




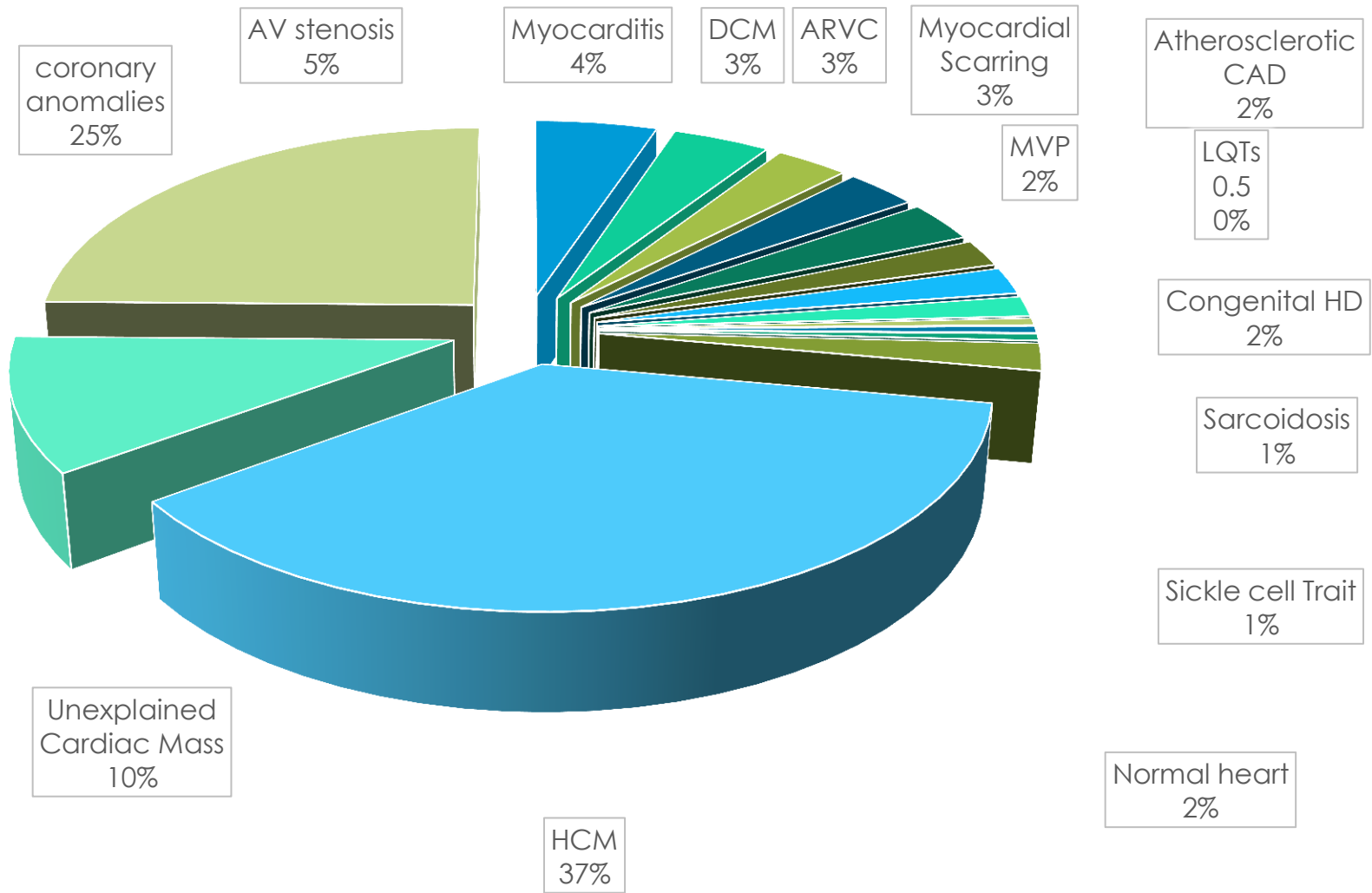
Coronary Anomalies

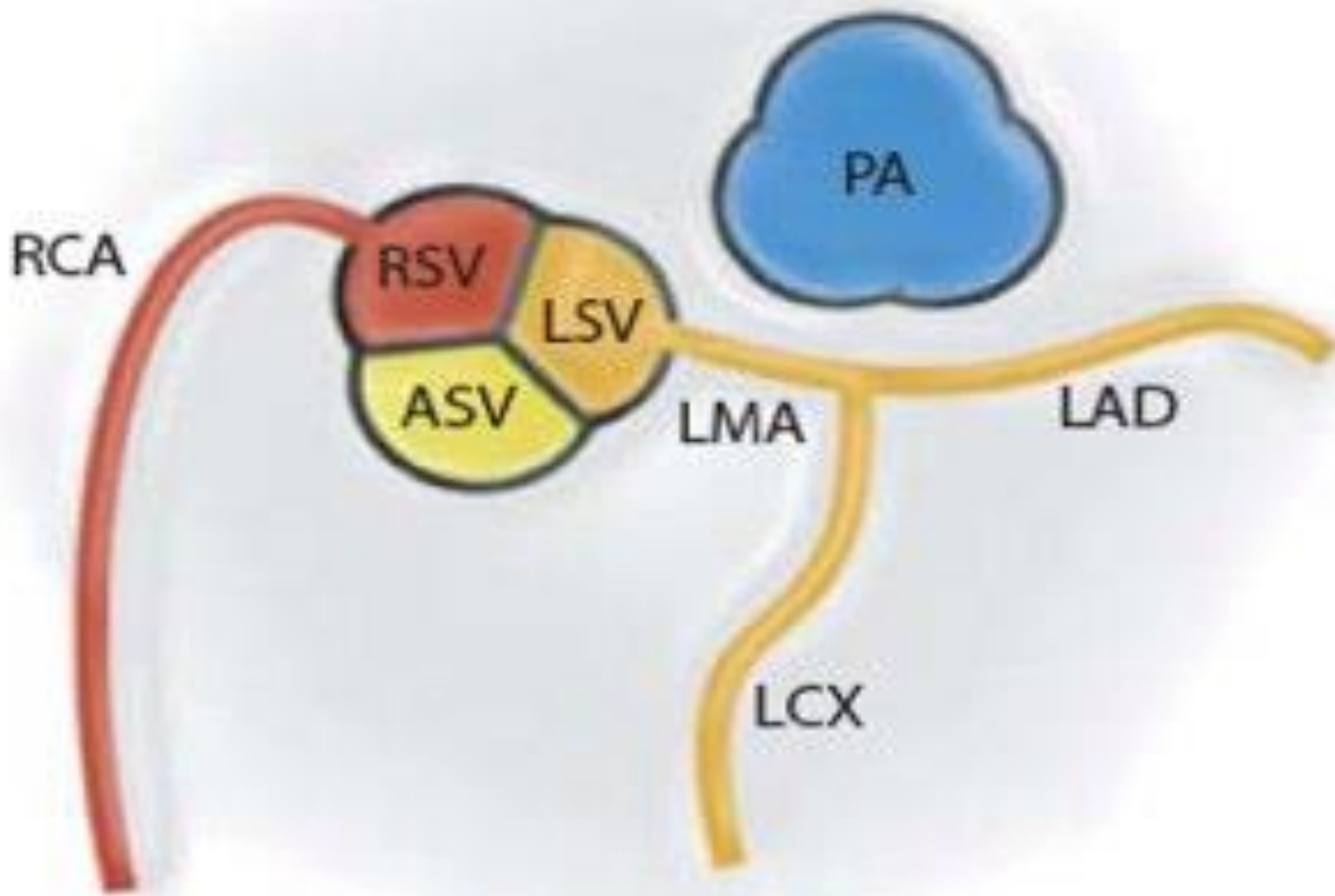
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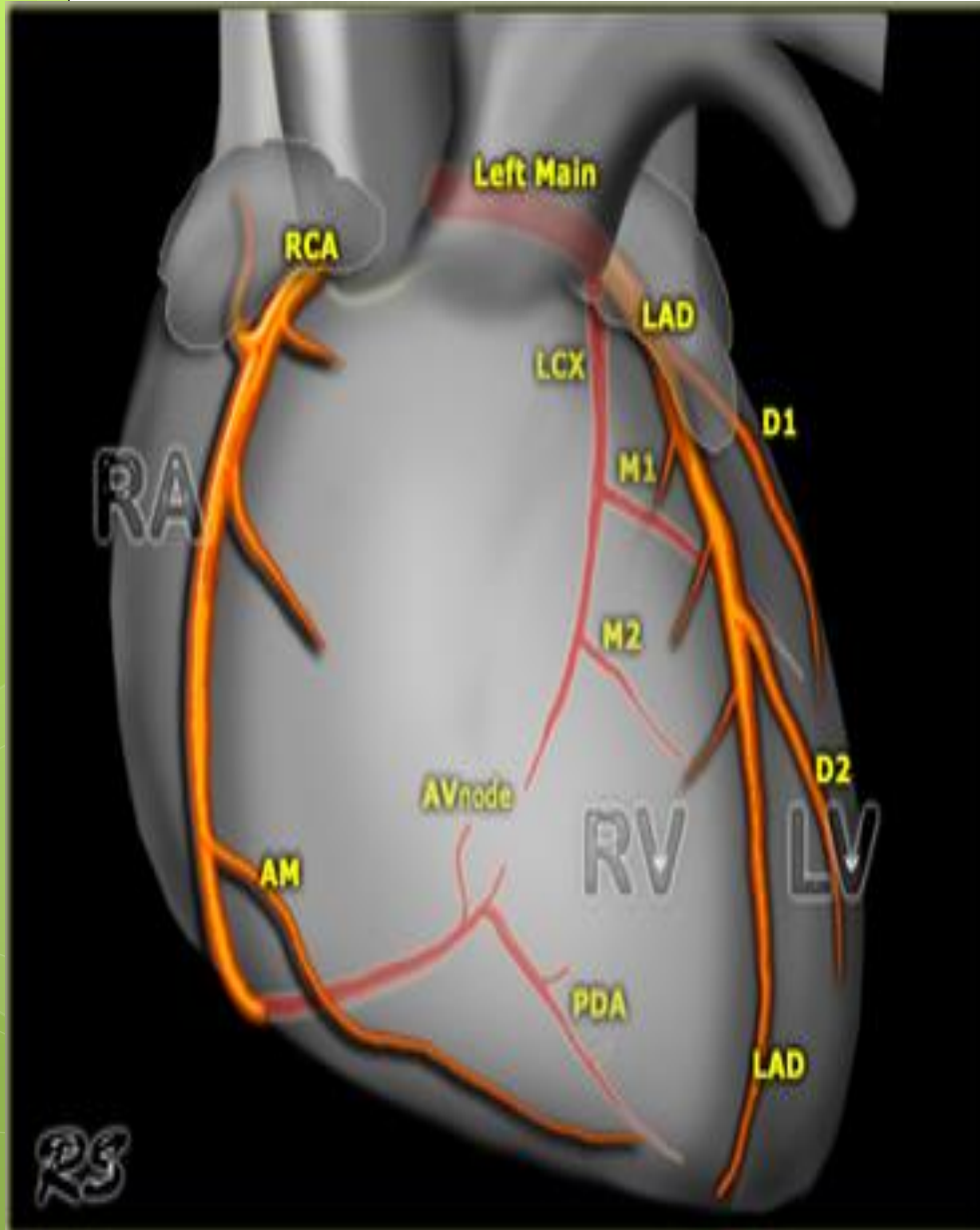


Causes of SCD

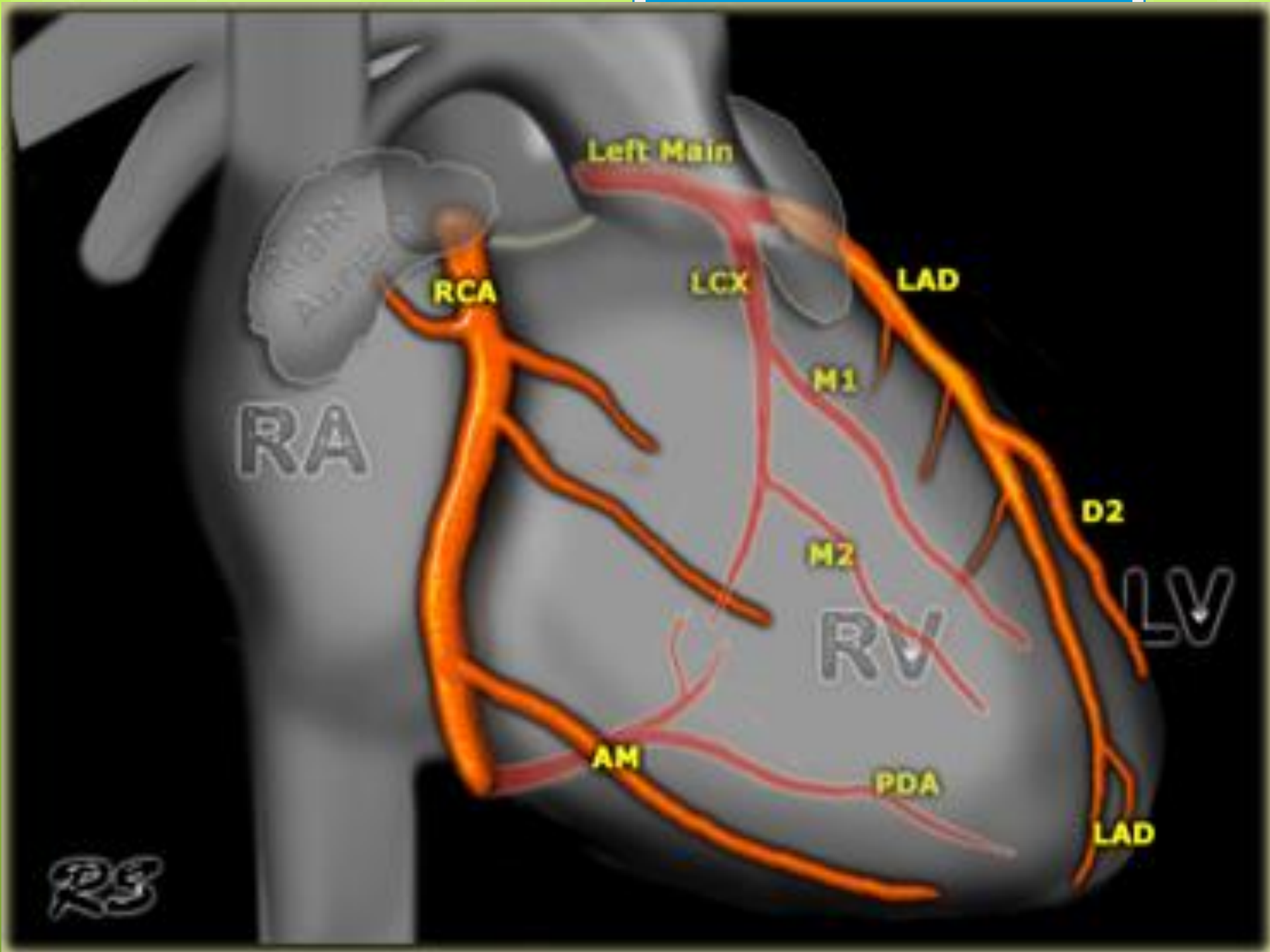
- Over 35 yrs. of age
 - Coronary Heart Disease
- Under 35 yrs.
 - Cardiomyopathies
 - Congenital Heart Disease
 - 'Structurally Normal Heart' (ion channel disorders, conduction disease) = SADS
 - Anomalous coronaries (abnormal anatomical position of coronary blood vessels)
 - Myocarditis (infection or inflammation of heart muscle)







- Left Main or left coronary artery (LCA)
 - Left anterior descending (LAD)
 - diagonal branches (D1, D2)
 - septal branches
 - Circumflex (Cx)
 - Marginal branches (M1, M2)
- Right coronary artery
 - Acute marginal branch (AM)
 - AV node branch
 - Posterior descending artery (PDA)



Left Main

RCA

LCX

LAD

RA

M1

D2

M2

LV

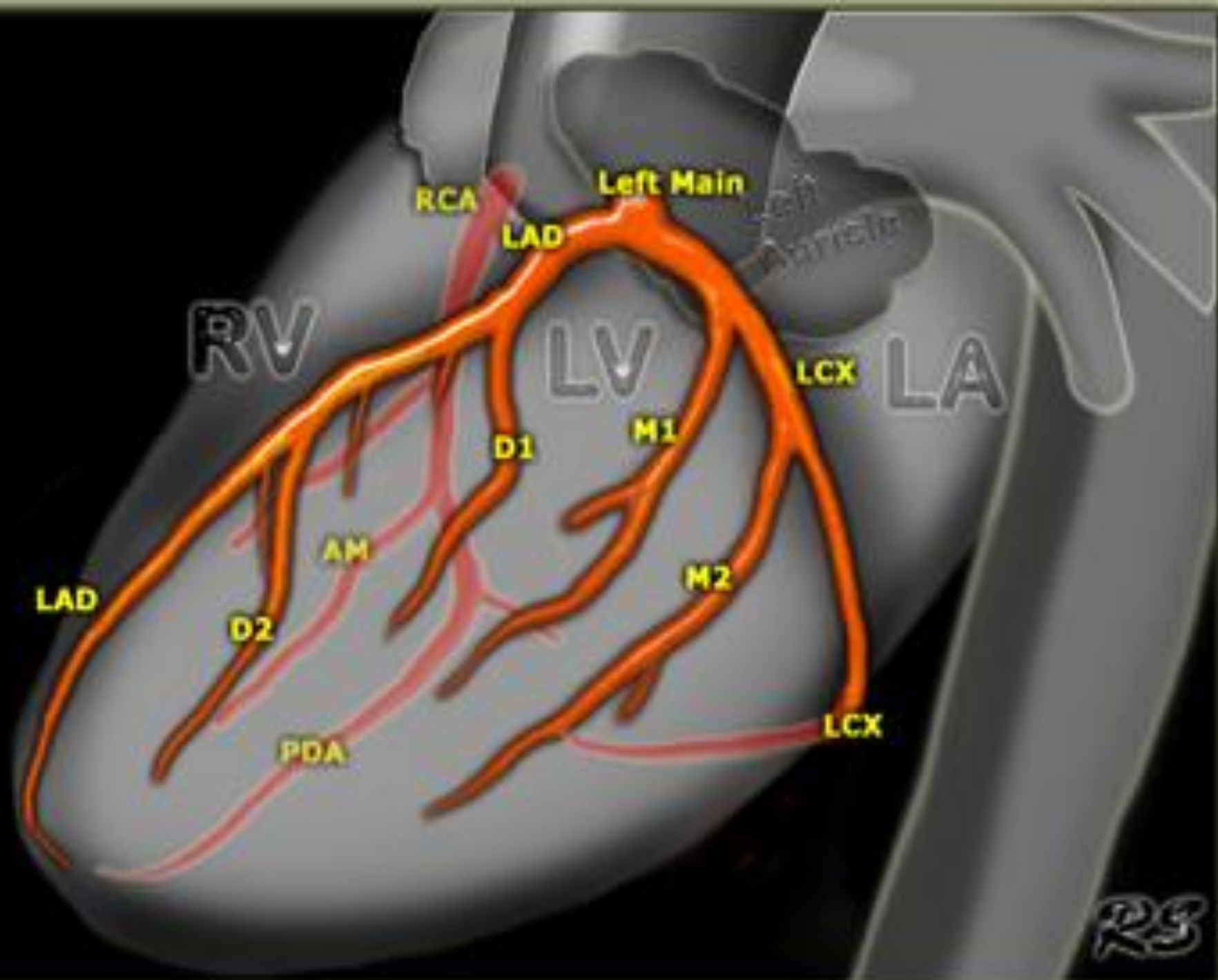
RV

AM

PDA

LAD

RS



LEFT CORONARY ARTERY (Right Oblique)

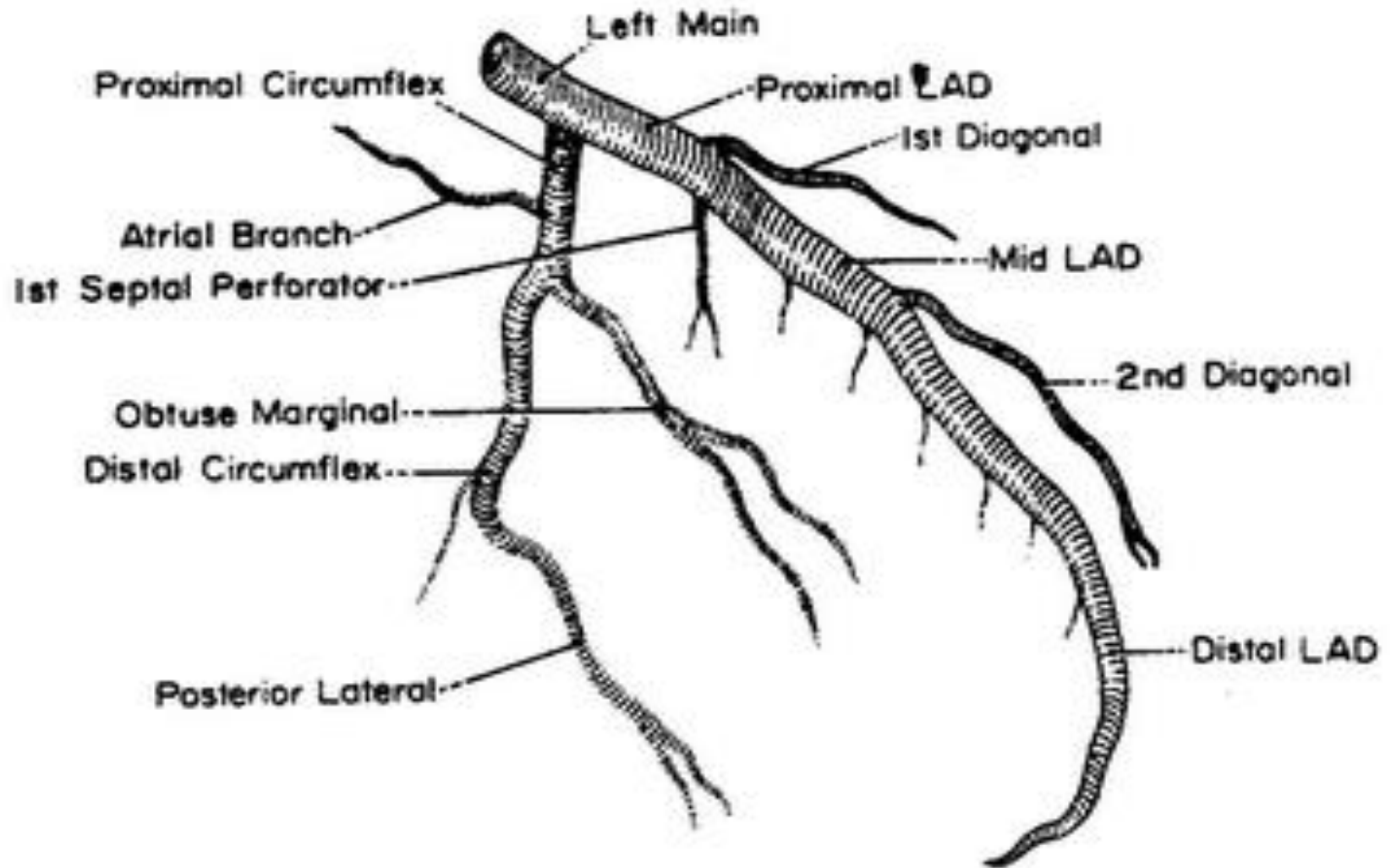
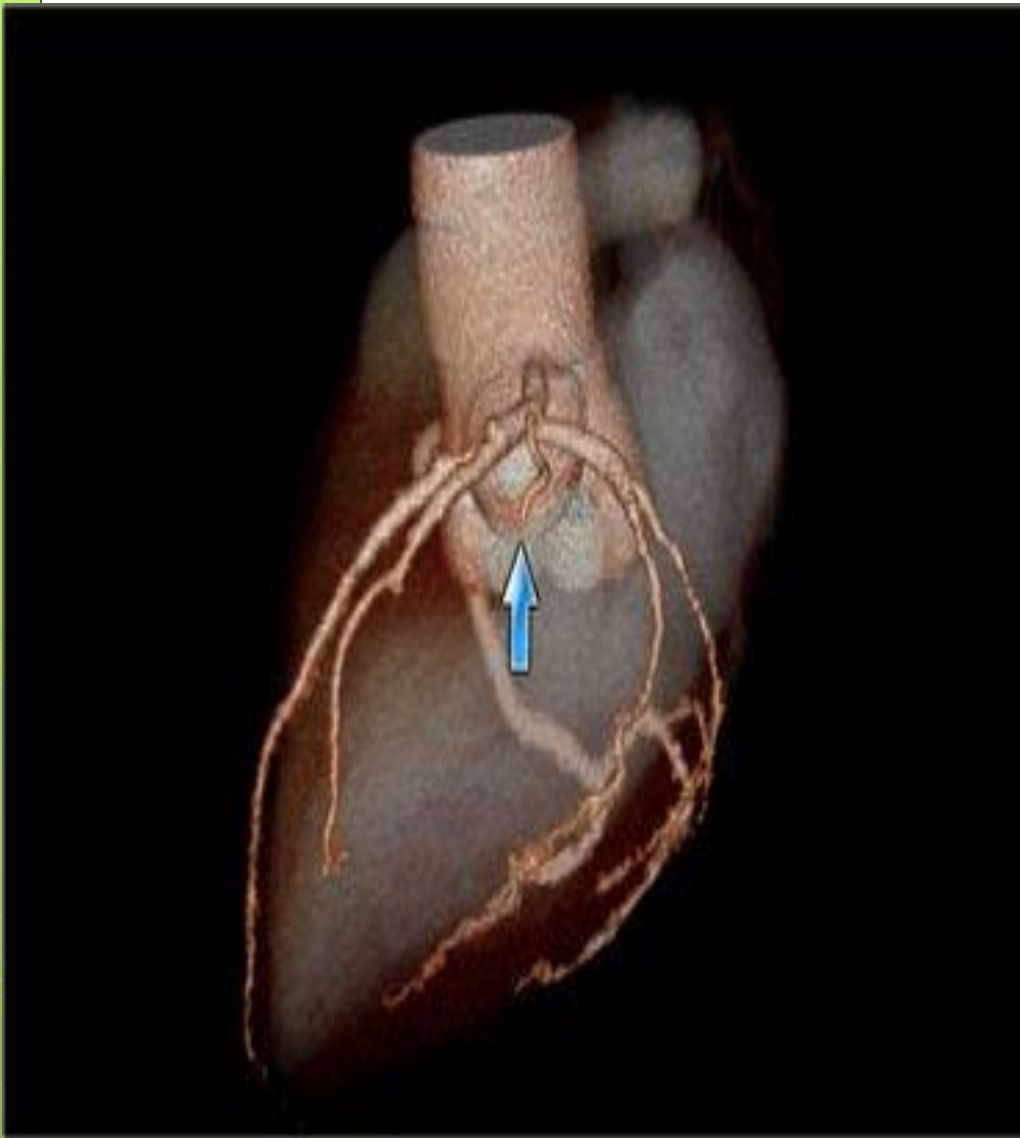


FIGURE 108-37 Anatomy of the left coronary tree in the right oblique view.



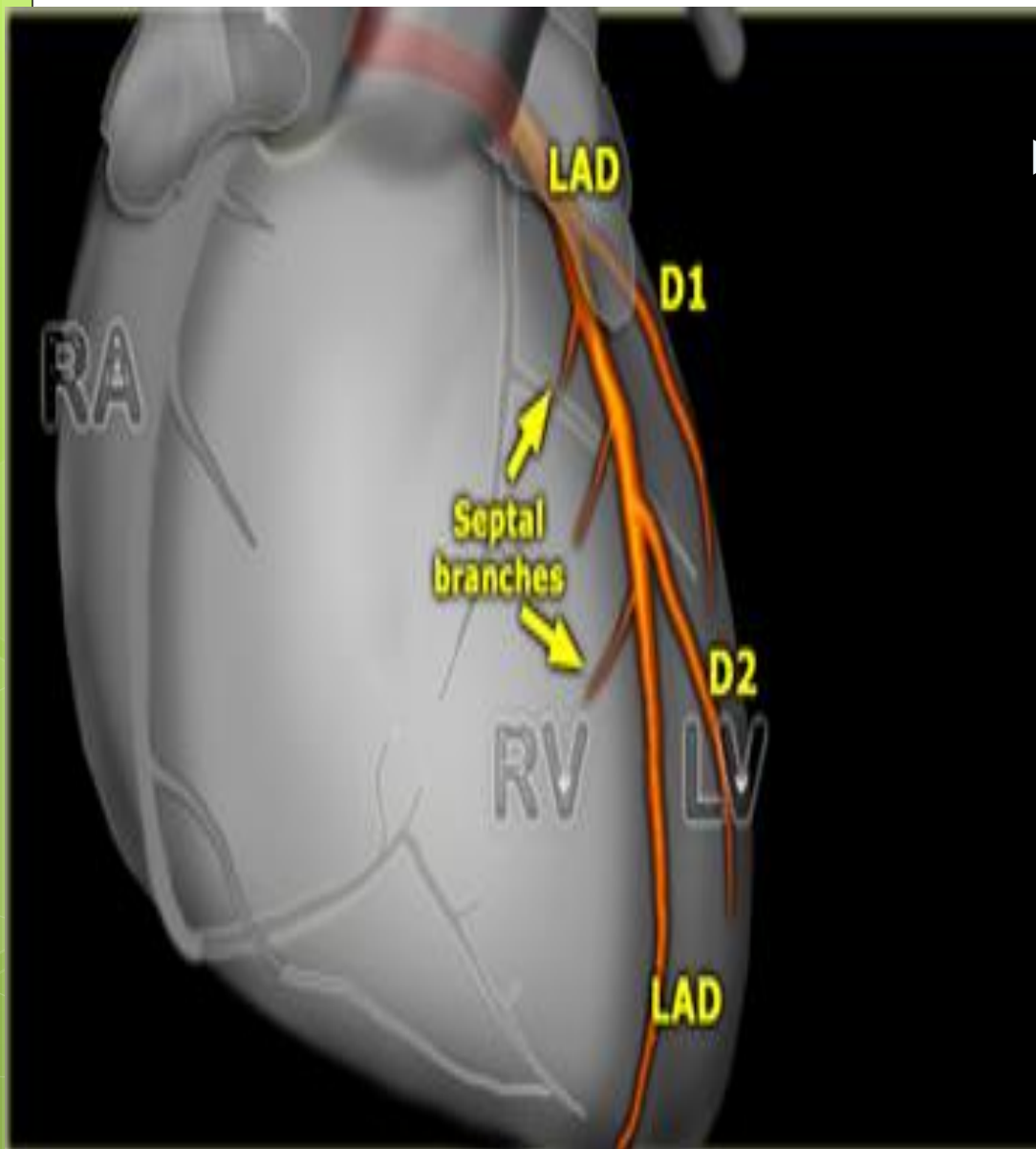
- The LCA divides almost immediately into the circumflex artery (Cx) and left anterior descending artery (LAD). On the left an axial CT-image. The LCA travels between the right ventricle outflow tract anteriorly and the left atrium posteriorly and divides into LAD and Cx.



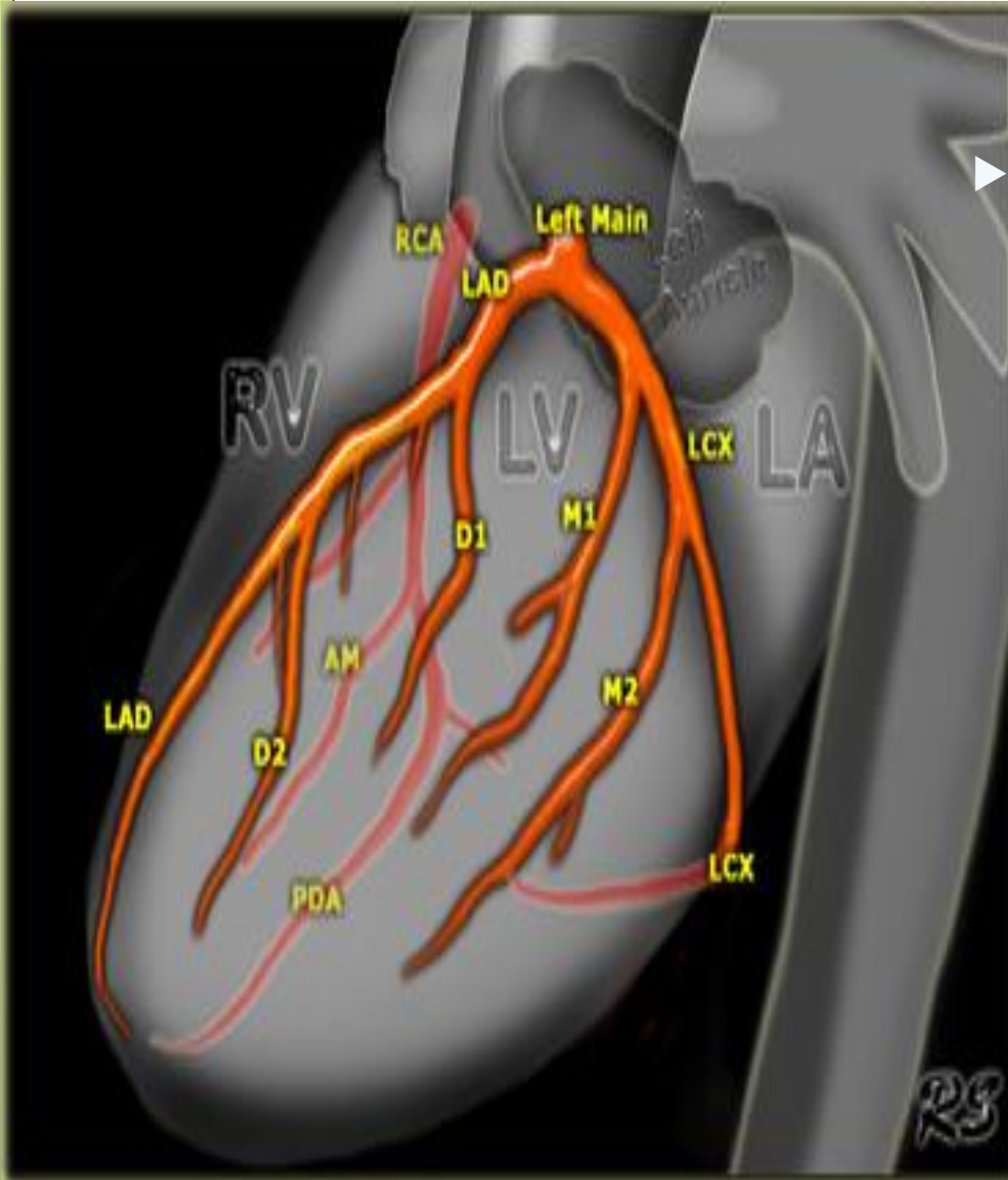
- ▶ In 15% of cases a third branch arises in between the LAD and the LCx, known as the ramus intermedius or intermediate branch. This intermediate branch behaves as a diagonal branch of the LCx.



- ▶ The LAD travels in the anterior interventricular groove and continues up to the apex of the heart. The LAD supplies the anterior part of the septum with septal branches and the anterior wall of the left ventricle with diagonal branches. The LAD supplies most of the left ventricle and also the AV-bundle.



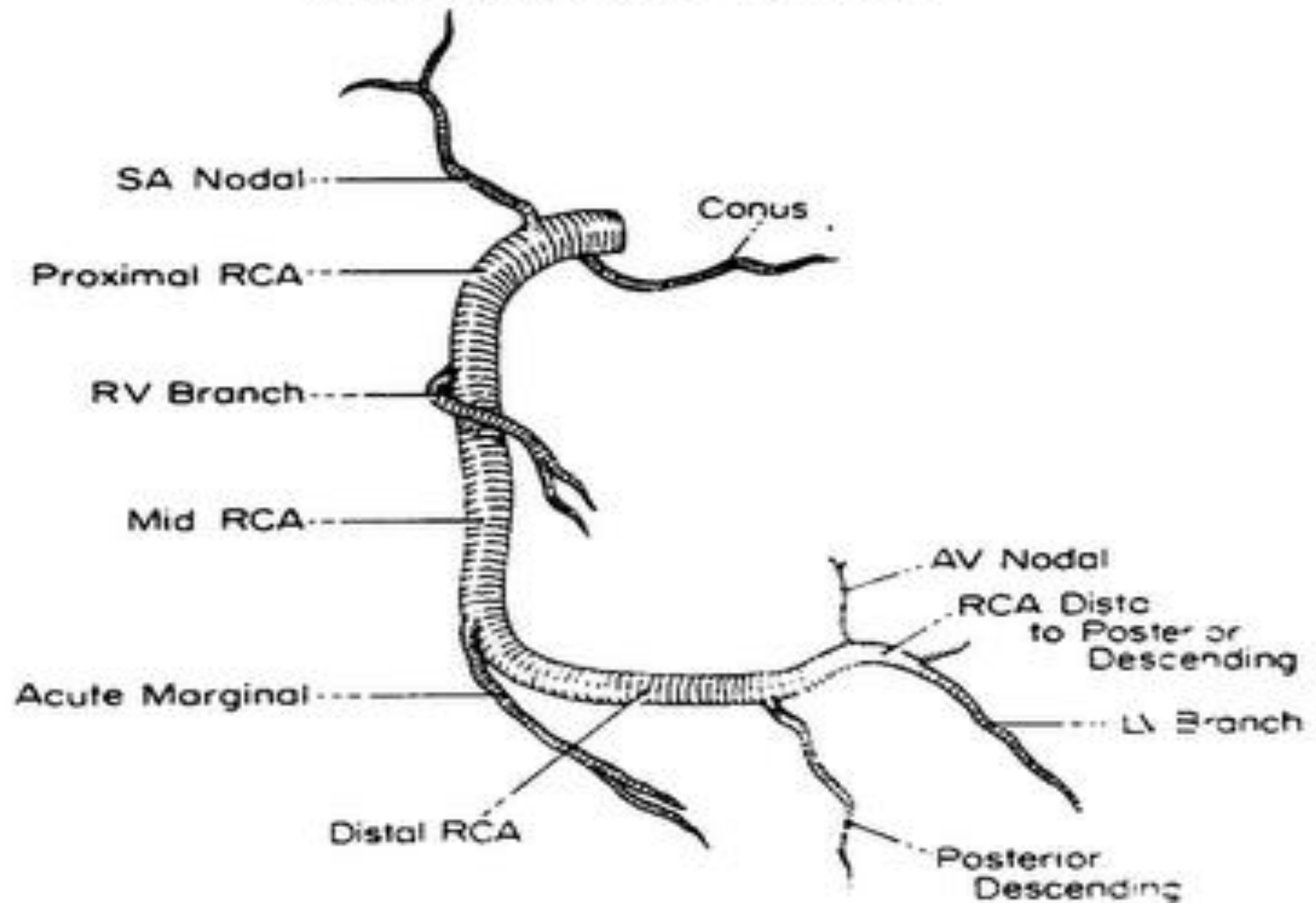
▶ The diagonal branches come off the LAD and run laterally to supply the antero-lateral wall of the left ventricle. The first diagonal branch serves as the boundary between the proximal and mid portion of the LAD (2). There can be one or more diagonal branches: D1, D2, etc.

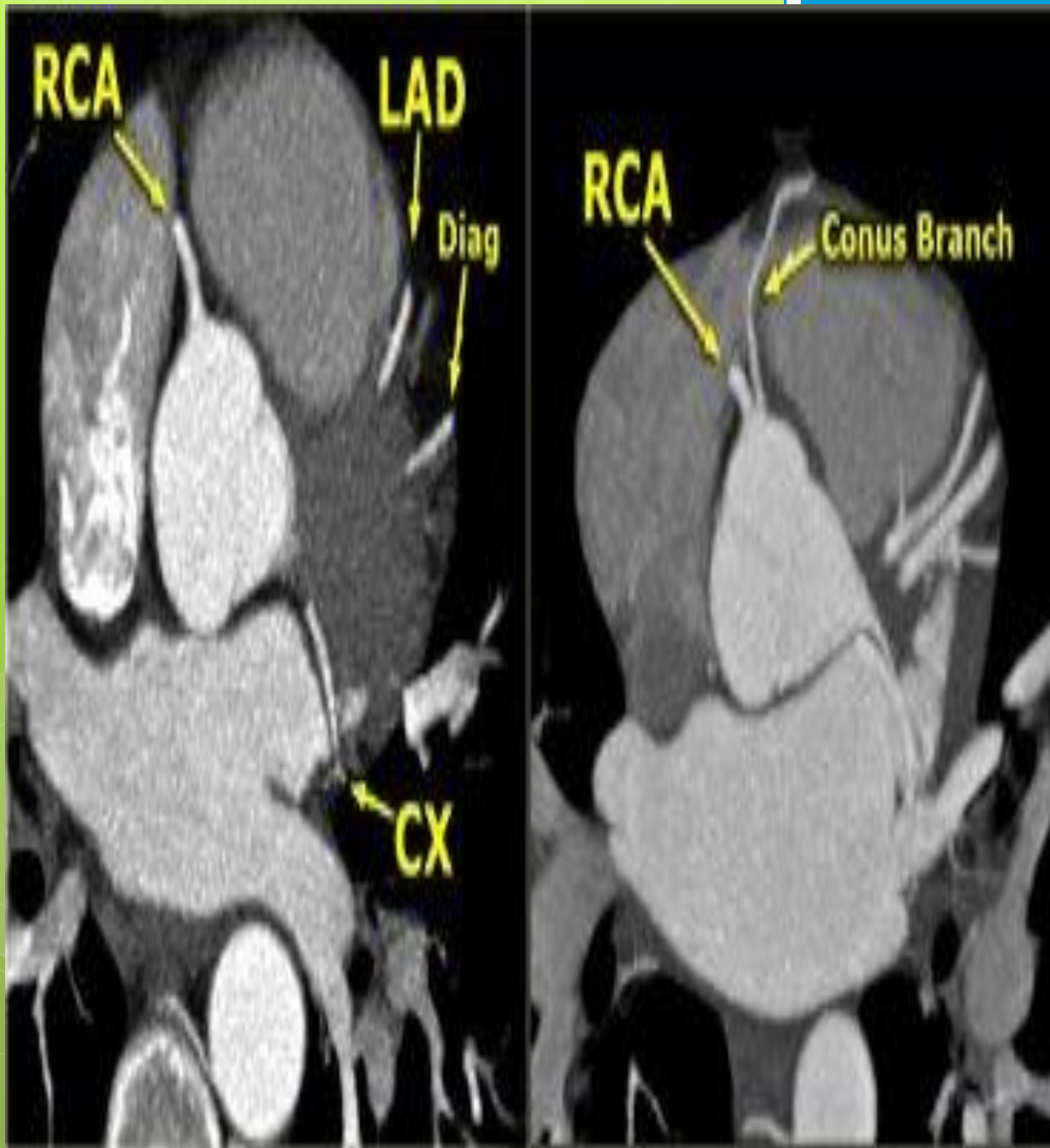


- ▶ The LCx lies in the left AV groove supplies the vessels of the lateral wall of the left ventricle. Obtuse marginal (OM1, OM2).
- 10%** of patients have a left **dominant circulation** in which the LCx also supplies the posterior descending artery (PDA).

FIGURE 108-40 Anatomy of the right coronary tree.

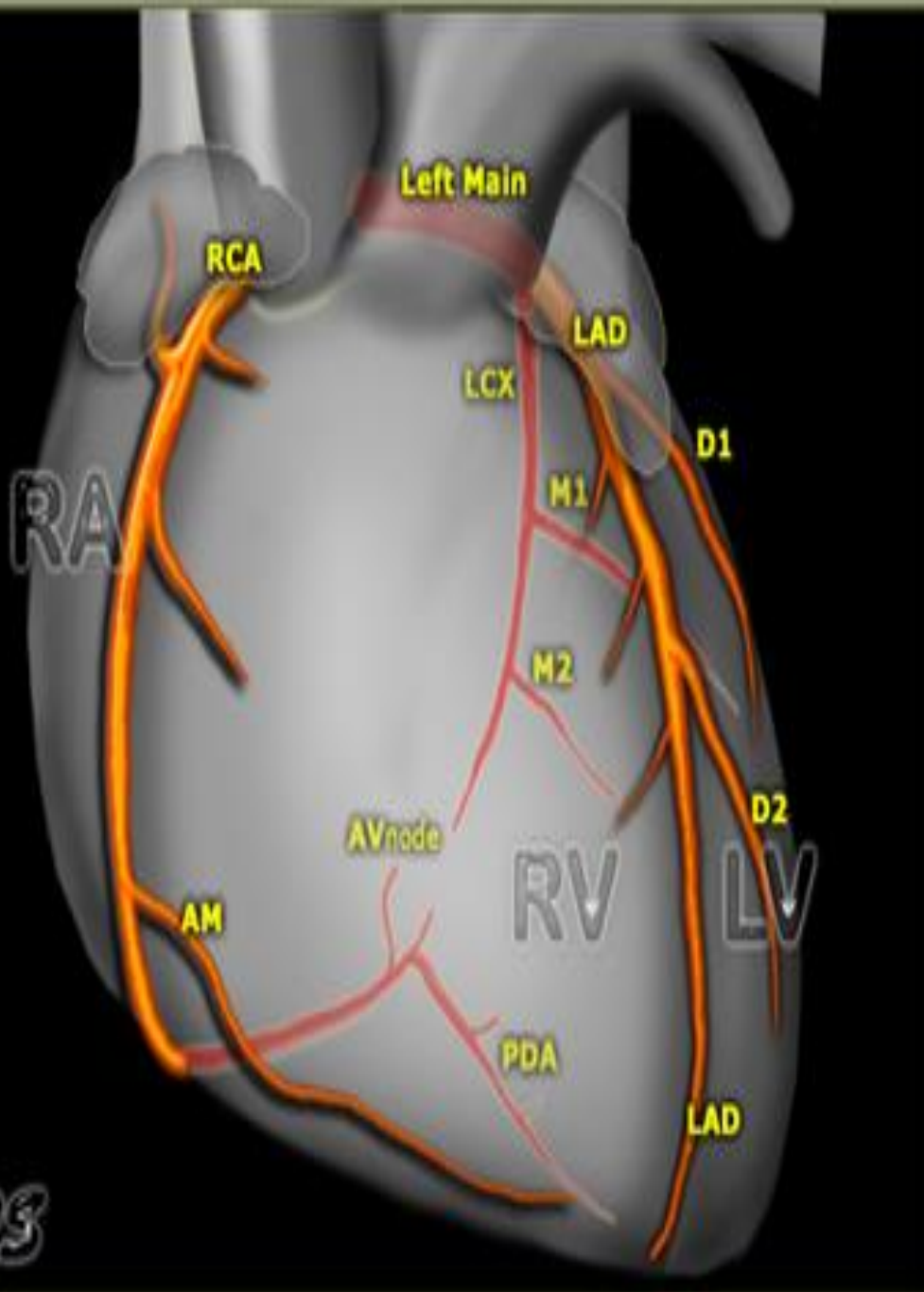
RIGHT CORONARY ARTERY





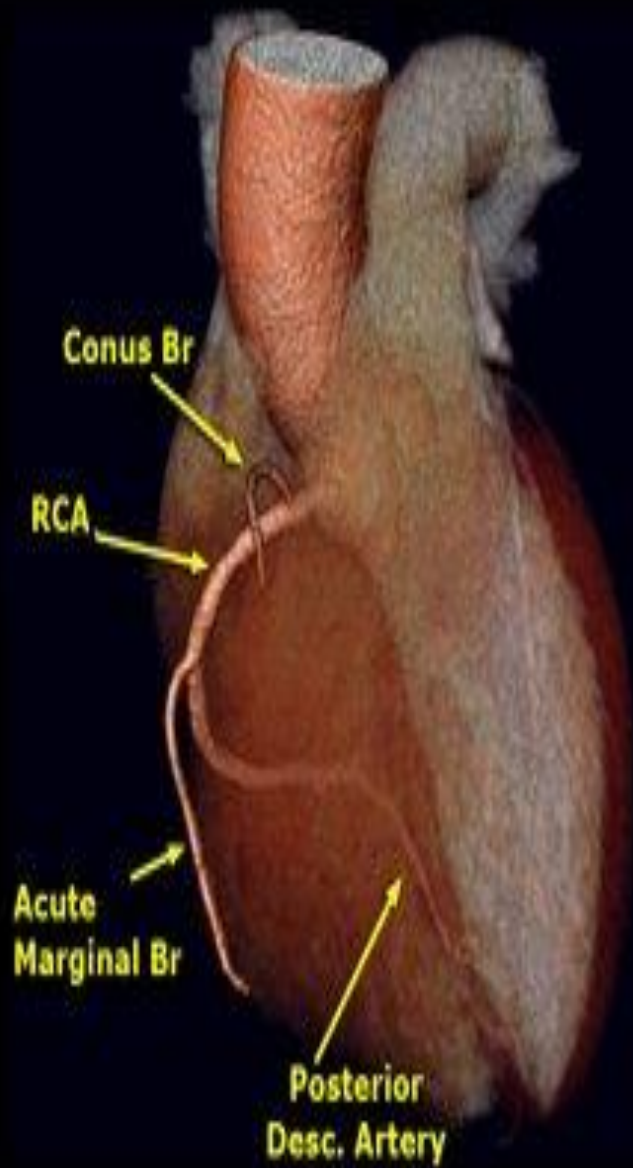
- In 50-60% the first branch of the RCA - Rt conus branch.
- In 36%- Directly from aorta

- Also known as – **ARTERIA CONI ARTERIOSI, THIRD CORONARY.**
- Anastomoses with a similar left coronary branch around pulmonary trunk – **ANNULUS OF VIEUSSENS**

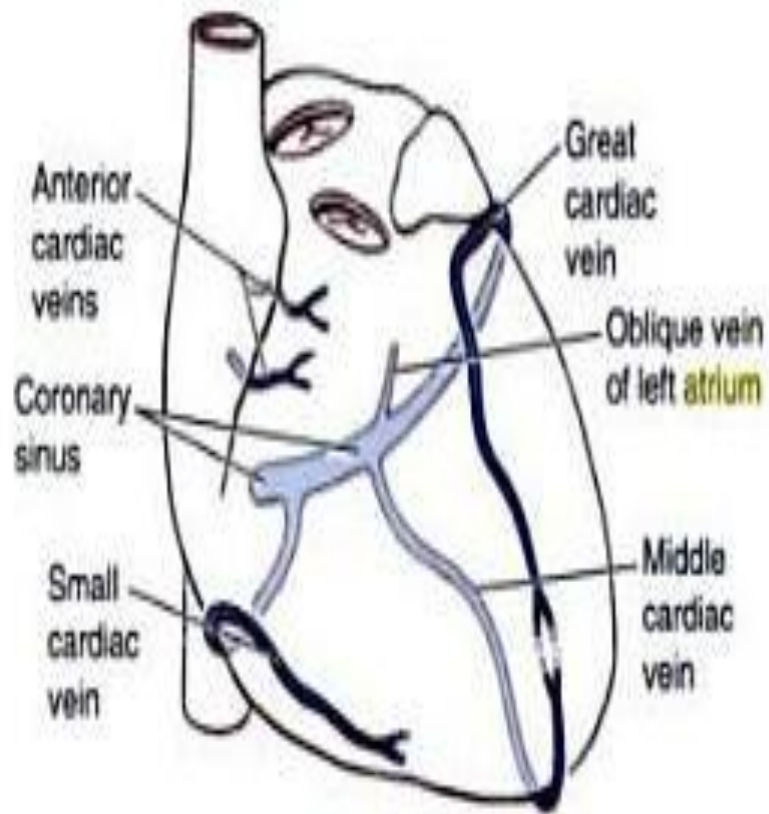


In 60% a sinus node artery arises as second branch of the RCA. The RCA continues in the AV groove posteriorly and gives off a branch to the AV node.

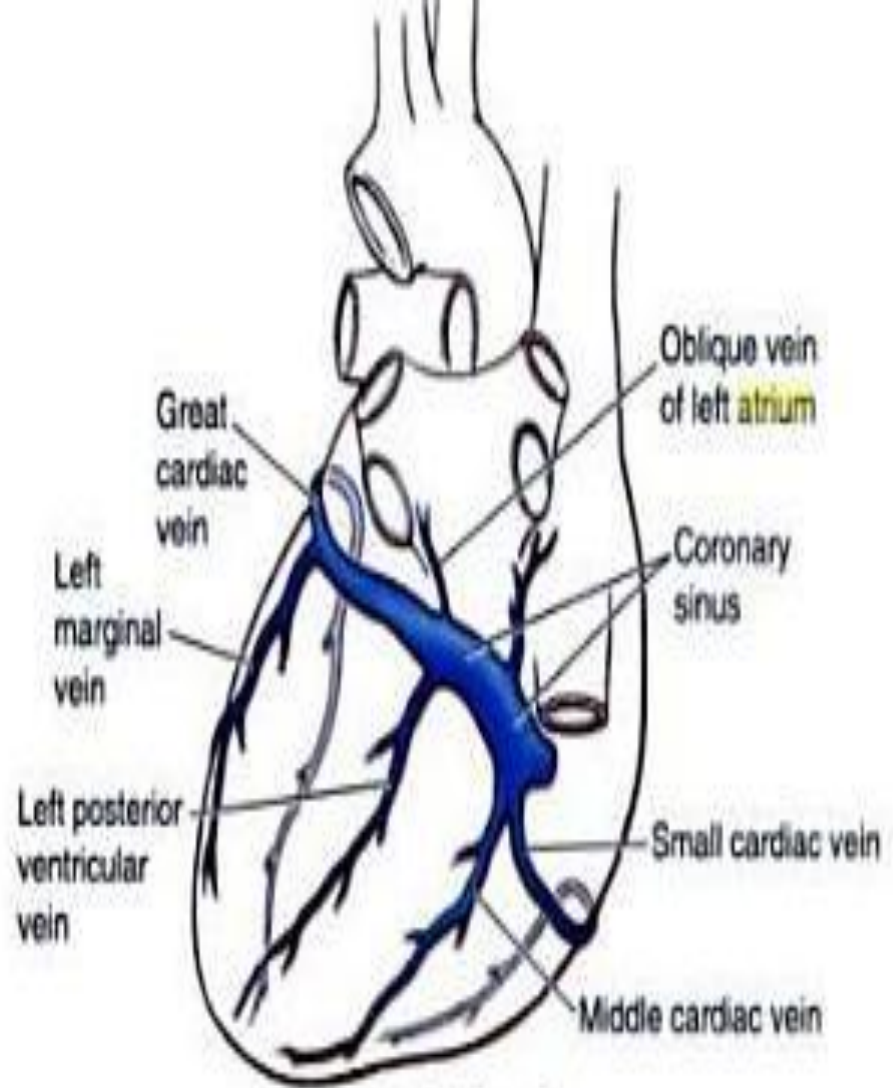
In 65% of cases -right dominant circulation. The PDA supplies the inferior wall of the left ventricle and inferior part of the septum.



The large acute marginal (AM) or RV branch supplies the lateral wall of the right ventricle.



Anterior view




Posteroinferior view

Figure 1.51. Cardiac veins. The great, middle, and small cardiac veins; the oblique vein of the left atrium; and the left posterior ventricular vein are the main vessels draining into the coronary sinus. The coronary sinus, in turn, empties into the right atrium. The anterior cardiac veins drain directly into the auricle of the right atrium.



Definitions

- 
- ▶ The **definition** of a coronary artery should be made **without** taking into account of its **origin** and **proximal course** but focusing on its **intermediate and distal segments** and/or its dependent micro vascular bed

CORONARY ARTERY	MINIMALLY REQUIRED FEATURES
Left anterior descending (LAD)	Location: the anterior interventricular sulcus Subepicardial position (but not infrequently intramyocardial) Provides septal branches and follows the direction of the septum. Accompanied by a conspicuous venous branch (greater cardiac vein)
Circumflex (Cx)	Location: the left side of the coronary sulcus Subepicardial position Provides at least one marginal branch
Right coronary artery (RCA)	Location: the right side of the coronary sulcus Subepicardial position Provides at least the right ("acute") marginal branch

LEVEL	VARIABLES
1. Ostium	Number of ostia Location Size Angle of origination Shape (e.g. slit-like; membrane)
2. Size	Small size
3. Proximal course	Especially intramural tract Consider angle of origin
4. Mid-course	Intraseptal tract or looping
5. Termination	Fistula

Coronary anomalies of clinical and surgical relevance

anomalous pulmonary origins of the coronaries(APOC);

anomalous aortic origins of the coronaries (AAOC);

congenital atresia of the left main (CALM)

coronary arterio-venous fistulas (CAVF);

coronary bridging (myocardial bridging);

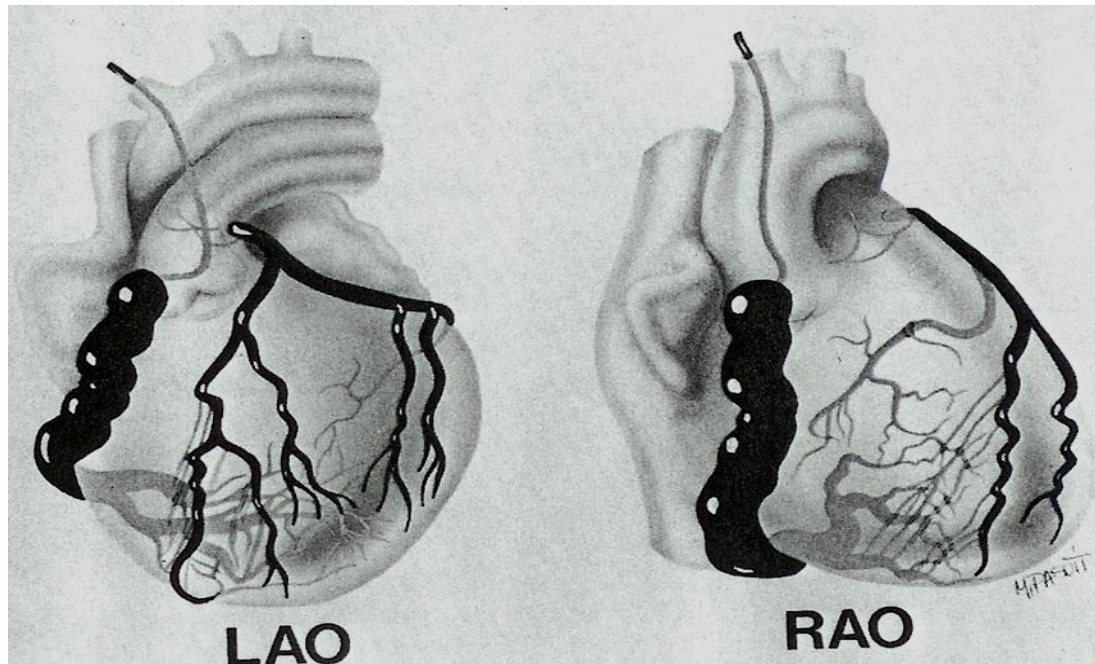
coronary aneurysms (CAn);

coronary stenosis

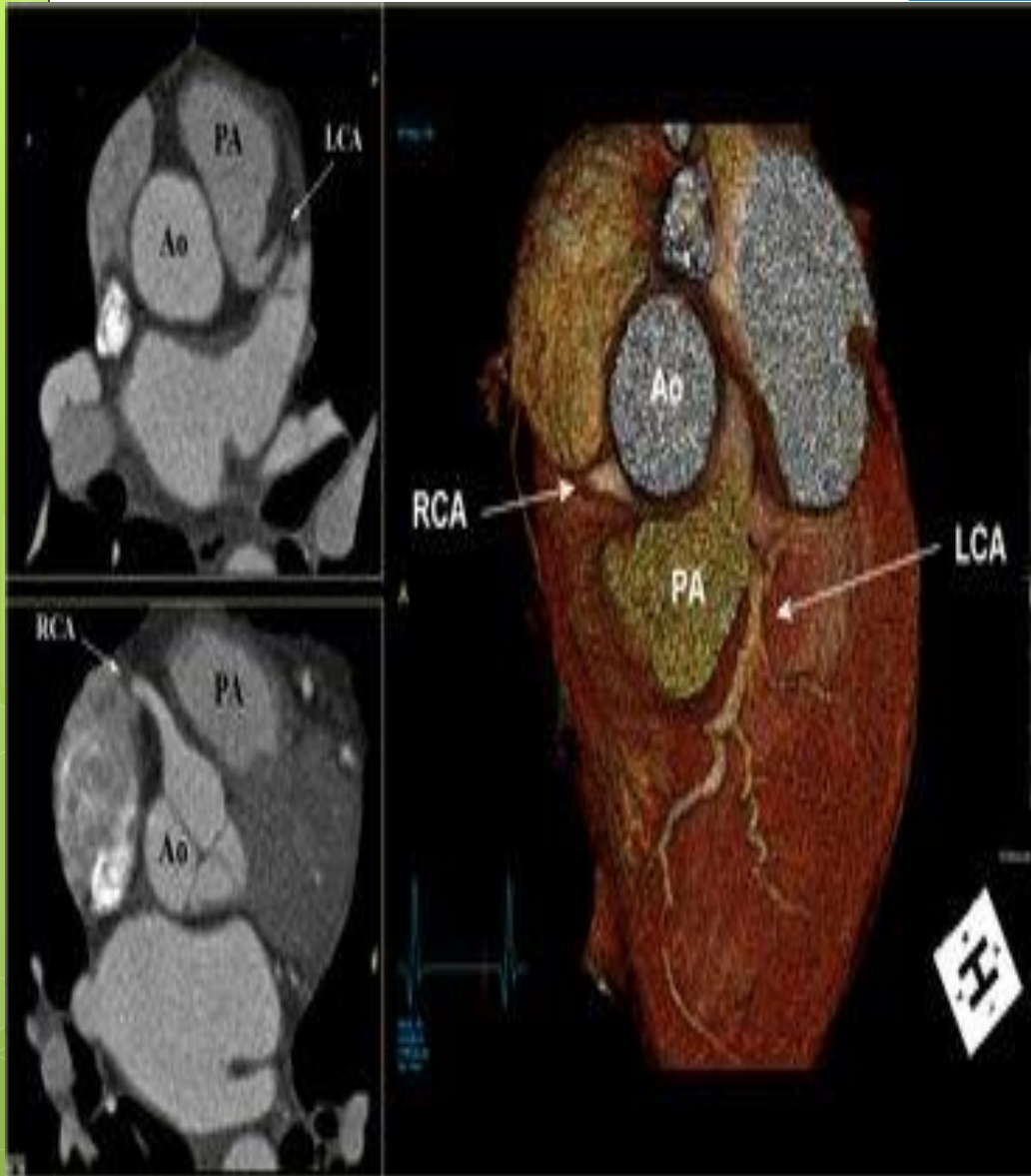
ANOMALOUS PULMONARY ORIGIN OF THE CORONARY ARTERIES

APOC	"Major anomalies"		
	ALCAPA	severe	Origin form Pulmonary sinus: 1, 2 or NF
	ARCAPA	severe, rare	-do-
	ACxPA	Severe, rare	-do
	ARCLCPA	Severe, rare	-do-

Left Coronary Arising From PA Bland-White-Garland Syndrome



Blood flows from the RCA via collaterals to the left coronary artery, and then into the pulmonary artery.



ALCAPA results in the left ventricular myocardium being perfused by relatively desaturated blood under low pressure, leading to myocardial ischemia

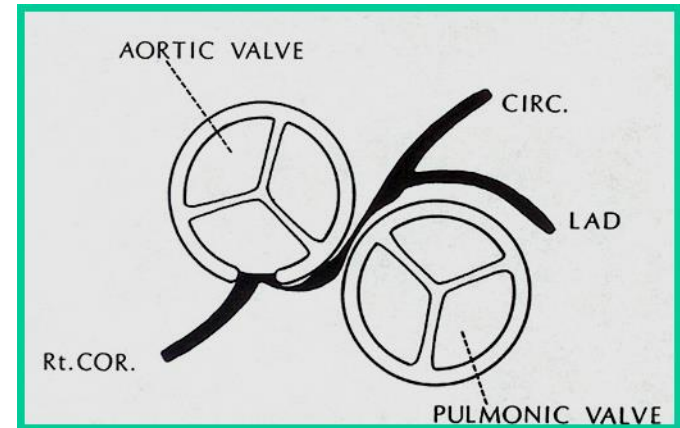
L-R SHUNT

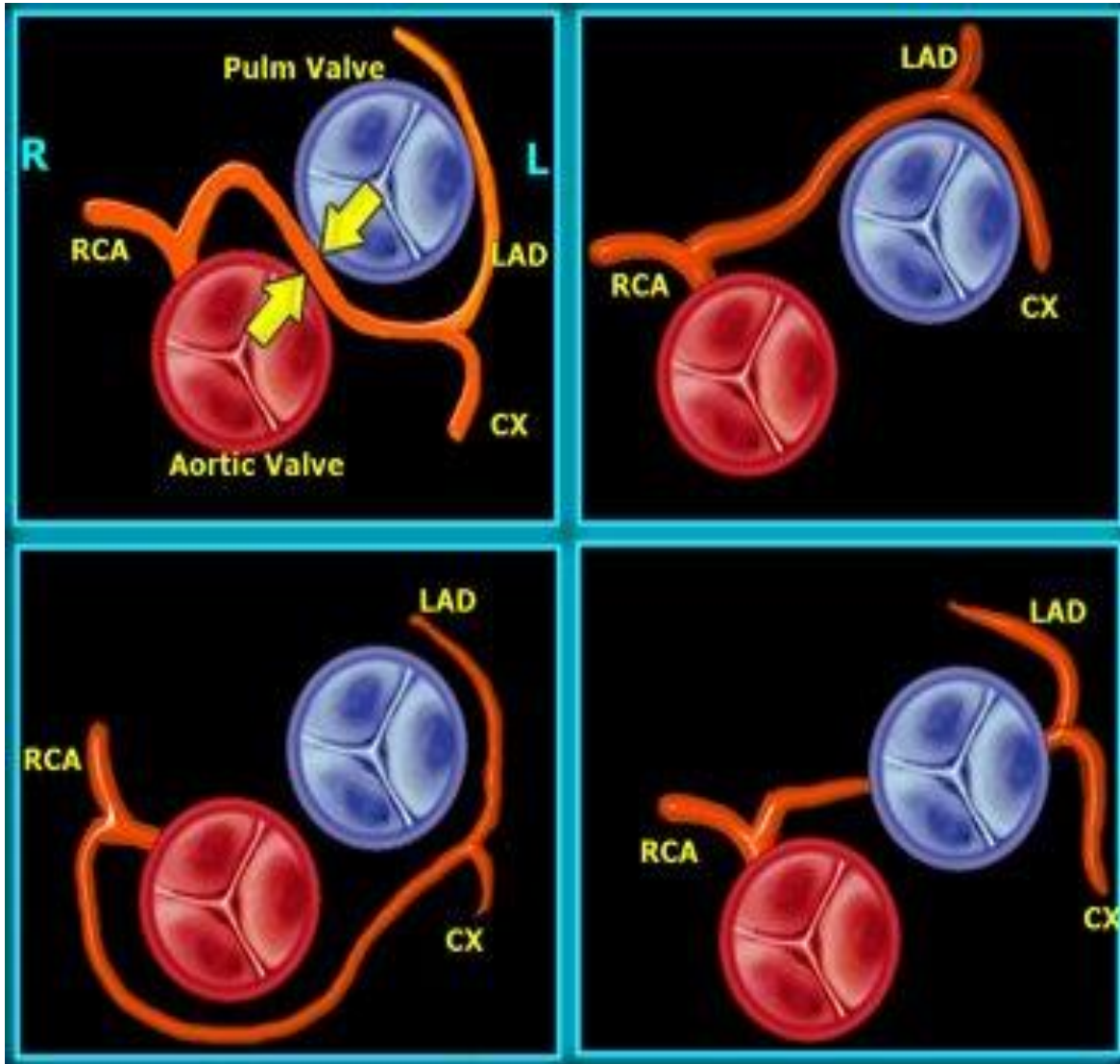
ANOMALOUS AORTIC ORIGIN OF THE CORONARIES

AAOC	"Minor anomalies"	
	LMCA from sinus 1 RCA from sinus 2 LAD from sinus 1 LAD from RCA Cx from sinus 1 Cx from RCA Single coronary artery Inverted coronary arteries Other	1/3 of all coronary anomalies

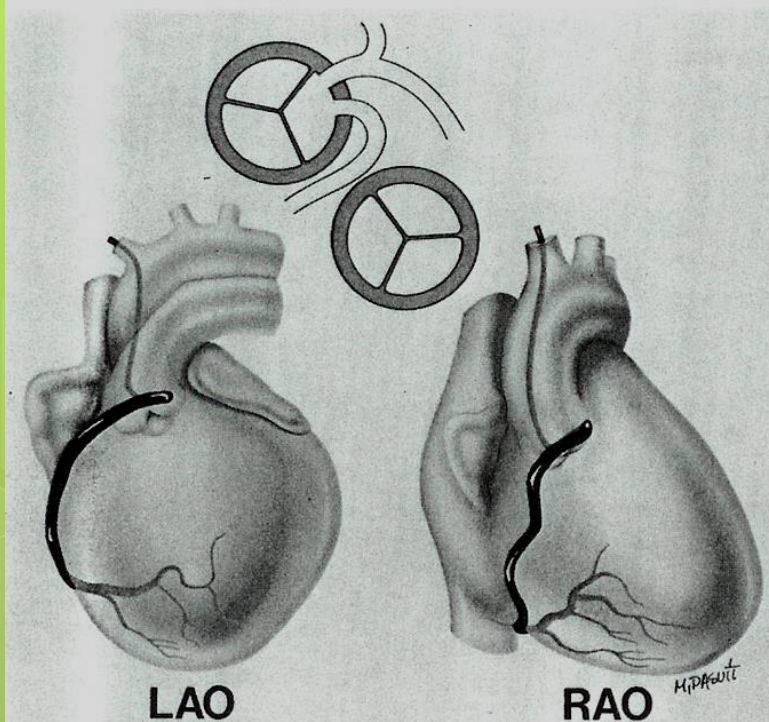
Left Main Arising from Right Coronary Sinus

- Subtypes:
 - Anterior free-wall course
 - Retro-aortic course
 - Septal course
 - Inter-arterial- incidence 1:12,500 [Accounts for 60% of anomalous left main from right coronary sinus (2.8% overall coronary anomalies). Recognized association with ischemic symptoms and sudden death >50%]

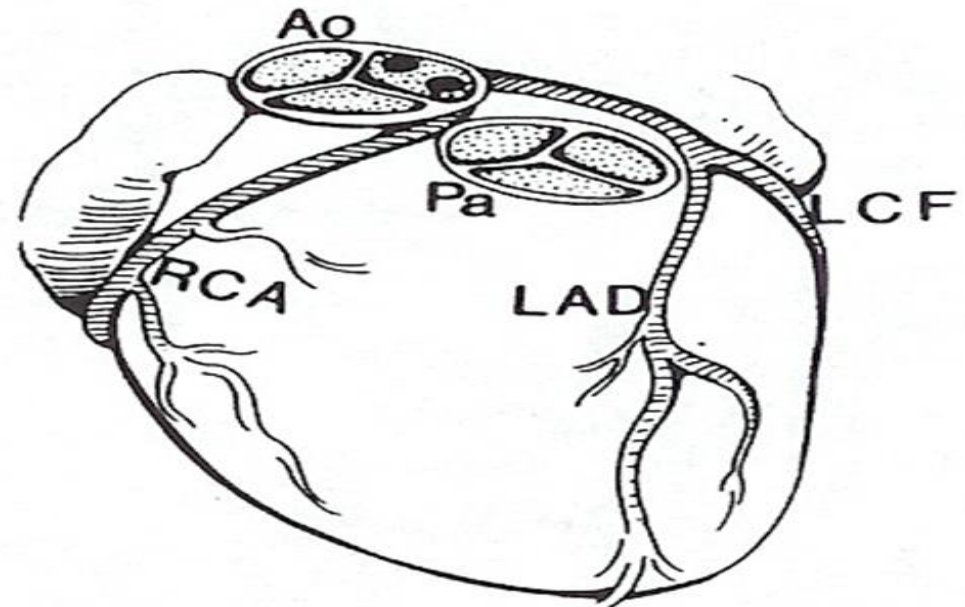


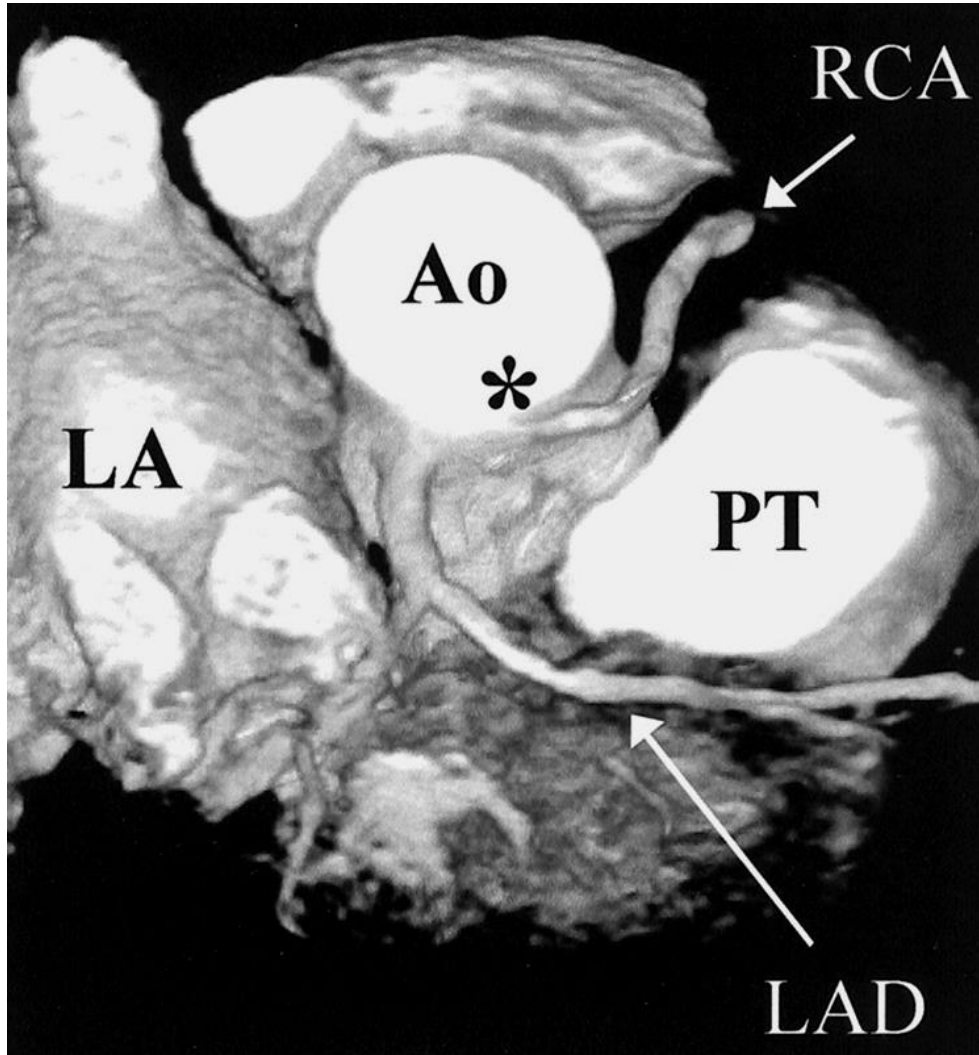


Anomalous RCA Takeoff From Left Coronary Sinus

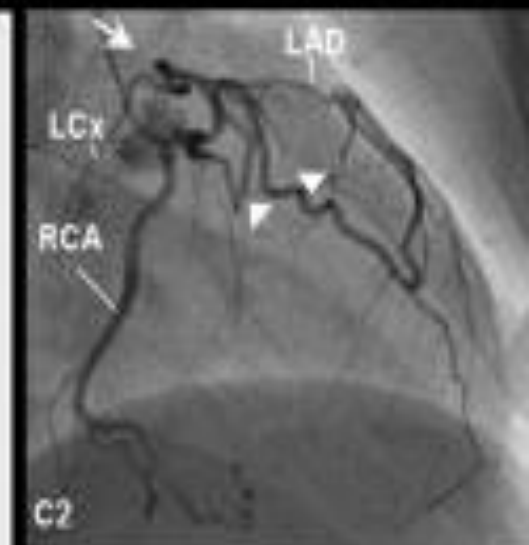
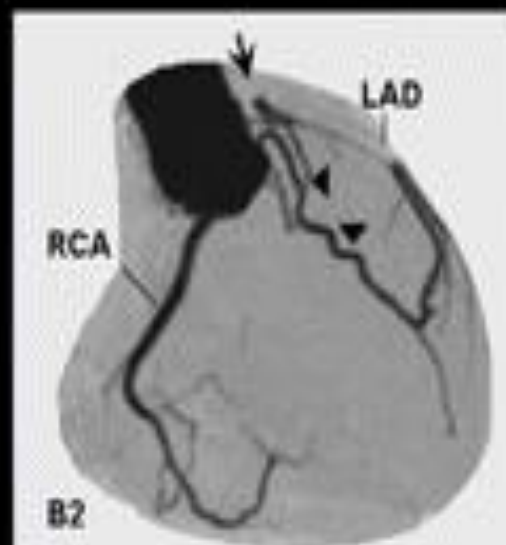
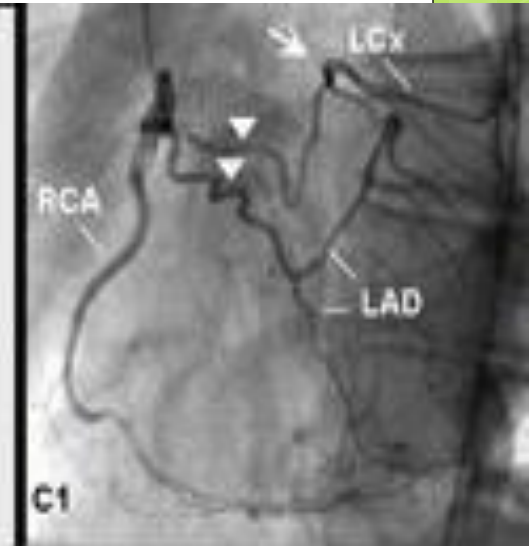
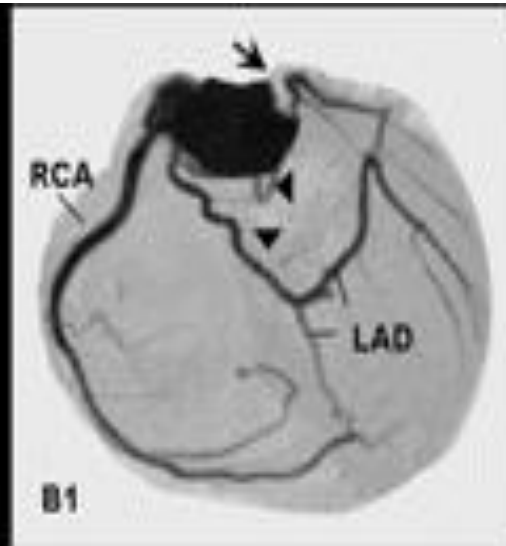


The most common, potentially serious coronary anomaly, accounting for 8.1% of serious coronary anomalies (25% incidence of sudden cardiac death).





Congenital atresia of the left main coronary artery (CALM)



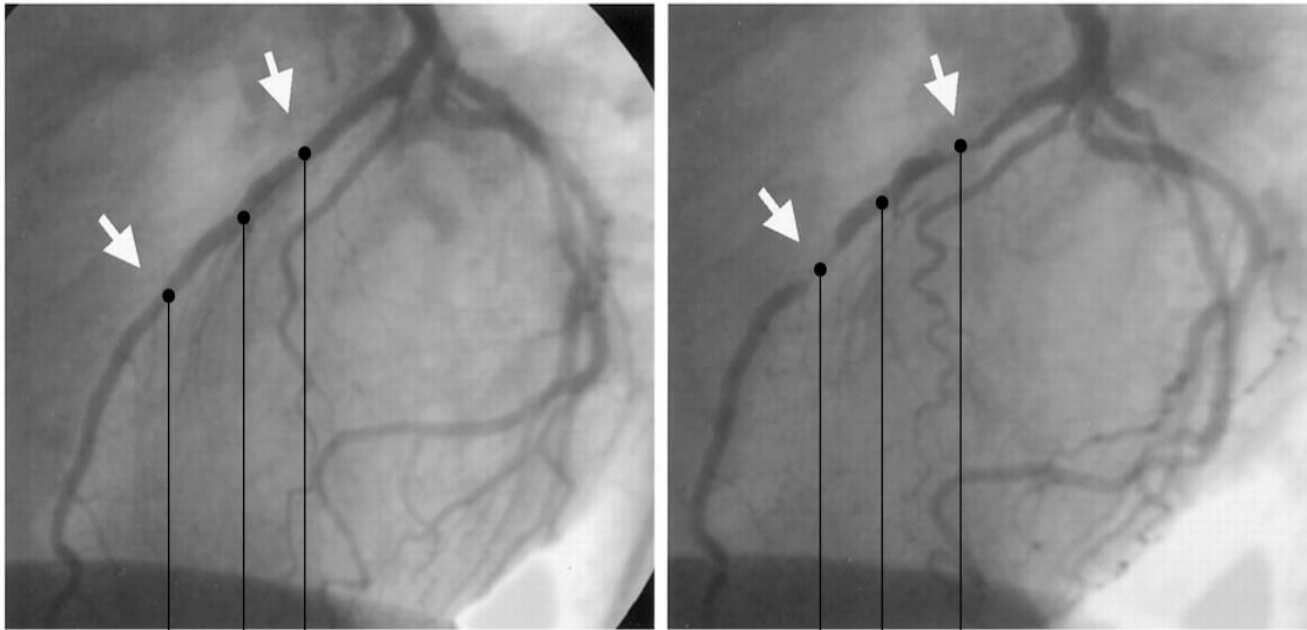
INTRAMYOCARDIAL COURSE

Bridging		
	LAD LCx RCA Multiple Other atypical / rare	Symptomatic or asymptomatic may require surgery

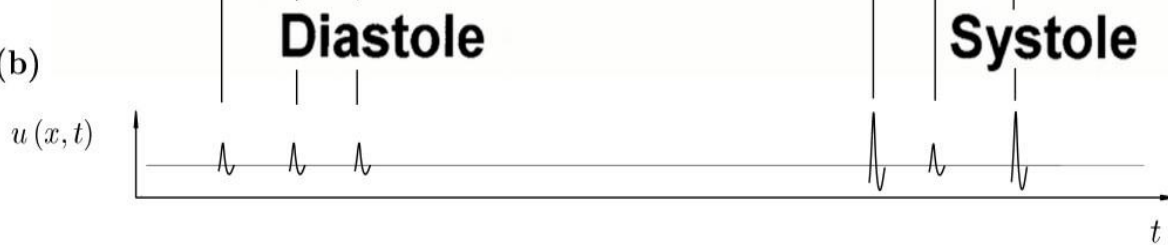
Myocardial Bridging Tunneled LAD

- Autopsy: ~30%, Angiographically: <5%
- Prevalent in HCM patients
- Segment proximal to bridge frequently shows atherosclerotic plaque (tunnel spared)
- Symptomatic patients may be treated with β -blocker or CCB
- Myotomy, CABG, and stenting in refractory cases

(a)



(b)



CAVF	"Major anomalies"	
	RCA to RV LAD to RA RCA, LAD to LV LCx to PA Diag to CS OM to SVC	congenital / acquired single / multiple associated with: TOF ASD, VSD, PDA Pulm. atresia + intact septum

CORONARY ANEURYSMS

CAn			
<p>Ø > 1.5 x diameter of adjacent normal coronary artery</p> <p>RCA</p>	<p>Cx and LAD Cx and RCA LAD and RCA Cx, LAD and RCA Cx and LAD Cx and RCA LAD and RCA Cx, LAD and RCA RCA</p> <p>Cx LAD RCA Cx LAD</p>	<p>Type I (diffuse, 2-3 vessels) Type II (diffuse in 1 vessel + Localized in other) Type III (diffuse in 1 vessel) Type IV (localized in 1 vessel)</p>	<p>88% in males</p> <p><u>Congenital</u> (types I-IV)</p> <p><u>Acquired</u>:</p> <ul style="list-style-type: none"> -atherosclerotic; - Kawasaki, Marfan, Ehlers-Danlos, Takayasu - other systemic diseases, polyarteritis, scleroderma - infectious (incl. syphilis) - traumatic <p>Aneurysm +/- stenosis</p>



Thank you