



CORONARY ARTERY DISEASE SURGICAL ASPECTS

Mahmoud Abu-Abeeleh

Professor of Cardiac Surgery

Chairman of general surgery department

School of Medicine

The University Of Jordan

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INTRODUCTION

HISTORY OF CARDIAC SURGERY

CORONARY ARTERY ANATOMY

ATHEROSCLEROSIS CAD

DIAGNOSIS 

MANAGEMENT

SURGICAL INDICATIONS /TECHNIQUES

COMPLICATIONS OF CABG

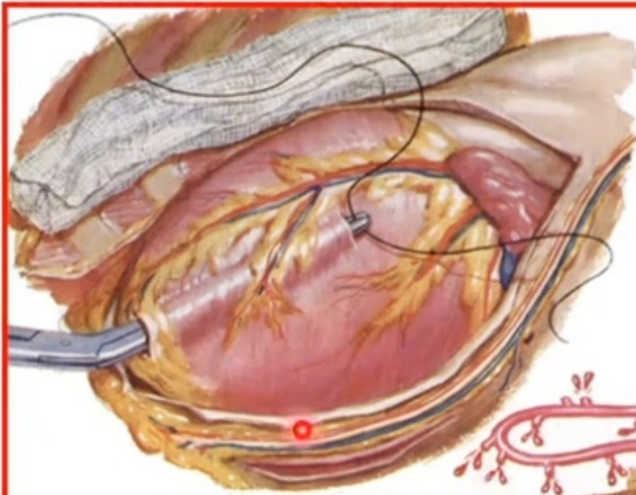
Adult Cardiac Surgery: Ischemic Heart Disease (History)

□ **Claude Beck**

- **1930's-** sought to increase myocardial blood flow indirectly with pericardial fat and omentum.

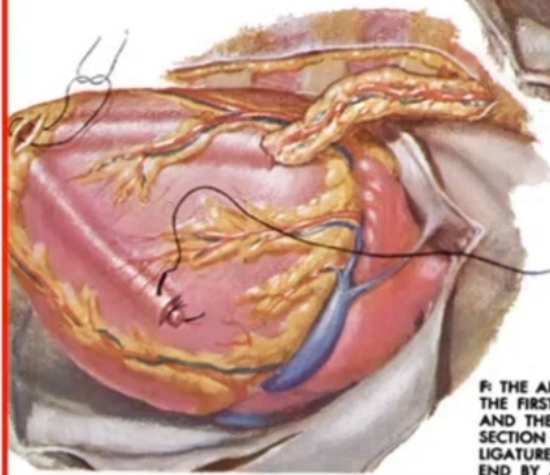
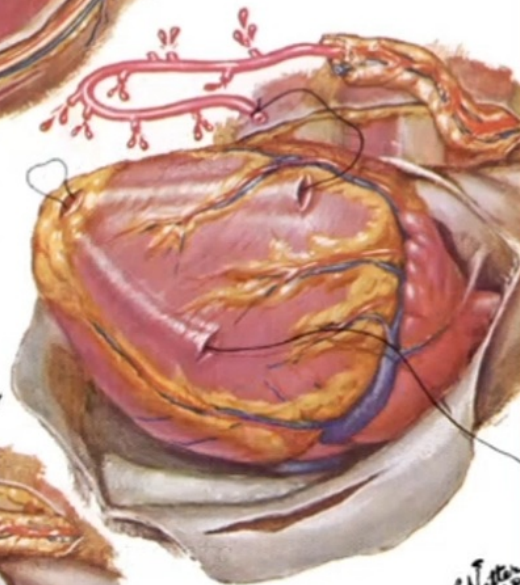
□ **Arthur Vineberg**

- **1940's-** Mobilization of left internal mammary artery with implantation of bleeding end into the left ventricle.
- **1964-** follow-up study on 140 patients
 - 33% mortality
 - 85% relief from angina



D: AN INSTRUMENT IS PASSED THROUGH MYOCARDIUM FROM DISTAL TO PROXIMAL STAB WOUND THUS CREATING A TUNNEL UNDERLYING THE DIAGONAL BRANCH OF THE ANTERIOR INTERVENTRICULAR ARTERY; A LIGATURE IS PULLED THROUGH THE TUNNEL

E: THE POSTERIOR MYOCARDIUM MAY BE VASCULARIZED BY MAKING ANOTHER STAB WOUND ON THE POSTERIOR WALL OF THE LEFT VENTRICLE AND THE TUNNEL CONTINUED TO THIS POINT, PASSING UNDER THE TERMINAL PORTIONS OF THE LATERAL BRANCHES OF THE CIRCUMFLEX BRANCH OF THE LEFT CORONARY ARTERY; THE LEFT INTERNAL THORACIC (INT. MAMMARY) ARTERY IS DISSECTED OUT OF THE PEDICLE FOR A SUITABLE DISTANCE, ALLOWING THE BRANCHES TO BLEED FREELY



F: THE ARTERY IS GENTLY DRAWN THROUGH THE FIRST SECTION OF THE TUNNEL AND THEN THROUGH THE SECOND SECTION BY MEANS OF THE IMPLANTED LIGATURE; IT IS ANCHORED AT DISTAL END BY A SUTURE

F. Netter
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Adult Cardiac Surgery: Ischemic Heart Disease (History)

- **Mason Sones,**

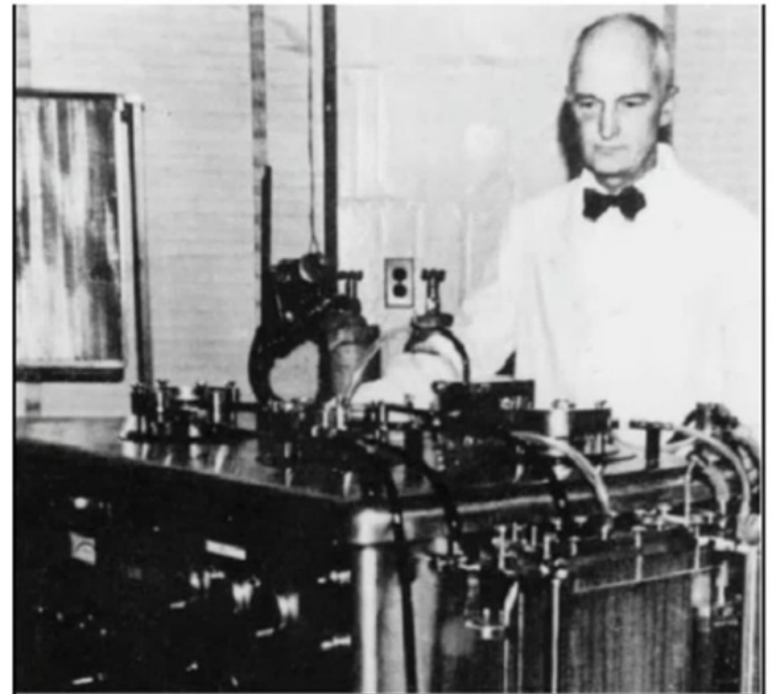
1950's- cine coronary arteriography.

1962- direct and reproducible catheterization of the coronary arteries.

Adult Cardiac Surgery: Ischemic Heart Disease (History)

John H. Gibbon, Jr.

- ▣ Heart-lung machine
- ▣ May 6, 1953- ASD closure



Heart Lung Machine



Adult Cardiac Surgery: Ischemic Heart Disease (History)

- 1962- **David C. Sabiston, Jr.-**
 - Aortocoronary saphenous vein bypass
- **KOLOSOV LIMA -LAD 1964 IN Russia**

Adult Cardiac Surgery: Ischemic Heart Disease (CABG)

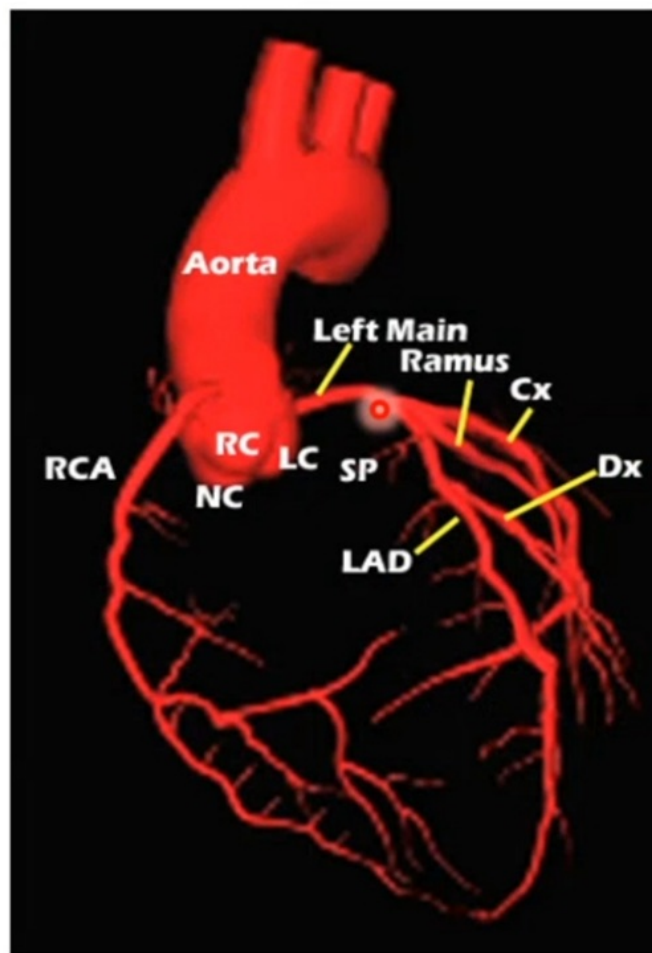
- Early and widespread acceptance of coronary bypass was delayed.
- Best known cooperative studies (1970-80's) were the;
 - VA
Coronary Artery Surgery Study
 - European Coronary Surgery Study



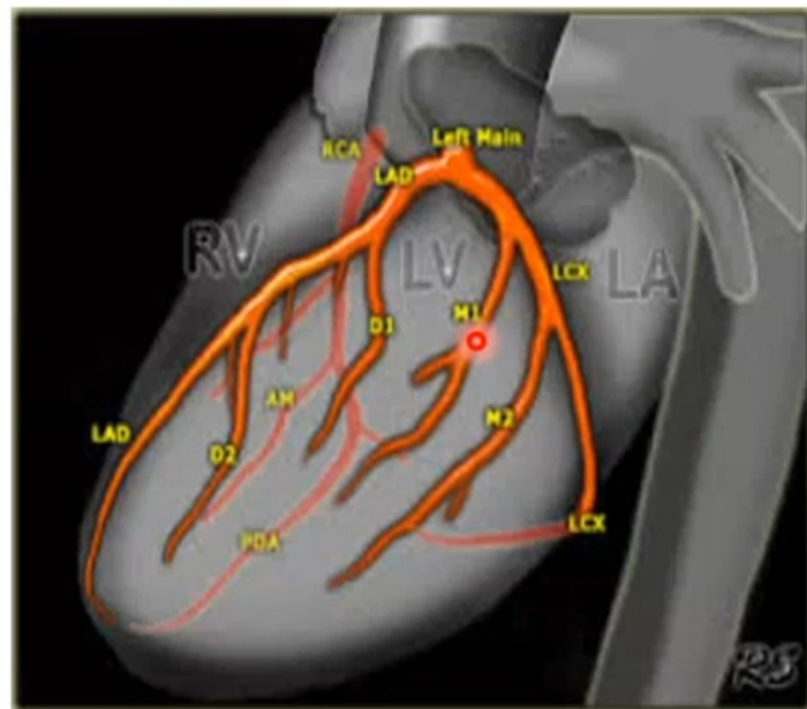
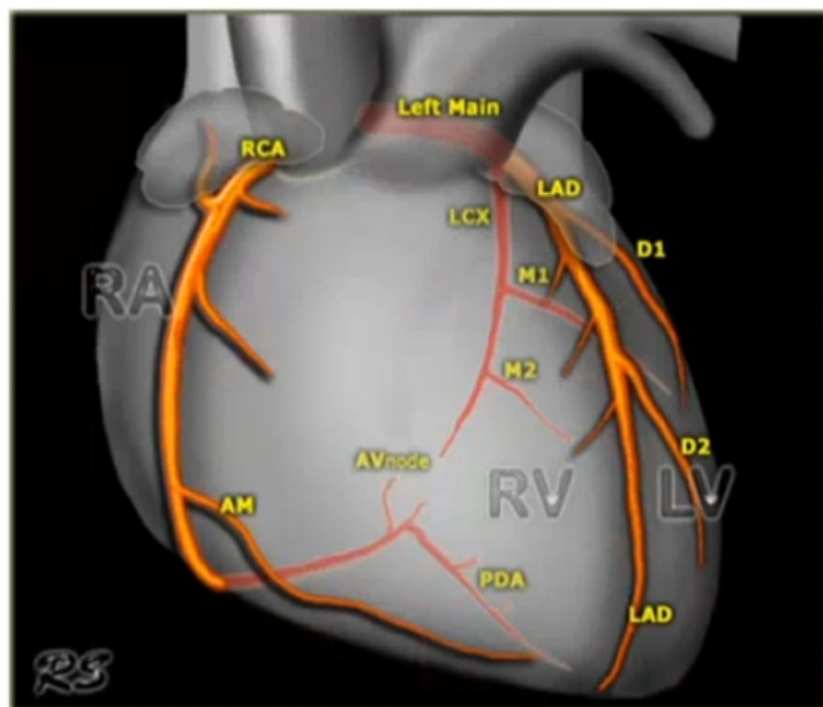
Coronary Artery Anatomy



The Normal Heart - Coronary Artery Anatomy



The Normal Heart - Coronary Artery Anatomy

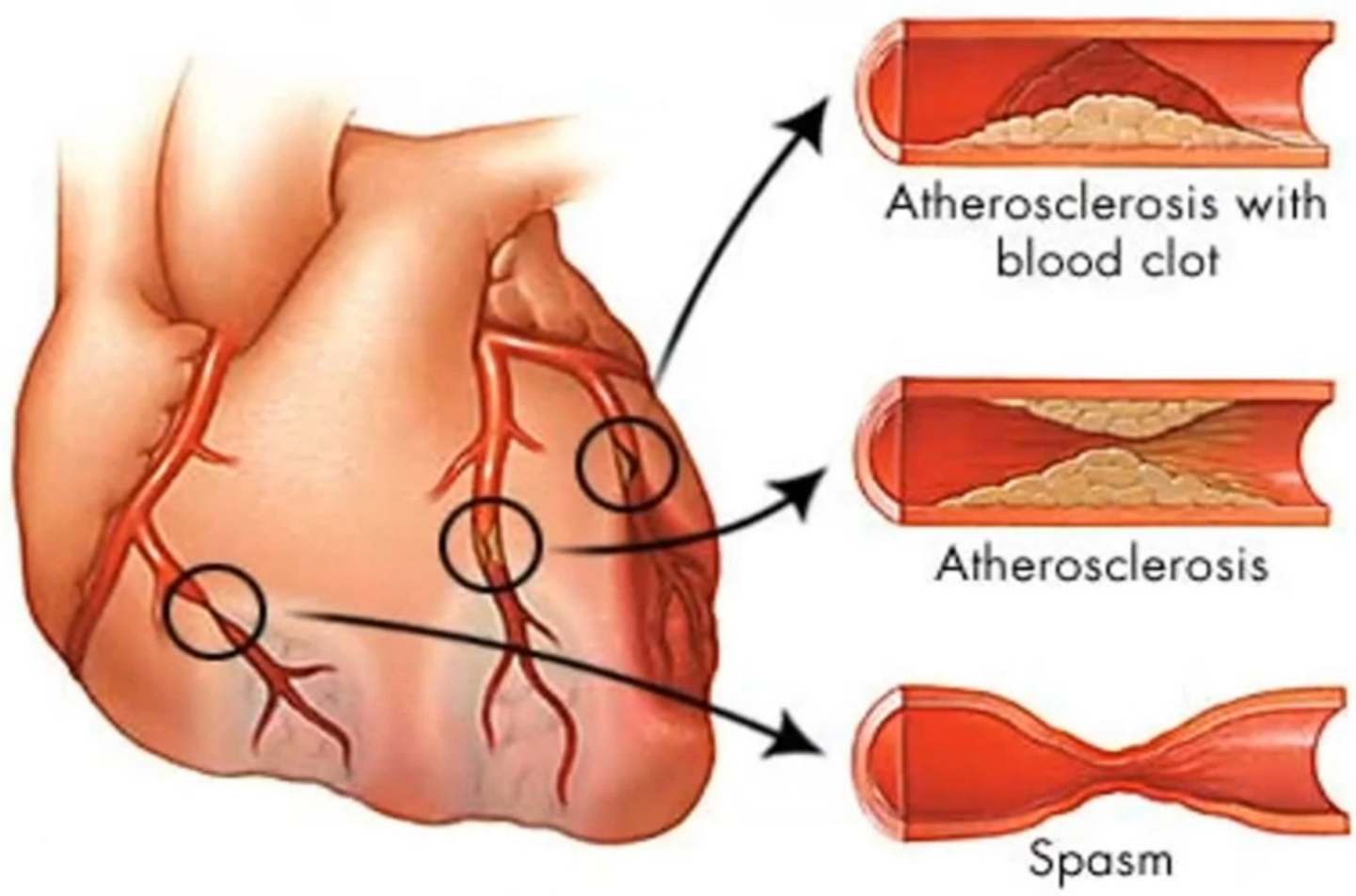


Ischaemic Heart Disease

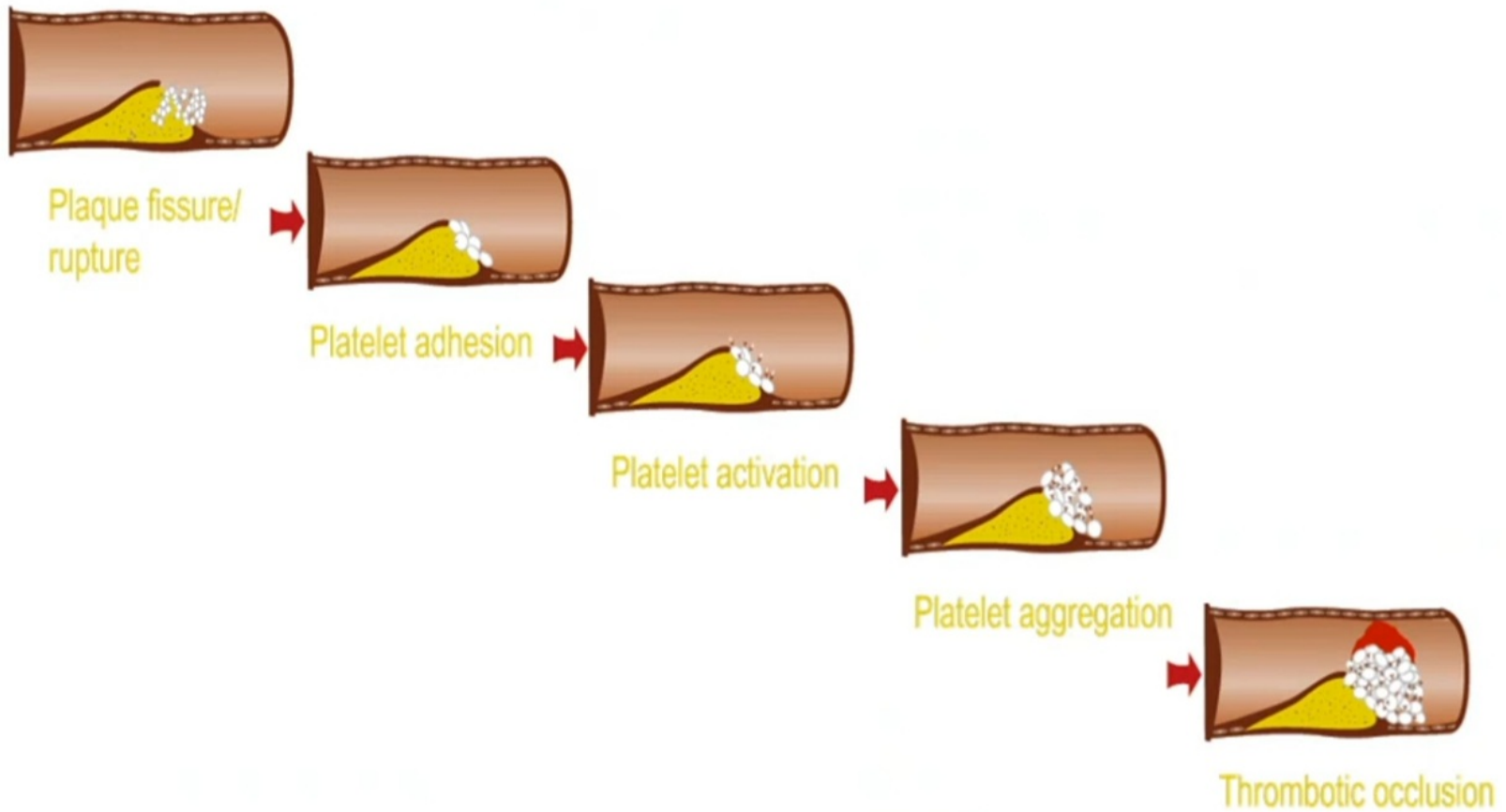
- It results from imbalance between oxygen demand and supply

Etiology

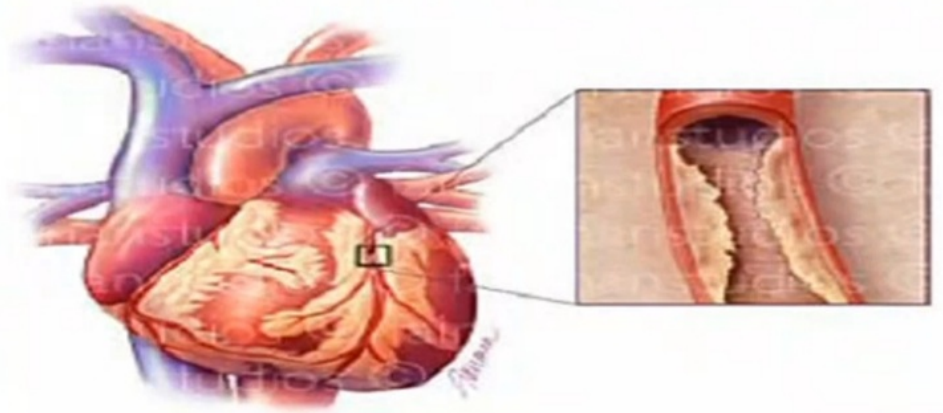
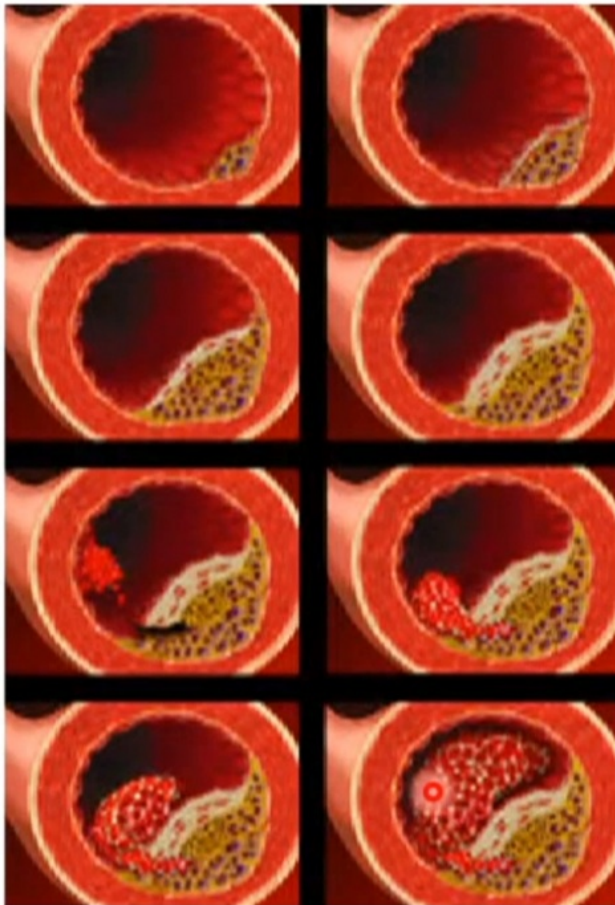
- **Atherosclerosis (>90%)**
- **Embolization**
- **Coronary spasm**
- **Vasculitis**
- **Ostial stenosis**
- **Severe LVH**
- **Congenital anomalies of the coronary arteries (e.g anomalous origin of LAD artery from pulmonary artery)**



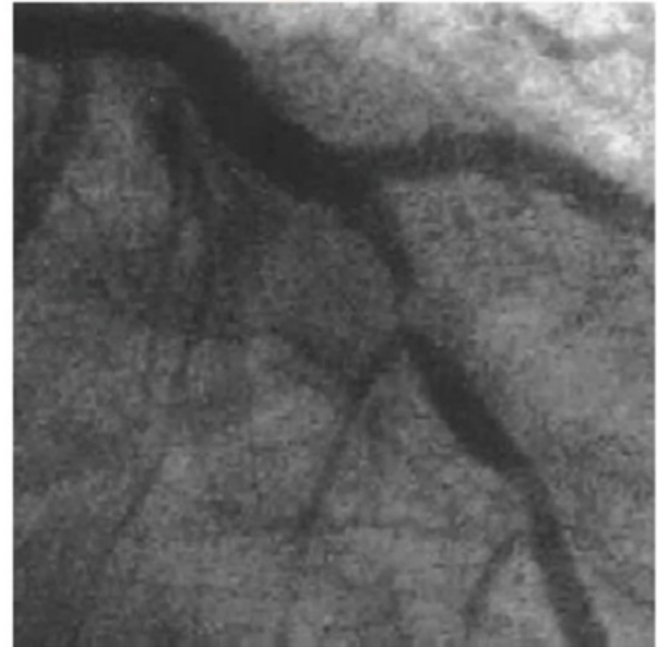
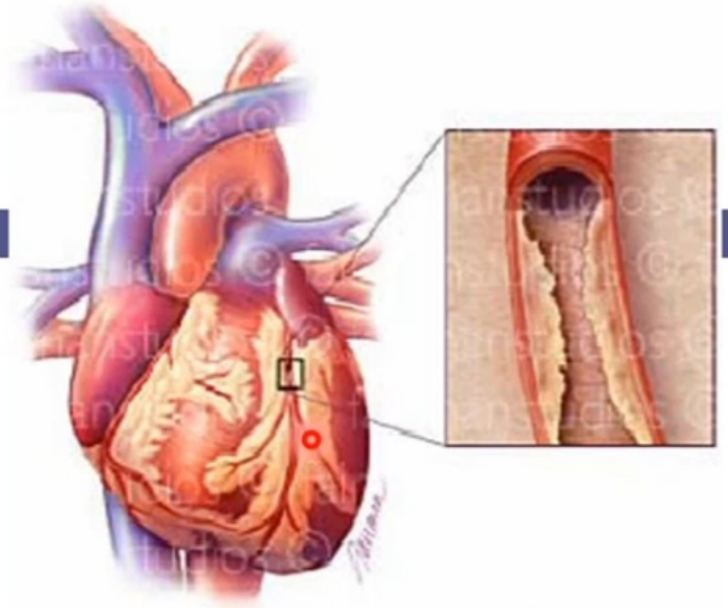
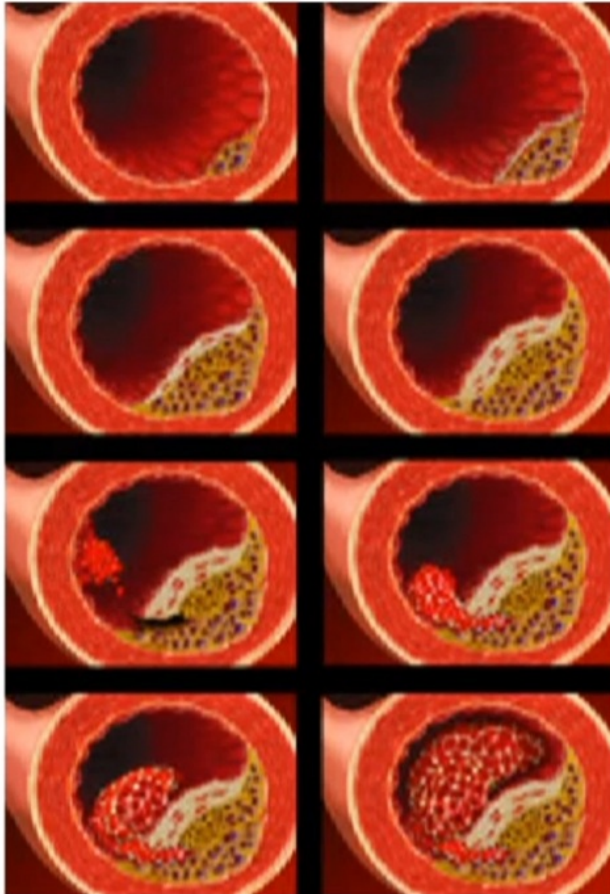
Pathogenesis of ACS



ATHEROSCLEROSIS



ATHEROSCLEROSIS



Risk Factors

Uncontrollable

- Sex
- Hereditary
- Race
- Age

Controllable

- High blood pressure
- High blood cholesterol
- Smoking
- Physical activity
- Obesity
- Diabetes
- Stress and anger

CAD

□ Diagnosis

1. History
2. Physical examination
3. ECG findings
4. cardiac enzymes



Investigations

- **ECG**
- **Cardiac enzymes**
- **Chest x-ray**
- **FBS**
- **Serum lipids**
- **TMT**
- **Stress or pharmacologic stress myocardial perfusion studies**
- **Cardiac CT-Scan Cardiac MRI**
- **Coronary angiography**

PRECISION MEDICINE /BIOINFORMATICS

- Big data of the pts. clinical characteristics with
- Enrichment of the diagnostic results
- The computer can reach a diagnosis of IHD
- The diagnosis should be quick and precise

Treatment of CAD

- Nitrates
- Beta blockers
- Aspirin/PLAVIX DUAL ANTIPLATELET THERAPY
- Ca-channel blockers(in coronary spasm)
- Treating the associated risk factors
- Treating the precipitating factor
- Revascularization (if indicated)

SURGICAL VS INTERVENTIONAL

Indications for open-heart surgery

▣ Coronary Artery Bypass Grafting: (CABG)

- ▣ Triple vessel disease
- ▣ Lf main coronary artery disease
- ▣ Unstable angina ,failed Mx therapy
- ▣ Complications of PTCA
- ▣ Life threatening complications of MI
- ▣ Anomalies of Coronary arteries.



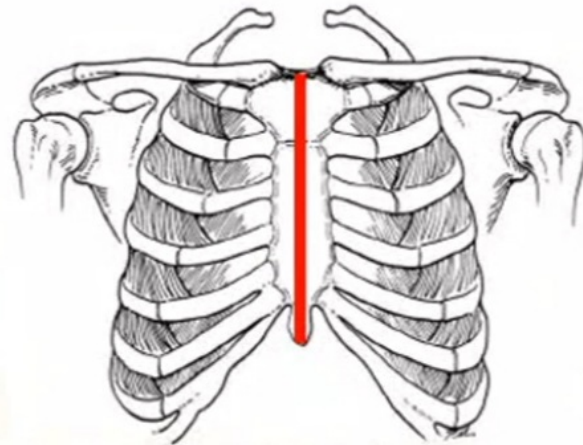
Adult Cardiac Surgery: CABG Techniques

- Median sternotomy
- Cardiopulmonary bypass
- Cardioplegic arrest
- Mammary artery, reversed saphenous vein, radial artery.

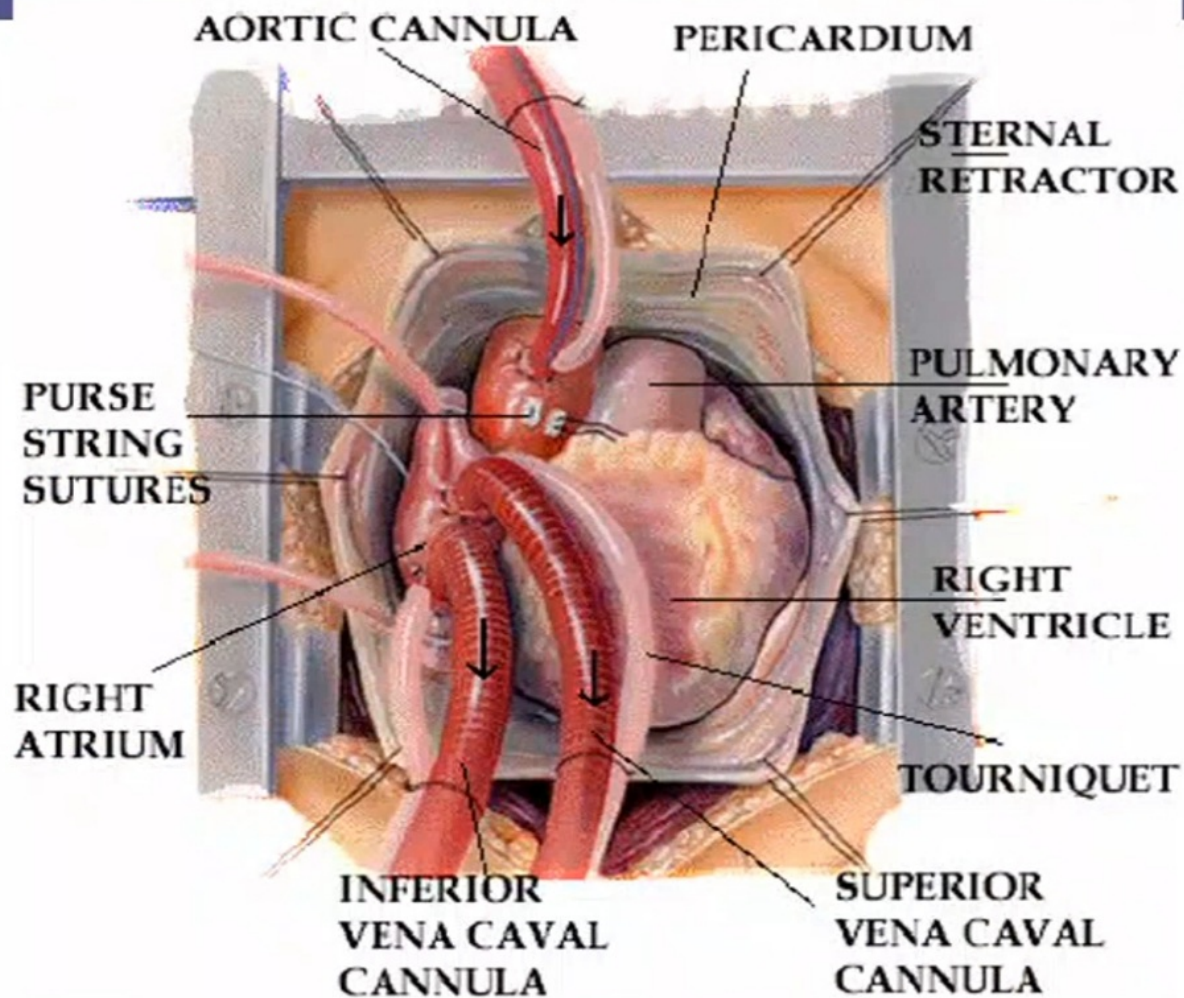


Sternotomy

- Sternotomy approach
 - allows almost all cardiac procedures
 - best overall access to the heart
- The sternum is divided with a saw



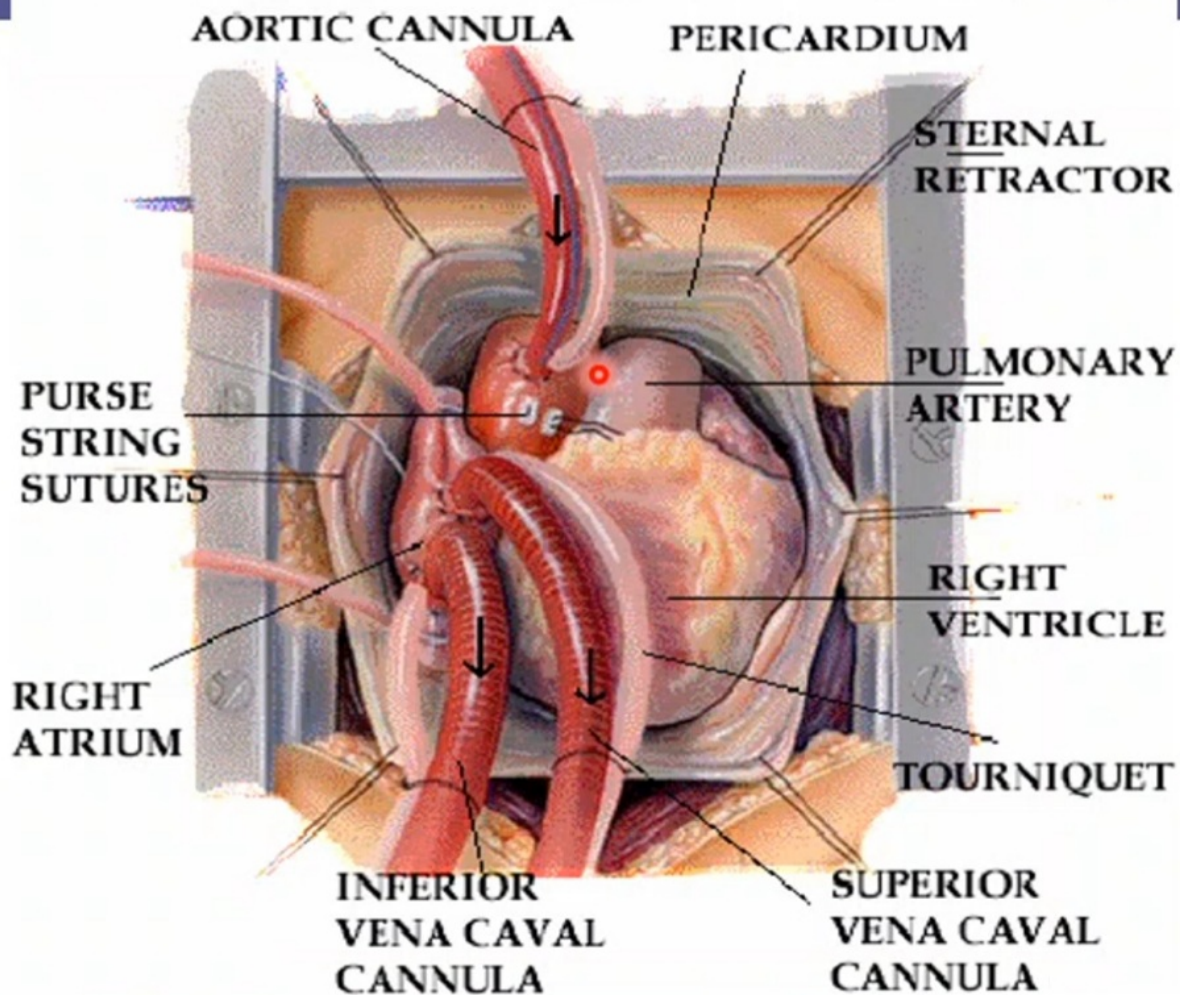
HEART ON CARDIOPULMONARY BYPASS

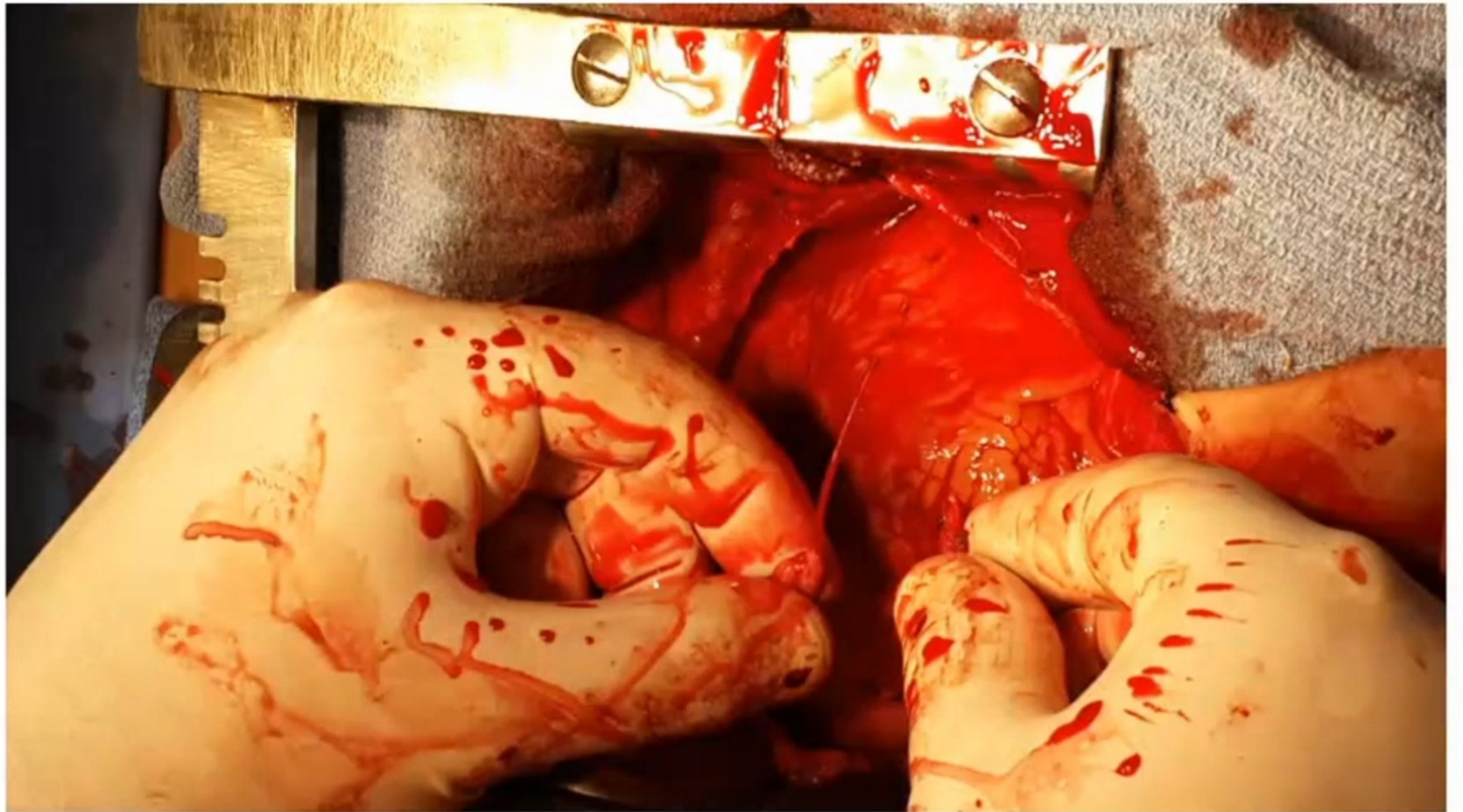


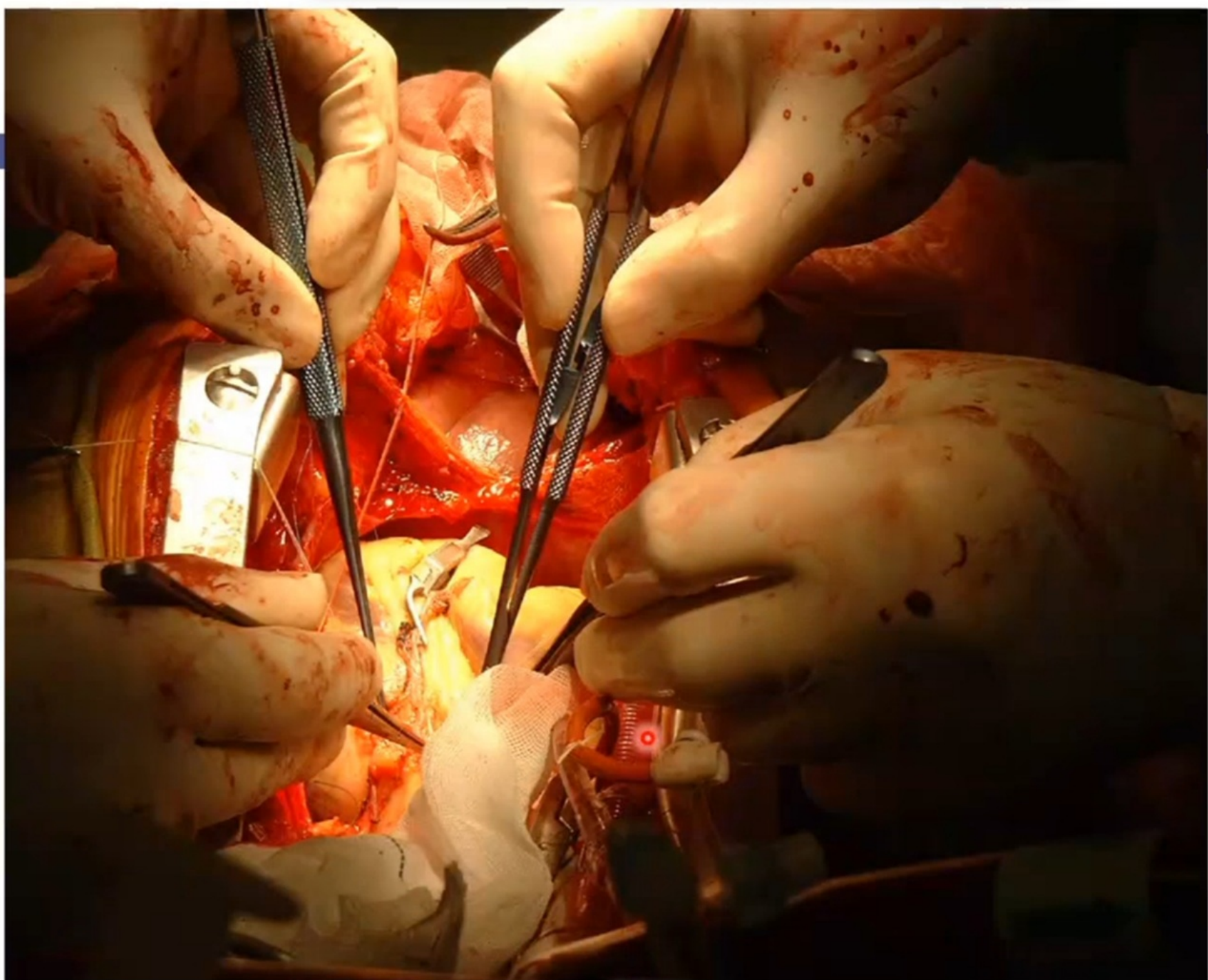
Heart Lung Machine



HEART ON CARDIOPULMONARY BYPASS

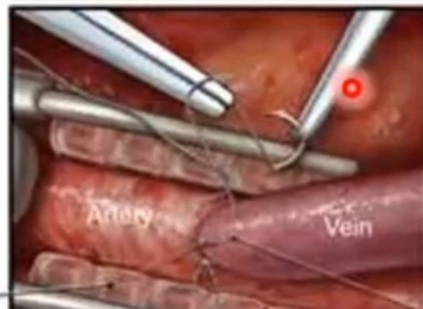
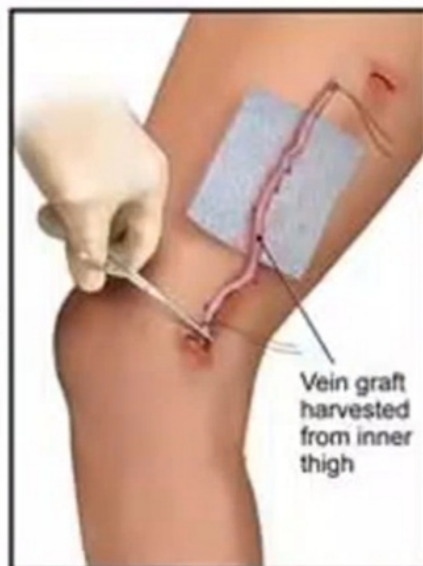
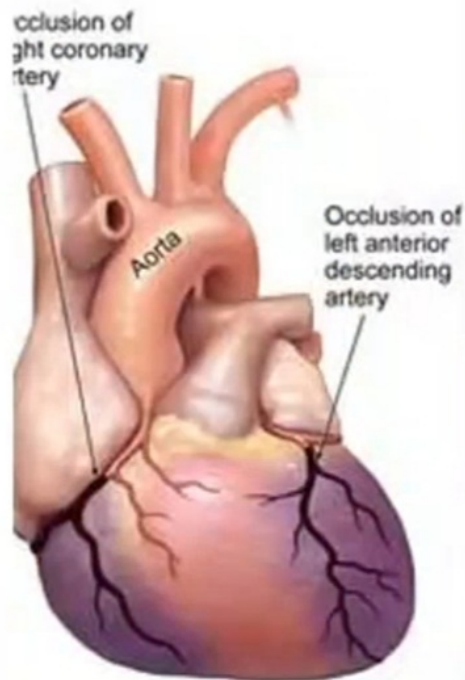




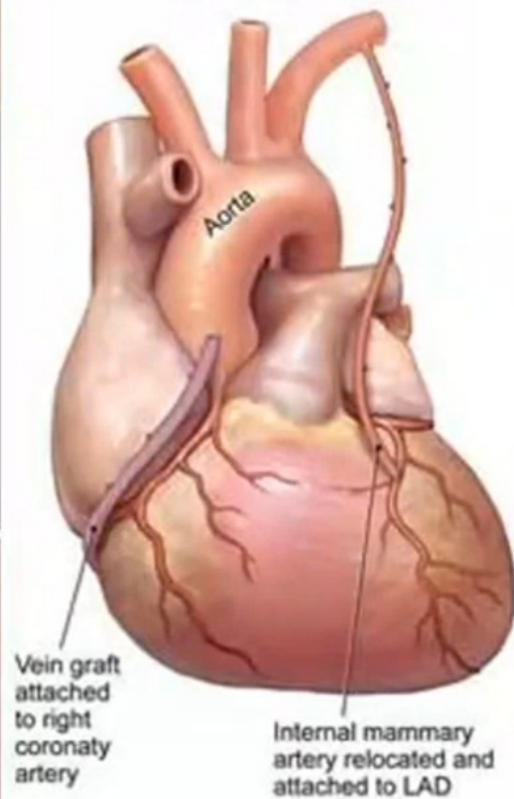


Coronary Artery Bypass Grafts

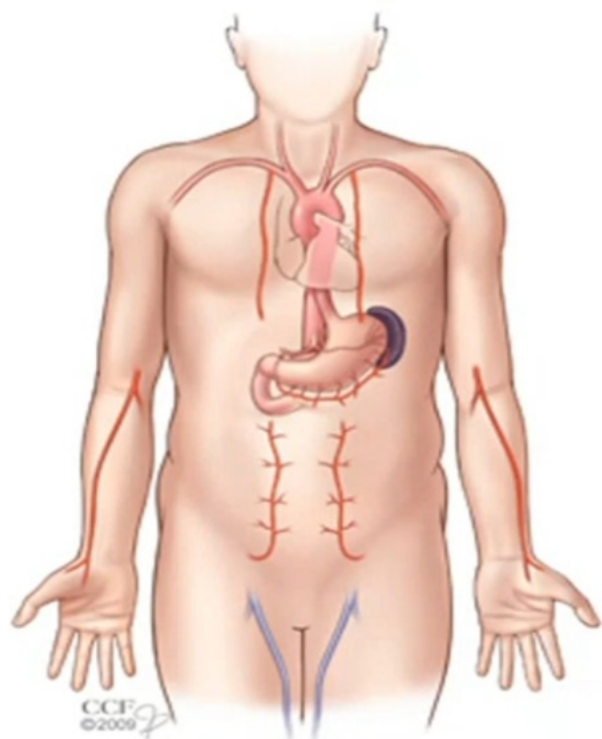
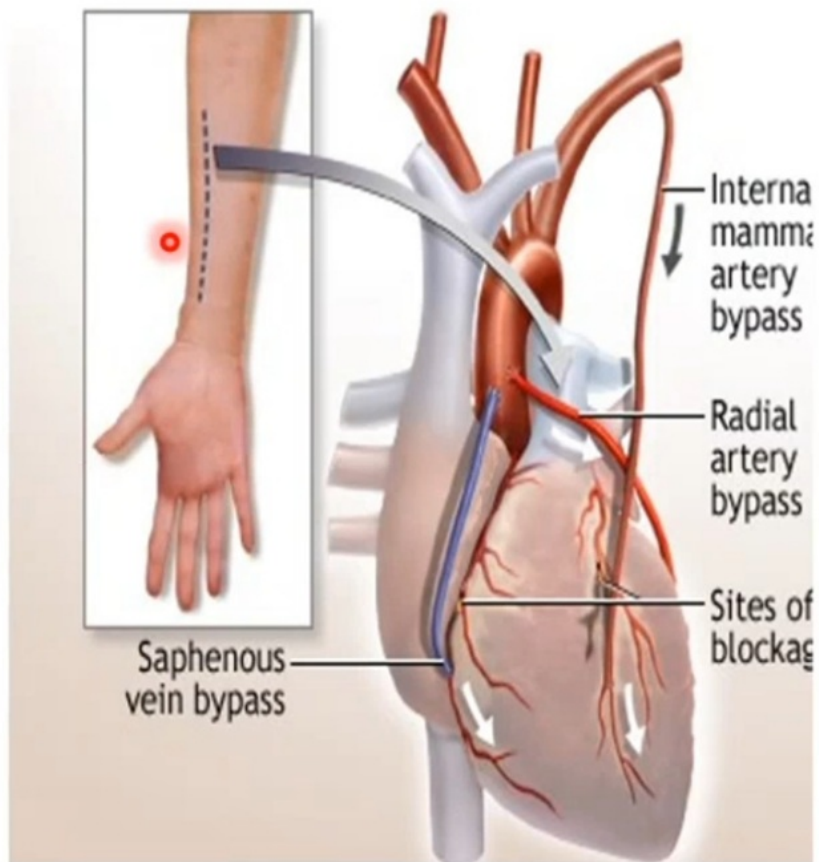
Preoperative Condition

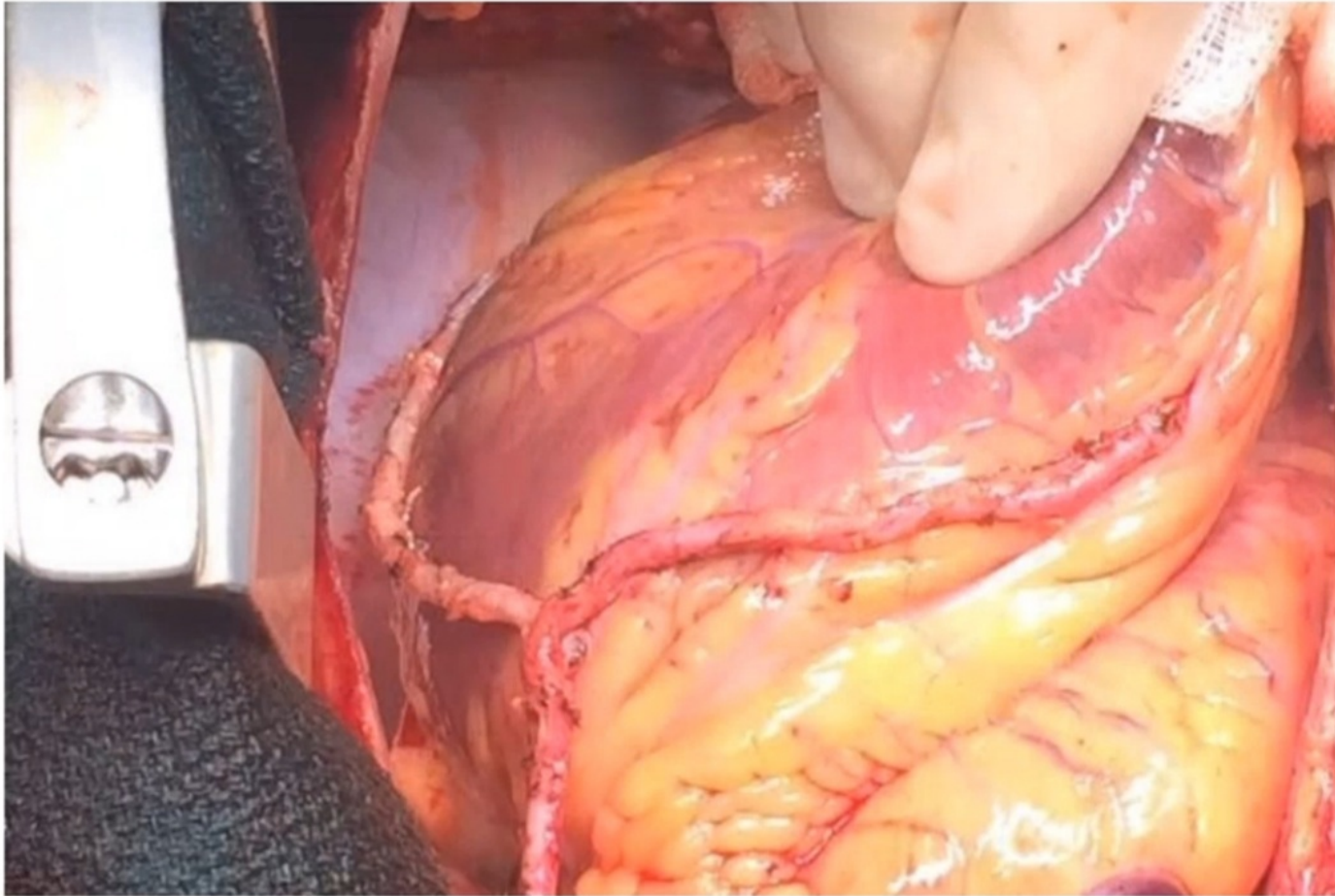


Postoperative Condition

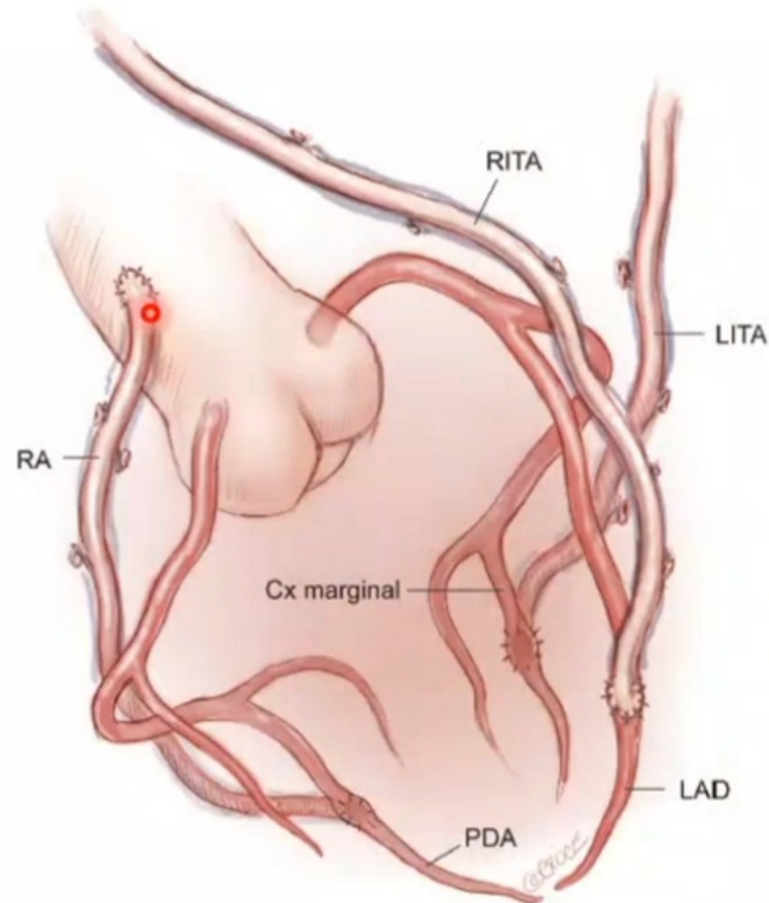


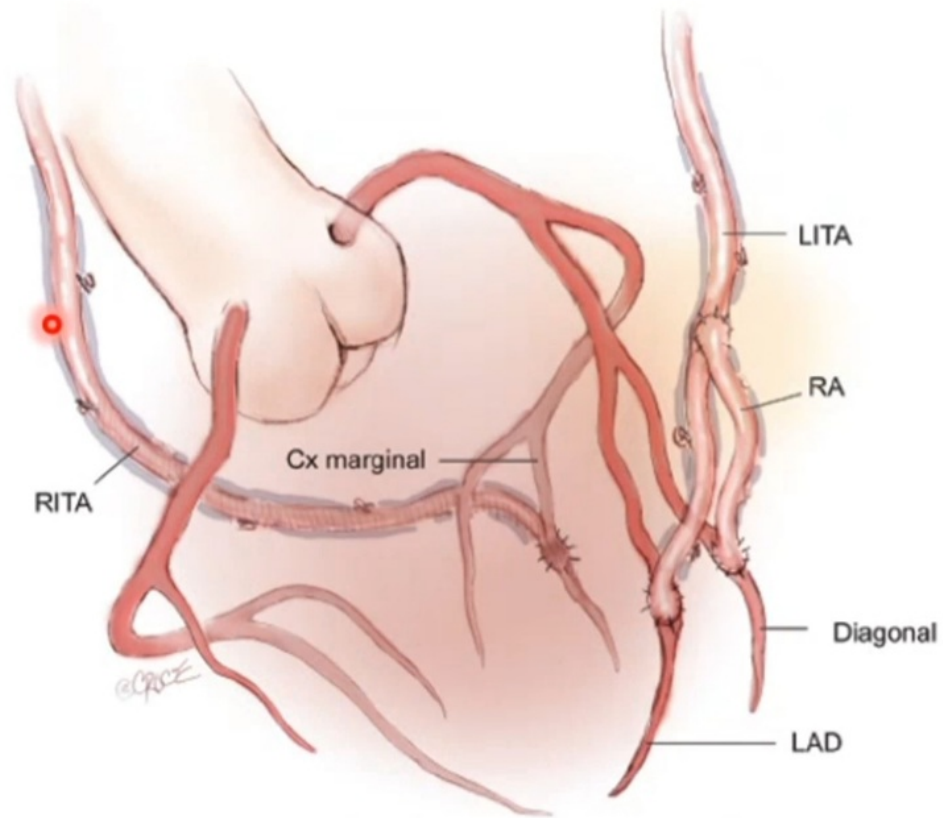
Arterial vs Venous conduits

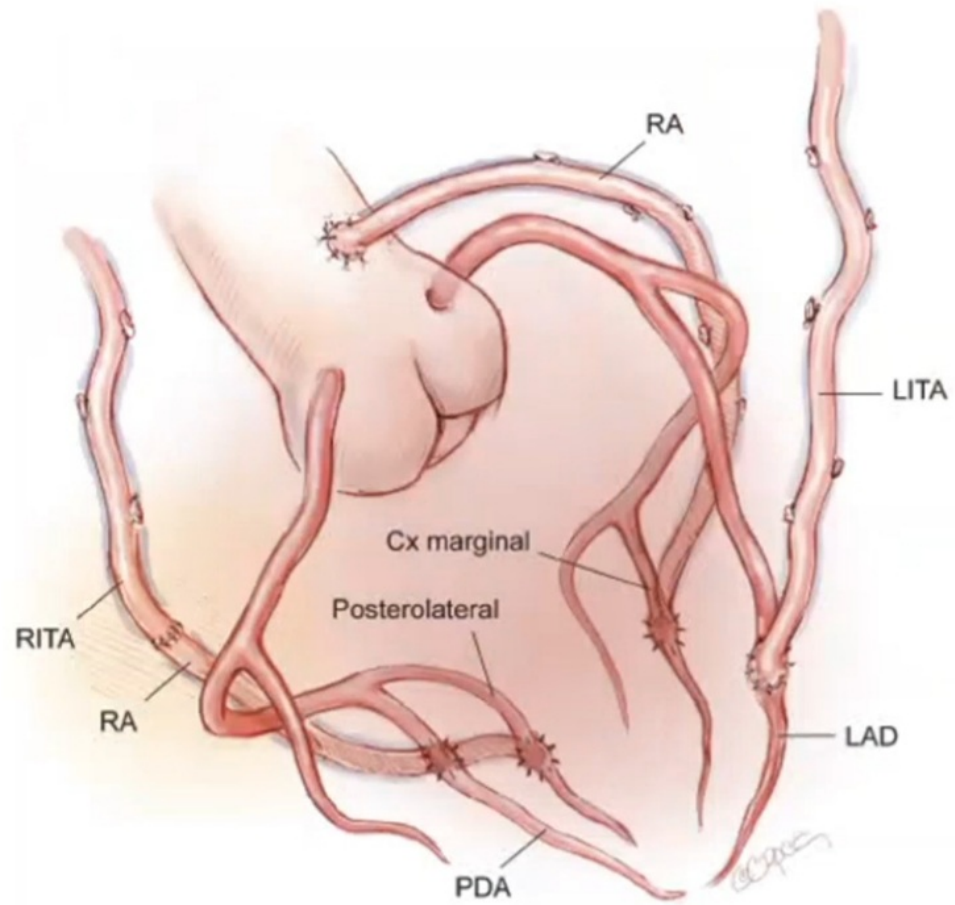


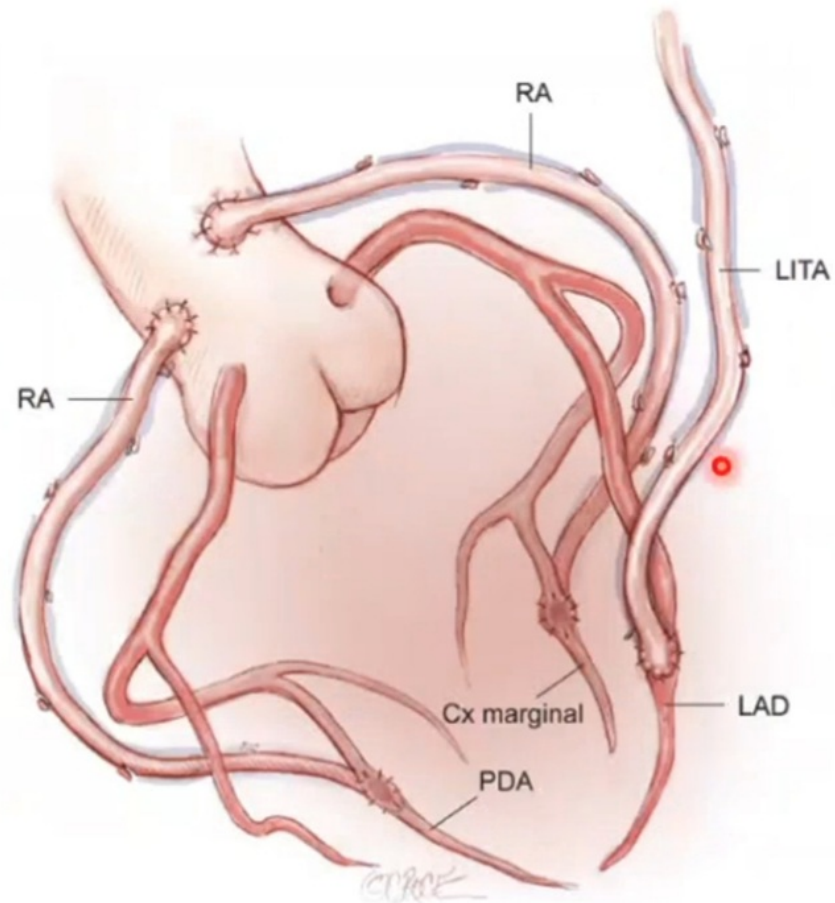


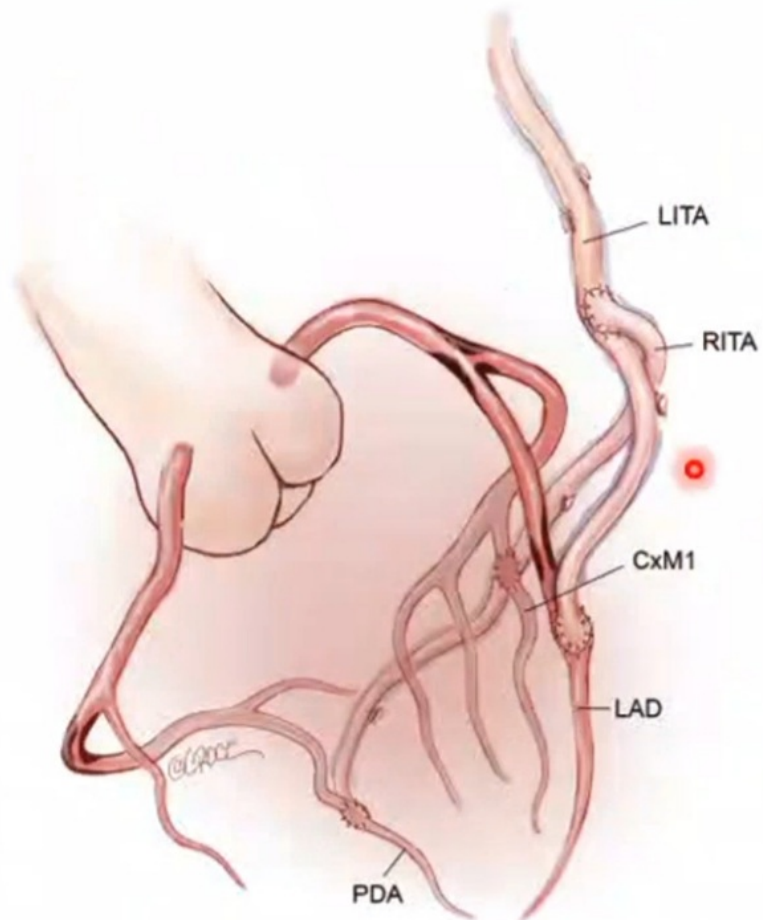
Total arterial revascularization

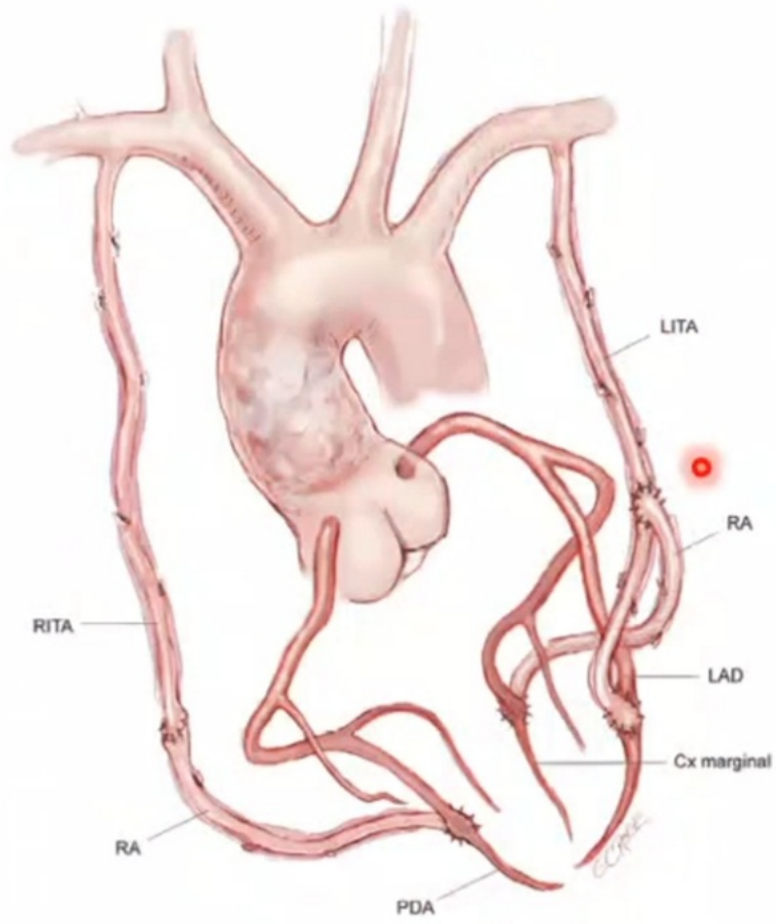












Complications of CABG

Mortality : STS PROM /EURO SCORE II

SSI/chest infection –sepsis –MOF

(both were LIMA-RIMA)

POST OP MI We do measure the flow in the new grafts intraoperatively

Stroke / CVA Especially in patients with Carotid artery diseases

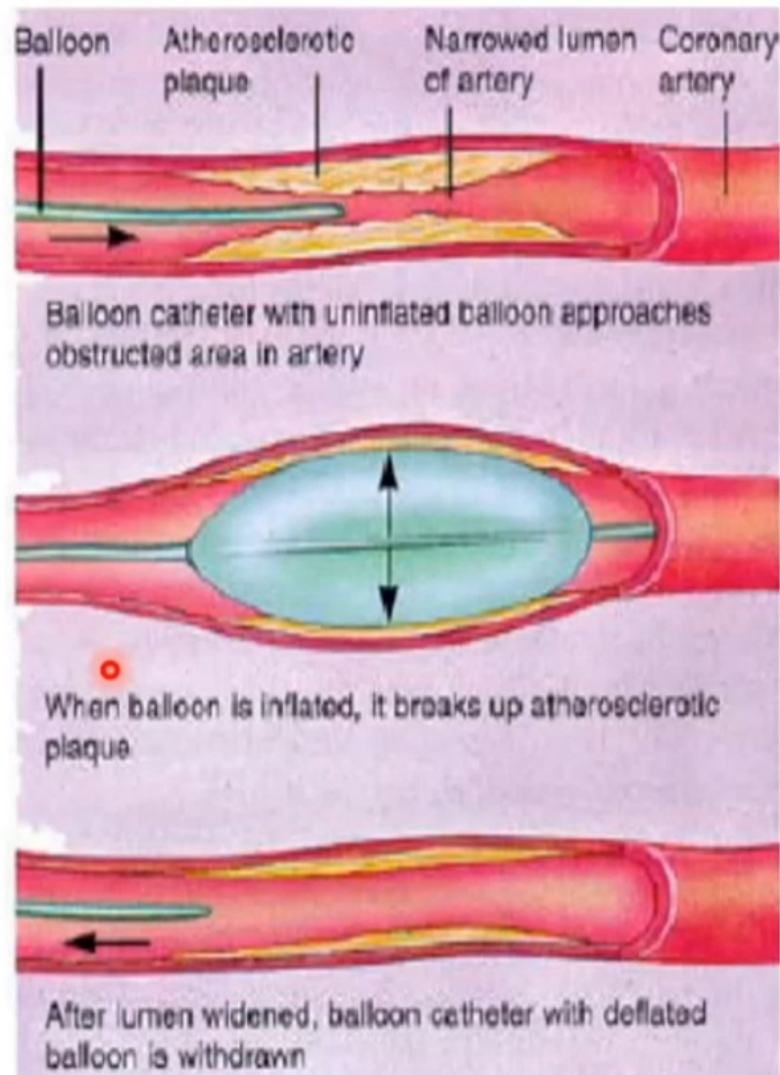
Arrhythmias AF THE MOST COMMON

STERNAL DEHISCENCE

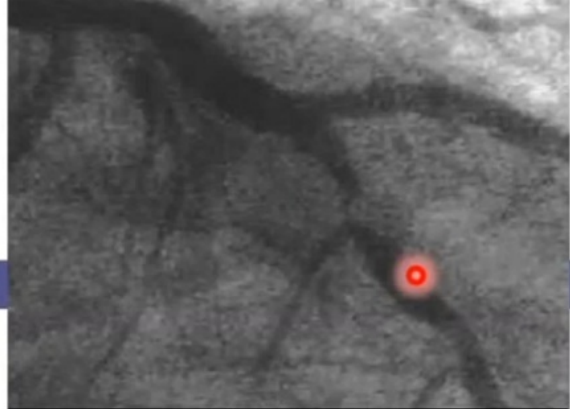


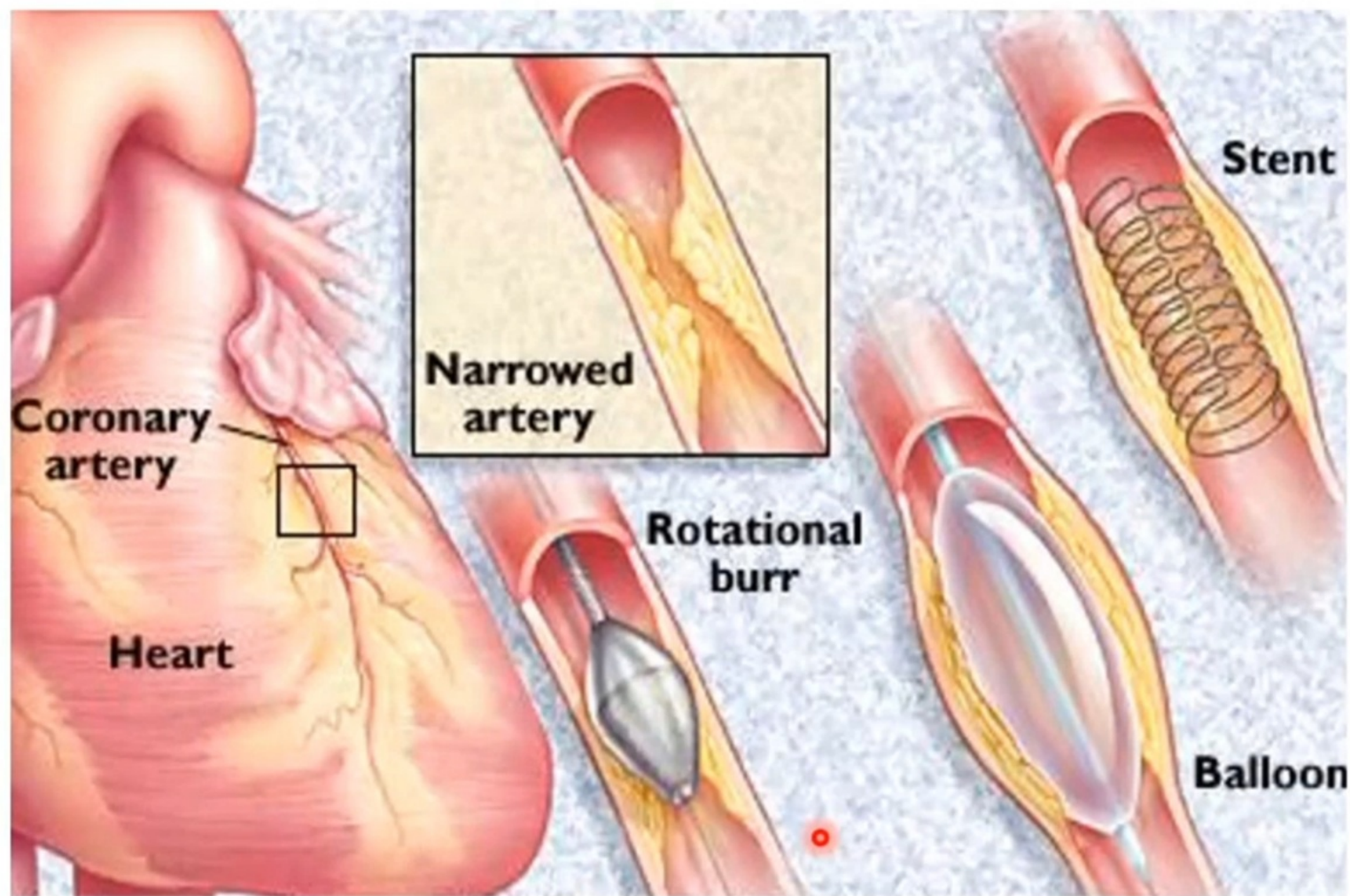
SIRS/CONVENTIONAL CABG

PTCA



BALLOON ANGIOPLASTY



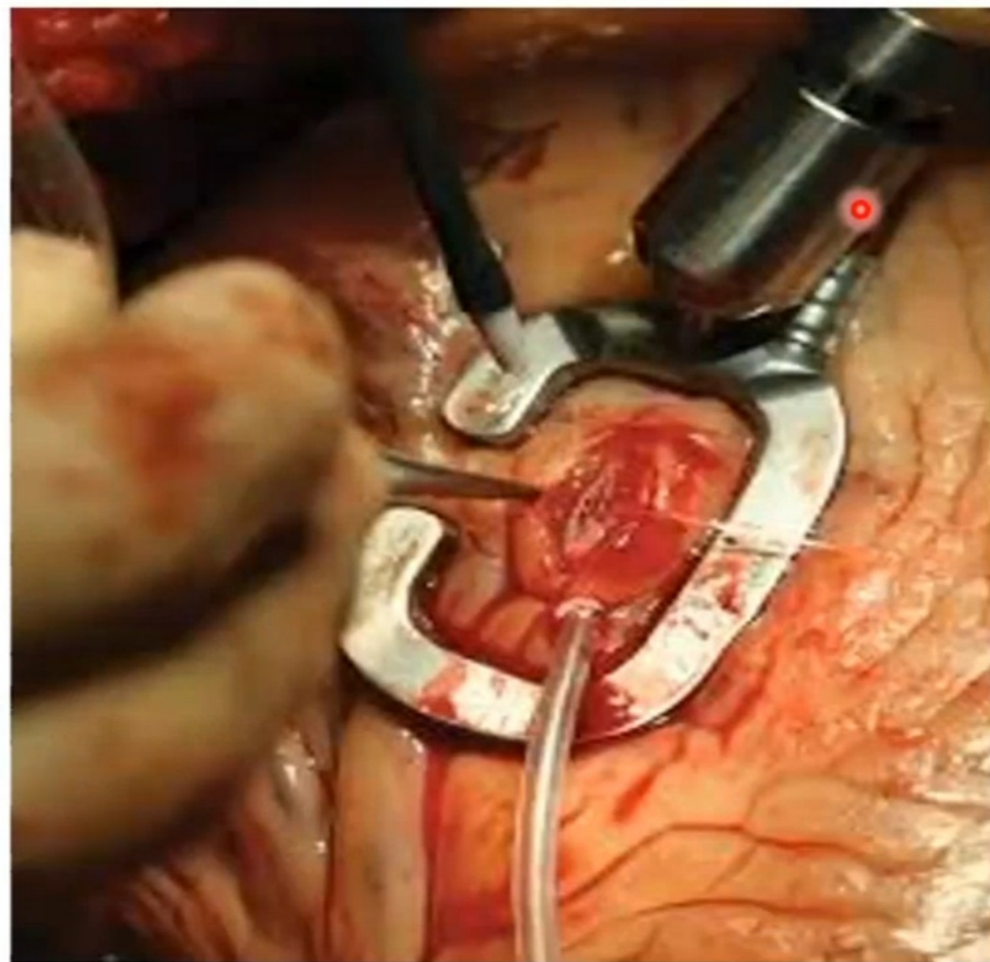


Off-Pump Coronary Artery Bypass (OPCAB)



Procedure

- Median sternotomy of varying sizes.
- Depending on the physiology of the patient, the smallest incision will be made.
- Arteries or veins can be harvested from the patients chest wall, arm, and or leg.
- Adenosine and Esmolol are used to slow the heart rate.
- Deep pericardial sutures and the use of specialized instruments to prop the heart in a position that will allow the surgeon to access occluded arteries.



Instrumentation

□ **Octopus Device**

- Has multiple small suction cups that are applied to the heart surface.
- When suction is turned on, the cups stick to the surface, and hold the heart steady, with movement being less than 1 mm.



□ **Drug Therapy**

- Esmolol and Adenosine have been found effective in slowing, and even temporarily stopping the heart beat for short periods (around 20 seconds).

