Anomalous origin of left main coronary artery: the value of myocardial scintigraphic and spiral computed tomography scans

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Abstract
Anomalous origin of the left main coronary artery (LMCA) from the right sinus of the Valsalva or the proximal right coronary artery (RCA) is one of the most clinically important anomalies of coronary circulation. We report the case of a patient with chest pain and abnormal thallium myocardial perfusion scan in whom the anomaly was first detected on invasive coronary arteriography. The exact anatomic course of anomalous LMCA was confirmed using contrast enhanced computed tomography.

Key words: left main coronary, thallium myocardial perfusion, computed tomography

Introduction
Anomalous origin of the left main coronary artery (LMCA) from the right sinus of Valsalva or the proximal right coronary artery (RCA) is one of the most clinically important anomalies of coronary circulation. The incidence of the anomaly is 0.01–0.07% in patients undergoing cardiac catheterization, and 1.2–6.1% in those with an isolated coronary artery anomaly [1, 2]. The course of anomalous coronary artery determines its hemodynamic significance and operative treatment. We report the case of a patient with chest pain and positive thallium myocardial perfusion scan in whom the anomaly was first detected on invasive coronary arteriography. The exact anatomic course of anomalous LMCA was confirmed using contrast enhanced computed tomography.

Case report
A 44-year-old woman with no significant medical history came to the emergency department due to recurrent episodes of chest pain mostly during exercise but also when resting. Results of the physical examination were normal and no signs of ischemia were found on rest ECG while chest X-ray findings and cardiac troponin I were normal. A diagnosis of unstable angina was suspected. The patient was hospitalized in the internal medicine department. Treatment with acetylsalicylic acid, subcutaneous enoxaparine and atenolol was started and the patient became asymptomatic. No dynamic ECG changes were revealed during hospitalization and subsequent blood tests for cardiac enzymes were normal.

An exercise test was performed and was stopped at 3:13 min due to chest pain when a heart rate of 120 bpm (68% of target rate) was achieved, while no ST segment displacement was demonstrated. Two days later stress and rest TI-201 cardiac perfusion studies were performed which showed reversible myocardial ischemia of the anterior and inferolateral walls (Figure 1); subsequently a coronary angiography was performed. No atherosclerotic lesions were found in the coronary arteries but anomalous origin of LMCA from the RCA was demonstrated (Figure 2). A contrast enhanced CT scan was performed with Multislice CT (MX-8000, Phillips, Eindhoven, The Netherlands) with slice thickness 1.3 mm and 0.8 mm increment (1.5 pitch). One hundred ml of non-ionic contrast me-
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iodia (Iopamid 370 Ultravist Schering, Germany) was injected via the right antecubital vein with an automated injector (Envision CT) at a rate of 3.5 ml/sec and 18 second delay time. Image analysis confirmed the anomalous origin and the interarterial course of LMCA (Figure 3). Thereafter, a successful surgical correction of the anomaly was performed.

Discussion

When the LMCA arises from the right coronary sinus or the proximal RCA it may follow one of four pathways: septal (subpulmonary) course, anterior free wall course, posterior (retroaortic)

![Figure 1](image1.png)

Figure 1. Thallium stress and rest SPECT images show reversible anterior and interolateral perfusion defects compatible with ischemia in the territory of left anterior descending and left circumflex coronary arteries.

![Figure 2](image2.png)

Figure 2. Coronary artery catheterization RAO 20° combined with cranial angulation 30° demonstrates anomalous origin of LMCA from right coronary sinus without evidence of coronary artery stenosis.

![Figure 3](image3.png)

Figure 3. Spiral computed tomography shows anomalous origin of LMCA with interarterial course. The arrow indicates the left main coronary artery taking a path between the ascending aorta and pulmonary trunk.
course or interarterial course. The first three variants are consid-
ered benign and are usually not associated with myocardial is-
chemia. The interarterial course of LMCA between the aorta and
pulmonary artery has been demonstrated to be associated with
exertional angina, syncope and sudden death, probably caused
by dynamic compression of LMCA between the aortic root and
the root of the pulmonary trunk [3, 4]. Surgical treatment is indi-
cated in this type of anomalous LMCA. The course of the anoma-
lous coronary artery is usually assessed by angiography in a right
anterior oblique (RAO) view. In the present case, according to the
angiography, an anterior course of anomalous LMCA was initially
suspected, but due to clear signs of myocardial exercise induced
ischemia on TI-201 myocardial perfusion study, an additional exa-
imination was needed. In the recent years, other less invasive
techniques such as contrast enhanced CT has been used for the
diagnosis. This can be quite helpful in defining the actual course
of anomalous LMCA which may be classified by invasive coro-
nary arteriography.

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