Clinical Lecture/Seminar

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- Cardiovascular diseases (CVDs) are the number one cause of death globally: more people die annually from CVDs than from any other cause.

- An estimated 17.3 million people died from CVDs in 2008, representing ***30% of all global deaths***.

- Of these deaths, an estimated 7.3 million were due to coronary heart disease and 6.2 million were due to stroke.

- Low- and middle-income countries are disproportionally affected: over 80% of CVD deaths take place in low- and middle-income countries and occur almost equally in men and women.

- The number of people who die from CVDs, mainly from heart disease and stroke, will increase to reach 23.3 million by 2030.

- ***CVDs are projected to remain the single leading cause of death.***

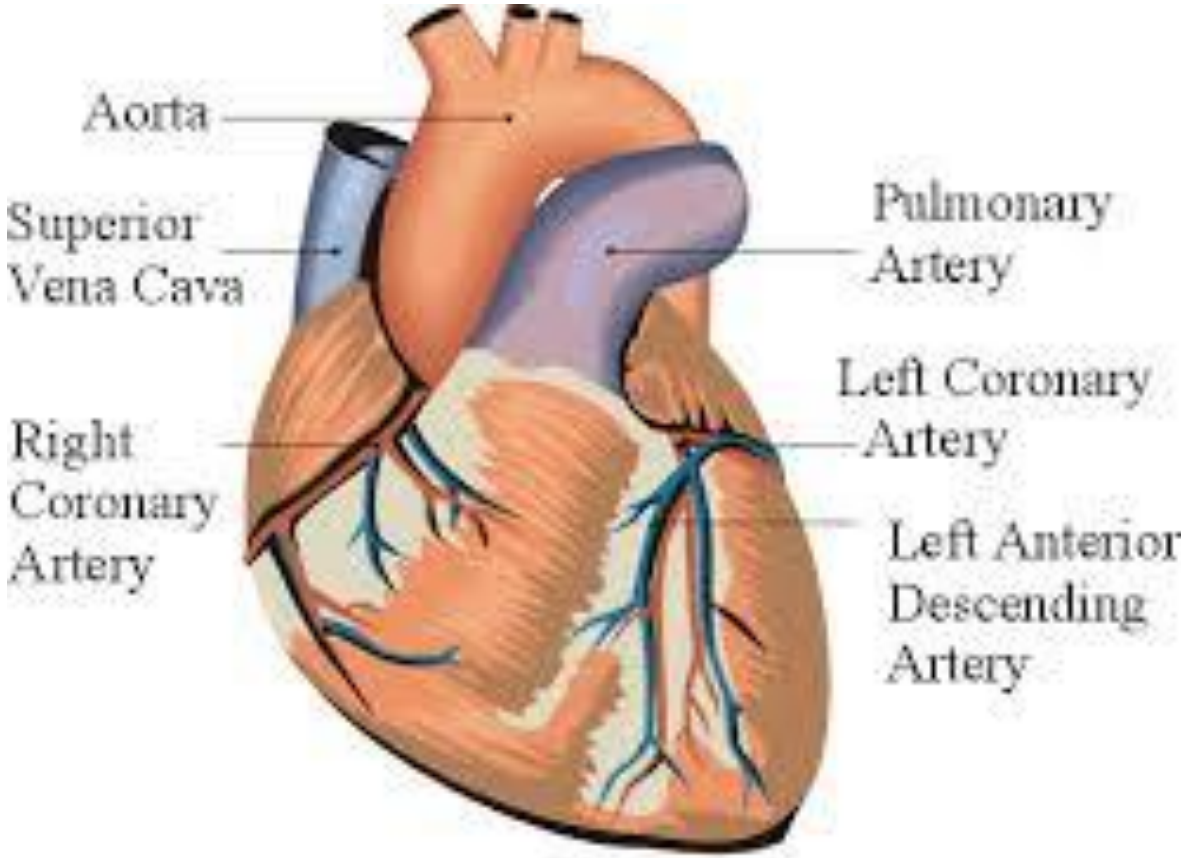
- Tobacco kills up to half of its users.

- Tobacco kills nearly **6 million people** each year. More than five million of those deaths are the result of direct tobacco use while more than **600,000** are the result of non-smokers being exposed to **second-hand smoke**.

- Unless urgent action is taken, the annual death toll could rise to more than eight million by 2030.

- Nearly 80% of the world's one billion smokers live in low- and middle-income countries.

- **Acute coronary syndrome:**
- Unstable angina.
- Non-ST segment elevation myocardial infarction (NSTEMI).
- ST segment elevation myocardial infarction (STEMI).



Adapted from CorelDraw 9 Library

- **Risk factors for CVDs:**
- Age.
- Family history.
- Hypertension (HTN).
- Smoking.
- Daibetes Mellitus.
- Dyslipidemia.
- Physical inactivity and obesity.

- 347 million people worldwide have diabetes.
- In 2004, an estimated 3.4 million people died from consequences of high fasting blood sugar.
- More than 80% of diabetes deaths occur in low- and middle-income countries.

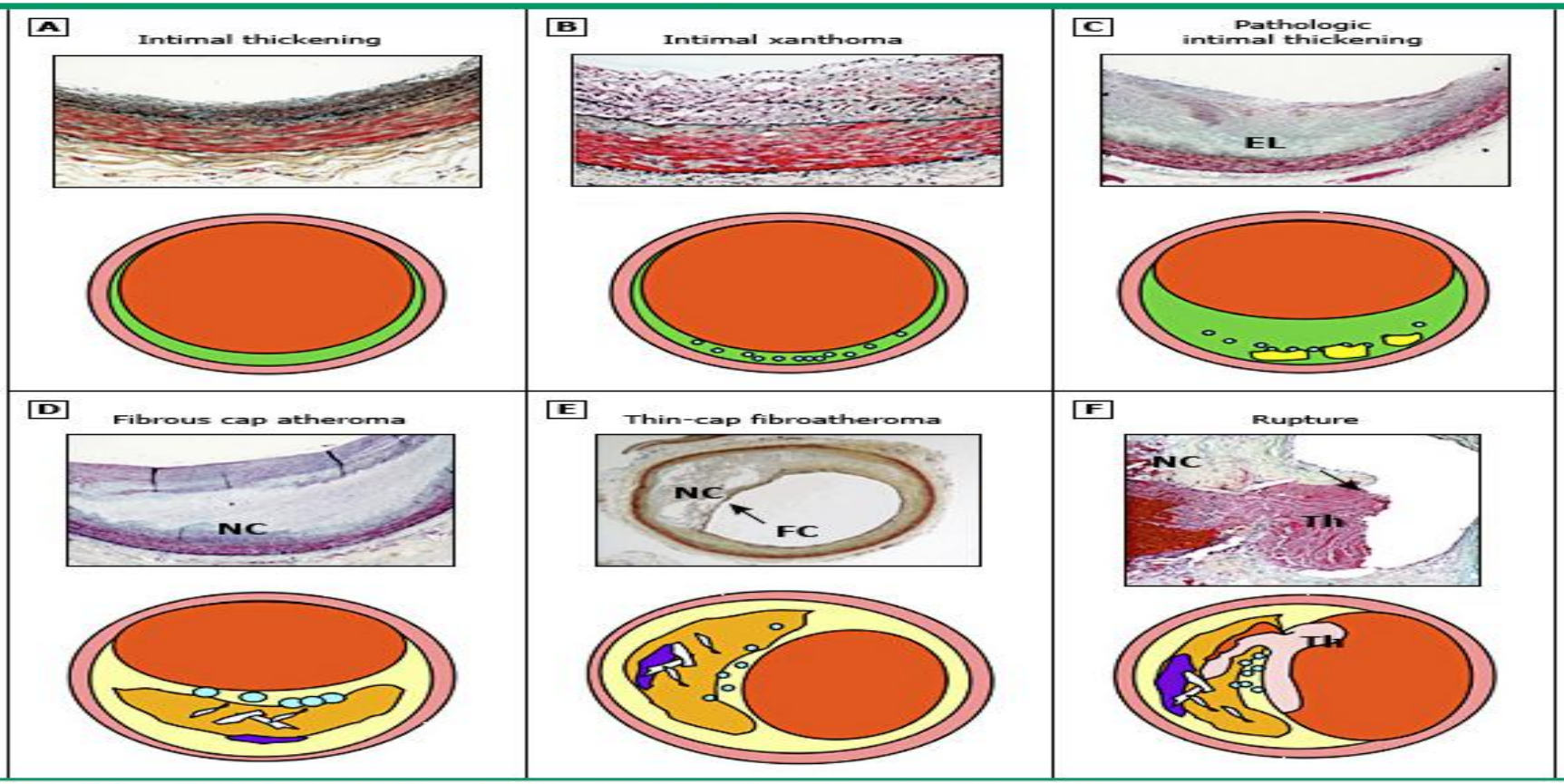
Classification of Blood Pressure (BP)*

Category	SBP mmHg		DBP mmHg
Normal	<120	and	<80
Prehypertension	120–139	or	80–89
Hypertension, Stage 1	140–159	or	90–99
Hypertension, Stage 2	≥160	or	≥100

- Most acute coronary syndromes (ACS) are believed to result from the loss of integrity of a protective covering over an atherosclerotic plaque; this occurs with plaque rupture or erosion.
- This disruption of the protective covering allows blood to come in contact with the highly thrombogenic contents of the necrotic core/collagen of the plaque and luminal thrombosis to occur.

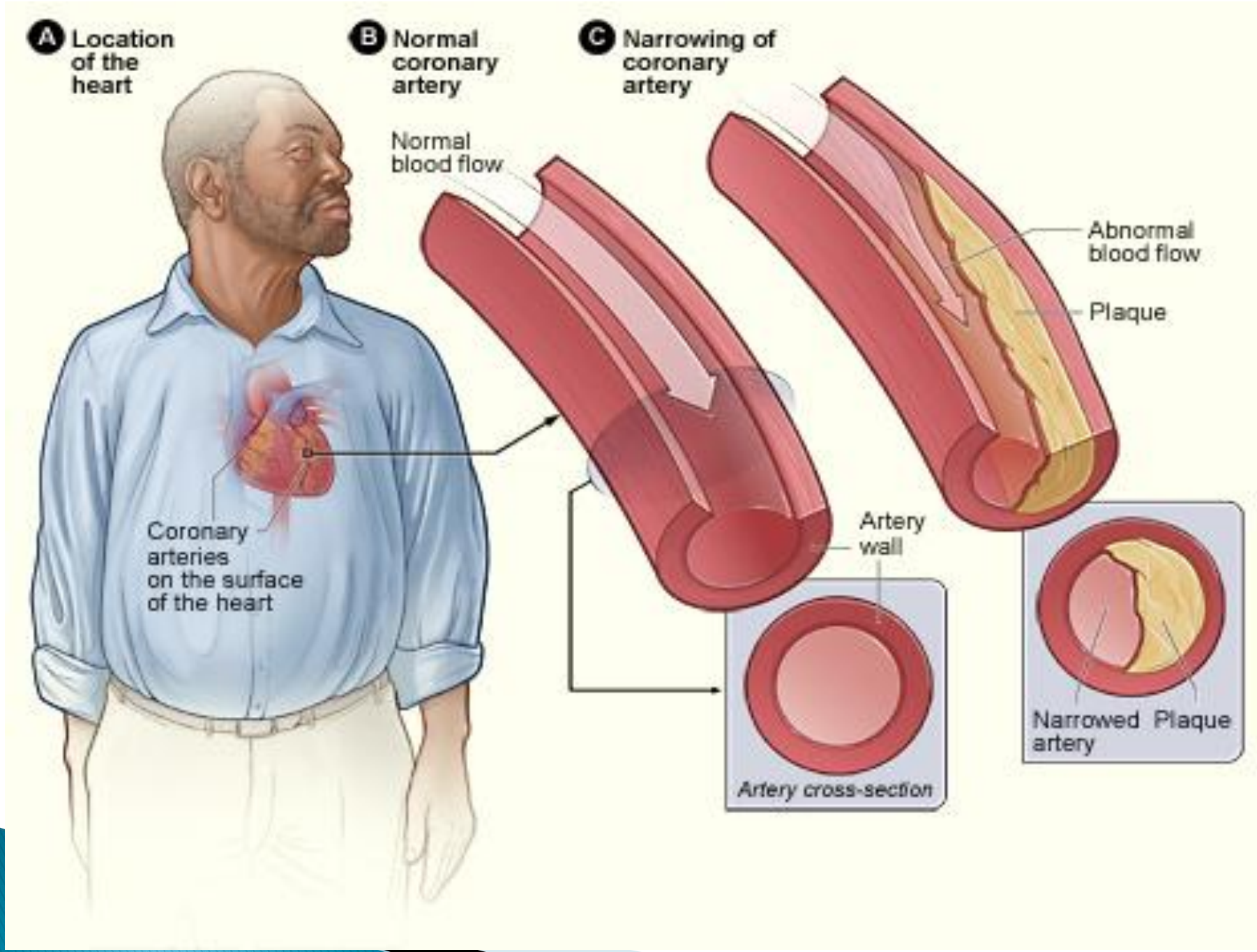
- Intraluminal thrombosis after exposure of the blood to calcified nodules has also been observed.

Progression of human coronary atherosclerosis I

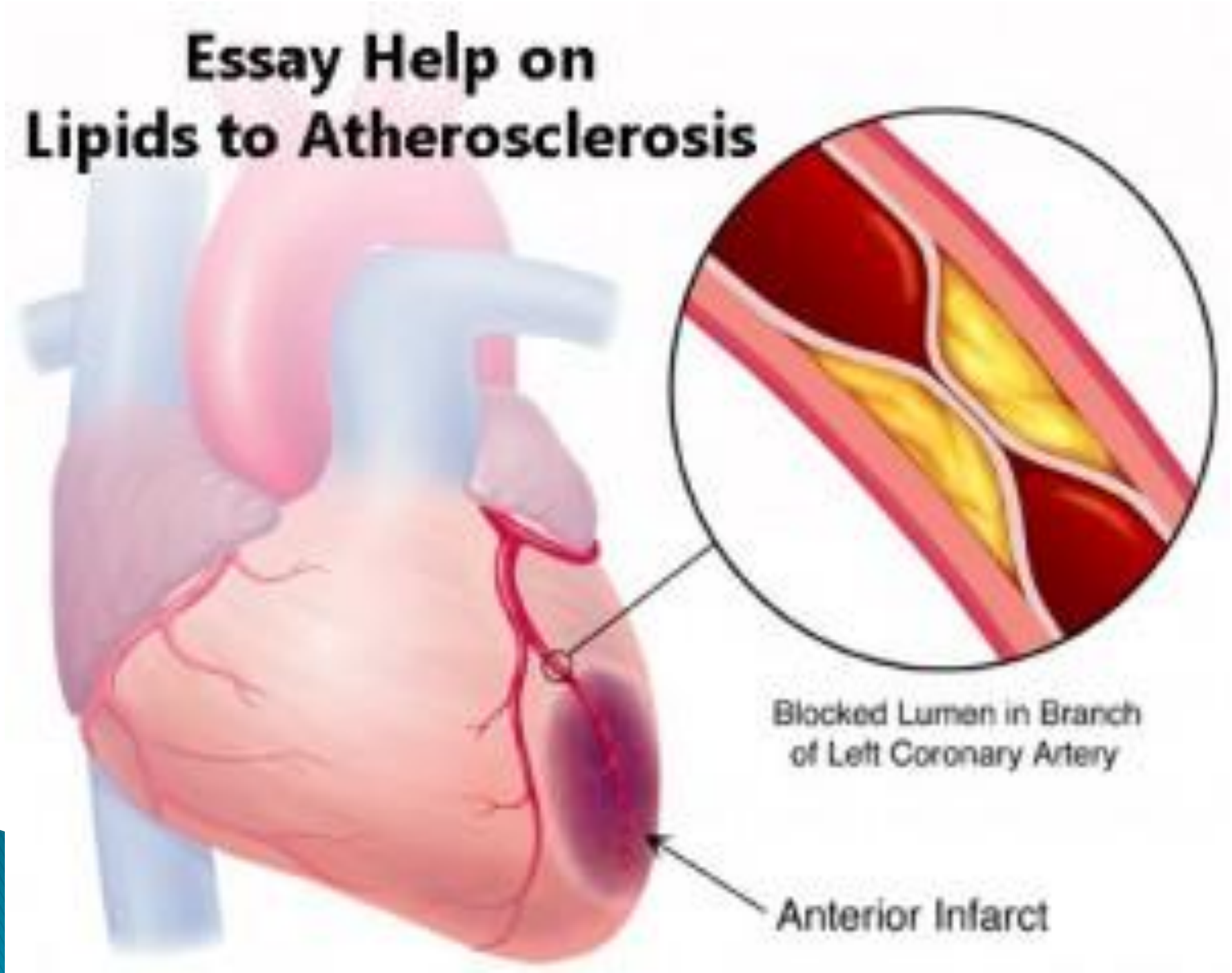


Histopathology of human coronary plaque progression, part 1 of 2.
(A) Intimal thickening is normal in all age groups and is characterized by smooth muscle cell accumulation within the intima.
(B) Intimal xanthoma or so-called fatty streak corresponds to the accumulation of predominantly macrophages within the intima; these lesions have been shown to regress in later adult life.
(C) Pathologic intimal thickening marks the first of the progressive lesions and denotes the accumulation of extracellular lipid in the absence of apparent necrosis.
(D) Fibrous cap atheroma indicates the presence of an encapsulated necrotic core.
(E) The core may eventually become thinned (thin-cap fibroatheroma).
(F) This lesion may rupture, allowing contact of the contents of the necrotic core, causing a luminal thrombosis.

EL: extracellular lipid; NC: necrotic core; FC: fibrous cap; Th: thrombus.


A Location of the heart
B Normal coronary artery
C Narrowing of coronary artery
Normal blood flow
Abnormal blood flow
Plaque
Coronary arteries on the surface of the heart
Artery wall
Artery cross-section
Narrowed artery
Plaque

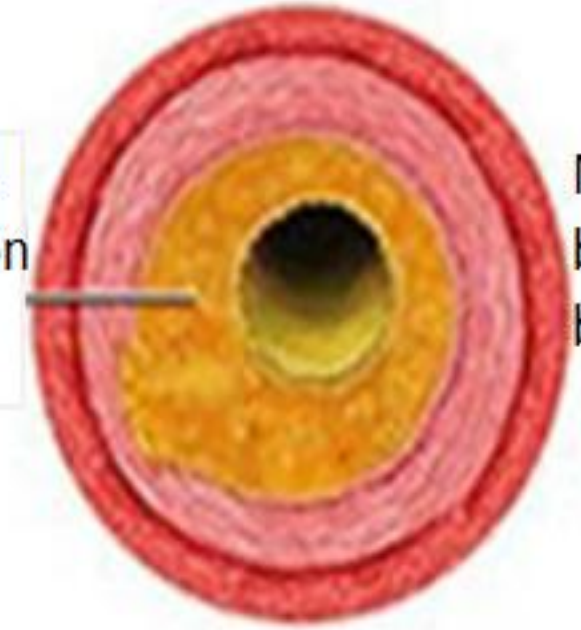
Essay Help on Lipids to Atherosclerosis



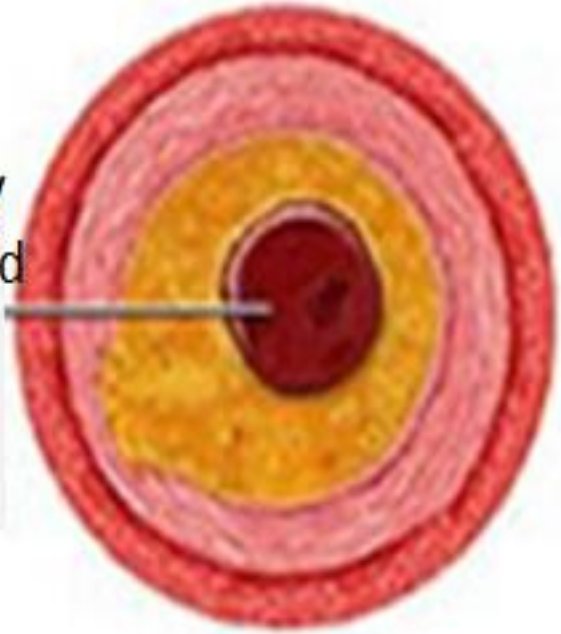
Cross section
of healthy artery

Tear in
artery wall

Fatty material
Is deposited on
vessel wall



Narrowed artery
becomes blocked
by blood clot



- **Symptoms of MI:**
- Retrosternal (central) chest pain (tightness, pressure) radiation to left shoulder, arm, neck or jaw.
- Dyspnea (shortness of breath).
- Nausea or vomiting.
- Diaphoresis (sweating).
- Paplitations or lightheadedness.

Call 9-1-1
Call fast

Hospital fibrinolysis:
Door-to-Needle within 30 min

Onset of symptoms of STEMI

9-1-1 EMS Dispatch

EMS on-scene
- Encourage 12-lead ECGs
- Consider prehospital fibrinolytic if capable and EMS-to-needle within 30 min

EMS Triage Plan

Not PCI capable

Inter-Hospital Transfer

PCI capable

Goals†

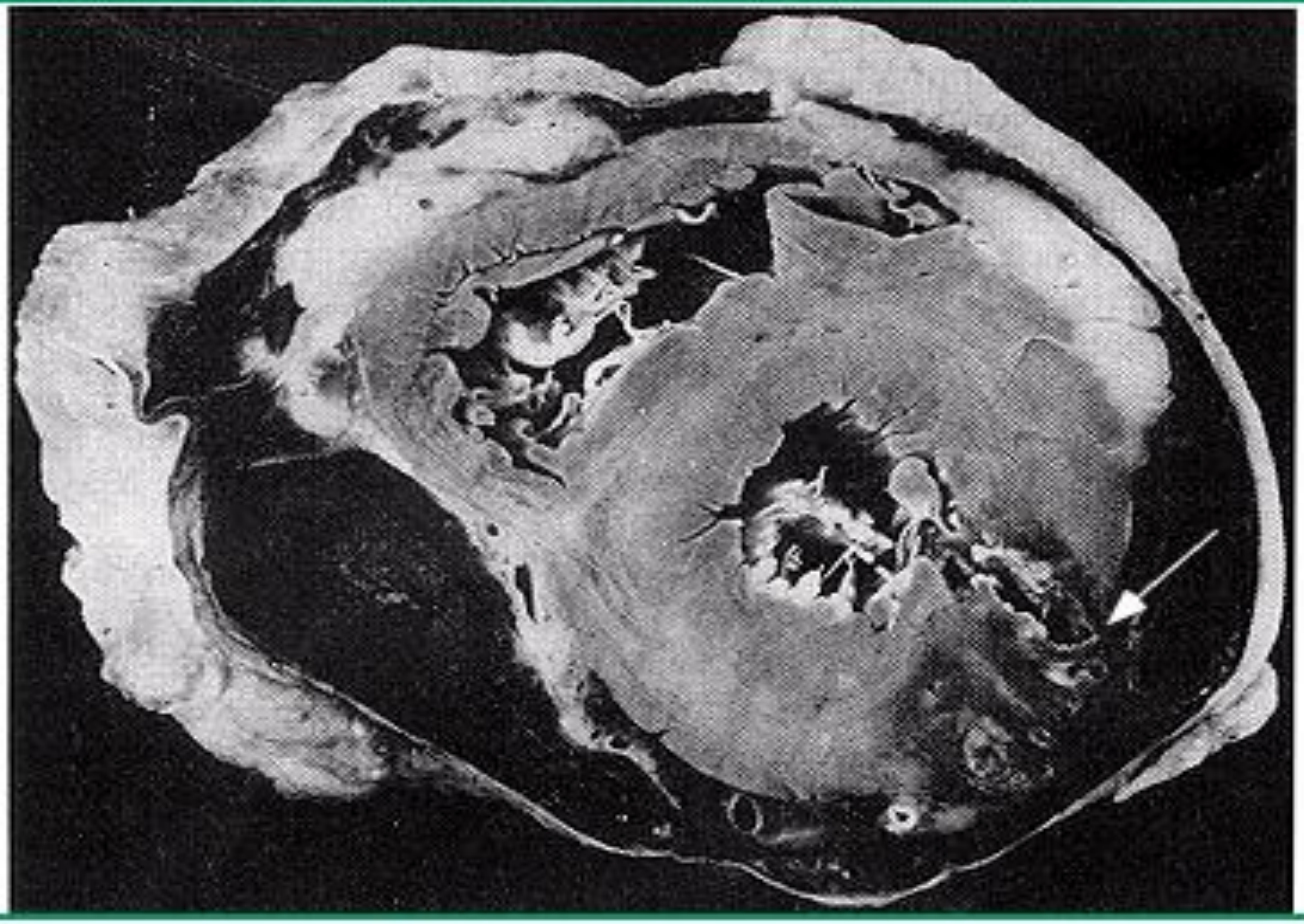
Patient	*Dispatch*	*EMS on scene*	*EMS transport*	
5 min after symptom onset	1 min	Within 8 min	Prehospital fibrinolysis: EMS-to-Needle within 30 min	*EMS transport:* EMS-to-Balloon within 90 min *Patient self-transport:* Hospital Door-to-Balloon within 90 min

Total ischemic time: Within 120 min*

*Golden Hour = First 60 minutes

- **Complications of MI:**
- Free wall rupture.
- Ventricular septal defect (VSD).
- Papillary muscle rupture causing mitral regurgitation.
- Cardiogenic shock (Left ventricular failure).
- Arrhythmias (VF, VT, AF).
- Ventricular aneurysm.
- Pericarditis.

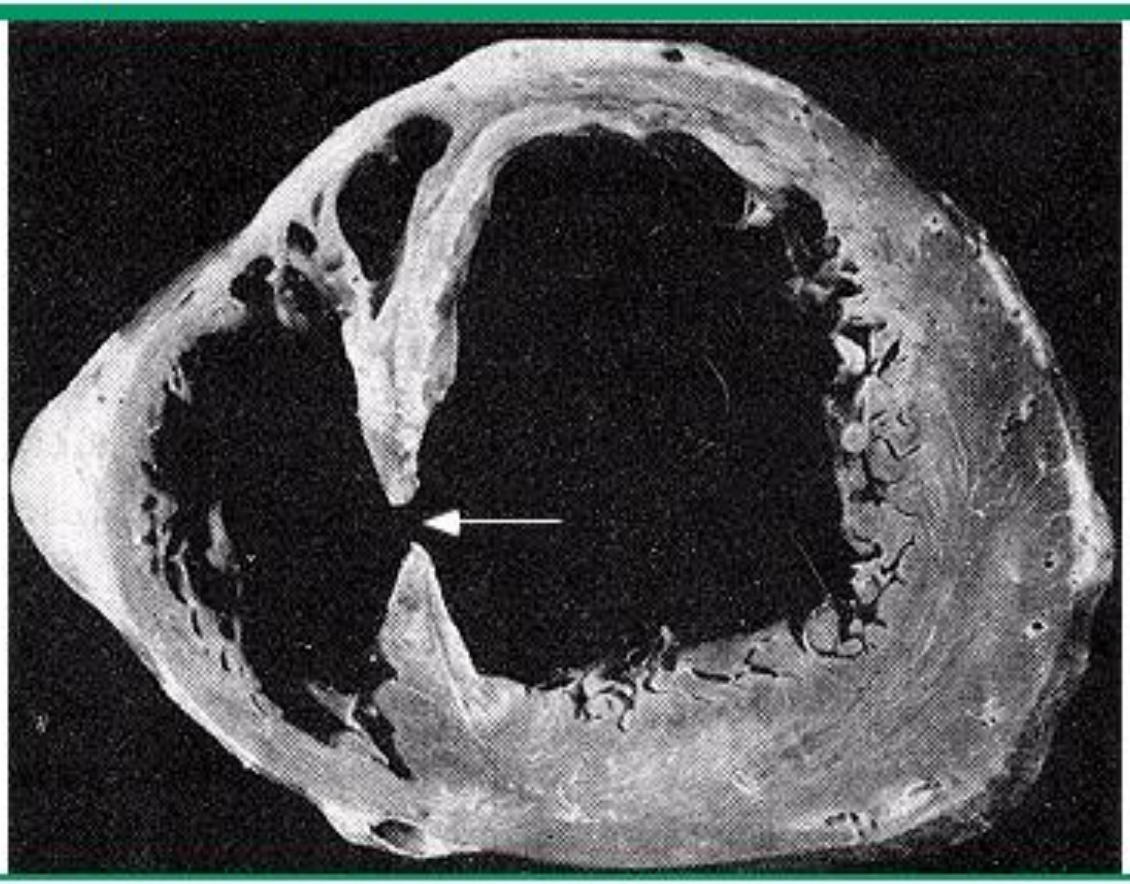
Left ventricular free wall rupture after MI



Pathologic specimen showing free wall rupture (arrow) and hemopericardium after a myocardial infarction.

From Edwards, WD, Applied anatomy of the heart. In: Cardiology: Fundamentals and Practice, Brandenburg, RO, Fuster, V, Guiliani, ER, McGoon, DC (Eds), Year Book, Chicago, 1987, pp. 47-109.

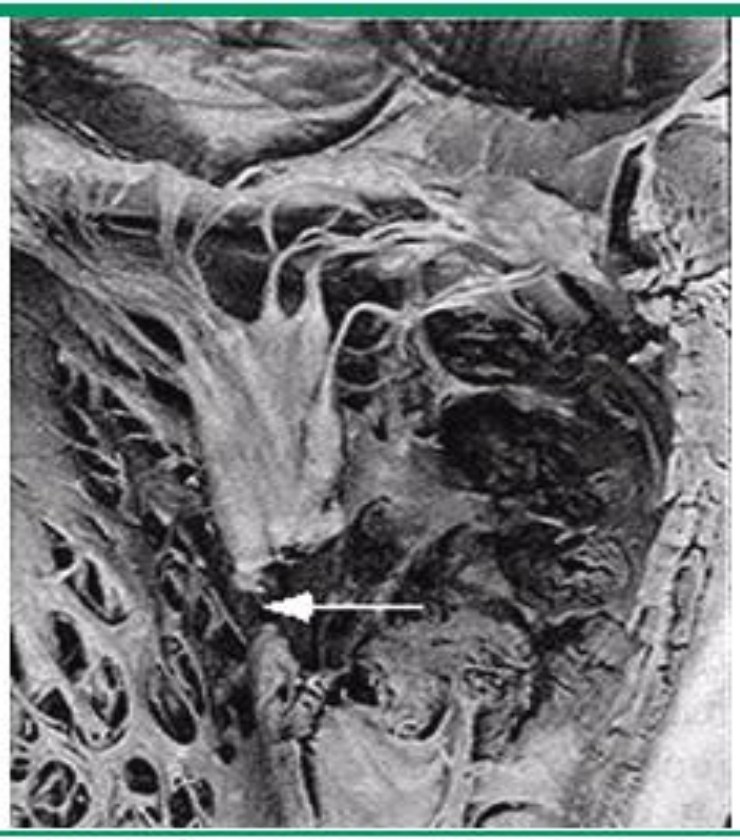
Septal rupture after MI



Pathologic specimen showing rupture of the interventricular septum (arrow) after a myocardial infarction.

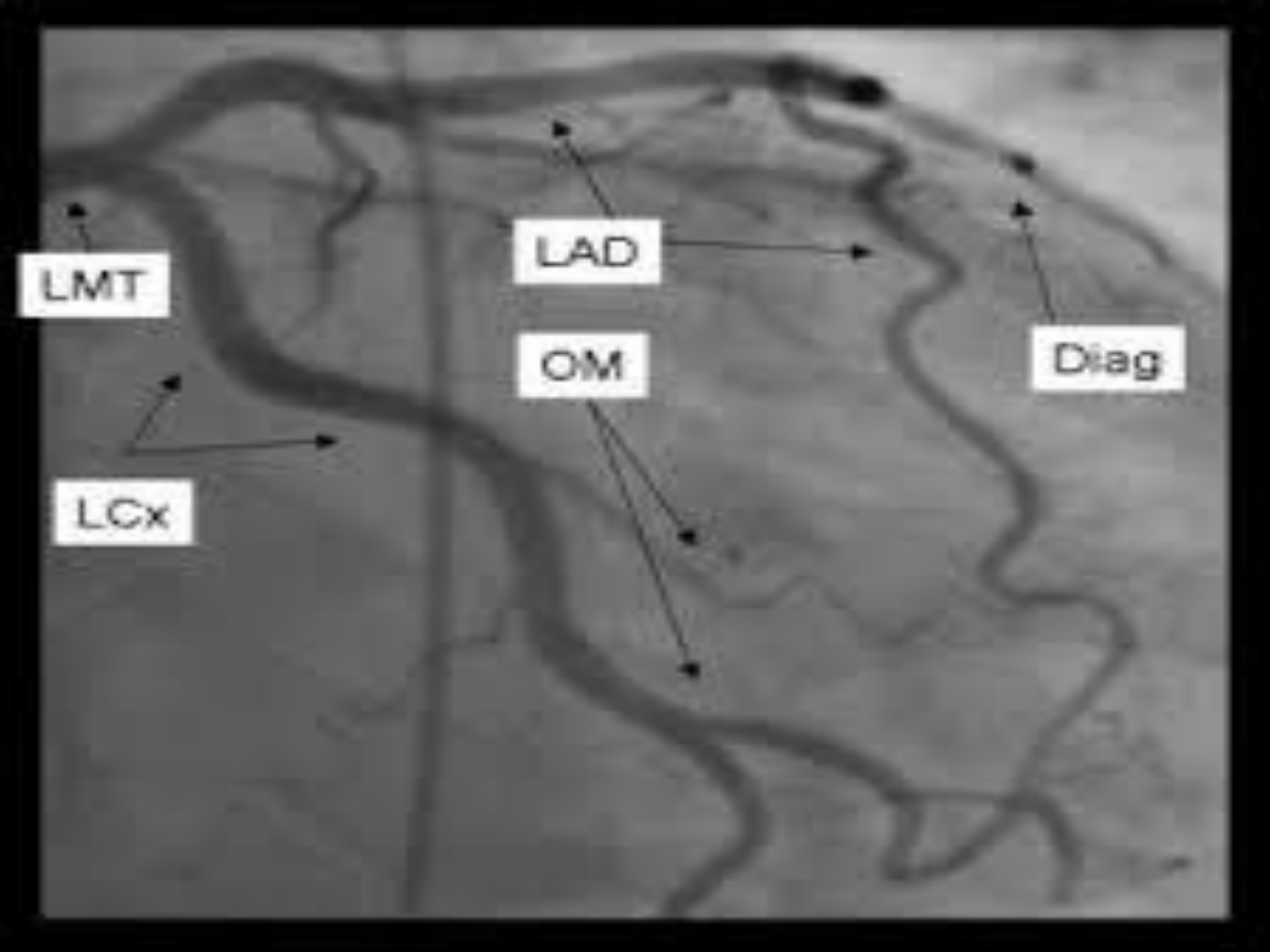
From Edwards, WD, Pathology of myocardial infarction and reperfusion. In: Acute Myocardial Infarction, Gersh, BJ, Rahimtoola, SH (Eds), Elsevier, New York 1991, pp, 14-48. By permission.

Papillary muscle rupture after MI



Pathologic specimen showing complete transection of papillary muscle (arrow) after an acute myocardial infarction. The patient died with severe mitral regurgitation.

Photograph courtesy of Dr William D Edwards. From Reeder, GS, Gersh, BJ, Acute myocardial infarction. In: Internal Medicine, 4th ed, Stein, JH, Hutton, JJ, Kohler, PO, et al (Eds), Mosby-Year Book, St Louis, 1994, pp. 169-189. By permission.


LMT
LAD
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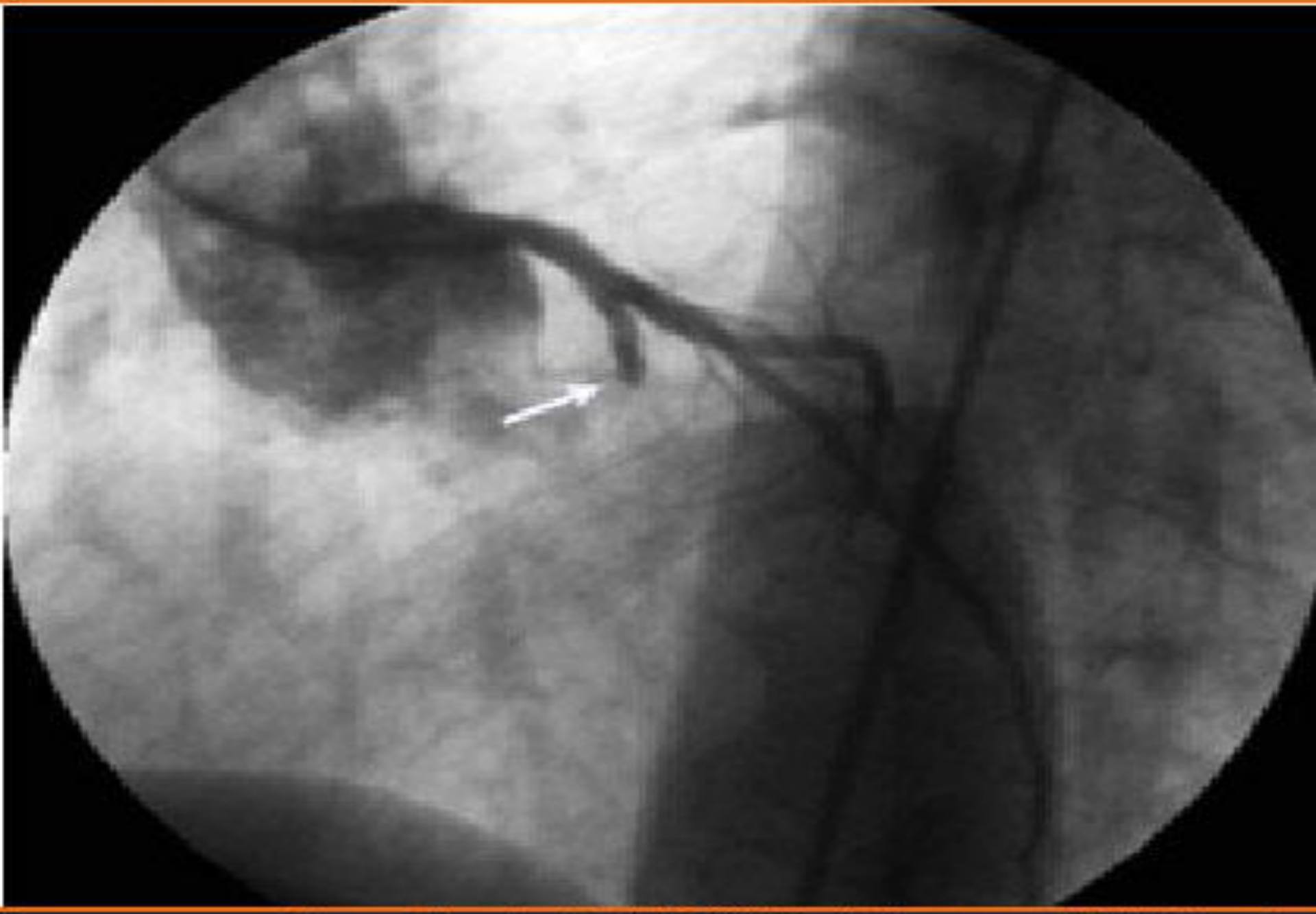

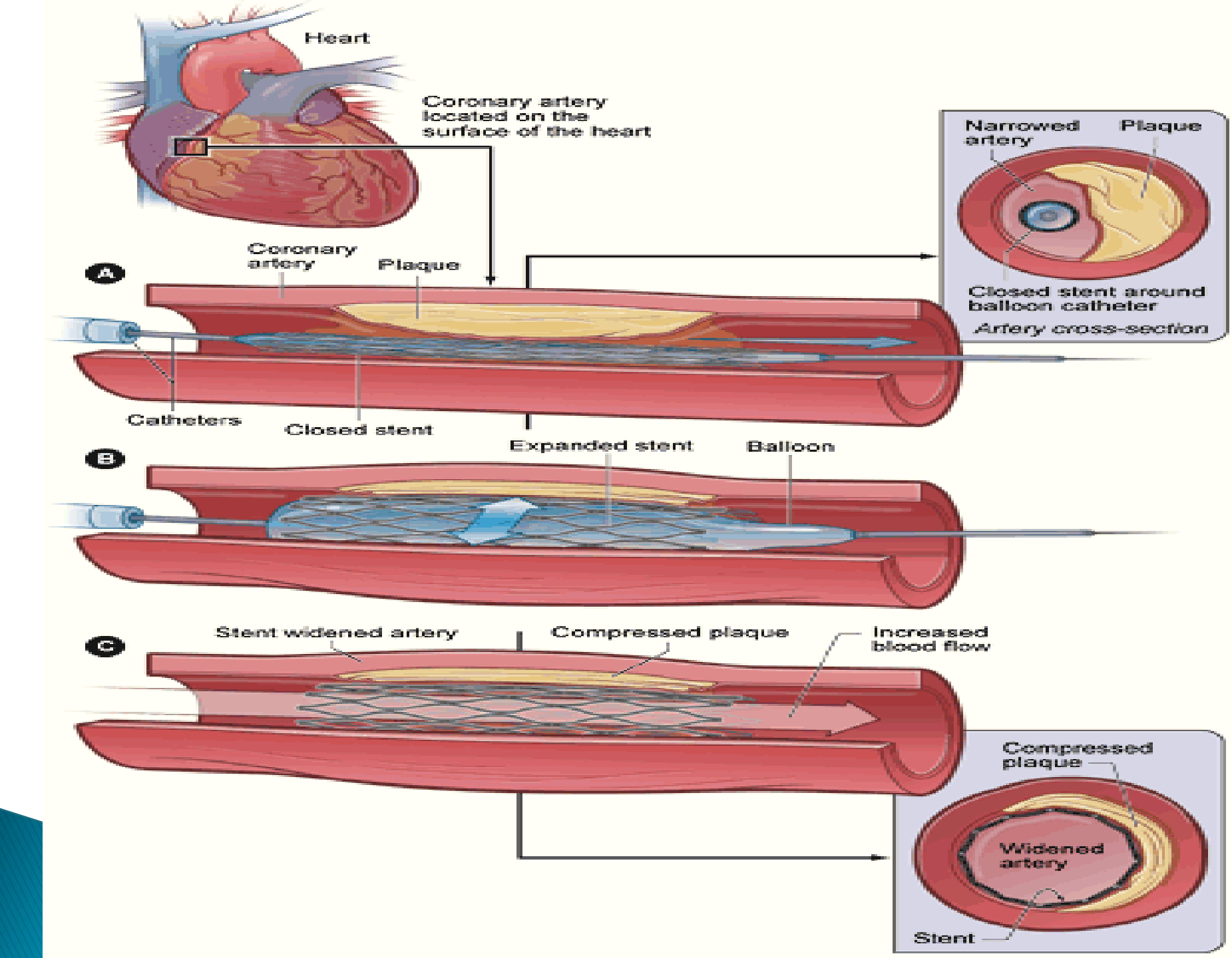
Heart
Coronary artery located on the surface of the heart
Narrowed artery
Plaque
Closed stent around balloon catheter
Artery cross-section
A
Coronary artery
Plaque
Catheters
Closed stent
B
Expanded stent
Balloon
C
Stent widened artery
Compressed plaque
Increased blood flow
Compressed plaque
Widened artery
Stent

Case

- A 60-year old male patient with past medical history of hypertension and smoking presented to the emergency room with sudden aphasia (unable to speak) and weakness in his right arm and leg.

- **Stroke (cerebrovascular accident) is classified into two major types:**

- Brain ischemia due to thrombosis, embolism, or systemic hypoperfusion.
- Brain hemorrhage due to intracerebral hemorrhage or subarachnoid hemorrhage.

- A stroke is the acute neurologic injury that occurs as a result of one of these pathologic processes.
- Approximately ***80 percent*** of strokes are due to ischemic cerebral infarction and ***20 percent*** to brain hemorrhage.

- The ***most common symptom of a stroke*** is sudden weakness or numbness of the face, arm or leg, most often on one side of the body.

- Other symptoms include:
- confusion.
- difficulty speaking or understanding speech.
- difficulty seeing with one or both eyes.
- difficulty walking, dizziness, loss of balance or coordination.
- severe headache with no known cause.
- fainting or unconsciousness.

Sudden numbness or weakness of the face, arm or leg, especially on one side of the body

Sudden confusion, trouble speaking or understanding

Sudden trouble seeing in one or both eyes

Sudden trouble walking, dizziness, loss of balance or coordination

Sudden, severe headache with no known cause

STROKE is an Emergency.

Every minute counts.

ACT F.A.S.T!

FACE

Does one side of the face droop?
Ask the person to smile.

ARMS

Is one arm weak or numb?
Ask the person to raise both arms. Does one arm drift downward?

SPEECH

Is speech slurred?
Ask the person to repeat a simple sentence. Is the sentence repeated correctly?

TIME

If the person shows any of these symptoms, Call 911 or get to the hospital immediately.


SPOT A STROKE
F
A
S
T
FACE DROOPING
ARM WEAKNESS
SPEECH DIFFICULTY
TIME TO CALL 911
Stroke Warning Signs and Symptoms


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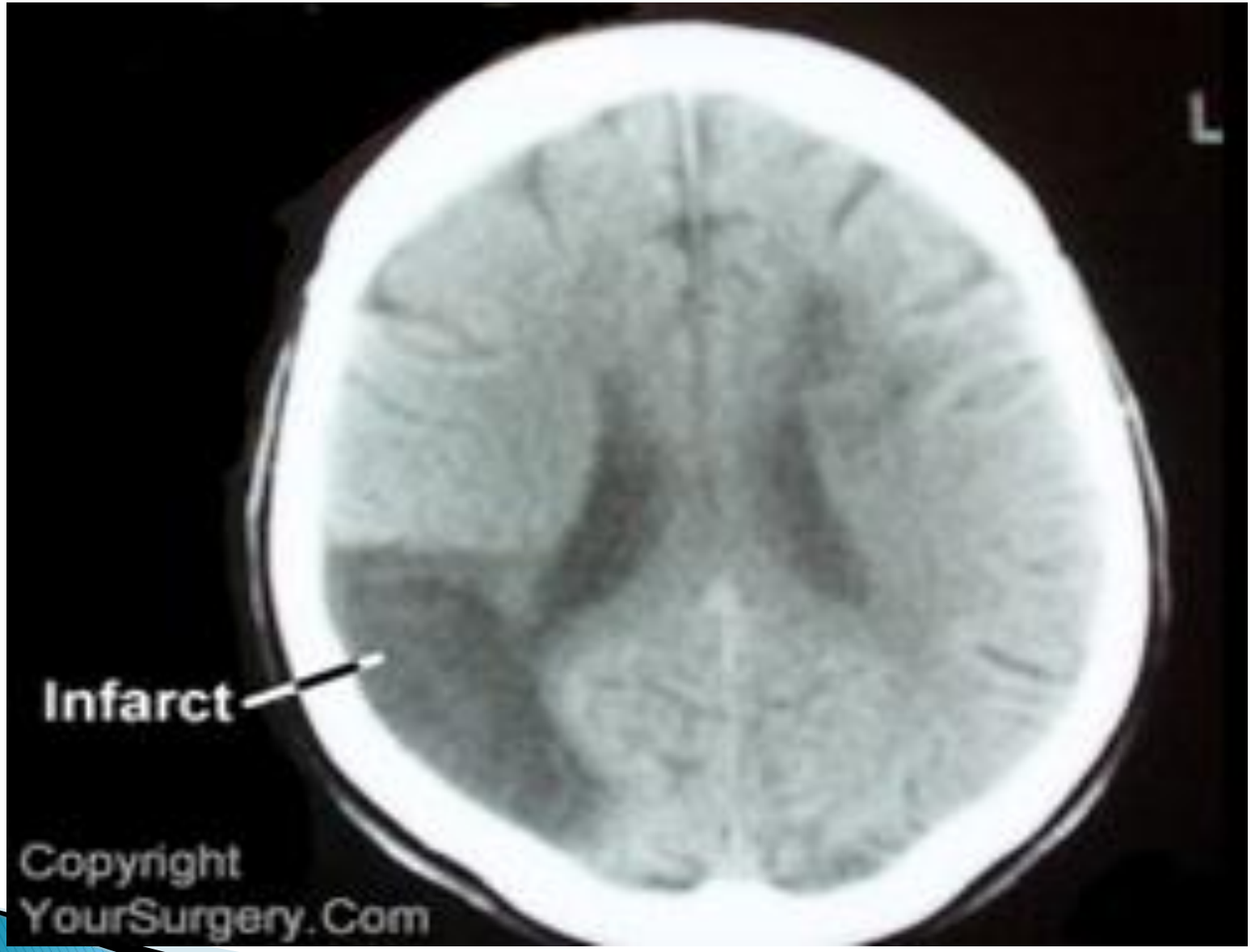
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