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Sokan Salamat Medical Group  
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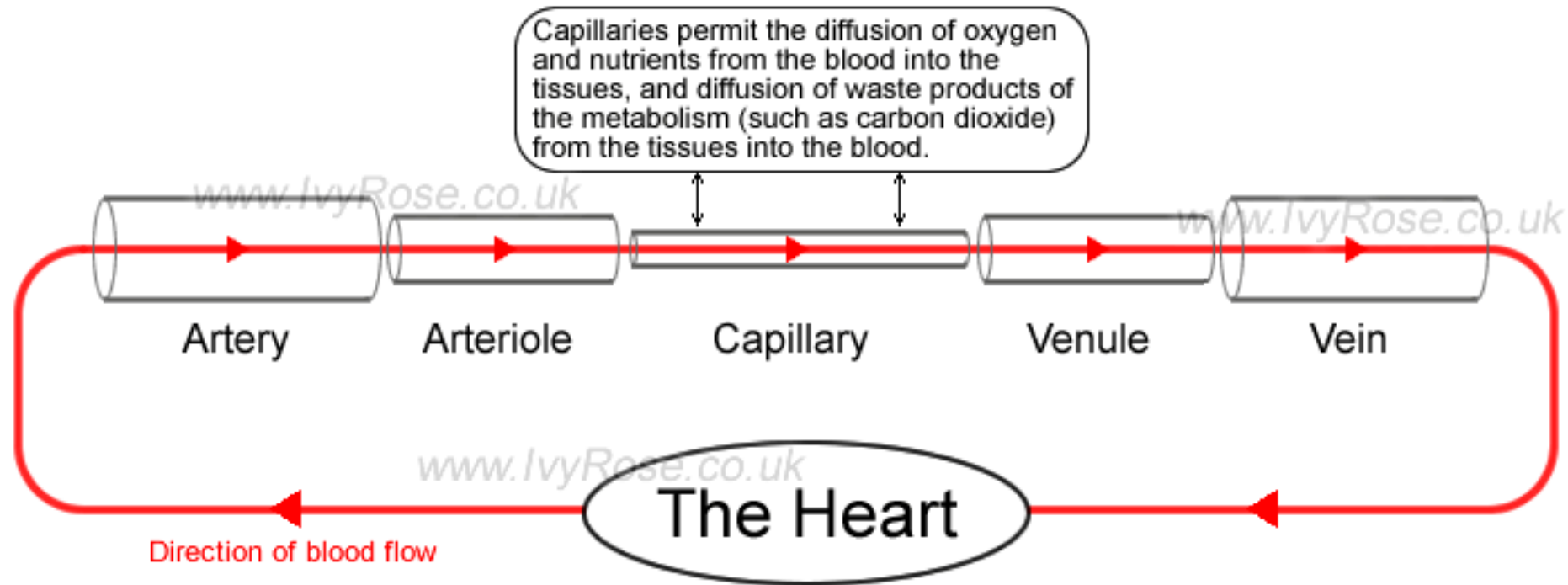


# Cardiovascular Procedures

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# Blood Circulation

Cardiac System function is to maintain a continuous flow of blood through the blood vessels of the body.



# Double blood circulation

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**The Pulmonary Circulation** Here blood is pumped from the heart to the lungs through the pulmonary artery. Blood is oxygenated in the lungs and it then returns to the heart in the pulmonary veins.

**The Systemic Circulation** Here the oxygenated blood is pumped to all major body systems through the aorta. Blood returns to the heart from body systems through the vena cava (great veins).



# Cardiac anatomy

Thoracic cavity (mediastinum)

4 chambers

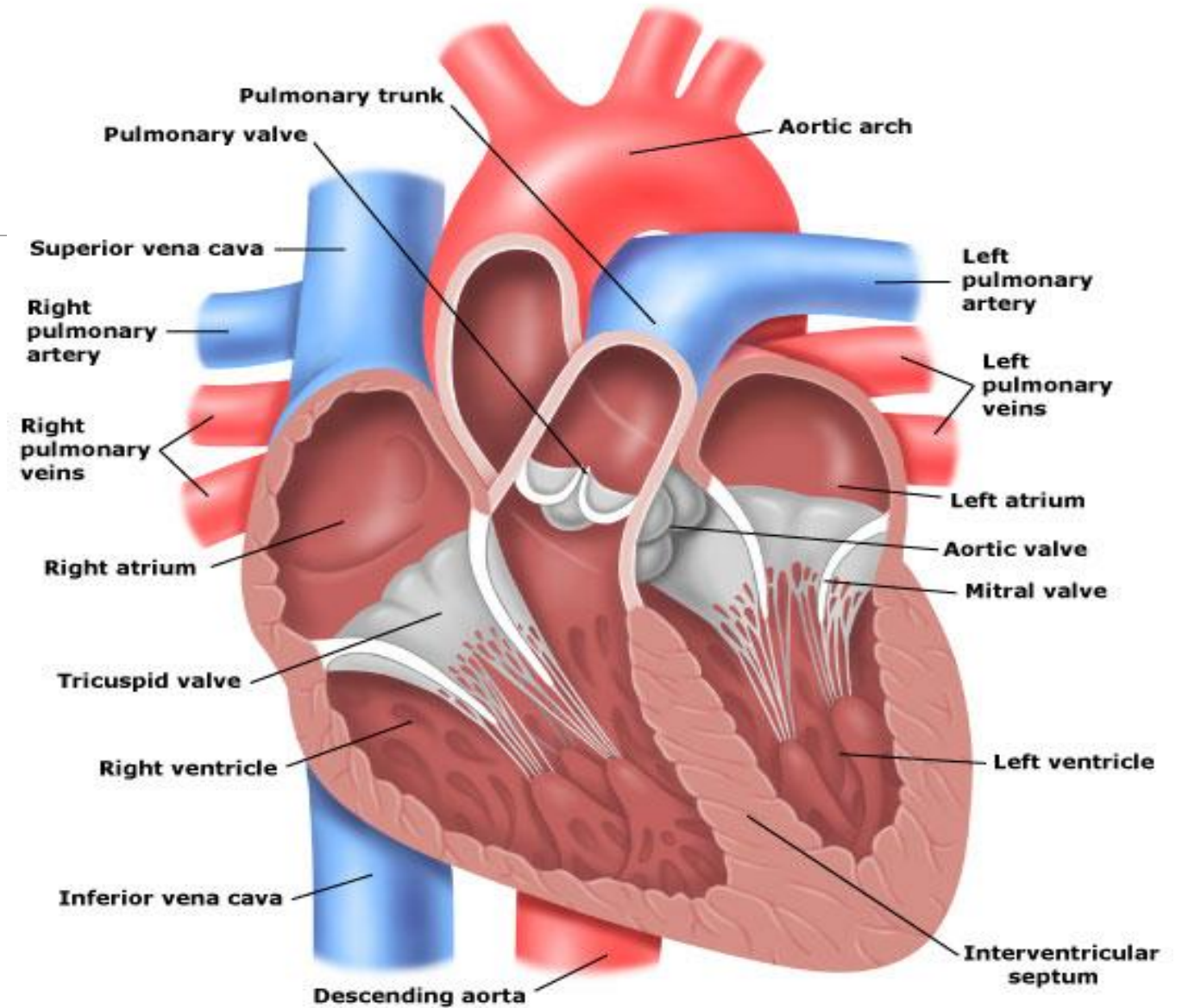
2 valves

Aorta

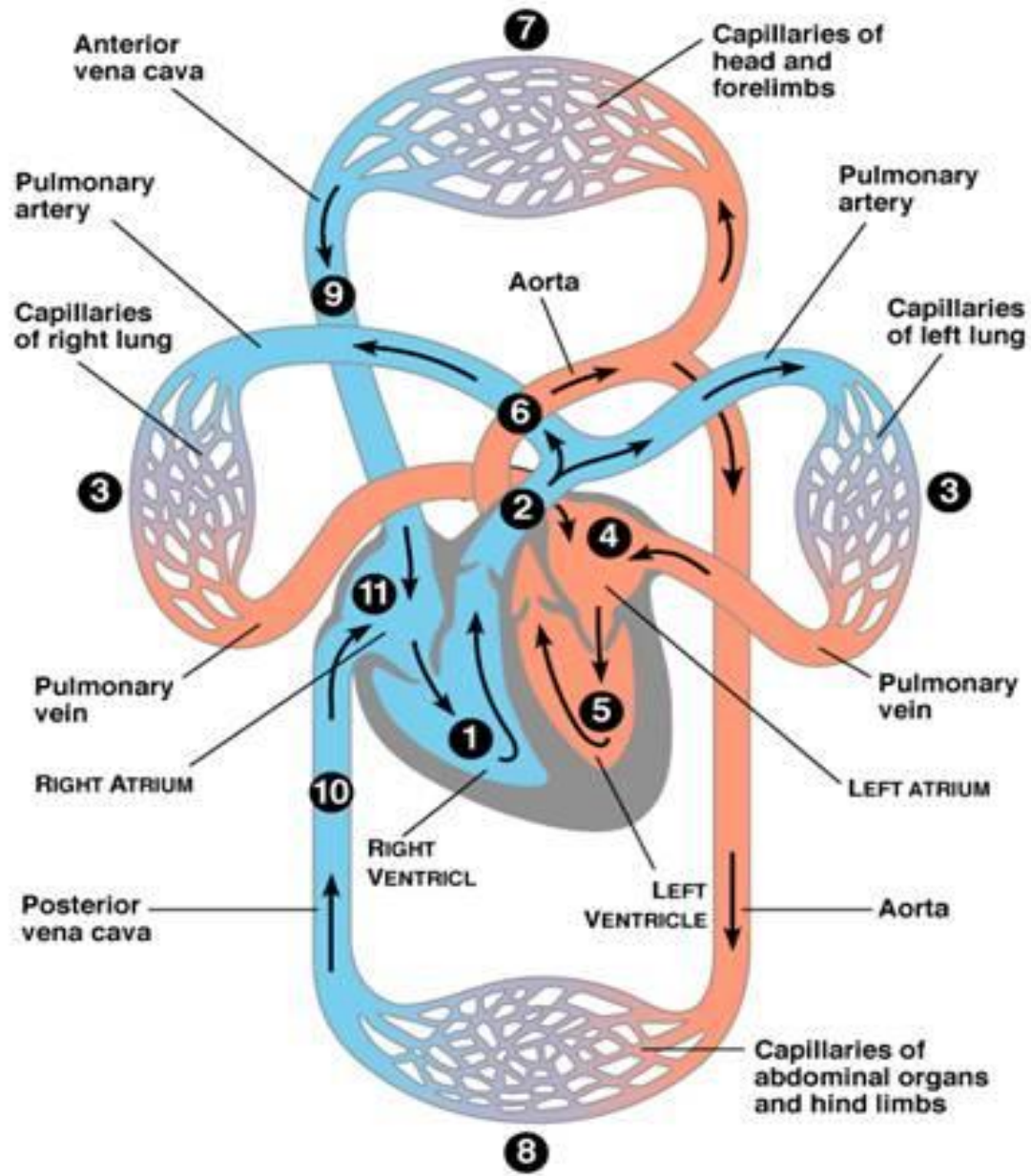
Superior and inferior vena cava

Septum

5 liters of blood every minute



# Blood circulatory system



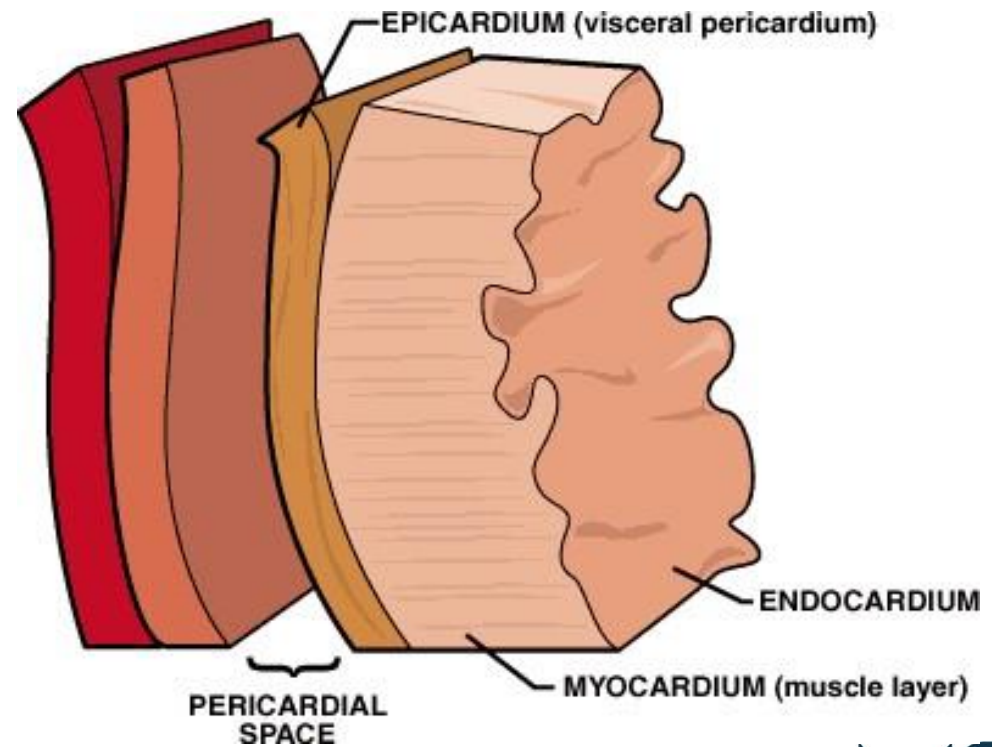
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# Heart layers

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- Endocardium
- Myocardium
- Epicardium



# CV procedures

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CABG

Valve replacement

Shunt

Ventricular Septal defect

Aortic stenosis

Carotid endarterectomy

AAA

Vascular repairs

Heart transplantation

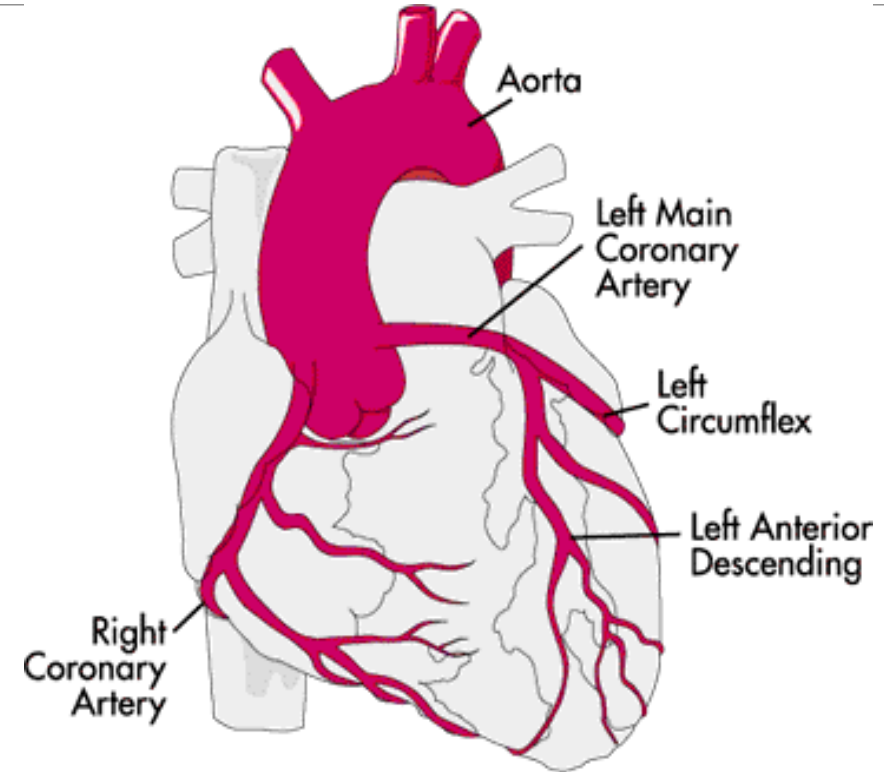




# Coronary Artery Bypass Graft CABG

## Definition

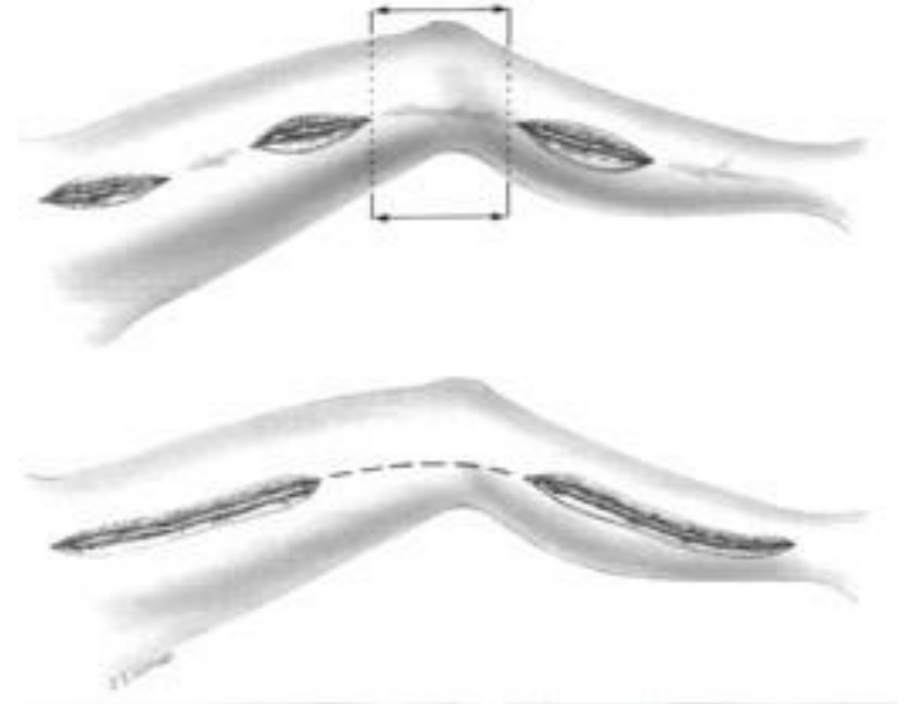
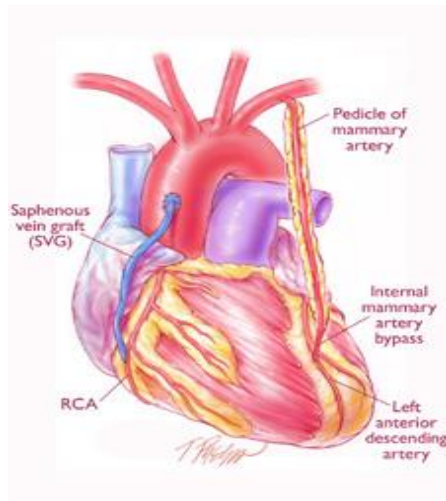
Coronary artery bypass graft surgery is a surgical procedure in which one or more blocked coronary arteries are bypassed by a blood vessel graft to restore normal blood flow to the heart. These grafts usually come from the patient's own arteries and veins located in the leg, arm, or chest.



# Procedure:

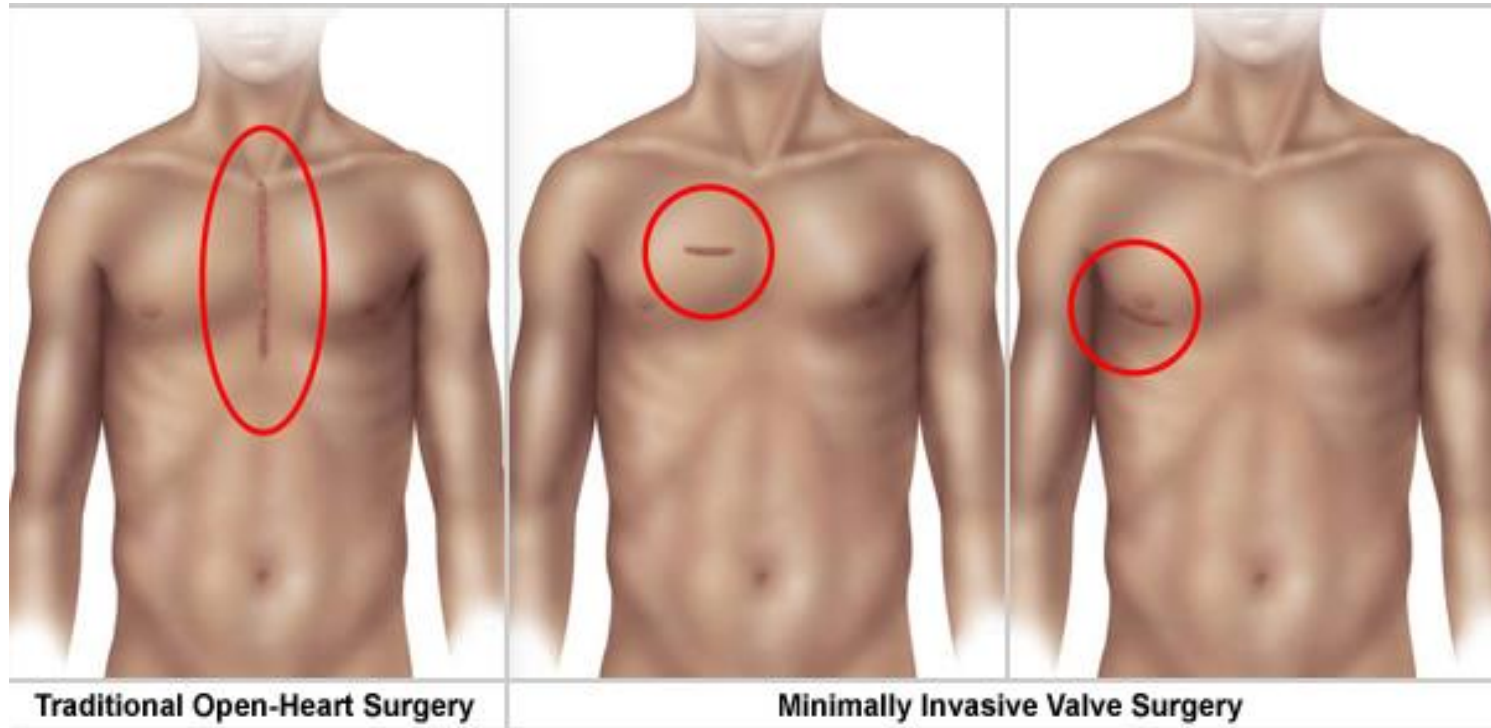
## Vein harvesting:

- Saphenous vein
- Radial vein
- IMA (best long term result)



# Access to the heart

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# Sternal incision

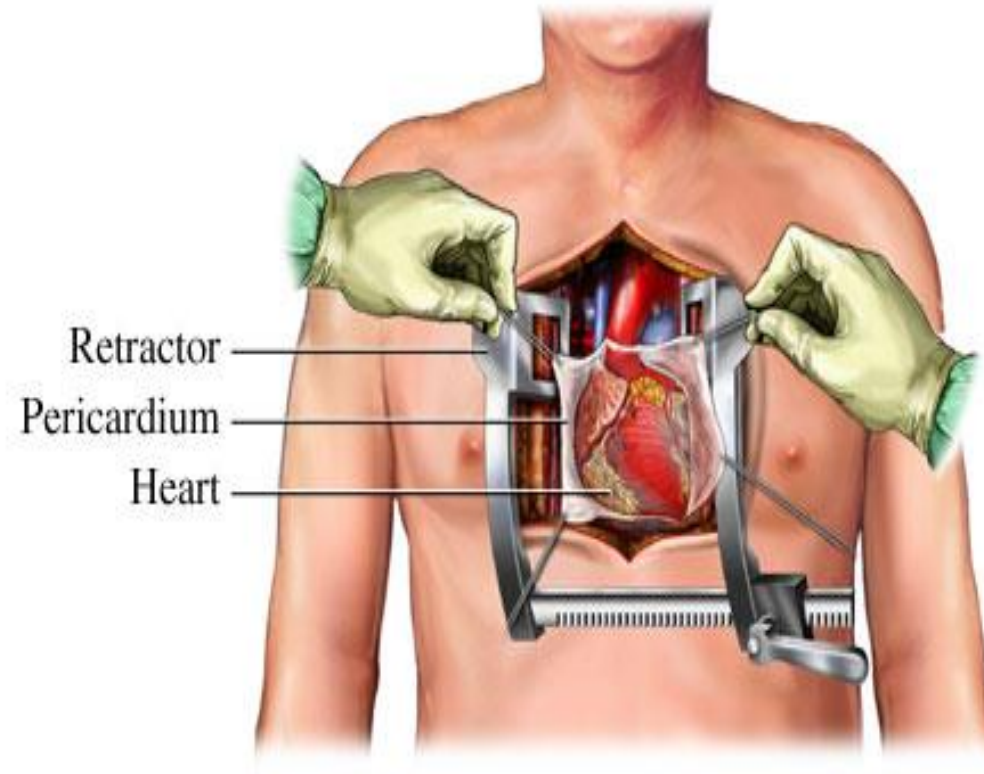
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Sawing

Oozing (Bonewax)

Retracting

Incision on pericardium



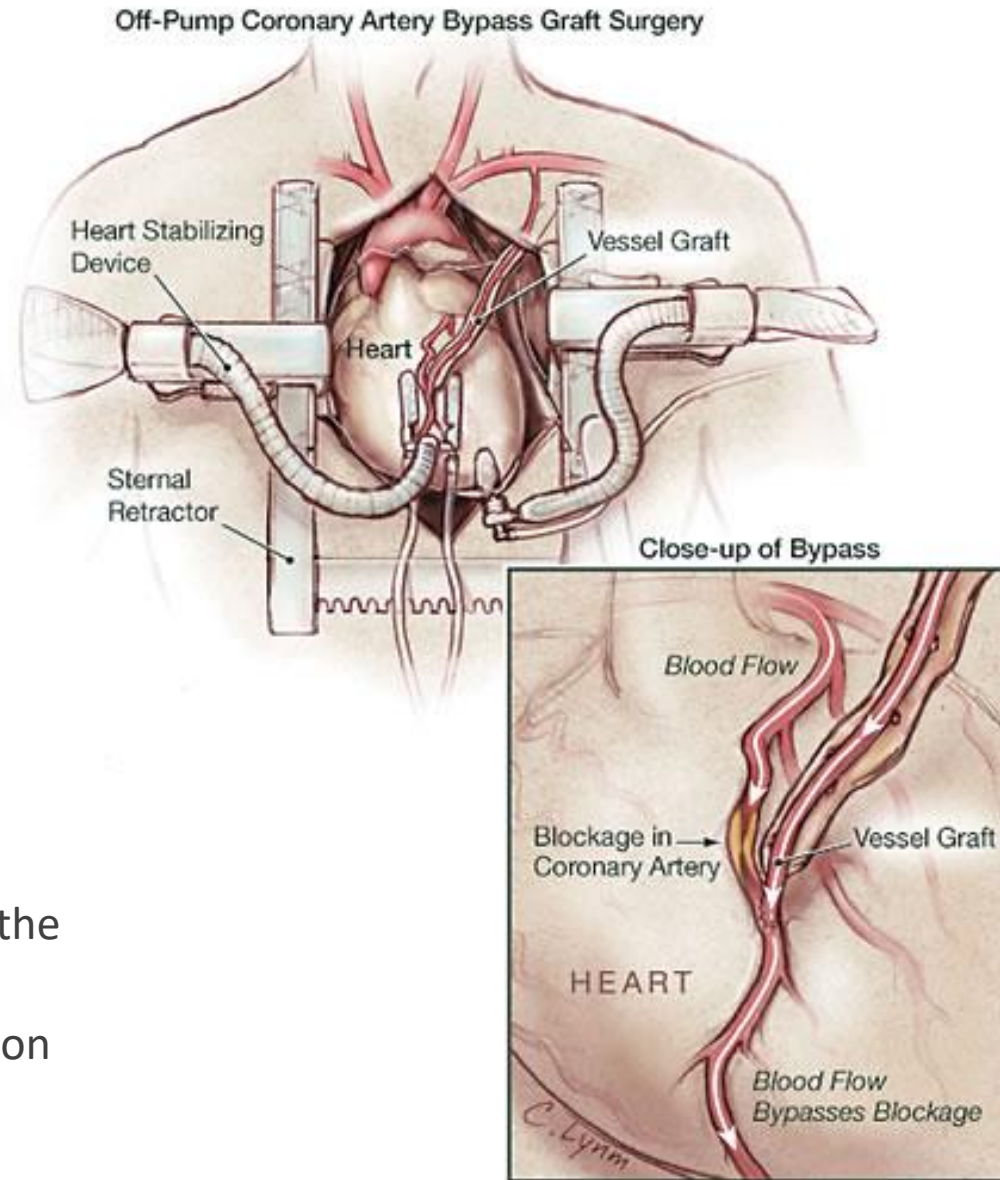
# Pump:

## Cardiopulmonary machine

- Canulation
- Aortic clamps

## Off-pump (beating heart)

- Equipment to stabilize portions of the heart
- Quicker recovery less risk of infection



# Anastomosis:

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Preparing the graft

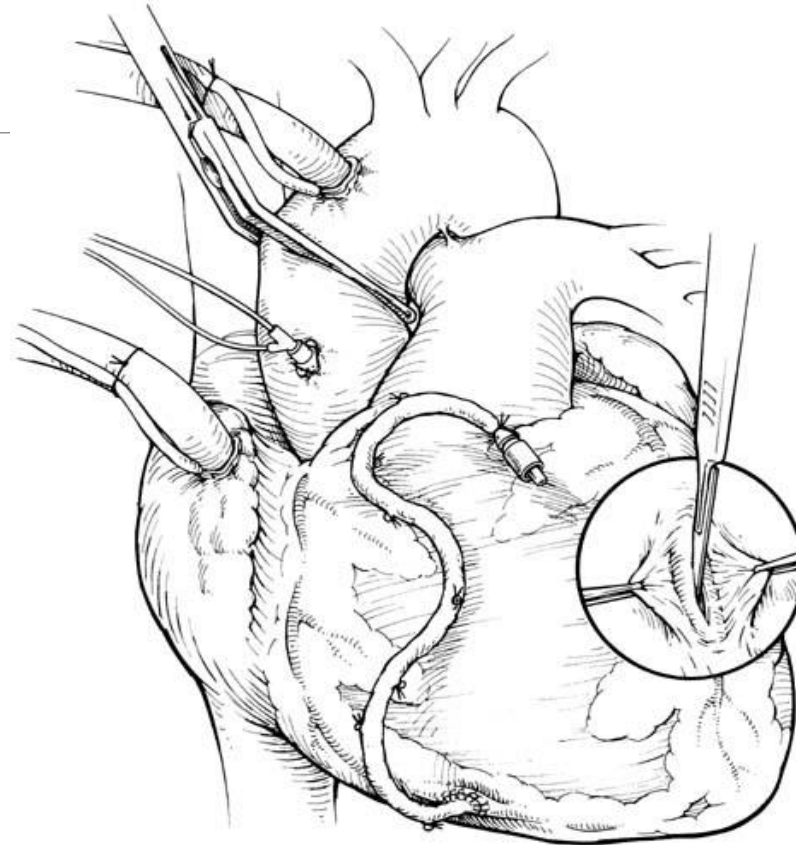
A small opening is made just below the blockage

Both end Anastomosis for Saphenous vein

Distal Anastomosis for IMA

On average, three or four coronary arteries are bypassed during surgery

Leakage and oozing



# Ending

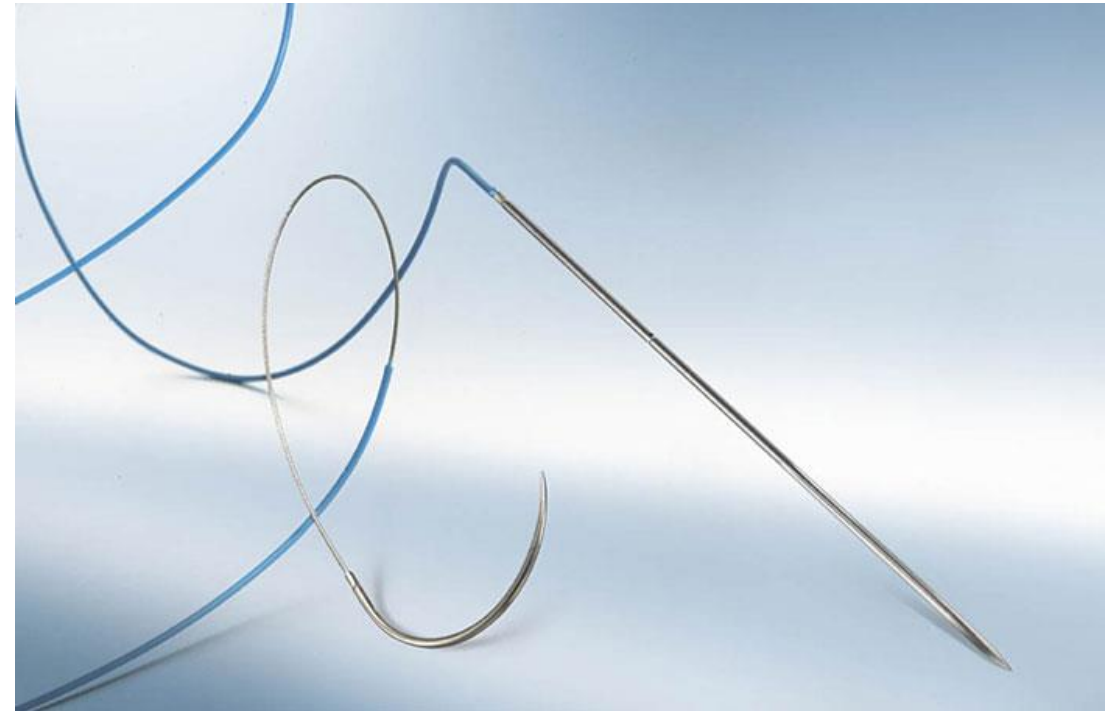
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Increasing Blood temperature

Turning off the heart –lung machine

Implanting **Pace wire**

Implanting Drain



# Sternum closure:

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Pericardium (redo surgery is probable): CARDIOPELE4/0

Sternum:

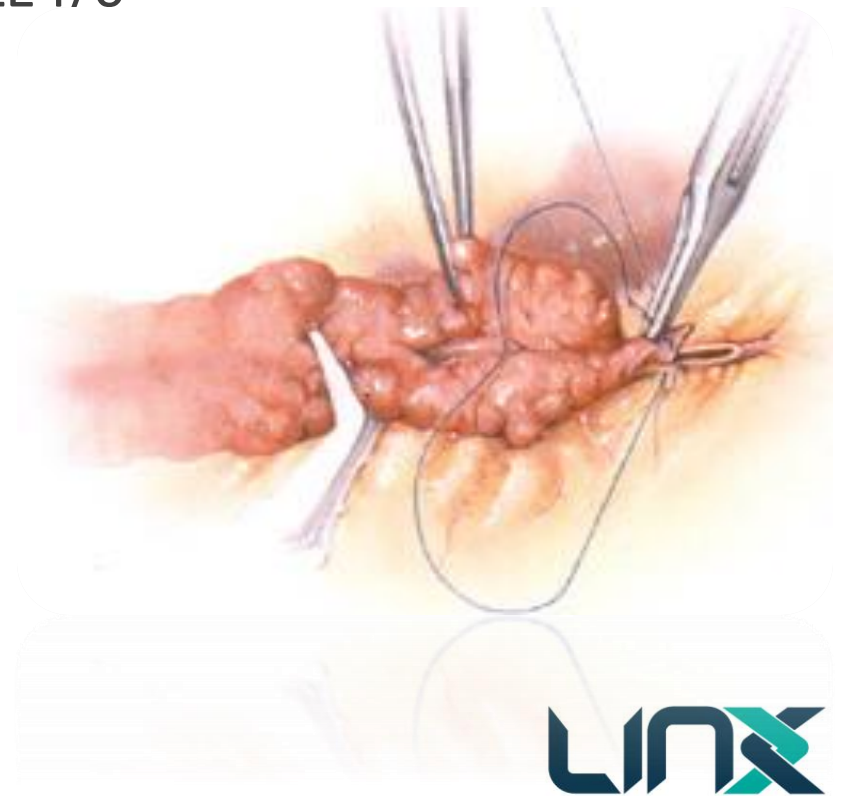
Steel wire gauges 5(pediatric),7,8,10

Subcutaneous: MONOPRONE, PDO, VYPRONE

Skin : TRUSEAL

Bonewax : Sternum oozing

Surgicel : oozing

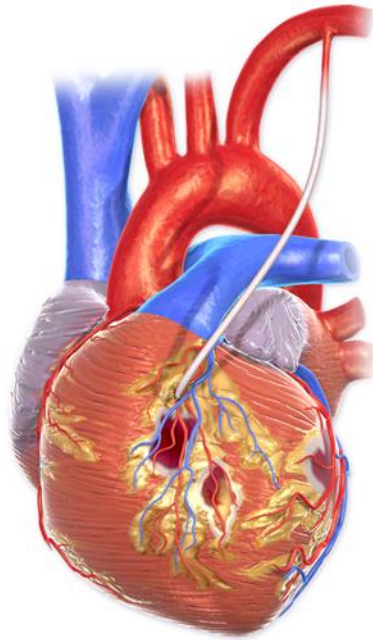




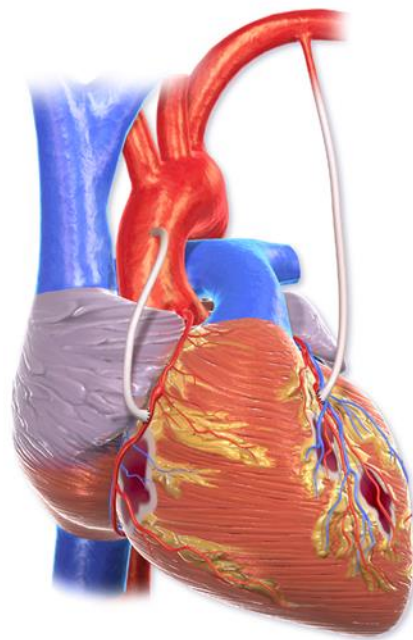
# “Bypassed” heart

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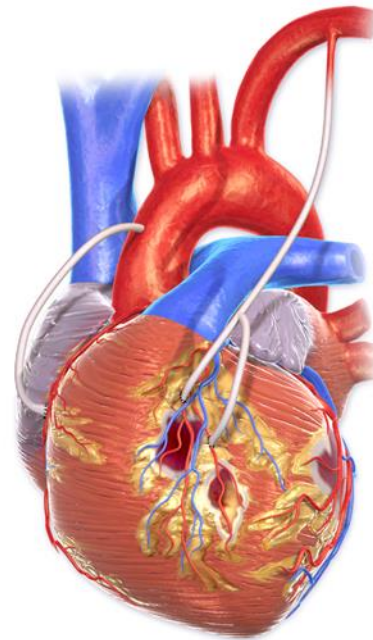
*Single*



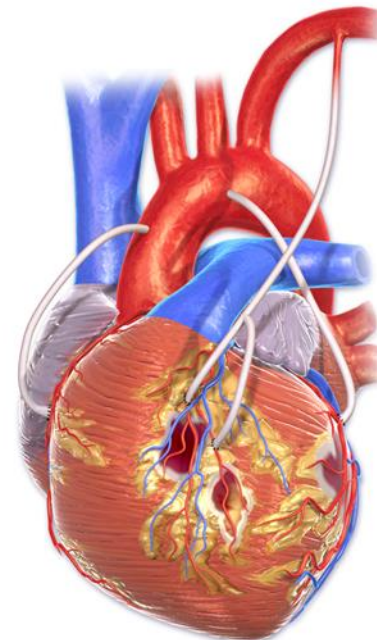
*Double*



*Triple*



*Quadruple*



**Coronary Artery Bypass Graft (CABG)**



# CABG Sutures

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Canula fixation: Silk tie, X-BOND

Aorta : Cardiopilene 5/0

Proximal Coronary Anastomoses : Cardiopilene 5/0

**Distal Anastomosis: Cardiopilene 6/0 ,7/0 (Saphenous vein) Cardiopilene 8/0**  
**Internal mammary**

Pericardium: (in the case of redo procedures) Cardiopilene 4/0

Nylon tape, Ligaclips: for ligation

Leg subcutaneous : Monoprone, PDO, Viprone

Leg skin: Monoprone,Rapid Viprone



# CABG Sutures

Product	Description	Layer	QTY
Cardiopilene 8/0	9.3 or 8mm	Internal mammary	1
Cardiopilene 7/0	9.3,8mm Visiblack,cc,Round	Coronary Anastomosis	3
Cardiopilene 5/0	13mm round	Aorta Anastomosis	3
Surgicel		Oozing	2
Steel wire	7 or 5 or 1	sternum	1
Pacing wire	Wire 1	Pacing	2
X-Bond		lifting	>5
Silk		Ligation	>7
Nylon	tape	Lifting	>5
PDO/Viprone	2/0 ,0	Subcutaneous	2
Monoprone/Viprone	3/0,2/0	Skin	2

# Heart valves

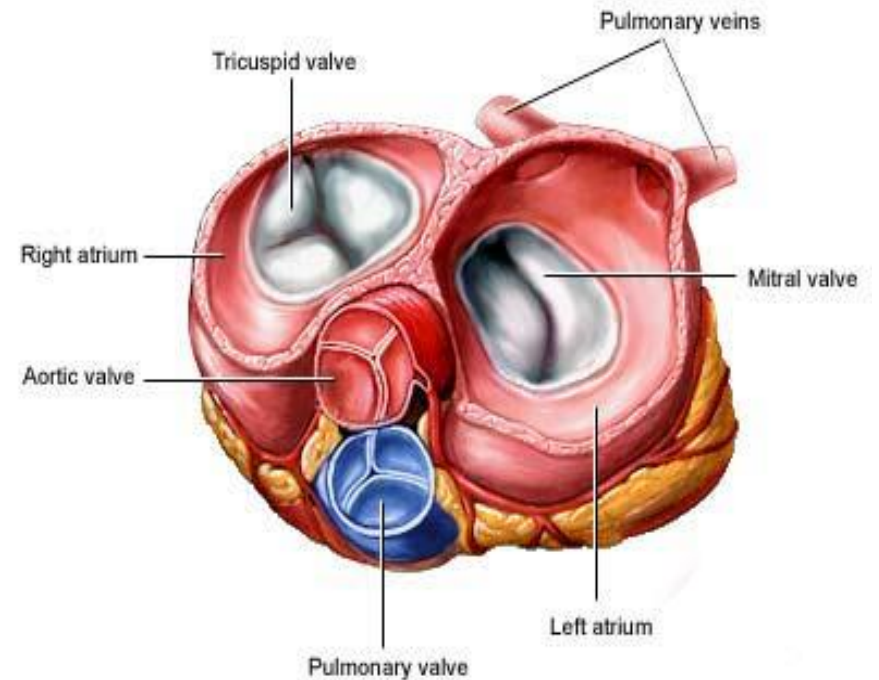
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There are four valves in the heart:

- 1) the aortic valve (Small round valve)
- 2) the Mitral valve (bicuspid)
- 3) the tricuspid valve (larger valve)
- 4) the pulmonary valve.

The valves are designed to control the direction of blood flow through the heart.

The opening and closing of the heart valves produce the heart-beat sounds



# Valve disorders

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## Stenosis

Narrowing of the heart valve

## Regurgitation

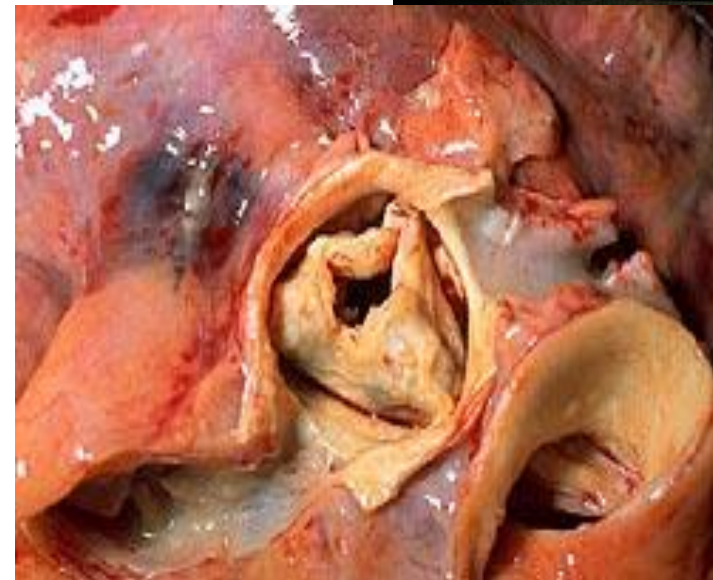
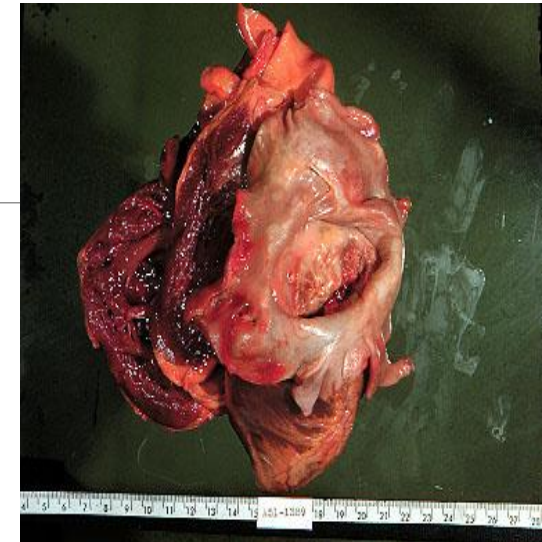
Leaking of the heart valve

## Valve infections

birth defects

Rheumatic fever

Endocarditis

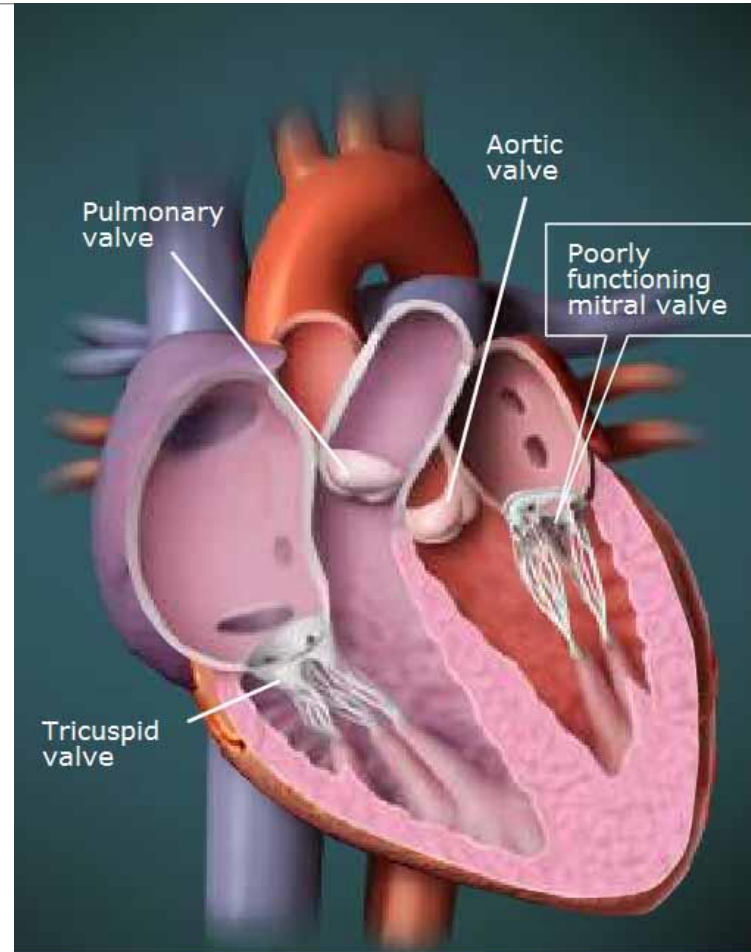


# Valve surgeries

Valve replacement

Annuloplasty

Valve repair



# Sternal incision

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Sawing

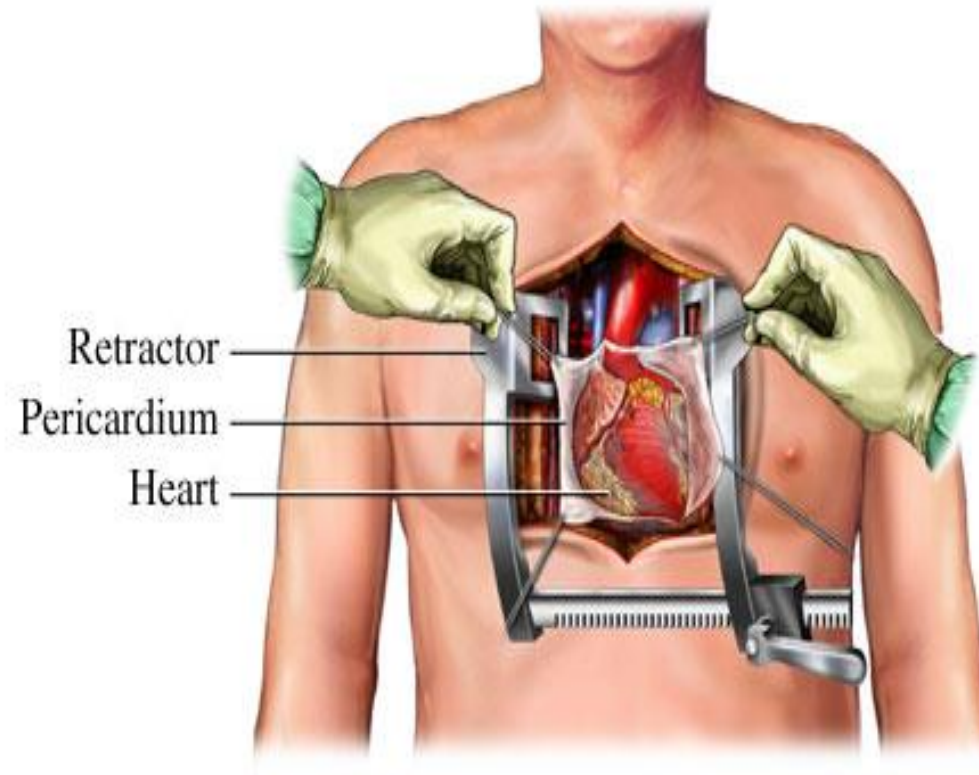
Oozing (Bonewax)

Retracting

Incision on pericardium

Canulation

Clamping

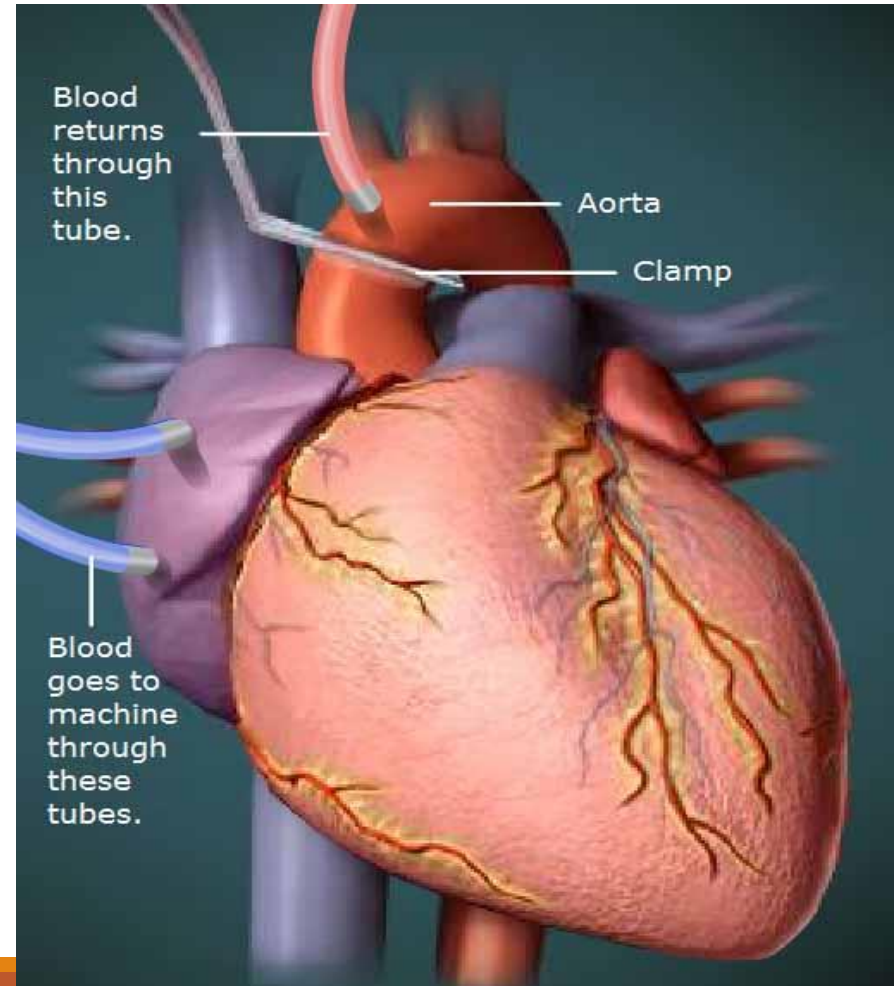


# Heart canulation and clamping

A long arterial cannula introduced through the ascending aorta

A conventional two-stage cannula is placed into the right atrium

Clamping Aorta

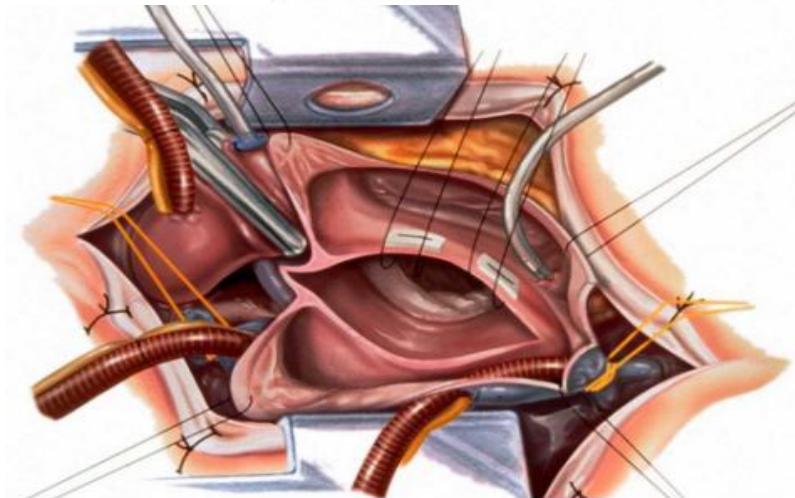
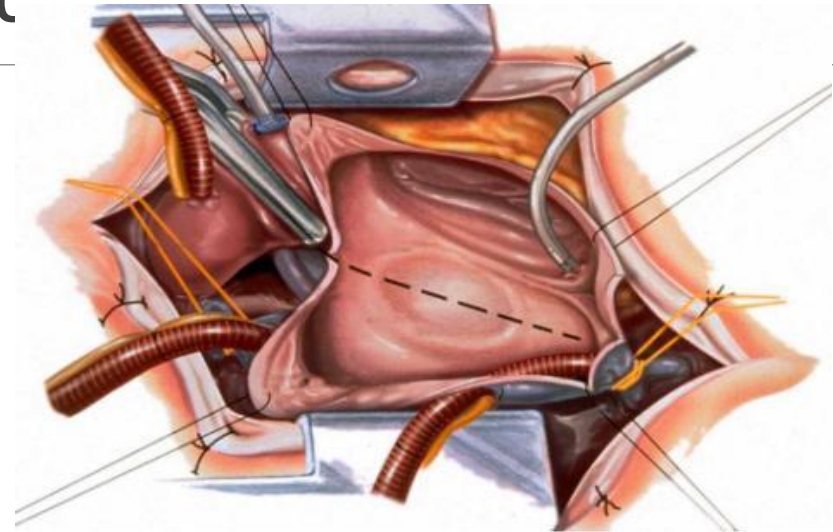




# Mitral valve replacement

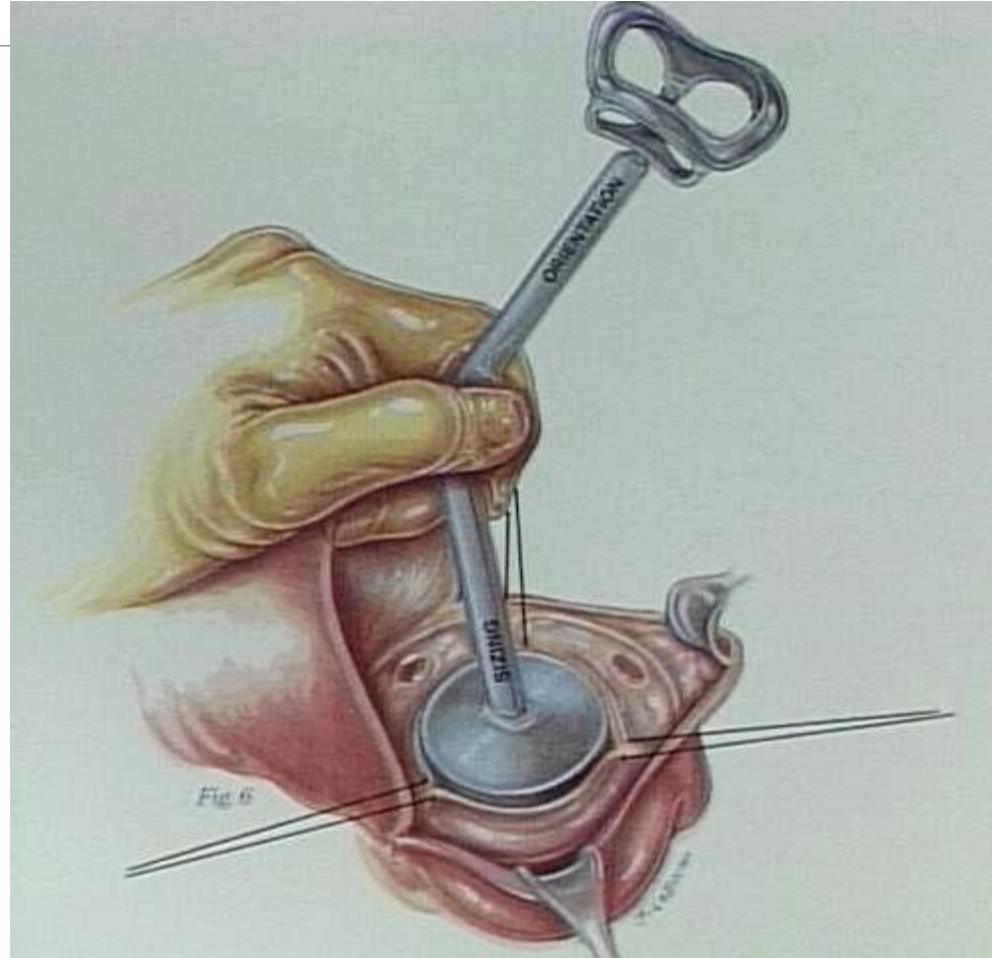
Approaching to the valve by incision into the dome of the left atrium

Sutures are placed through the superior portion of the septum and retract towards the patient's left



# Valve sizing

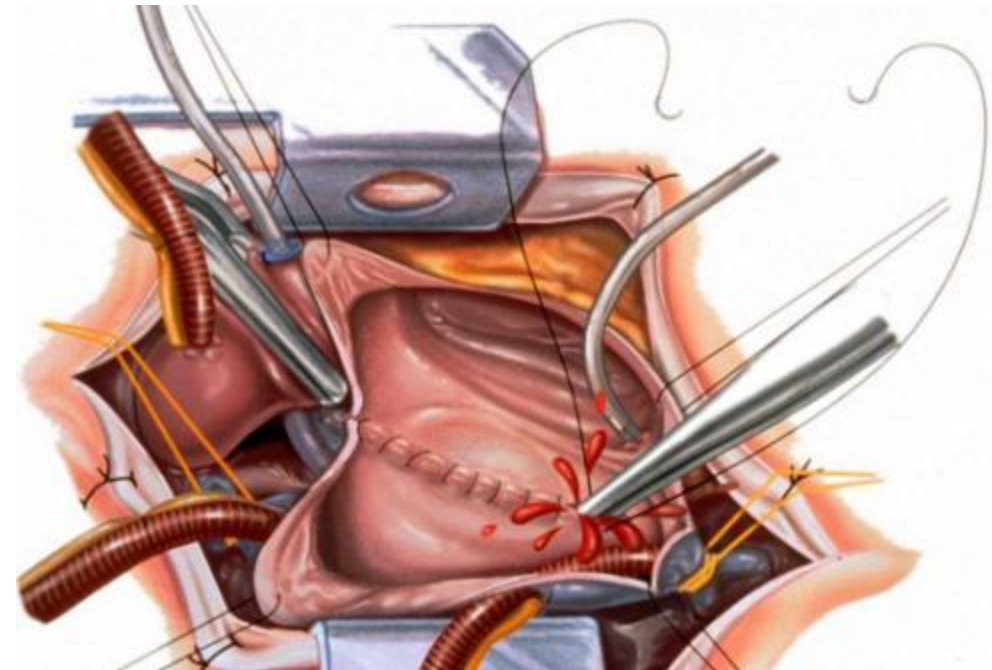
Sizes usually  
between 24 to 27



# Suturing heart muscle

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The incision in the left atrium is closed with a continuous 4/0 or 3/0 Cardiopilene suture.



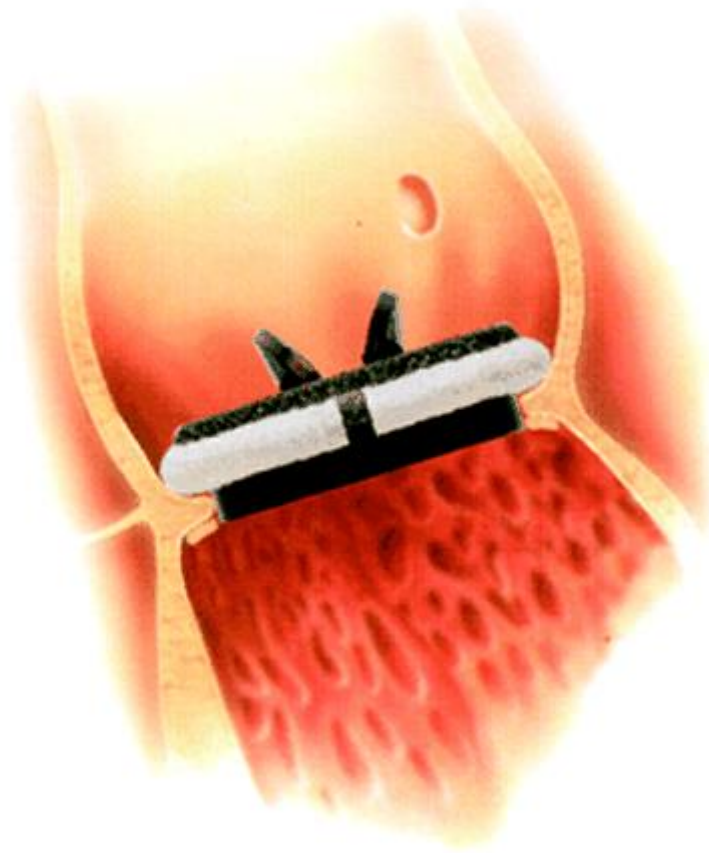
# Valve Suturing technique

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Interrupted X-Bond

Interrupted Cardiopilene

Continues Cardiopilene



# Intrrupted with X-BOND

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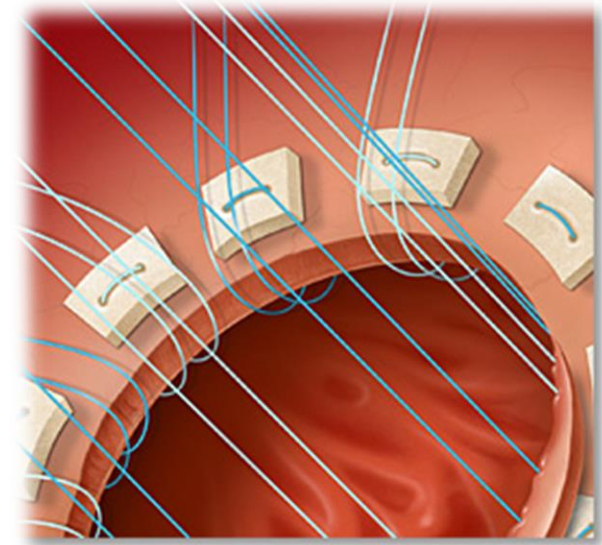
For Mitral valve always pledget is needed

Needles for Mitral valve usually bigger

Mitral : X-Bond 2/0,26mm needle,with pledget

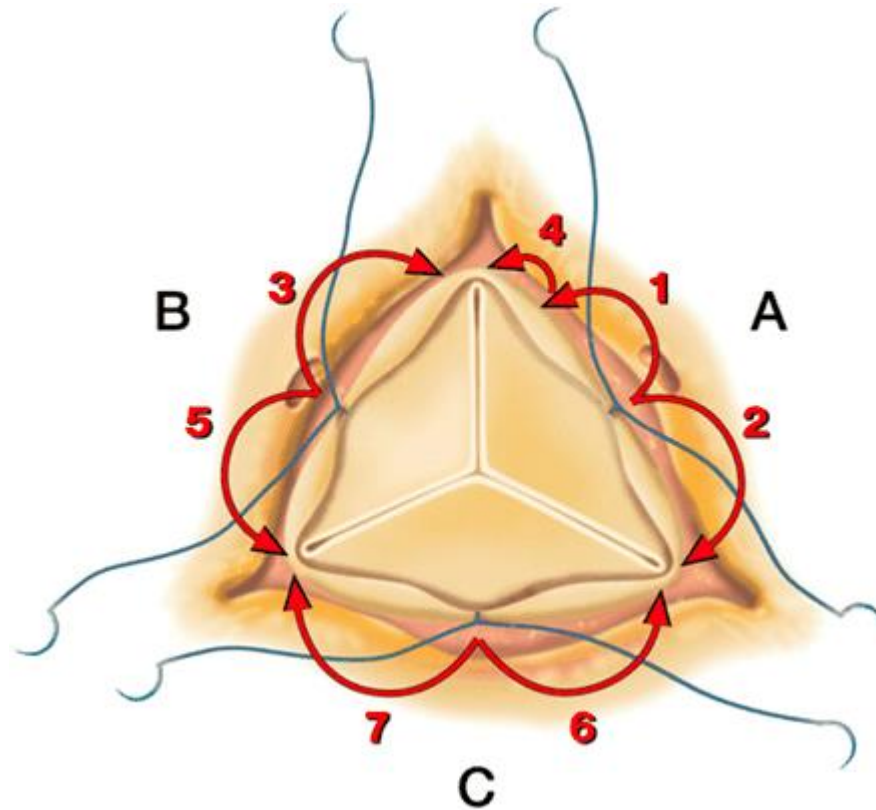
Aorta: X-Bond 2/0,17 mm

,with or without pledget



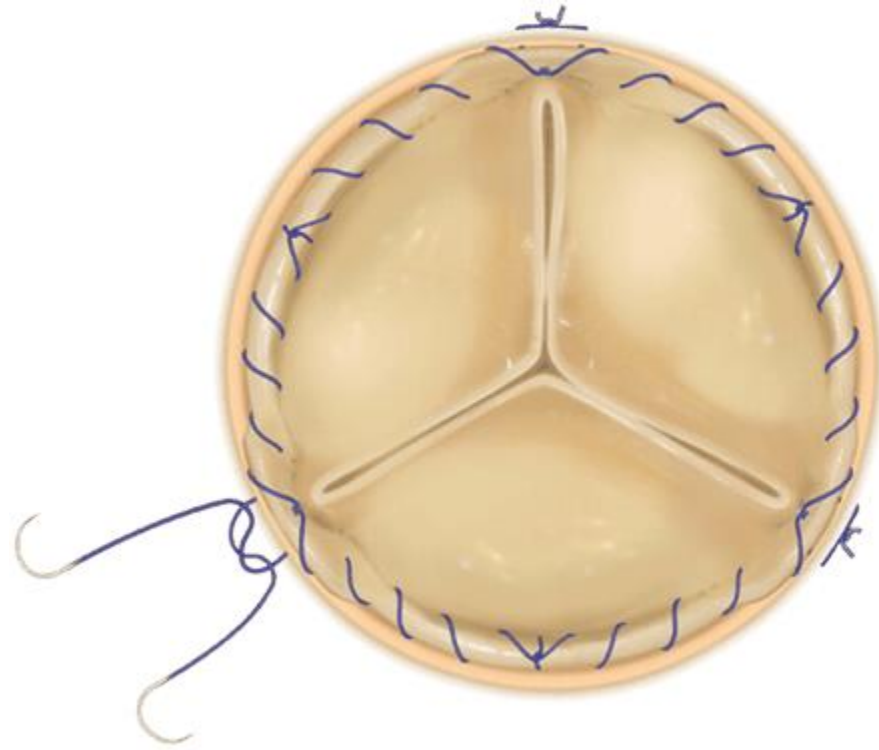
# Interrupted with Cardiopilene

Dividing Valve circle in to 3 or 4 curves



# Interrupted suturing with Cardiopilene

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# Sternum closure:

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Pericardium: Cardiopilene 4/0

Sternum: Steel wire gauges 5(pediatric),7

Subcutaneous: Monoprone,Viprone

Skin : Truseal

Bonewax : Sternum oozing

Surgicel : oozing





# AAA (Abdominal Aortic Aneurysm)

- An aneurysm is a sac formed by the dilation of a blood vessel wall.
- 
- Aneurysms form at weak points in vessel walls when blood pressure is raised due to atherosclerosis.
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- Aneurysms can be successfully repaired using a prosthesis known as a dacron graft.

## Procedure:

Access to an AAA is through an extensive abdominal incision.

The sac is opened and any atheroma scooped out.

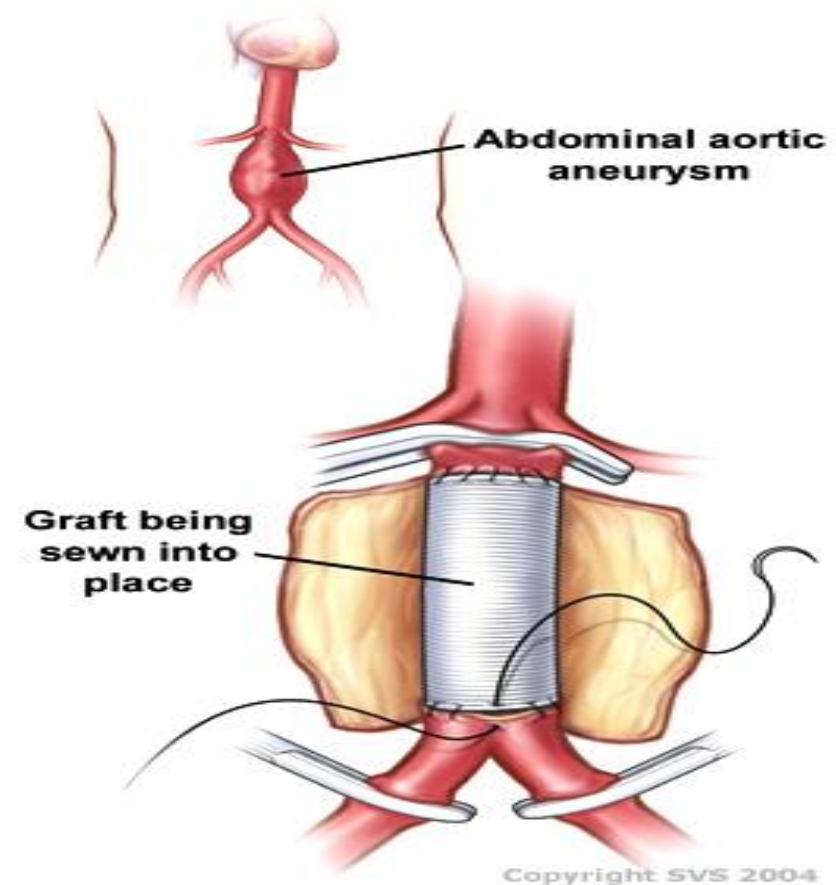
A woven Dacron graft is introduced.

The proximal anastomosis of graft to aorta is completed and tested for leaks.

The distal anastomosis is completed and tested for leaks.

If small the inf. mesenteric artery can be left sewn off, if large it can be replanted on the Dacron graft.

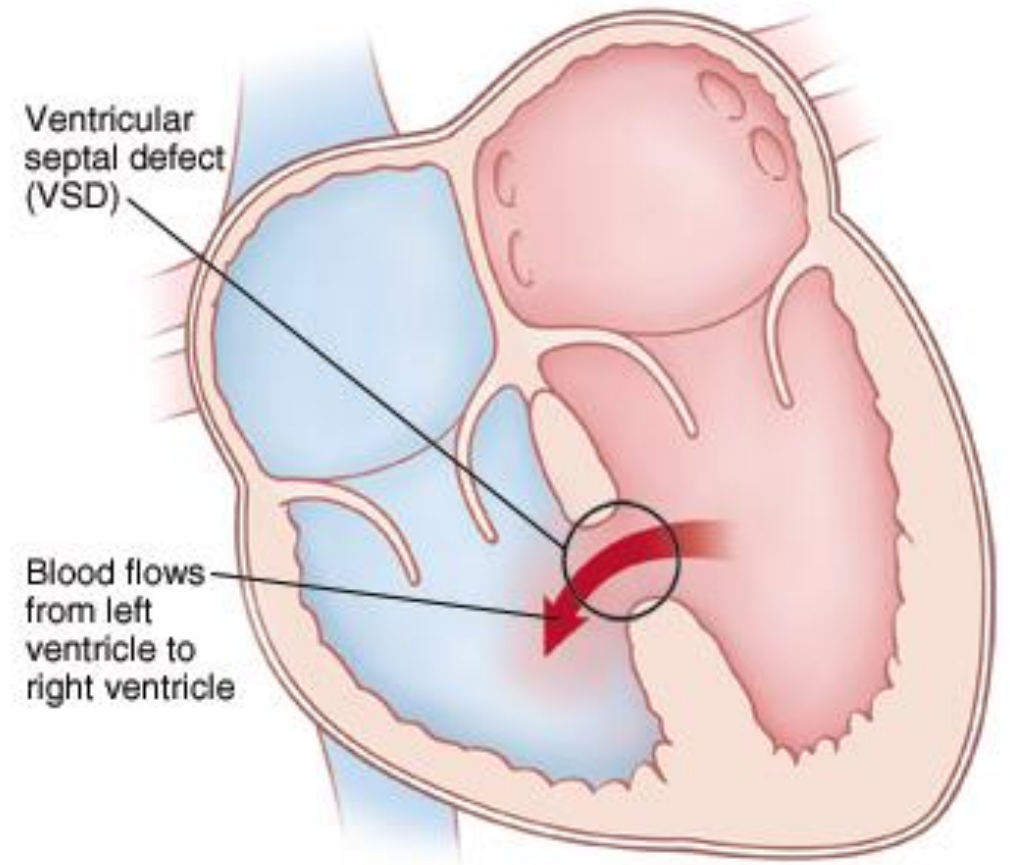
The aneurysmal sac is folded over the Dacron graft to prevent adhesion. The incision is closed.



# Ventricular septal defect

A ventricular septal defect (VSD), a hole in the heart, is a common heart defect that's present at birth (congenital). The hole occurs in the wall that separates the heart's lower chambers (septum) and allows blood to pass from the left to the right side of the heart. The oxygen-rich blood then gets pumped back to the lungs instead of out to the body, causing the heart to work harder.

A small ventricular septal defect may cause no problems, and many small VSDs close on their own. Larger VSDs need surgical repair early in life to prevent complications.



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Thanks for your attention

