Care of the Cardiac Patient

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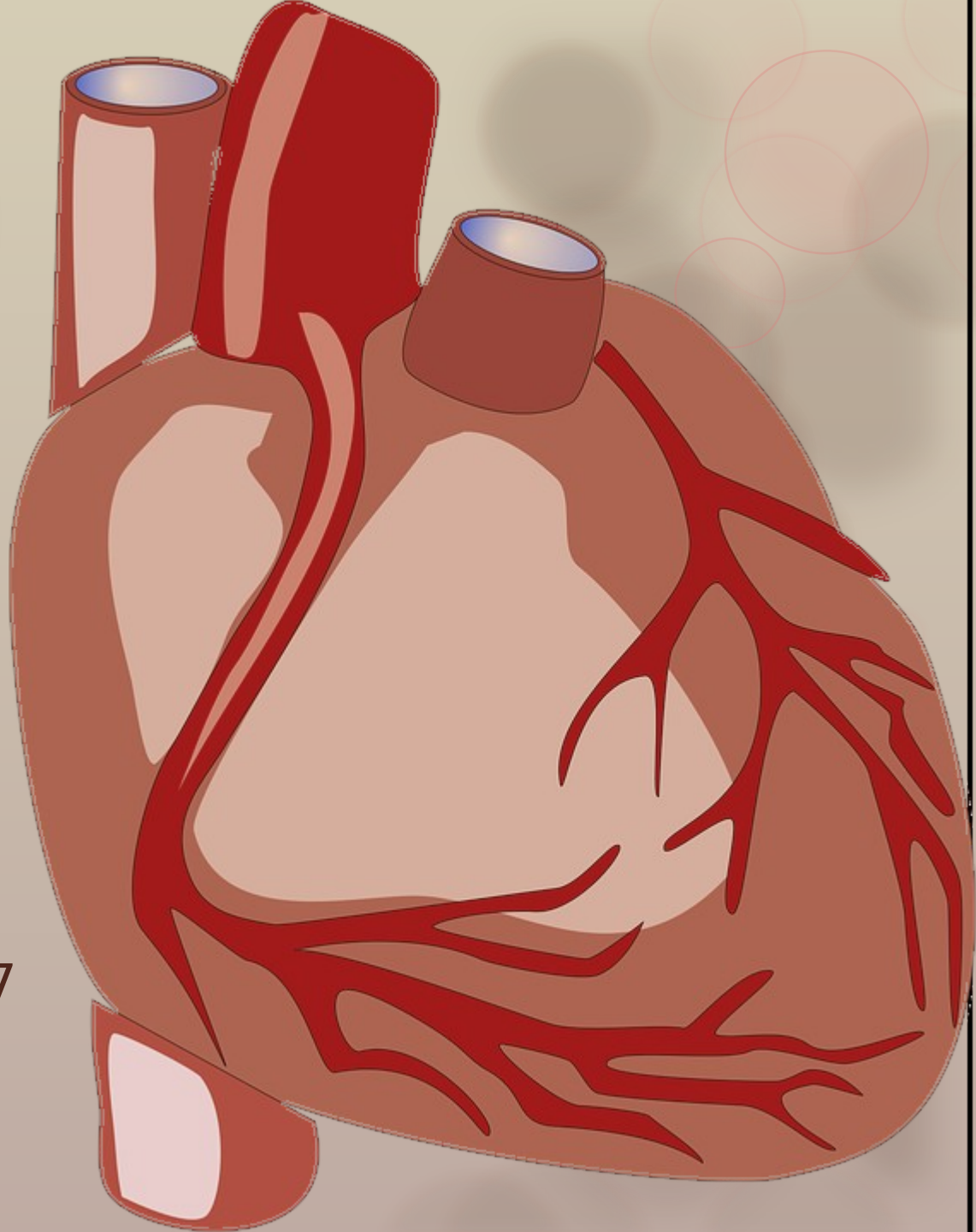
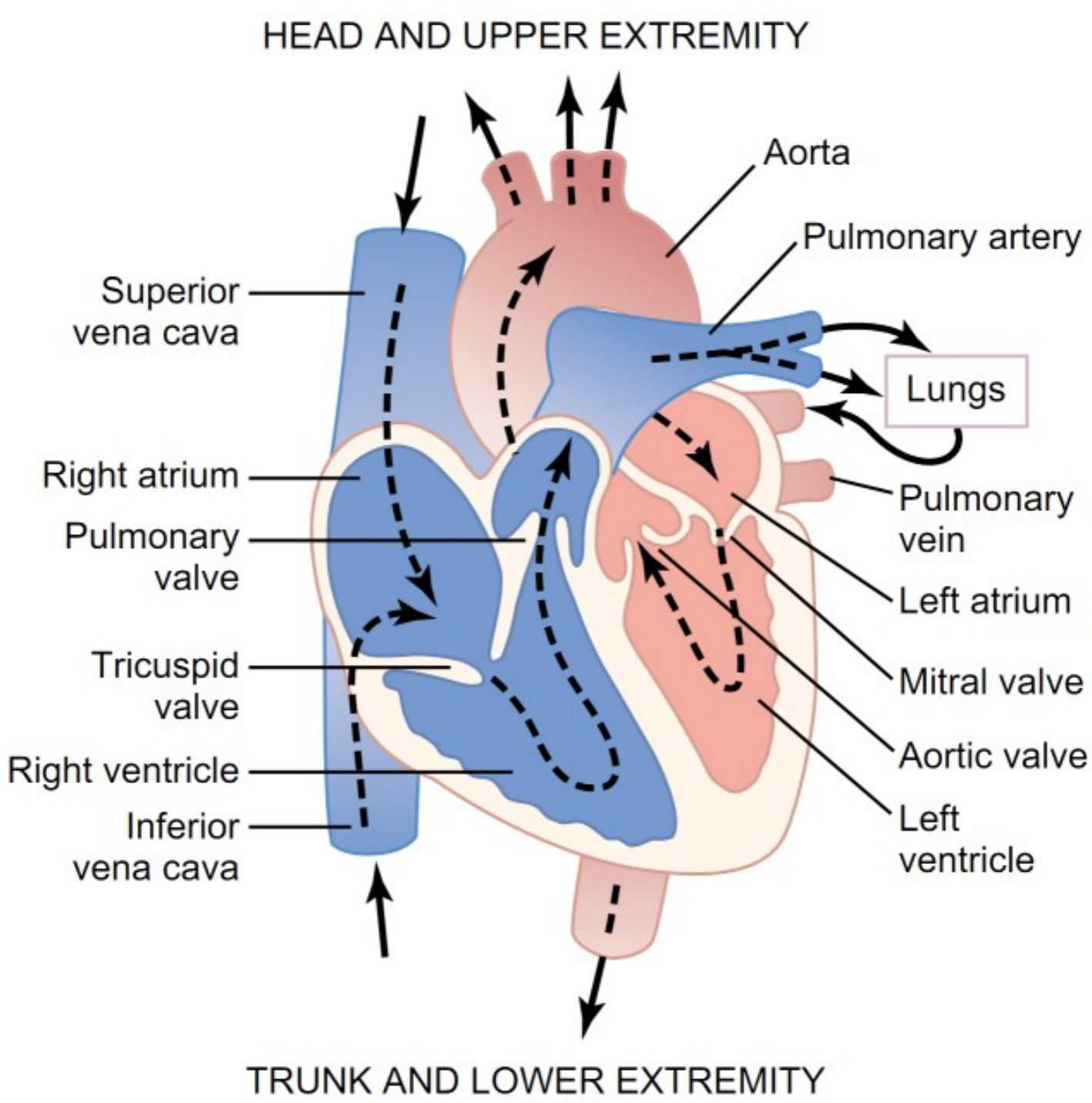
Instructional Module 7

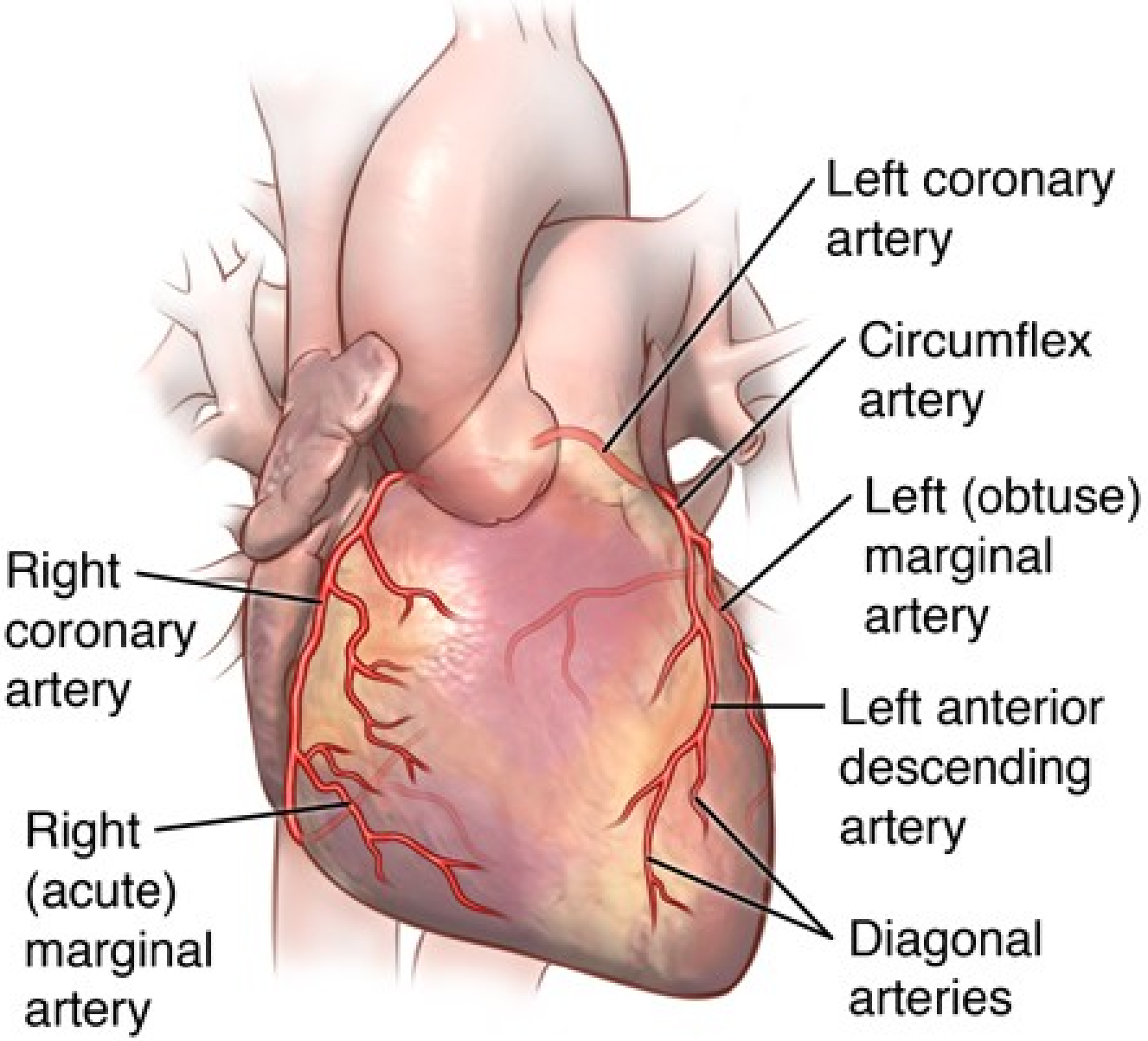


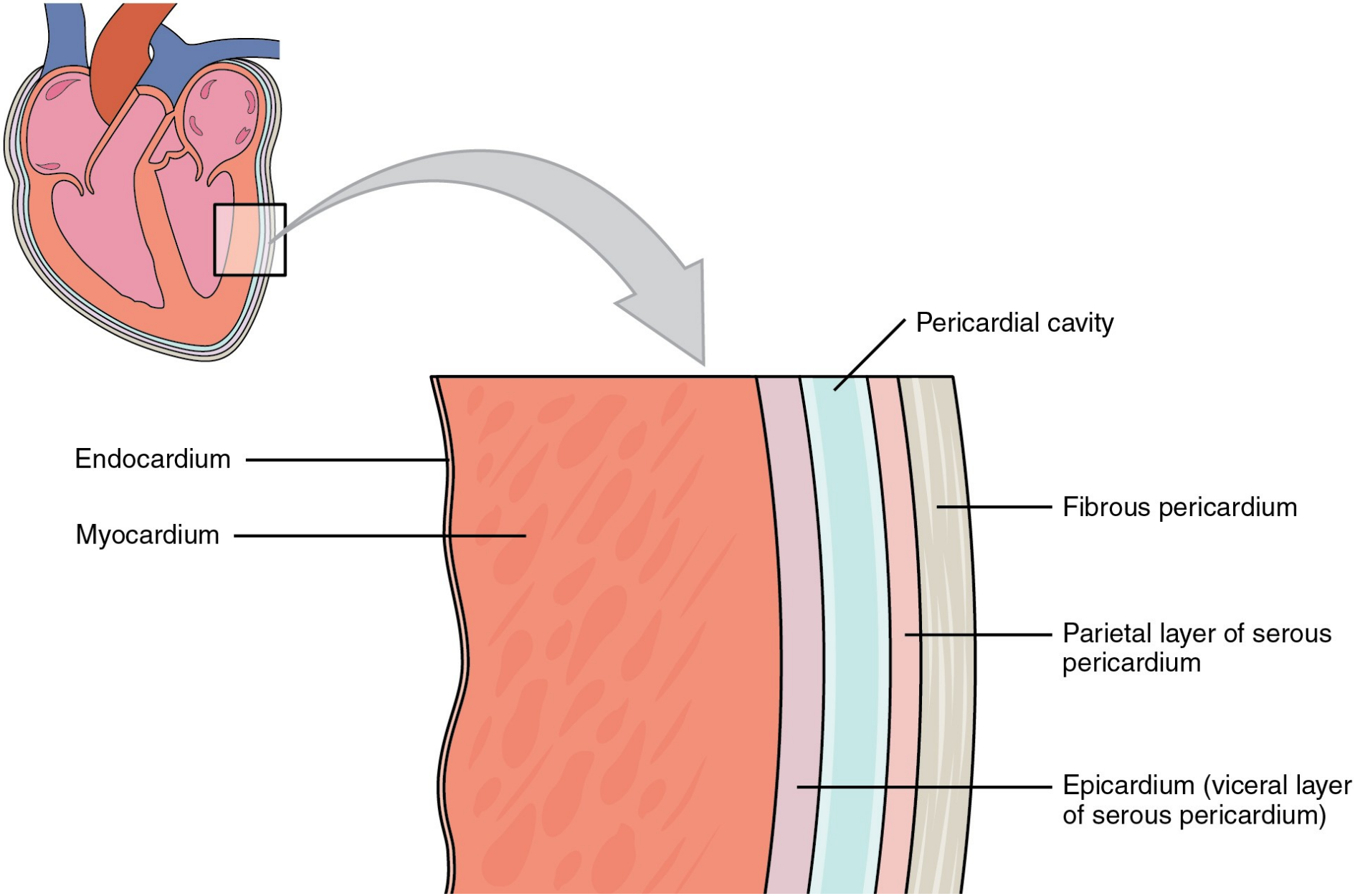
Learning Outcomes

- Integrate knowledge of cardiac anatomy and how it relates to perfusion.
- Recognize signs and symptoms of cardiac problems along with nursing interventions.
- Participate in discharge and rehabilitation therapy plans to prevent re-hospitalization.
- Recognize abnormal cardiac rhythms and intervene when necessary.


HEAD AND UPPER EXTREMITY
Aorta
Pulmonary artery
Superior vena cava
Lungs
Right atrium
Pulmonary vein
Pulmonary valve
Left atrium
Tricuspid valve
Mitral valve
Aortic valve
Right ventricle
Left ventricle
Inferior vena cava
TRUNK AND LOWER EXTREMITY

Coronary arteries of the heart



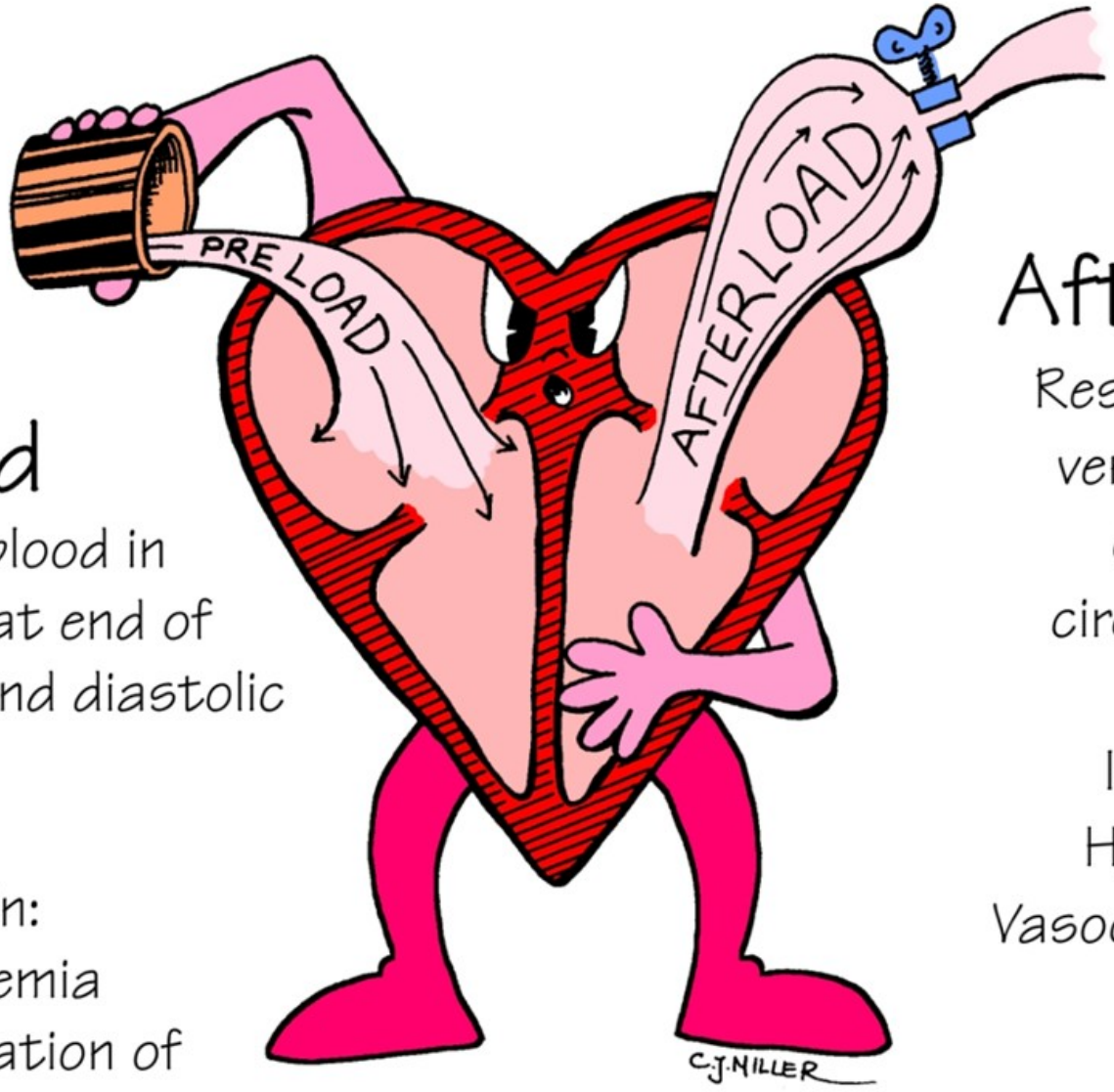

Pericardial cavity
Endocardium
Myocardium
Fibrous pericardium
Parietal layer of serous pericardium
Epicardium (viceral layer of serous pericardium)

What does the heart do?

- Here is a review of basic A&P

https://www.youtube.com/watch?v=X9ZZ6tcxArI

PRELOAD AND AFTERLOAD



Preload

Volume of blood in ventricles at end of diastole (end diastolic pressure)

Increased in:

- Hypervolemia
- Regurgitation of cardiac valves

Afterload

Resistance left ventricle must overcome to circulate blood

Increased in:

Hypertension
Vasoconstriction

↑ Afterload
↑ Cardiac workload

Let’s Talk About Acute Coronary Syndrome

What is Acute Coronary Syndrome?

- A condition that occurs when blood flow is decreased or blocked in the heart:
  - Unstable angina
  - NSTEMI
  - STEMI

Our objective with ACS: Decrease O2 Demand and Increase O2 Supply!

- Decrease physical activity
- Apply supplemental oxygen
- Administer medication

- Decrease preload
- Decrease afterload
- Dilate coronary arteries
- Reduce contractility
- Reduce heart rate
- Prevent further thrombosis

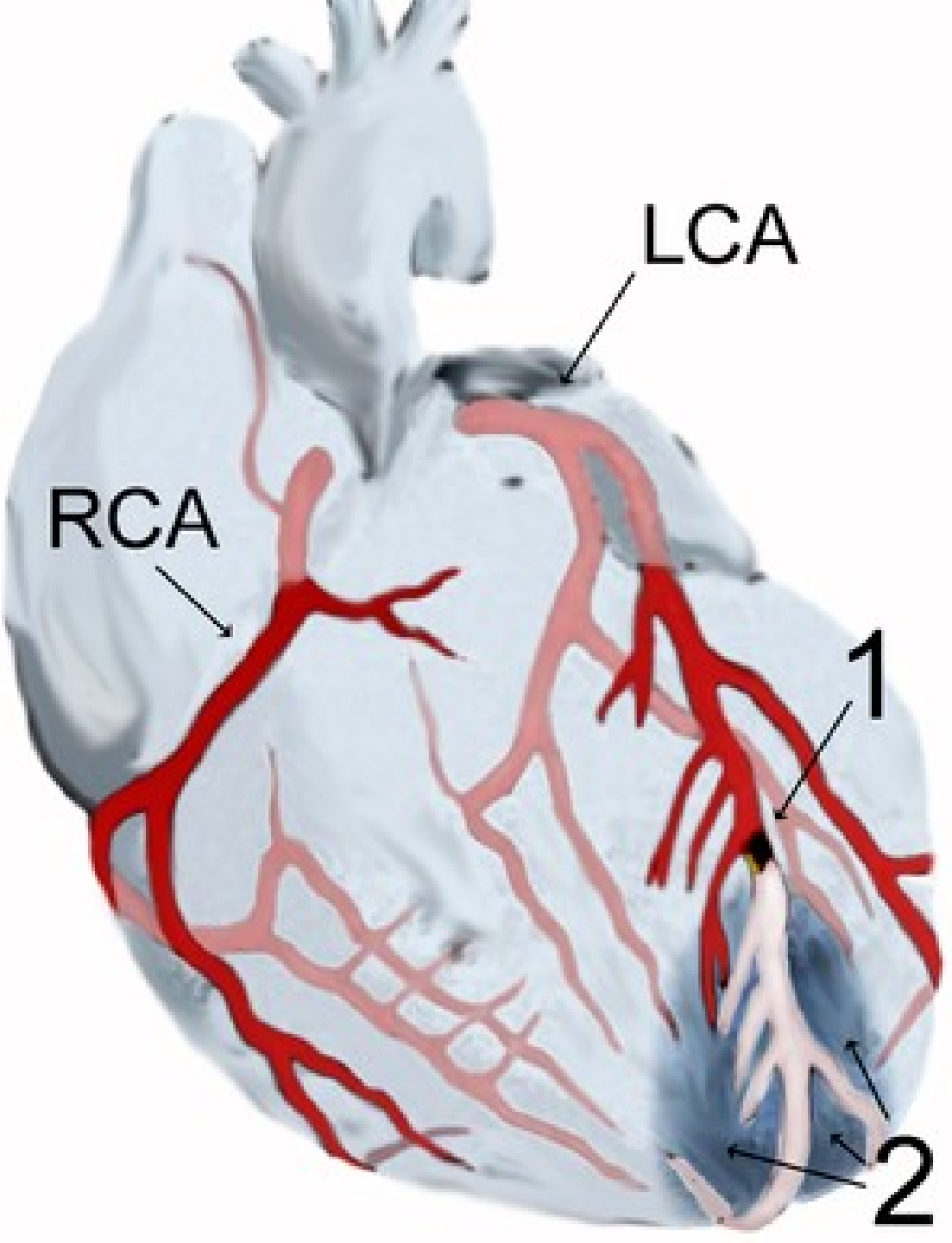
- Beta Blockers
- Anticoagulants
- Ca Channel Blockers
- Nitrates
- Opioids
- ACE/ARB

https://www.youtube.com/watch?v=viK121c8iZI

Let’s Talk About Myocardial Infarction…MI

What is an MI?

- Death or necrosis of myocardial cells caused by blood flow blockage
- STEMI
- NSTEMI



Time = Muscle

- Once cells have died, they are gone
- The body replaces necrotic cells with scar tissue
- Hypoxia begins in 10 seconds
- Damage occurs after 20 minutes of O2 deprivation

- **A STEMI is an emergent situation! Intervention w/in 90 minutes!**
- A NSTEMI is non-emergent

Signs and Symptoms of MI

- Typical symptoms:
  - Chest pain/discomfort/pressure
  - Elevated blood glucose
  - N/V
  - Diaphoresis
  - Increased HR/BP
  - S3/S4 heart sounds
  - Peripheral vasoconstriction
  - Fever
  - SOB
  - Dizziness
  - AMS
  - Dysrhythmias
  - Pulmonary edema
- Atypical symptoms:
  - Any symptom not accompanied by chest pain…

Descriptions frequently used by patients include:		It is generally not described as:
• Squeezing	• Burning/Heartburn	• Sharp
• Tightness	• Band-like sensation	• Knife-like
• Pressure	• Knot in the center of the chest	• Changed w/ breathing
• Ache	• Toothache	• Stabbing
• Crushing	• Heavy weight on chest (elephant sitting on chest)	• Like “pins and needles”

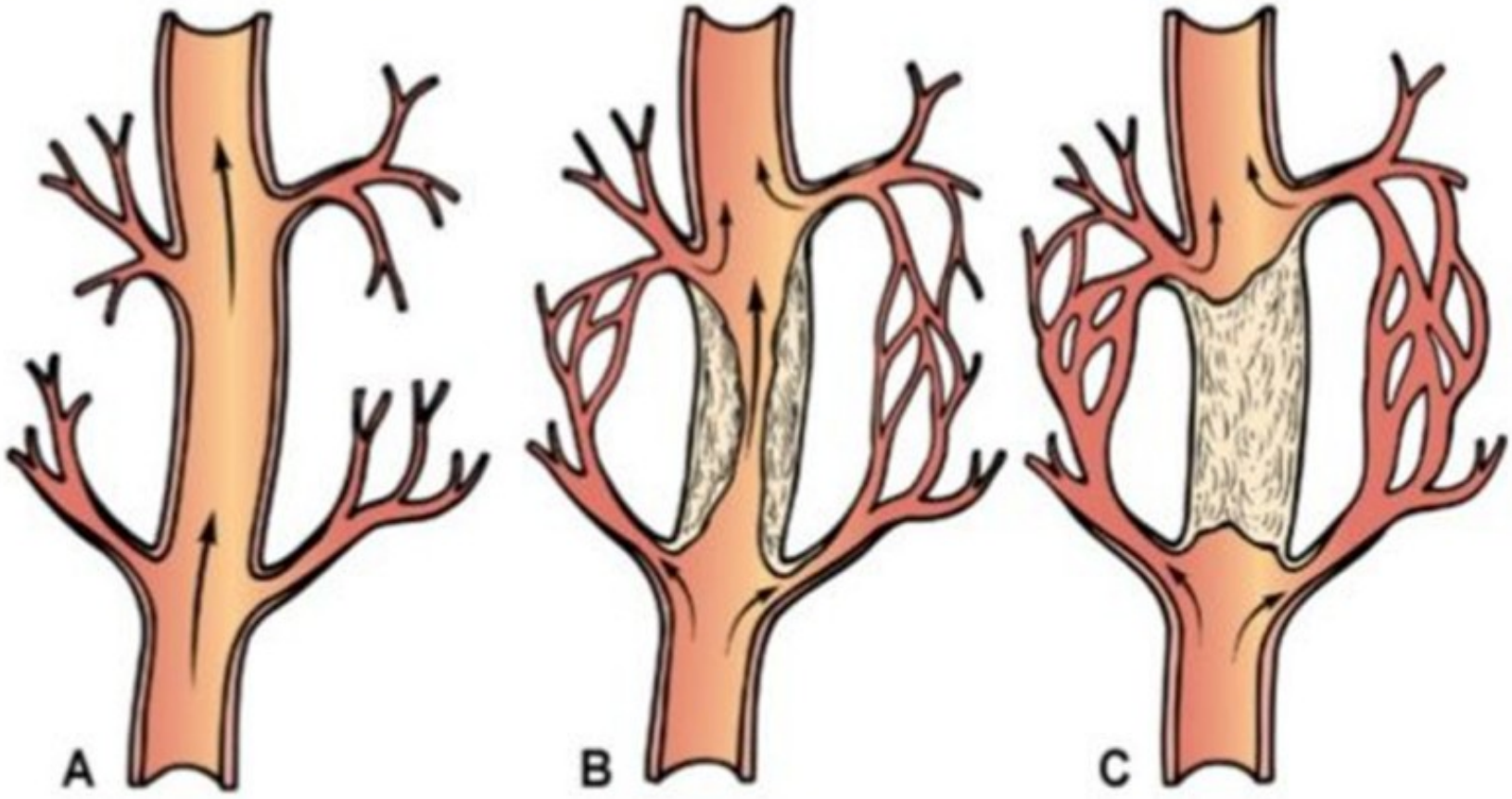
Evaluation of MI

- Diagnosis is made with elevated cardiac enzymes **PLUS:**
  - ? Typical Symptoms
  - ? ST Segment Changes
  - ? History of Cardiac Intervention

–

- EKG
- Cardiac Enzymes
- Stress Test
- Echocardiogram
- Coronary Angiogram

Occlusion/Collateral Circulation



Vessel Occlusion with Collateral Circulation

A. Open, functioning coronary artery

B. Partial coronary artery closure with collateral circulation being established

C. Total coronary artery occlusion with collateral circulation bypassing the occlusion to supply the myocardium

Question…

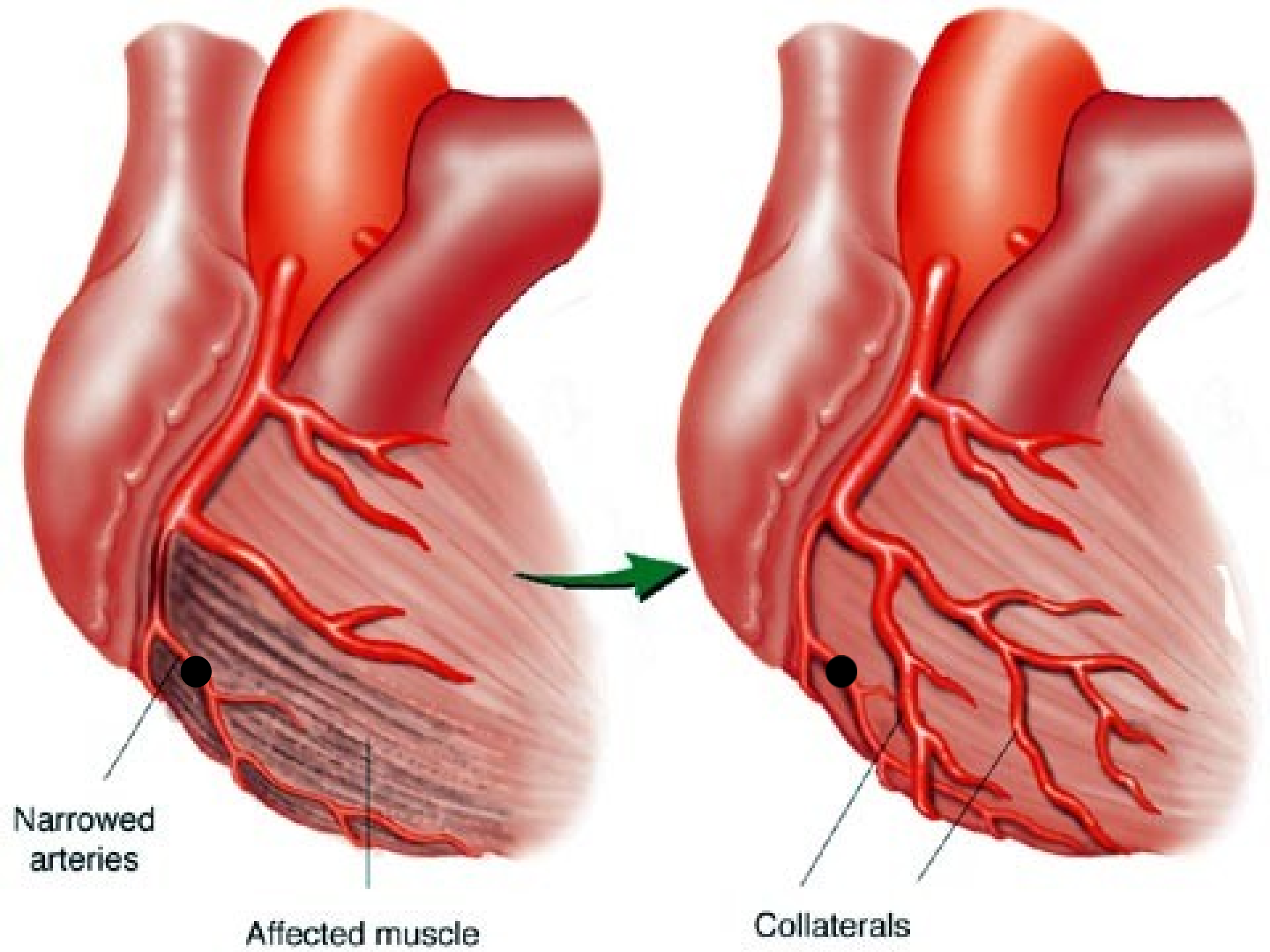
You are the nurse working in triage in the adult ED. According to you, which patient should be seen first?

A) A 78-year old complaining of dizziness and chest pain radiating to their left arm

B) A 17-year old complaining of abdominal pain who is doubled over crying

C) A 34-year old grabbing their chest who appears diaphoretic and pale

D) A 55-year old vomiting coffee-ground emesis who appears lethargic and pale

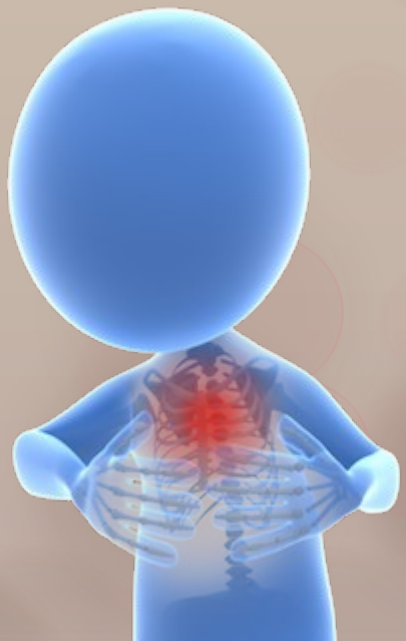

Narrowed arteries
Affected muscle
Collaterals

Let’s Talk Lab Work…

- Troponin (T or I)
  - Elevates 4-6 hours after injury, peaks at 10-24 hours
  - Level = <0.03 ng/mL (I); <0.1 ng/mL (T)
  - Returns to baseline in 10-14 days
- Creatine Kinase (CK)
  - Elevates 6 hours after injury, peaks at 18 hours
  - Level = 30-170 U/L
  - Returns to normal 24-36 hours following injury
- Myoglobin (CK-MB)
  - Elevates within 2 hours, peaks at 3-15 hours
  - Level = <90
  - Returns to normal 12-24 hours after injury

Your Patient Complains of Chest Pain……what do you do??

- Apply supplemental O2
- Get vital signs
- Get an EKG
- Ensure adequate IV access
- Draw cardiac enzymes
- Place the patient on a cardiac monitor
- Administer medication
- Get patient ready for reperfusion therapy



Medication for MI

- Nitrates (IV/SL nitroglycerin)
- Beta Blockers (metoprolol)
- Antiplatelet Agents (ASA/clopidogrel/eptifibatide)
- Anticoagulants (heparin/enoxaparin)
- Thrombolytic Therapy (alteplase)

Heparin-Induced Thrombocytopenia (HIT)

- Immune response to heparin
  - Body forms antibodies against heparin

  Platelets activated = ⬆platelet plugs = ⬆R/O thrombosis = ⬇circulating platelets
- Usually occurs 5-10 days into treatment
  - Can occur in as little as 24 hours
- Suspect HIT
  - Plt. <150 or drop of 50% or more from baseline
  - Arterial or venous thrombosis
  - Acute systemic reactions after administration
- Treatment?

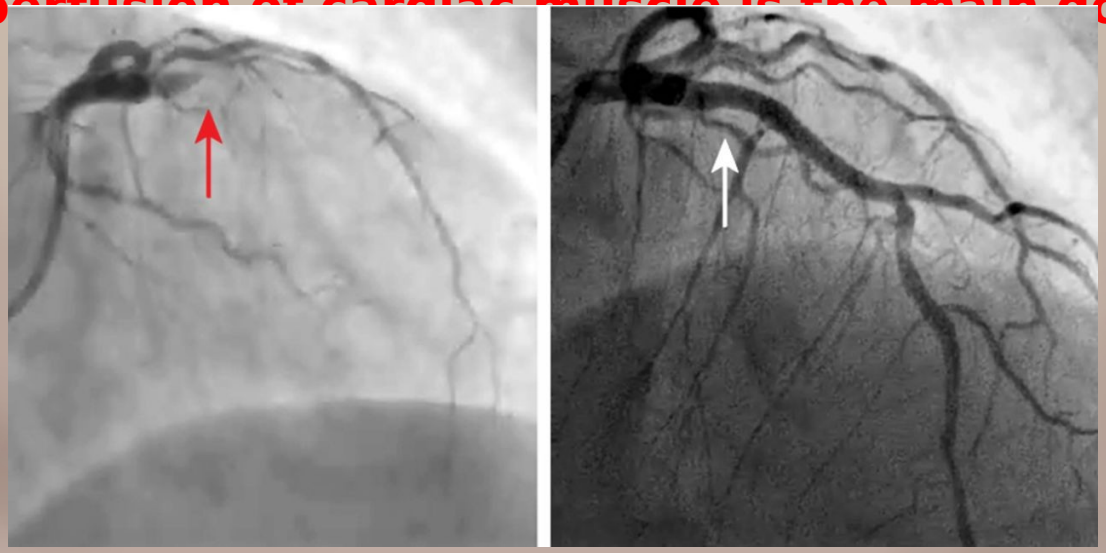
Continued Treatment of MI

- Percutaneous Coronary Intervention (PCI)
- Cardiac Bypass

  https://www.youtube.com/watch?time_continue=87&v=p5gHvSbBNXI (Thrombectomy aspiration catheter w/ stent)

  https://www.youtube.com/watch?v=0PRPeuJ0g0A (CABG)

****Reperfusion of cardiac muscle is the main goal!****



Cardiogenic Shock

- Inadequate tissue perfusion due to cardiac dysfunction

  O2 to Cardiac Muscle ↓ Cardiac Function ↓ Perfusion to Body ↓

- Most common cause: ?
- What else could cause cardiogenic shock?
- Treatment:
  - Reperfusion of cardiac muscle!
  - Find the cause and treat it!
  - ASA before PCI, clopidogrel after PCI
  - Symptom management

- **Life-threatening/high mortality rate ~50-75%**

Symptom Management in Cardiogenic Shock

- Dysrhythmias:
  - Antidysrhythmics
    - amiodarone
- Hypotension:
  - Positive inotropic and vasopressor agents
    - norepinephrine
    - dopamine
  - Avoid Beta Blockers
  - Cautious fluid administration
    - May try a 250 mL fluid challenge
- Fluid overload:
  - Diuretics
  - Vasodilators

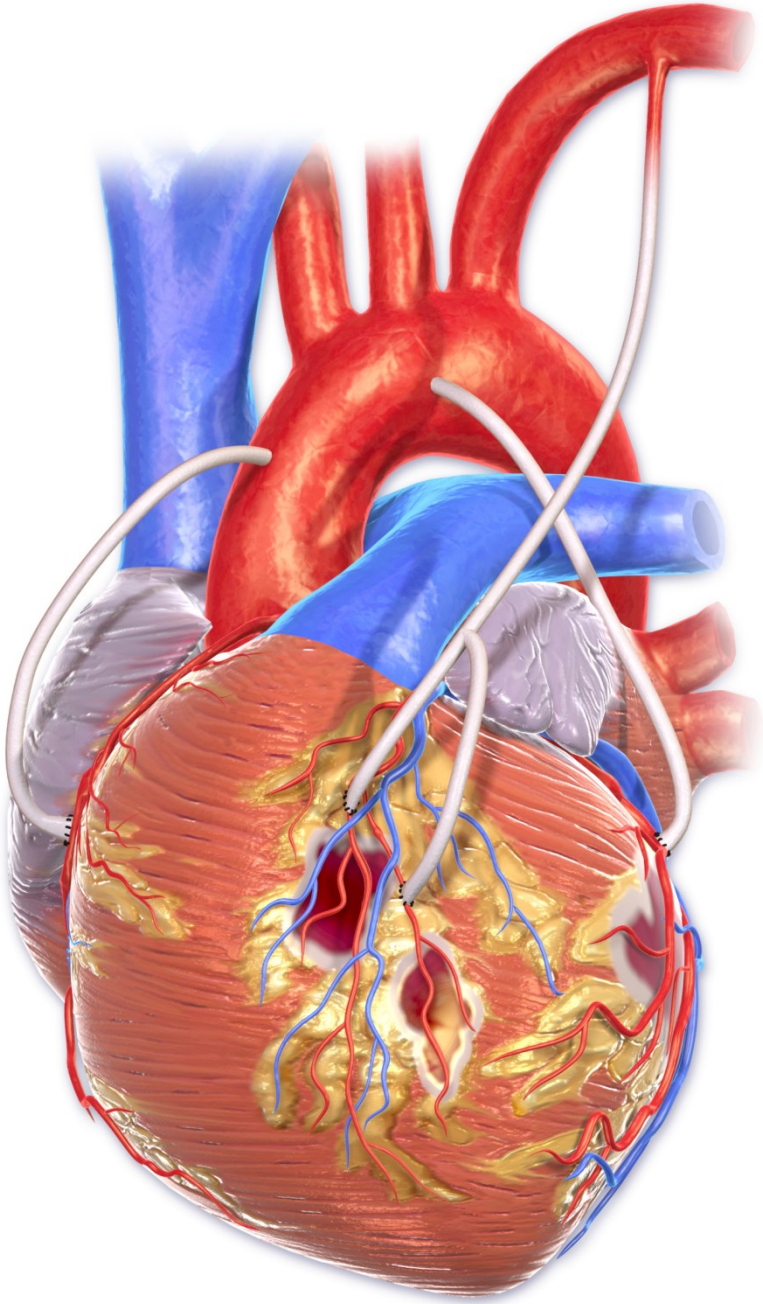
Recovery After an MI

- Several weeks
  - Scar tissue replaces damaged heart muscle
- Life style changes are necessary
  - New medications
  - Diet modification
  - Activity modification
  - Tobacco cessation
- Cardiac rehab is a good resource for these patients.

What if a blockage cannot be fixed with PCI?

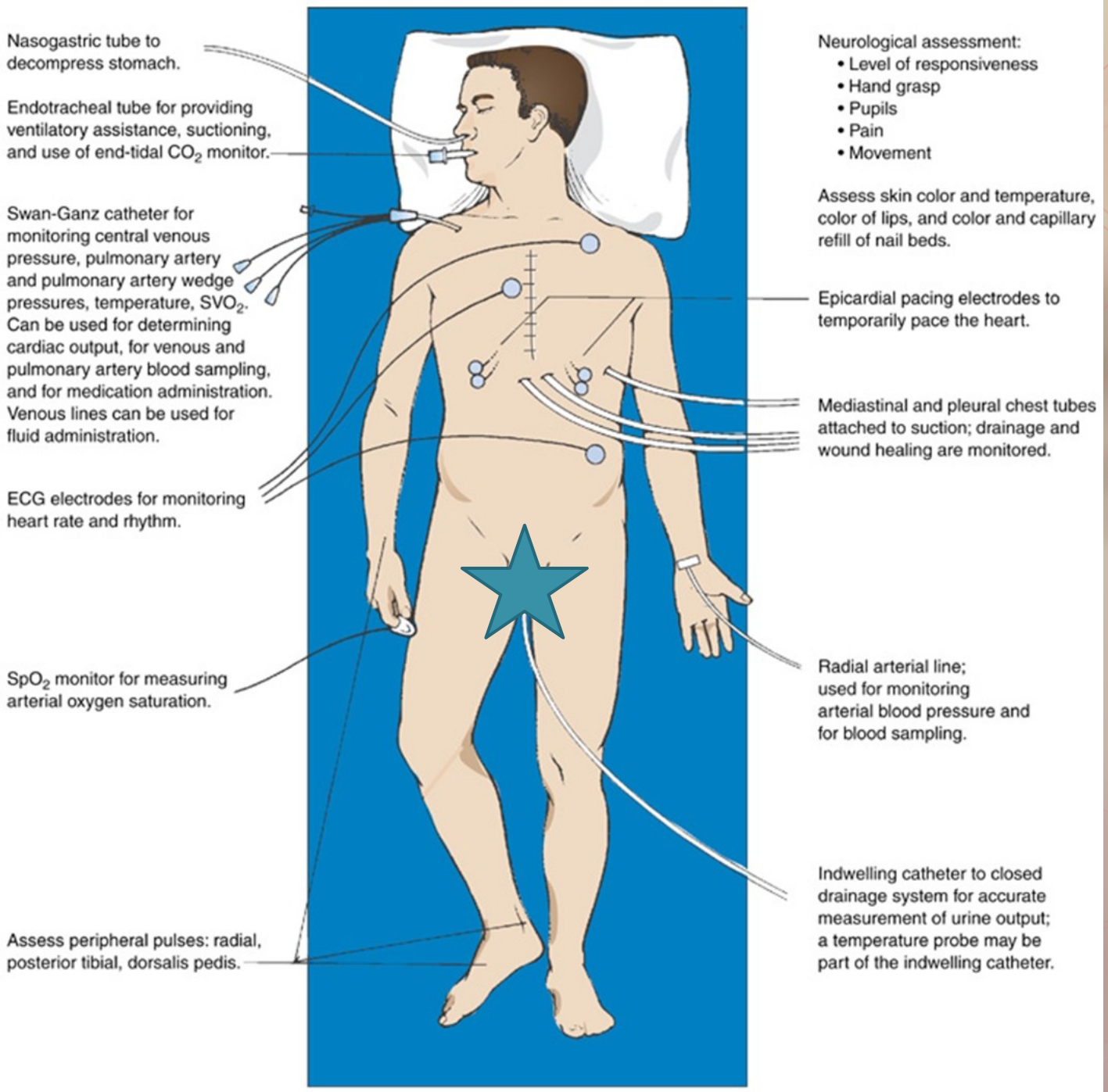
Cardiac Bypass

- The surgeon “bypasses” a blockage that cannot be opened with PCI.



Coronary Artery Bypass Graft (CABG)

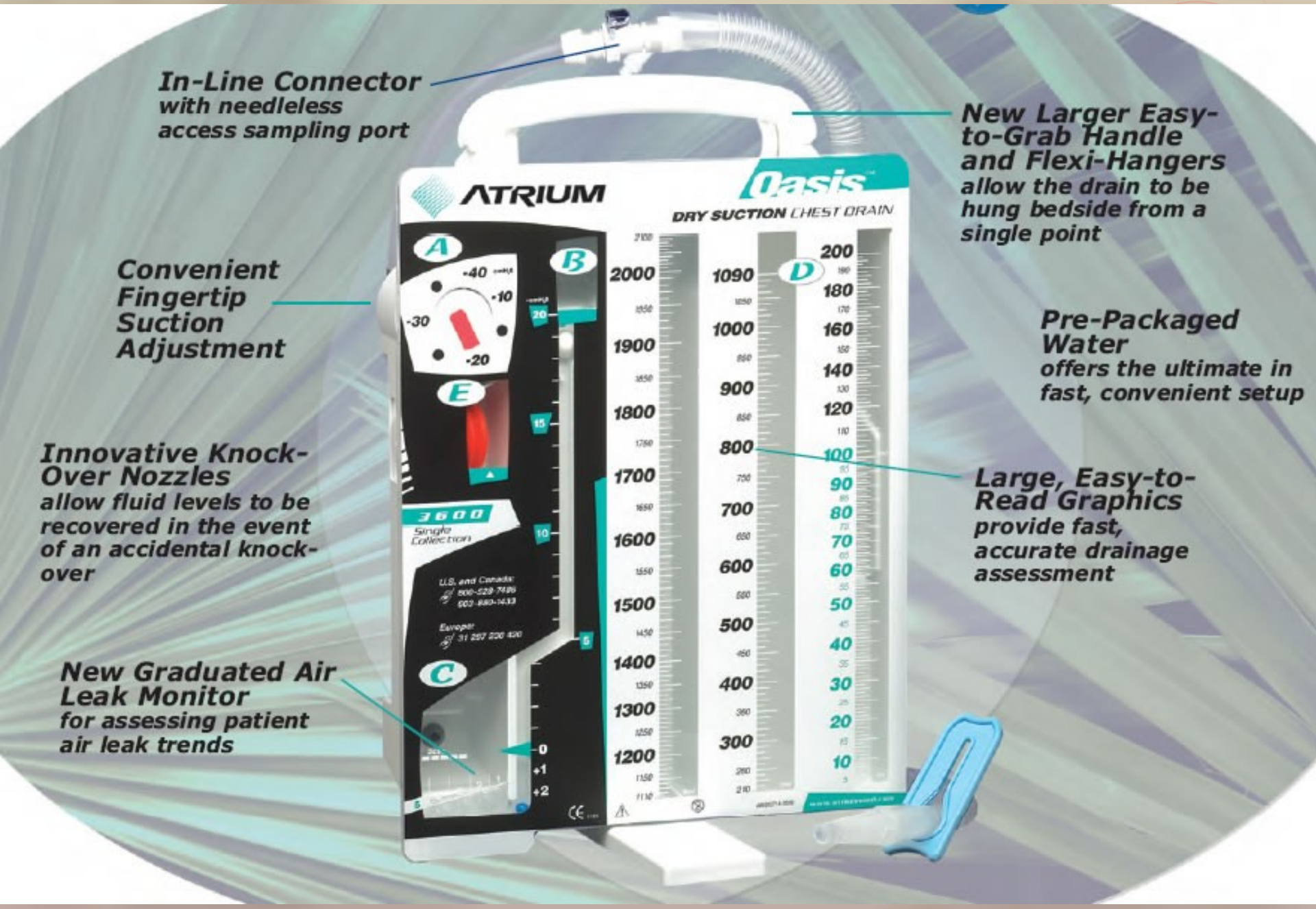
Quadruple Bypass



Chest Tubes

- Always present after bypass to drain excess blood
- Frank blood immediately post-op
- Serosanguinous >1 hours post-op
- Drainage should not be >100 mL/hr

- What do we assess?
- What do we monitor for?


In-Line Connector
with needleless
access sampling port
New Larger Easy-
to-Grab Handle
and Flexi-Hangers
allow the drain to be
hung bedside from a
single point
Convenient
Fingertip
Suction
Adjustment
Pre-Packaged
Water
offers the ultimate in
fast, convenient setup
Innovative Knock-
Over Nozzles
allow fluid levels to be
recovered in the event
of an accidental knock-
over
Large, Easy-to-
Read Graphics
provide fast,
accurate drainage
assessment
New Graduated Air
Leak Monitor
for assessing patient
air leak trends
ATRIUM
Oasis
DRY SUCTION CHEST DRAIN
A
B
C
D
E
3600
Single Collection
U.S. and Canada:
Europe:
2000
1900
1800
1700
1600
1500
1400
1300
1200
1090
1000
900
800
700
600
500
400
300
200
180
160
140
120
100
90
80
70
60
50
40
30
20
10
0
+1
+2

What do we do….

- If chest tube disconnects from setup or setup breaks?

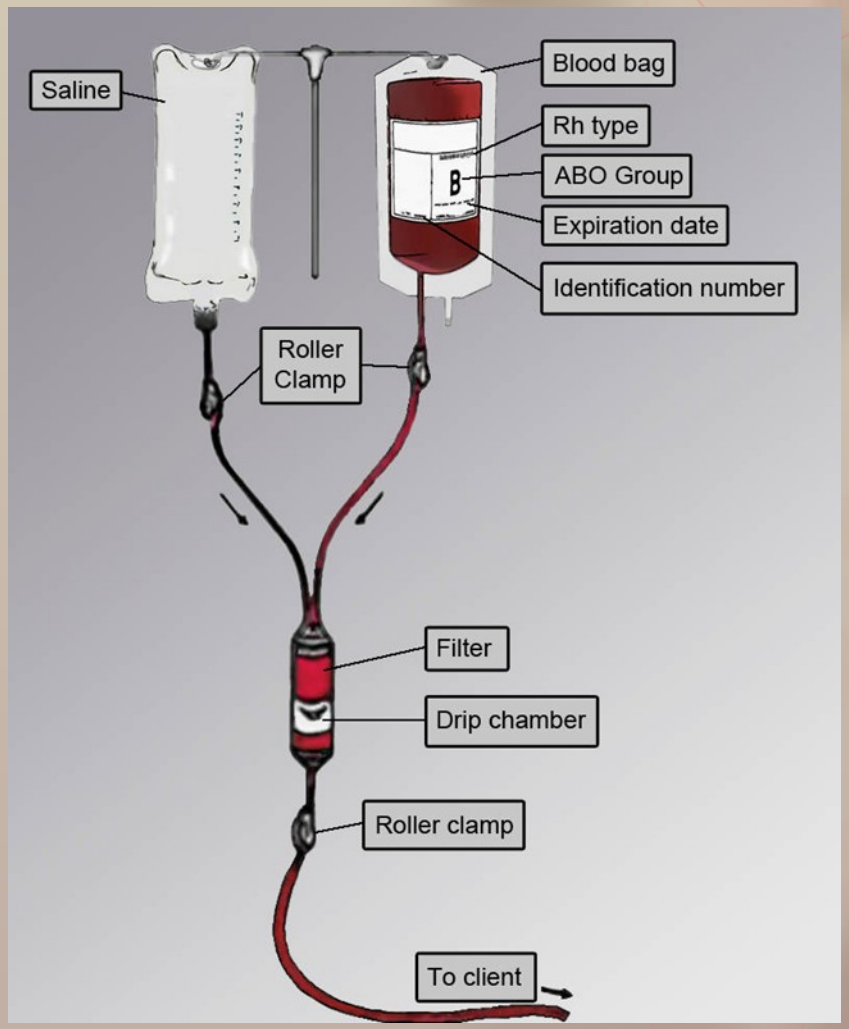
- If chest tube is pulled out?

Blood Transfusions

- Blood often needed after major surgery
- Considered a “transplant” and should be monitored closely
- Types of transfusions:
  - Red Blood Cells (RBC’s)
  - White Blood Cells (WBC’s)
  - Cryoprecipitate
  - Fresh Frozen Plasma (FFP)
  - Platelets
  - Albumin

RBC Transfusion

- Maintain Hgb at or above 7
- One unit = 300-500 mL.
- Start w/in 30 minutes
- Infuse within 4 hours
- Two nurse verification
- Consent is necessary
- Special blood tubing
- Normal Saline
- Transfusion reactions



Transfusion Reaction

- Vital signs within 30 minutes before starting
- Remain with the patient for the first 15 minutes
- Post-transfusion vital signs
- Reaction suspected = STOP transfusion
- Infuse normal saline TKO
- Physician determines whether to stop or treat and continue
- Blood work and urine sample
- Blood, tubing and lab work are sent to blood bank

***Any change seen in your patient can be an indication of a reaction!!**

Blood Transfusion Reaction

A Allergic

MILD
Facial Flushing
Hives/ Rash
SEVERE
Increased Anxiety
Wheezing
Decreased BP

F Febrile

Headache
Tachycardia
Tachypnea
Fever/Chills
Anxiety

H Hemolytic

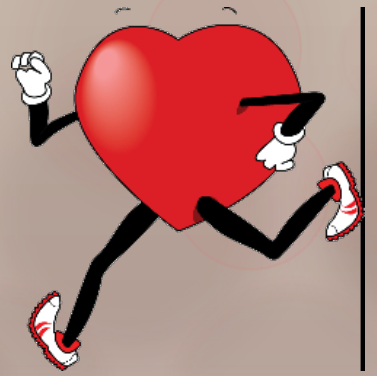
Decreased BP
Increased RR
Hemoglobulinuria
Chest Pain

Apprehension
Low Back Pain
Fever
Tachycardia
Chills

Cardiac Rehabilitation

- Restoration of a person to an optimal state of function:

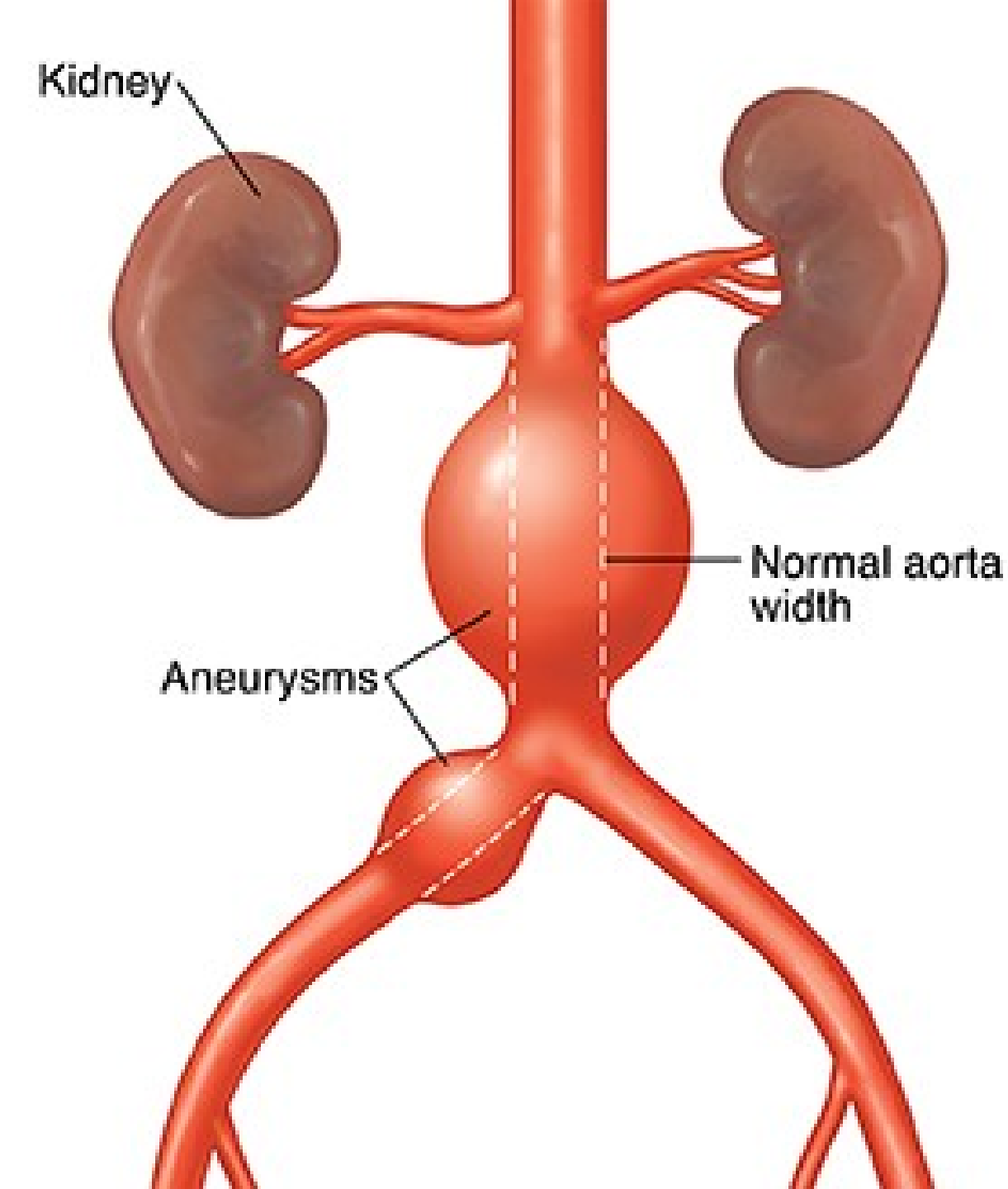
- Physiologic = weight reduction, smoking cessation, physical exercise, healthy eating, rest & comfort
- Psychologic = dealing with fear, anger, depression
- Mental = management of stress, relaxation techniques
- Spiritual = support to deal with guilt or feeling of hopelessness
- Economic = dealing with loss of income or restrictions on work
- Vocational = assistance with new skills



Let’s Talk About Aneurysms

What is an aneurysm?

- When an artery wall weakens causing it to widen abnormally or “balloon out”



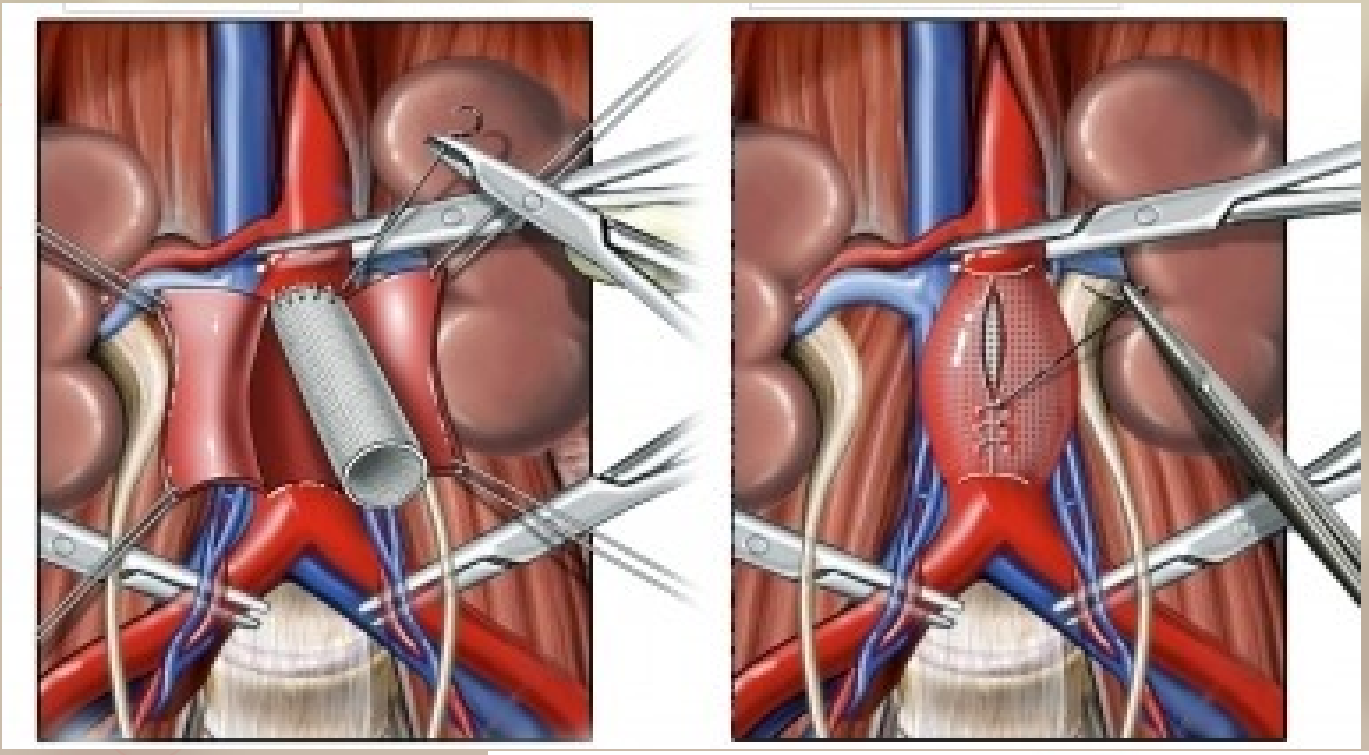
Signs & Symptoms of a AAA

- Nonruptured:
  - Abdominal, back or flank pain
  - Pulsating abdomen
  - Pain or discoloration in the feet
- Ruptured:
  - Severe pain
  - Hypotension
  - Pulsatile abdominal mass
  - MEDICAL EMERGENCY!!

- What are your priorities for these patients?

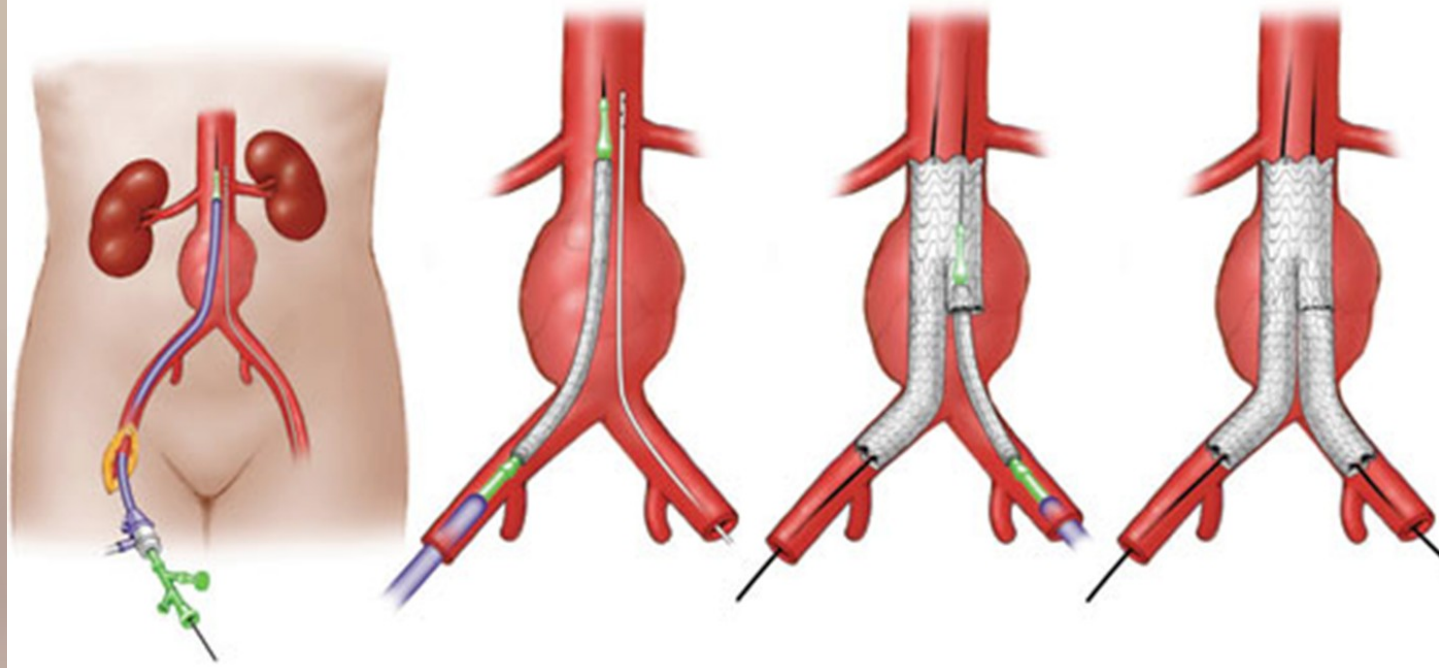
Management of a AAA

- Open Repair
- Endovascular Aneurysm Repair (EVAR)
  - Replace diseased part of aorta
- Complications post-op:
  - MI
  - Bleeding
  - Renal Failure
  - Bowel/Ureteral injury
  - GI complications
  - Leg ischemia
  - Graft infection (mortality of 90% with this)



- Open Repair

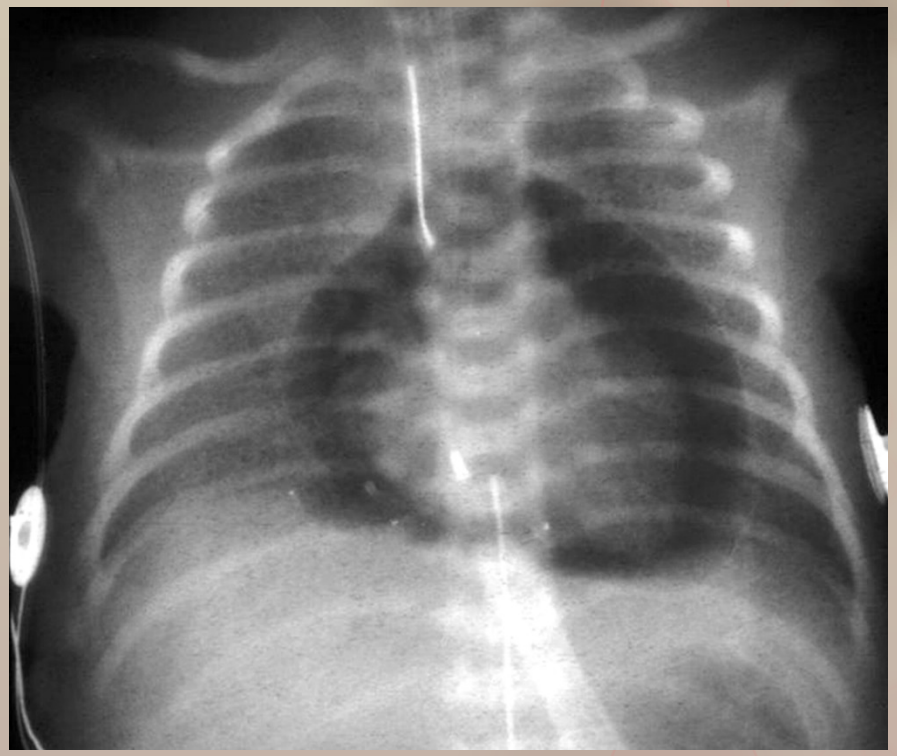
- Endovascular Repair



Cardiac Tamponade

- A pericardial effusion extends the sac beyond it’s limits
- The heart is unable to function properly

- What would we expect to see in a patient with cardiac tamponade?



Treatment for Cardiac Tamponade

- If having hemodynamic changes = Pericardiocentesis:
  - Percutaneous
  - Surgical
- If no hemodynamic changes:
  - Conservative management with continuous hemodynamic assessment