III' SCA, after leaving the right coronary sinus of Valsalva LAD and LCX arise separately from proximal part of the artery. A further subdivision can be made according to the anatomical course. In type 'A' the main left or right coronary passes anterior to the pulmonary artery, 'B' passes between the aorta and pulmonary artery and 'P' posterior to the aorta. Yamanaka et al. distinguished a septal type 'S' with the course of the SCA through the interventricular septum and a combined type 'C'.

Patients with a SCA are usually asymptomatic and the anomaly found incidentally during angiography. The clinical significance mainly depends on the course of the SCA in relation to the great arteries with a course between the pulmonary artery and the aorta being at risk to arrhythmias, ischemia and sudden death especially during exercise.

According to our knowledge, this is the first anatomical description of right ventricular branches of a single RCA continuing to a diagonal branch, a bidirectional LAD and a hypoplastic LCX.

Reference

1. Lipton M.J., Barry W.H., Obrez I., Silverman J.F., Wexler L.: Isolated single coronary artery: diagnosis, angiographic classification, and clinical significance. *Radiology*, 1979, 130: 39-47.

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