

Mechanical Complications of Ischemic Heart Disease

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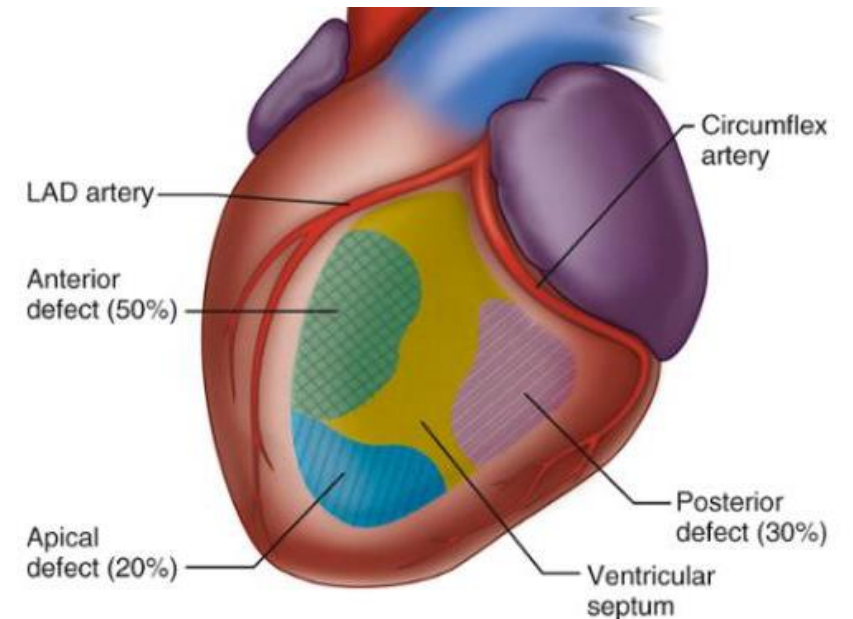
Postinfarction septal rupture

Incidence

- 1~2% of AMI
- Postinfarction septal rupture occurs typically 3-5 days after onset of AMI
- Prevalence : Man > Woman (transmural infarction)
- Incidence has declined d/t PCI.

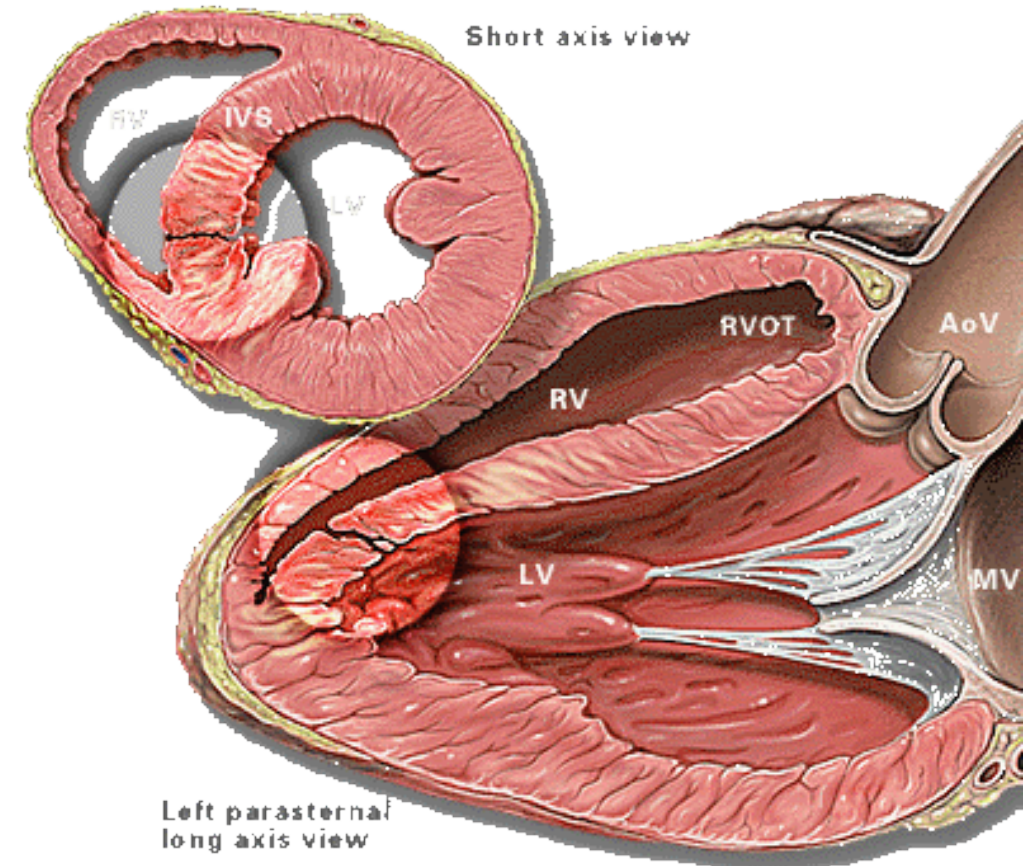
Pathophysiology

- Transmural infarction of interventricular septum
- Anterior infarction (70%), posterior infarction (29%)
- Total occlusion of infarct vessel with minimal collateralization
- Typically, large anterior wall AMI (LAD territory)
- L-R shunt



Clinical manifestation and natural course

- Shock (67%), heart failure (89%) – cause of death
- Natural course
 - 25% dead within 24 hours
 - 50% dead within 1 week
 - 65% dead within 2 weeks
 - 80% dead within 4 weeks
 - 80-95% dead within 1 year



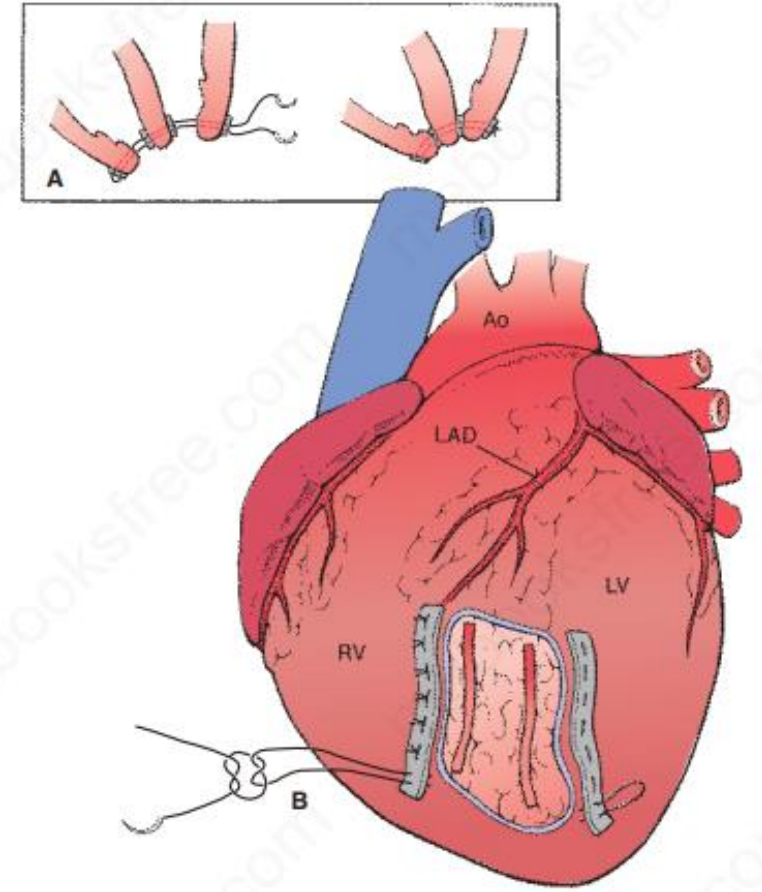
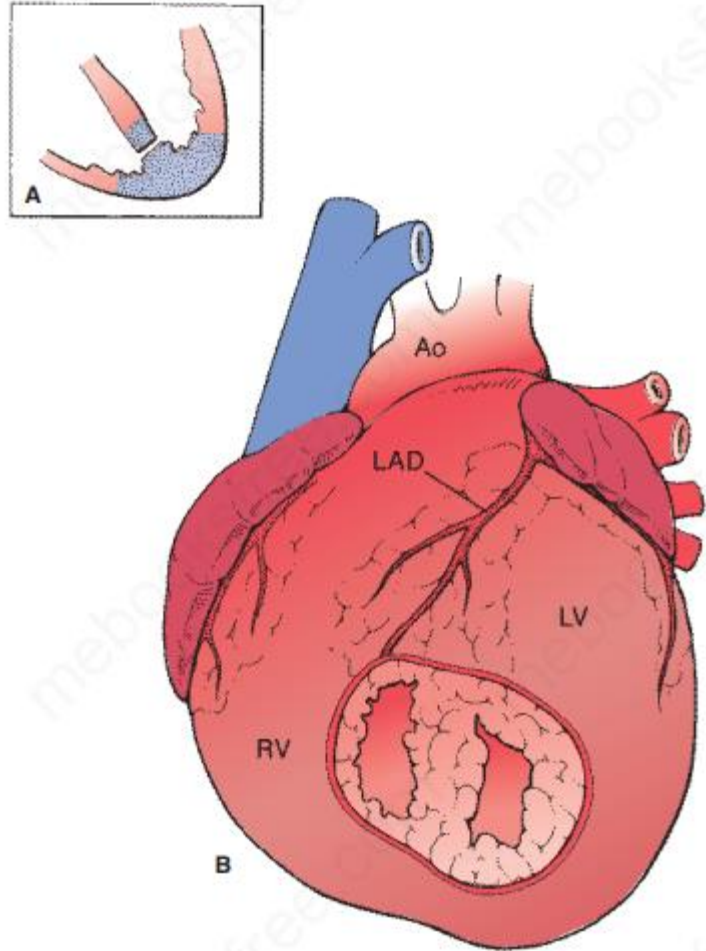
Indication for Operation

- Indication for operation, if diagnosed
- Timing of surgery
 - Emergent
 - Urgent
 - Delayed – hemodynamic optimization, acquisition of diagnostic information

Operative techniques

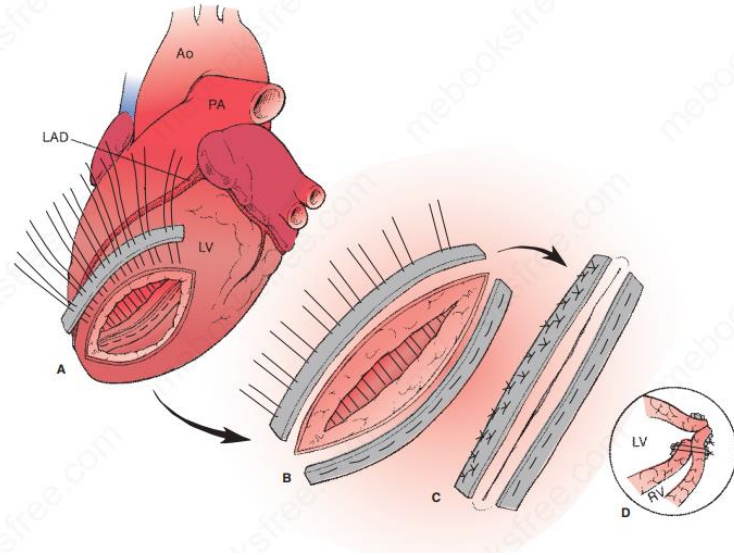
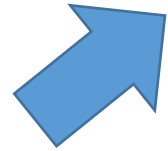
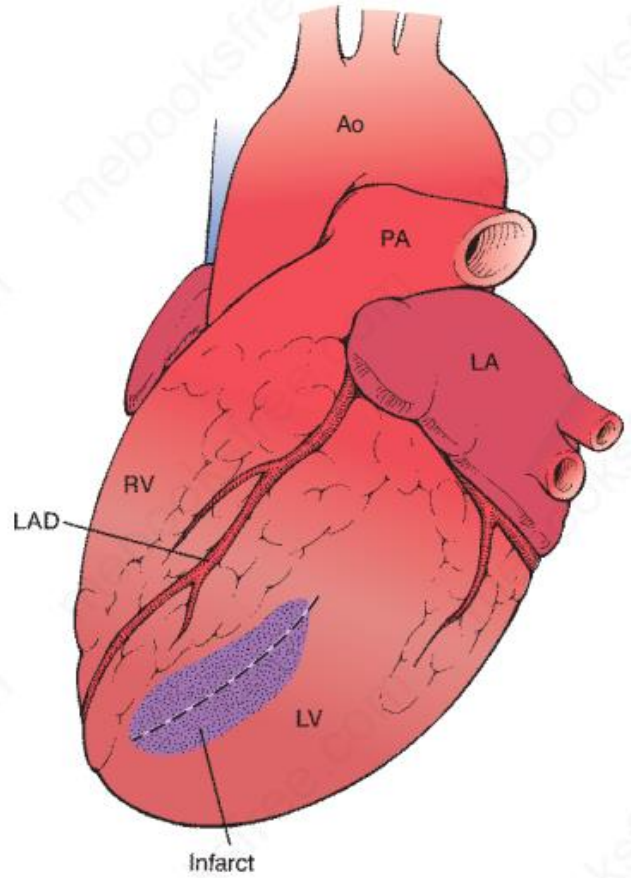
- Location of the infarct
- Infarct excision vs exclusion
 - Infarct excision -> with or without patch closure
- Suturing to viable myocardium

Operation – apical VSD



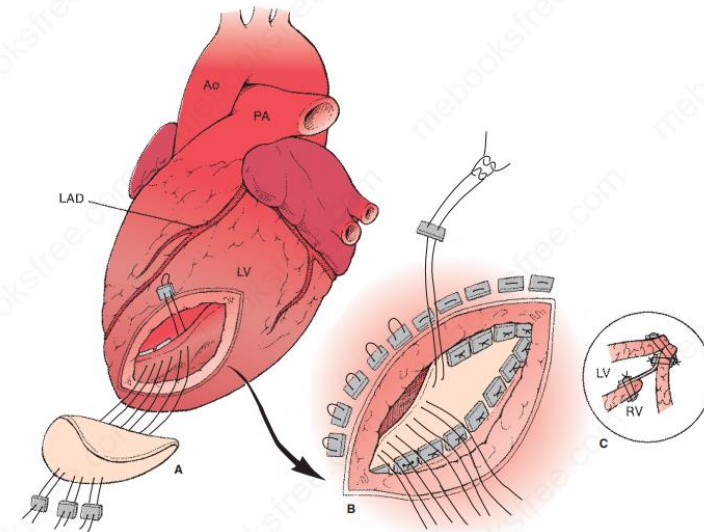
Infarct excision

Operation – anterior VSD



Infarct excision

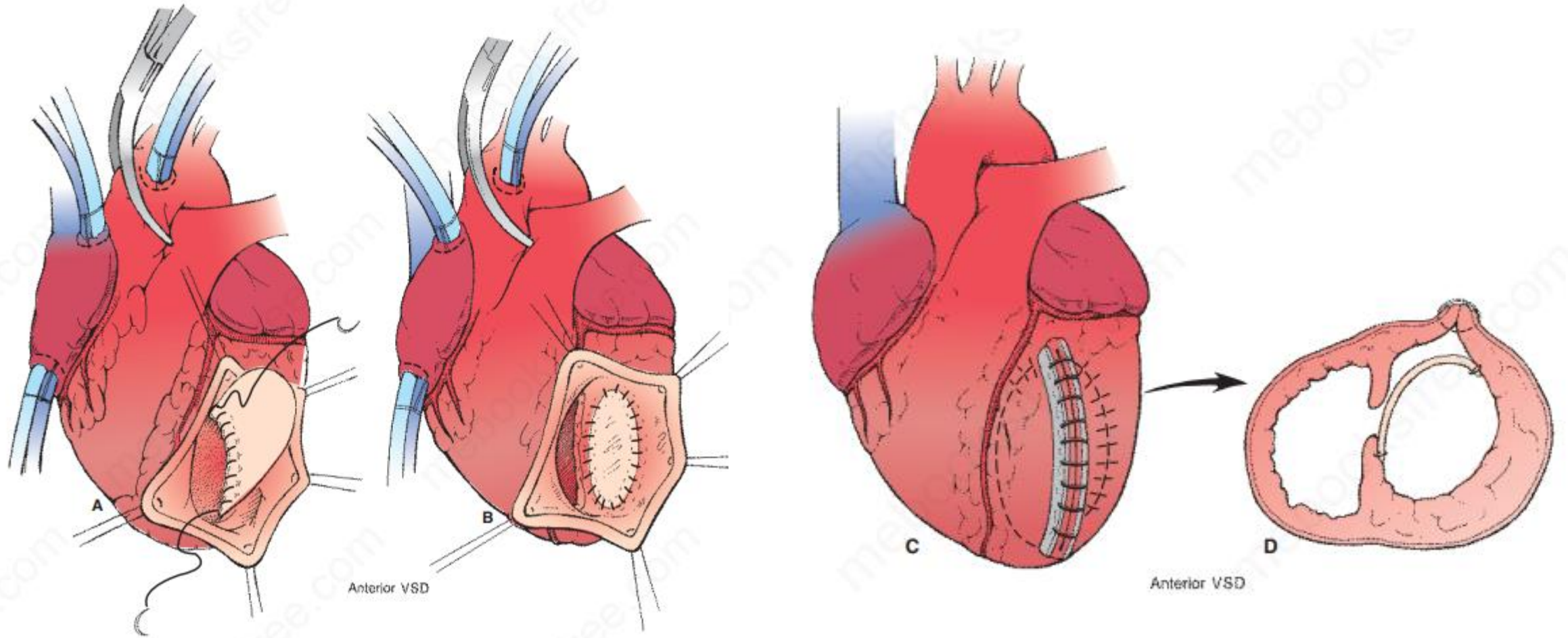
Repair without patch



Infarct excision

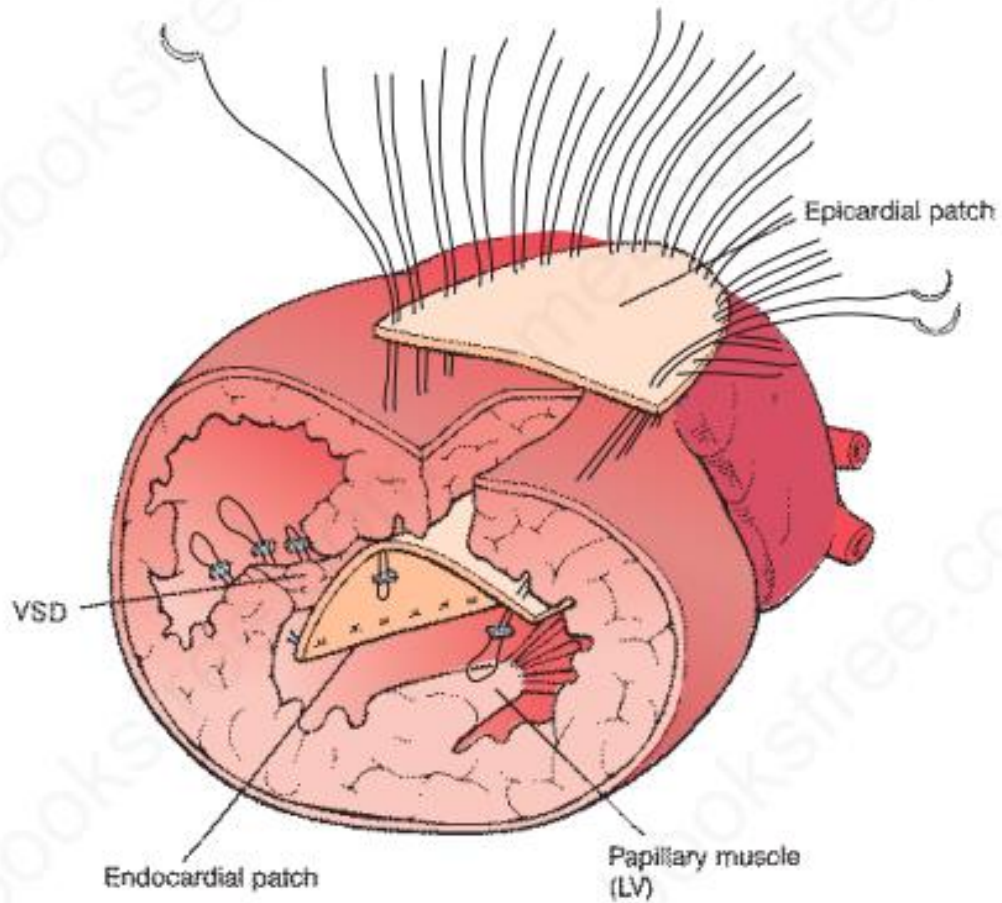
Repair with patch

Operation – anterior VSD



Infarct exclusion

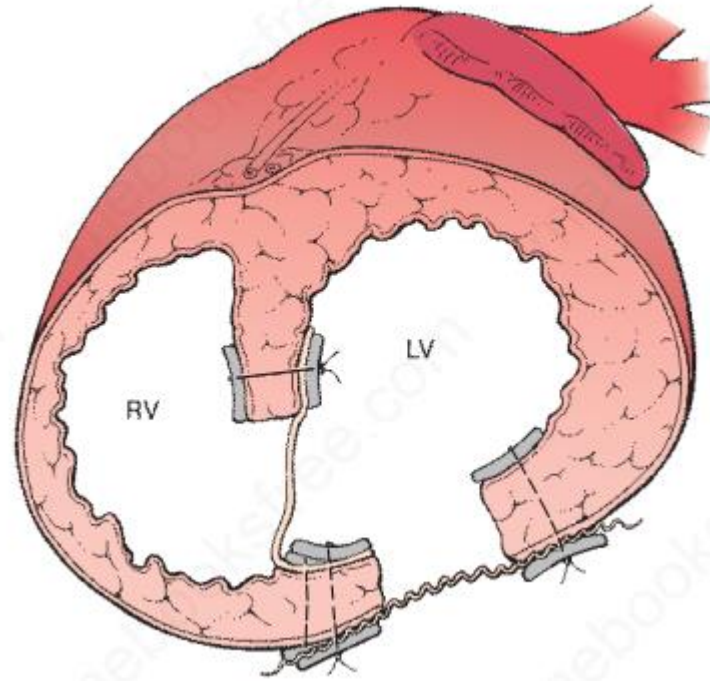
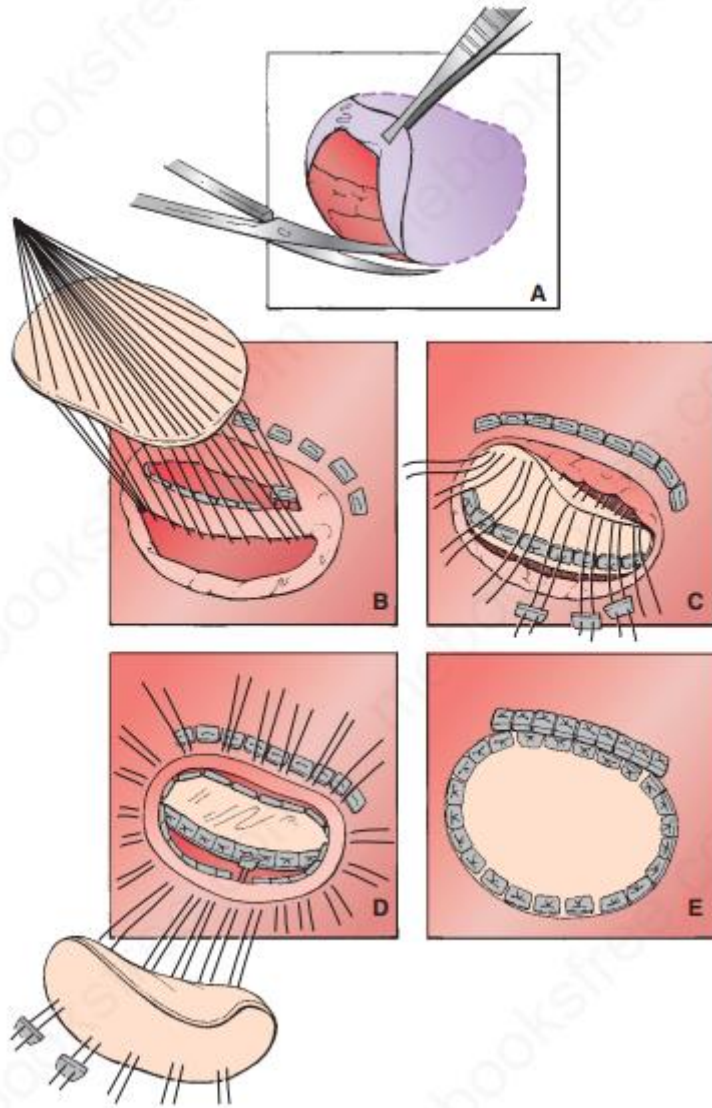
Operation – anterior VSD



Infarct exclusion

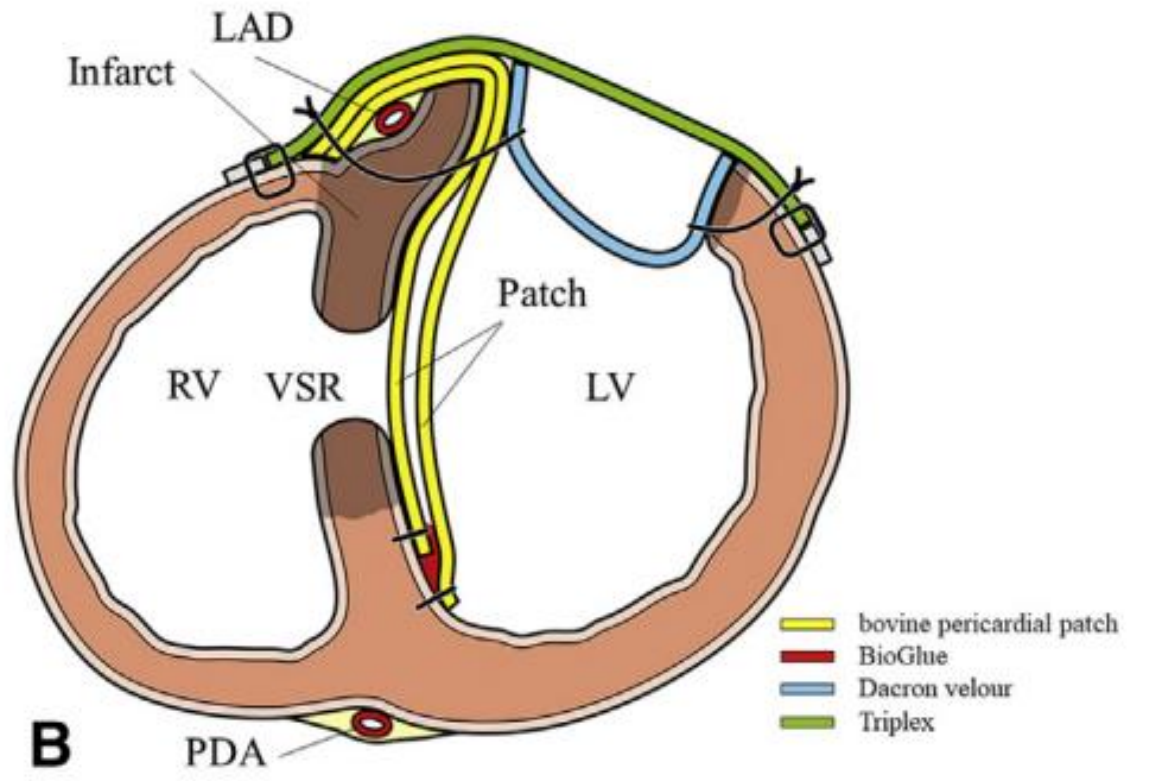
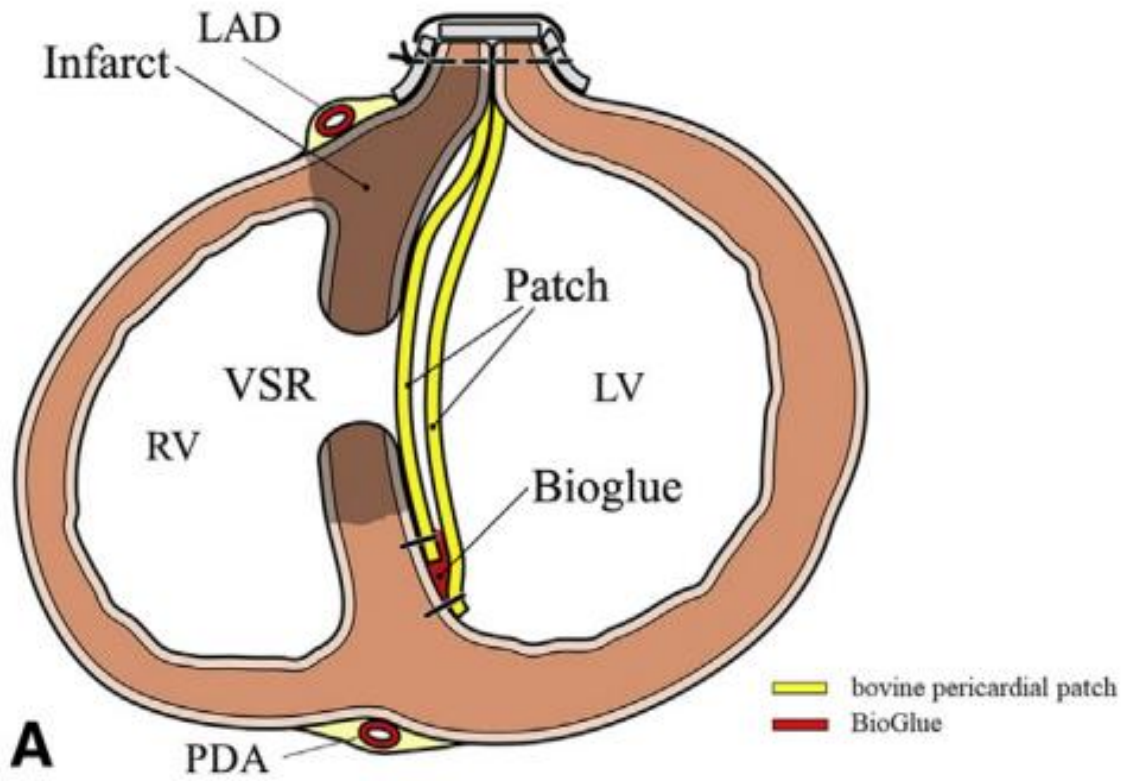
external patching of the
ventricular free wall

Operation – posterior VSD

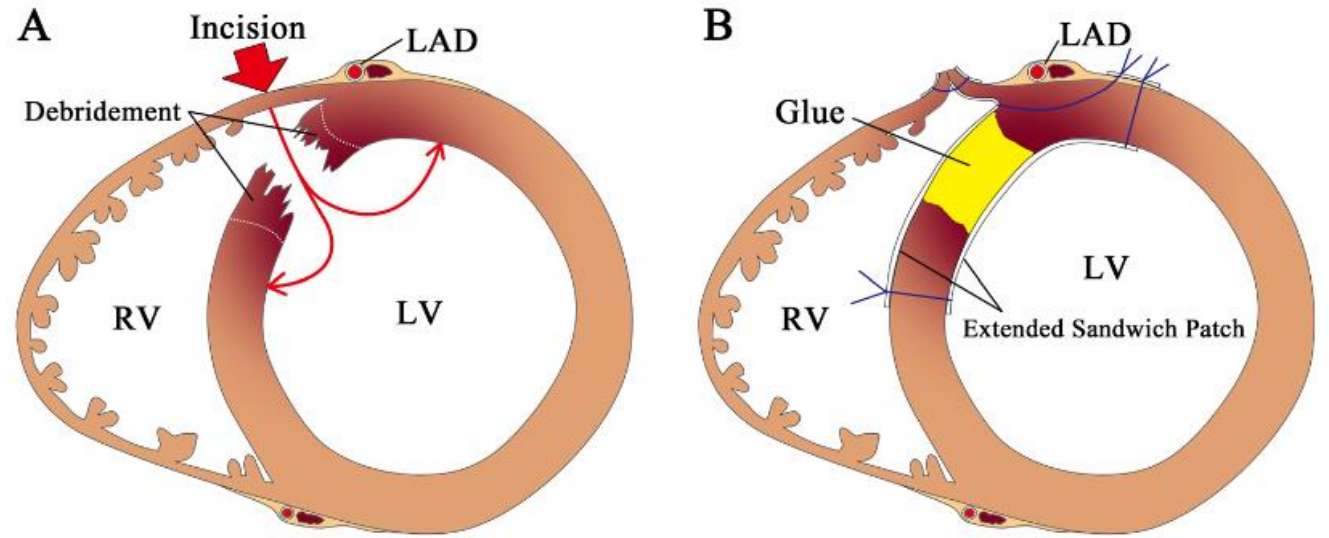


Infarct excision

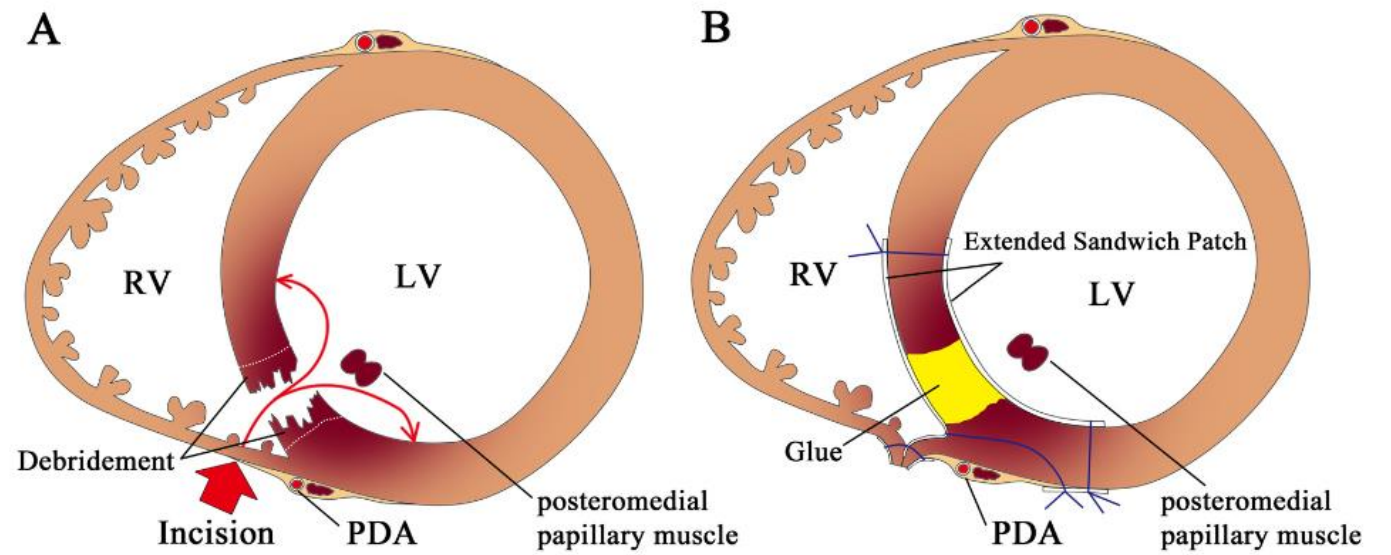
Repair with patch



Anterior infarct

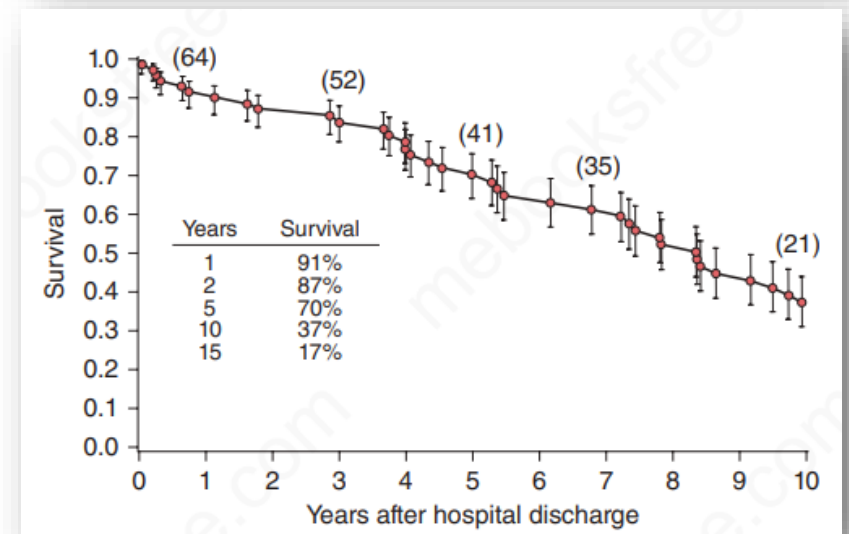
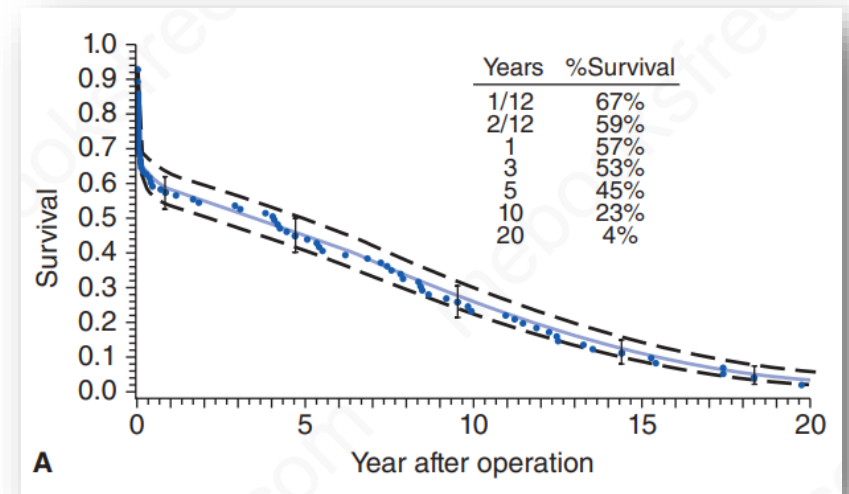


Posterior infarct



Outcomes

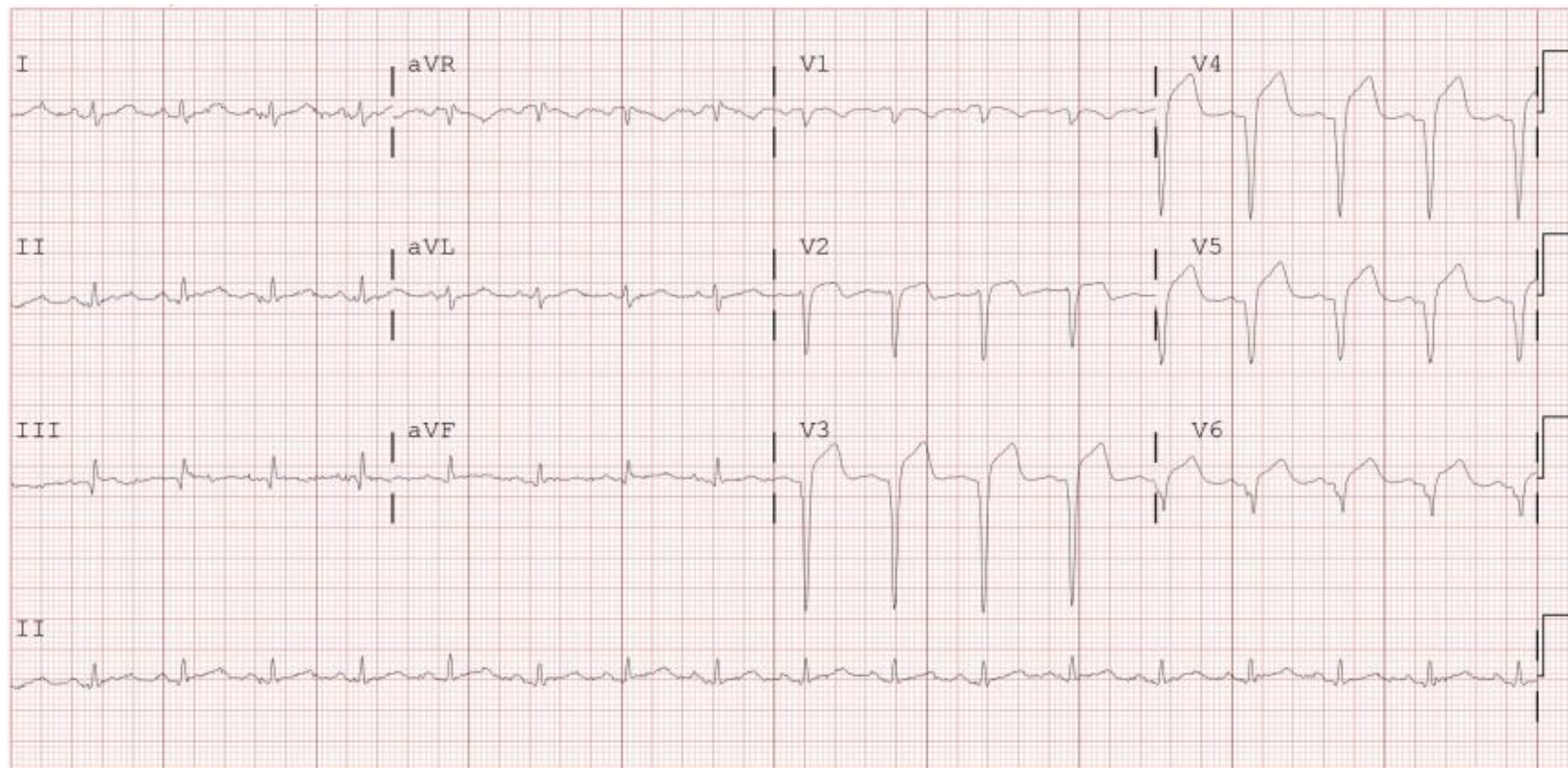
- Operative mortality : 30-50%
- Long-term survival for hospital survivals
 - 1-year 91%
 - 5-year 70%
 - 10-year 37%



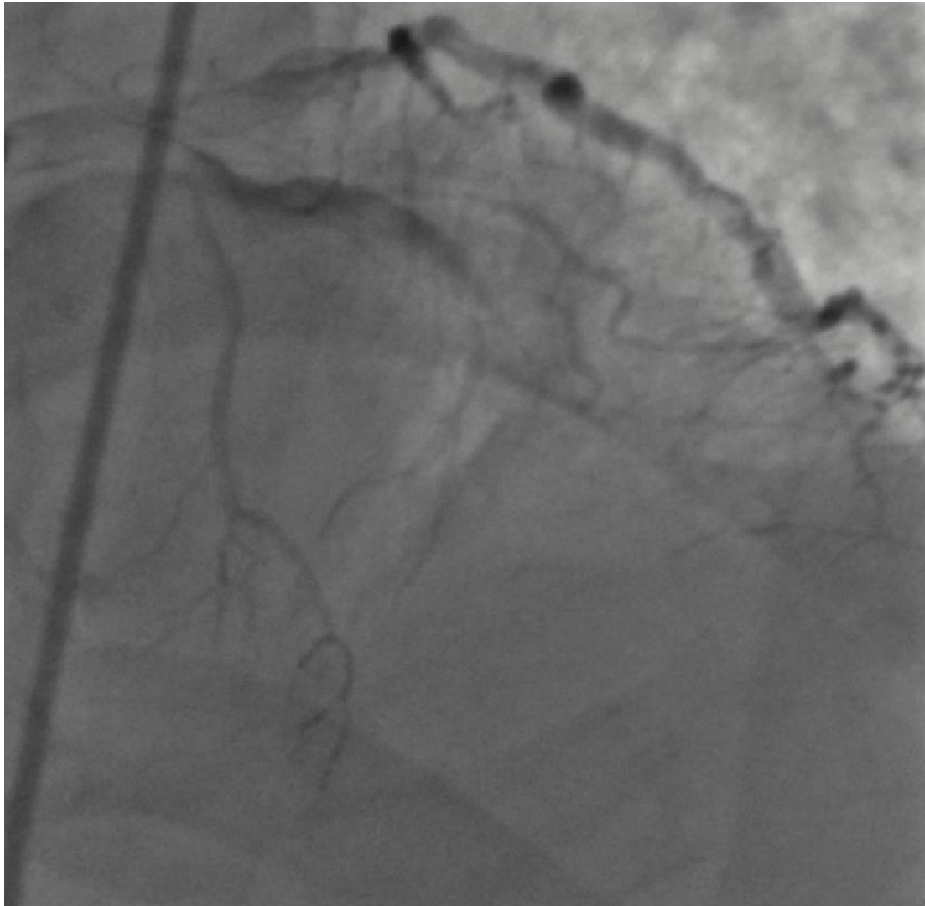
Case

- M/60
- CC : sudden onset chest pain
- PI
 - 1 wk ago : chest pain, nausea, cold sweating
 - 1 day ago : aggravated chest pain, BP 70/40
- P/E
 - BP 80/60, HR 110
- Lab
 - Tnl 21.97, NT-proBNP 21059

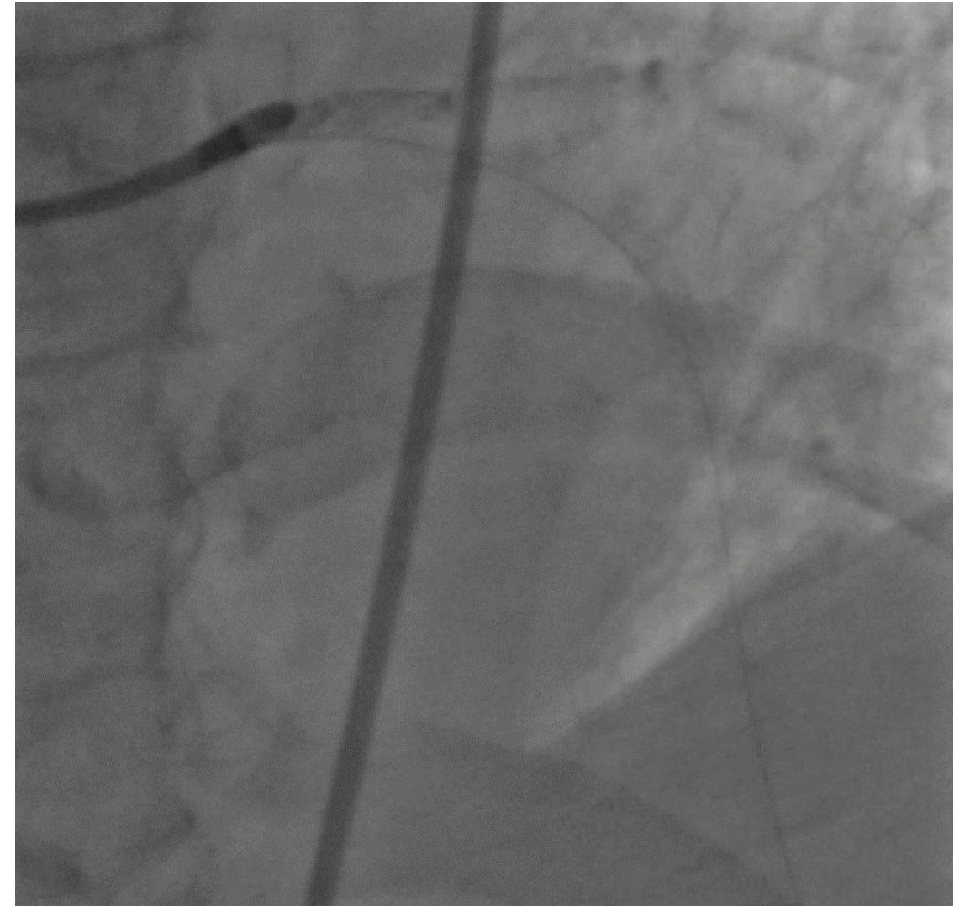
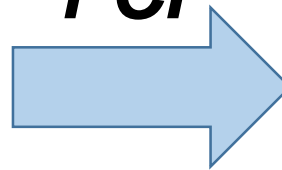
ECG



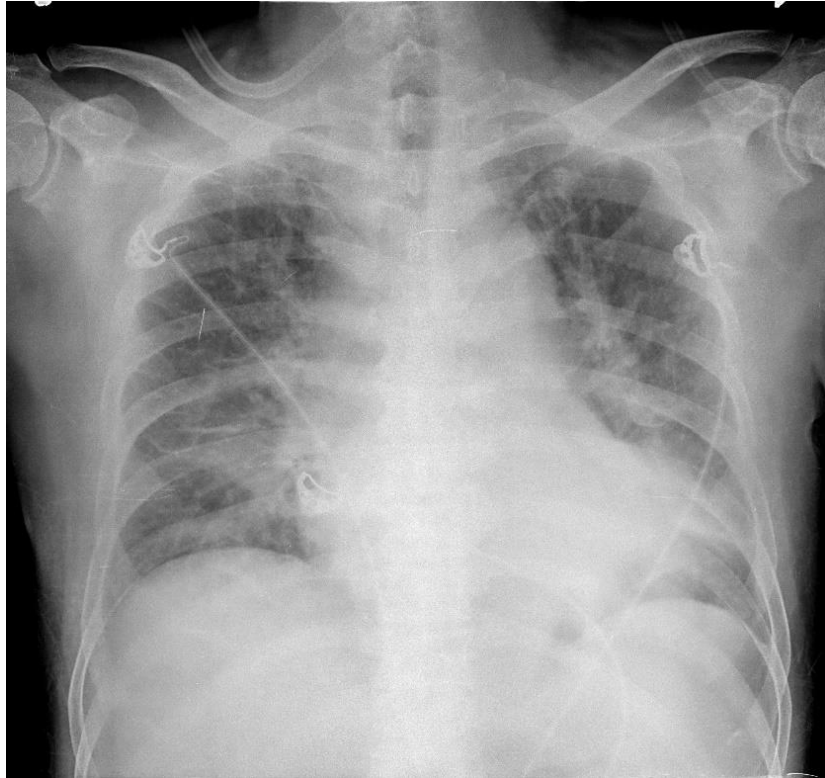
CAG



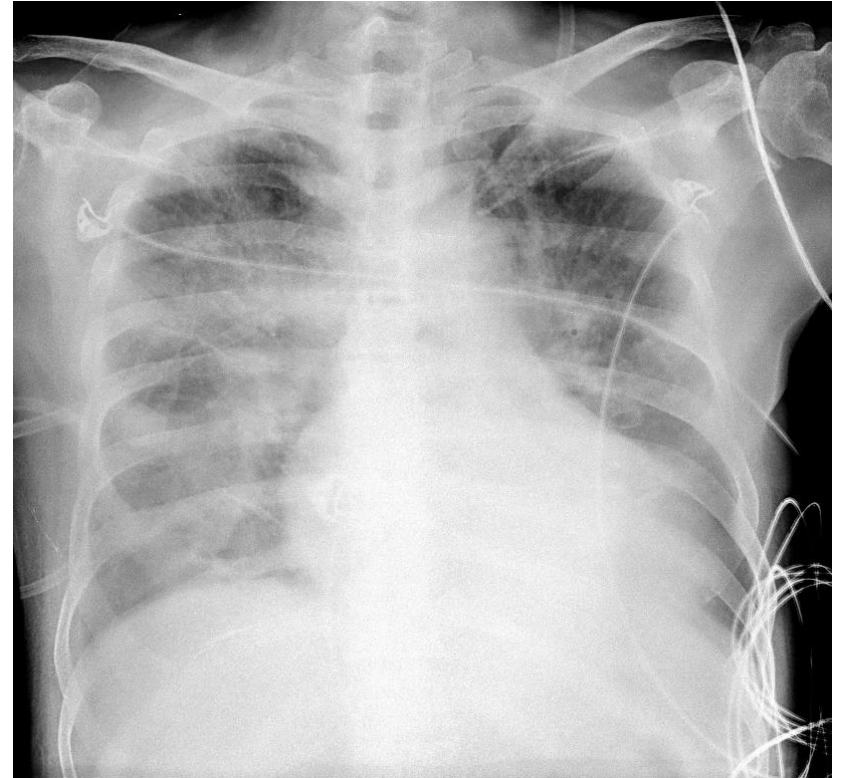
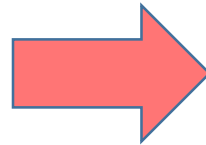
PCI



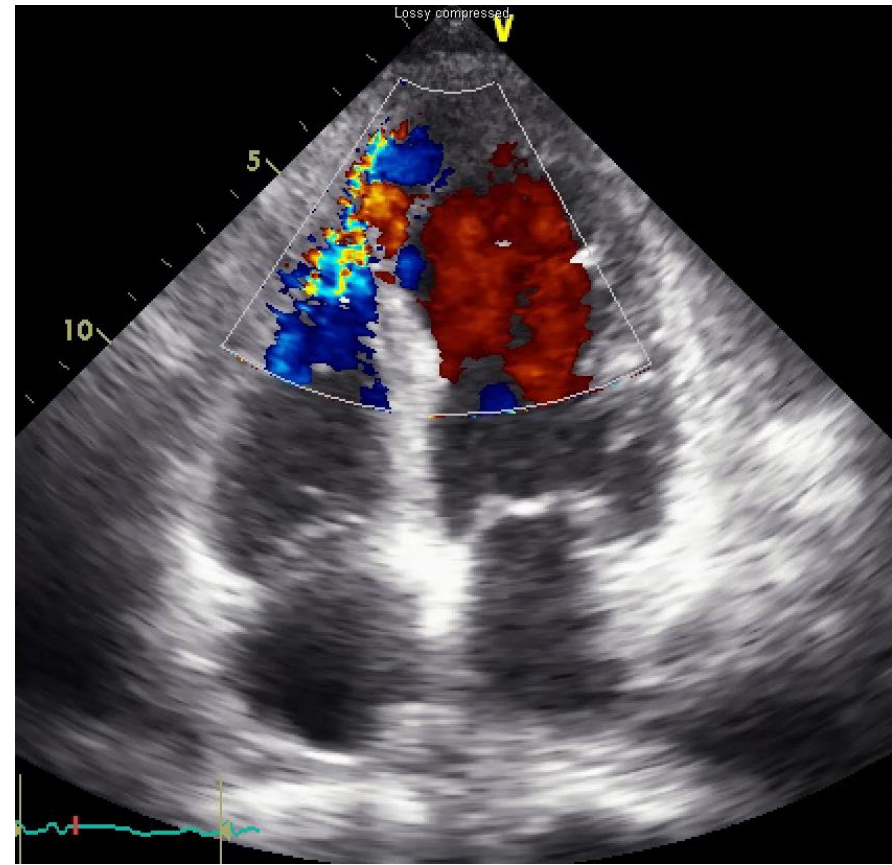
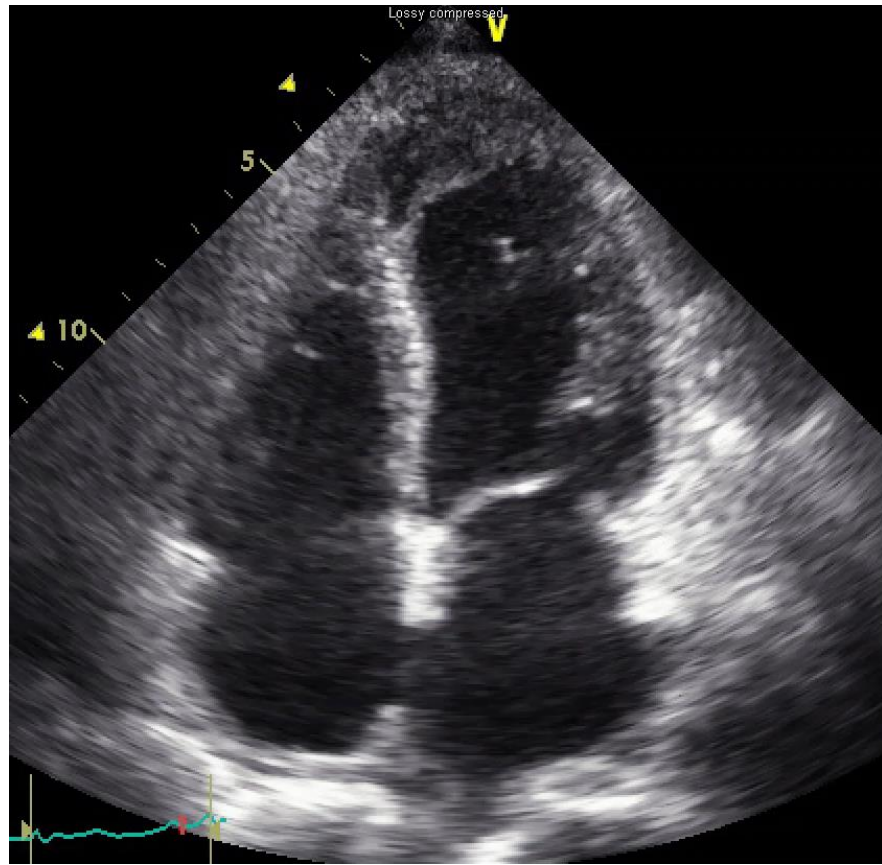
CXR



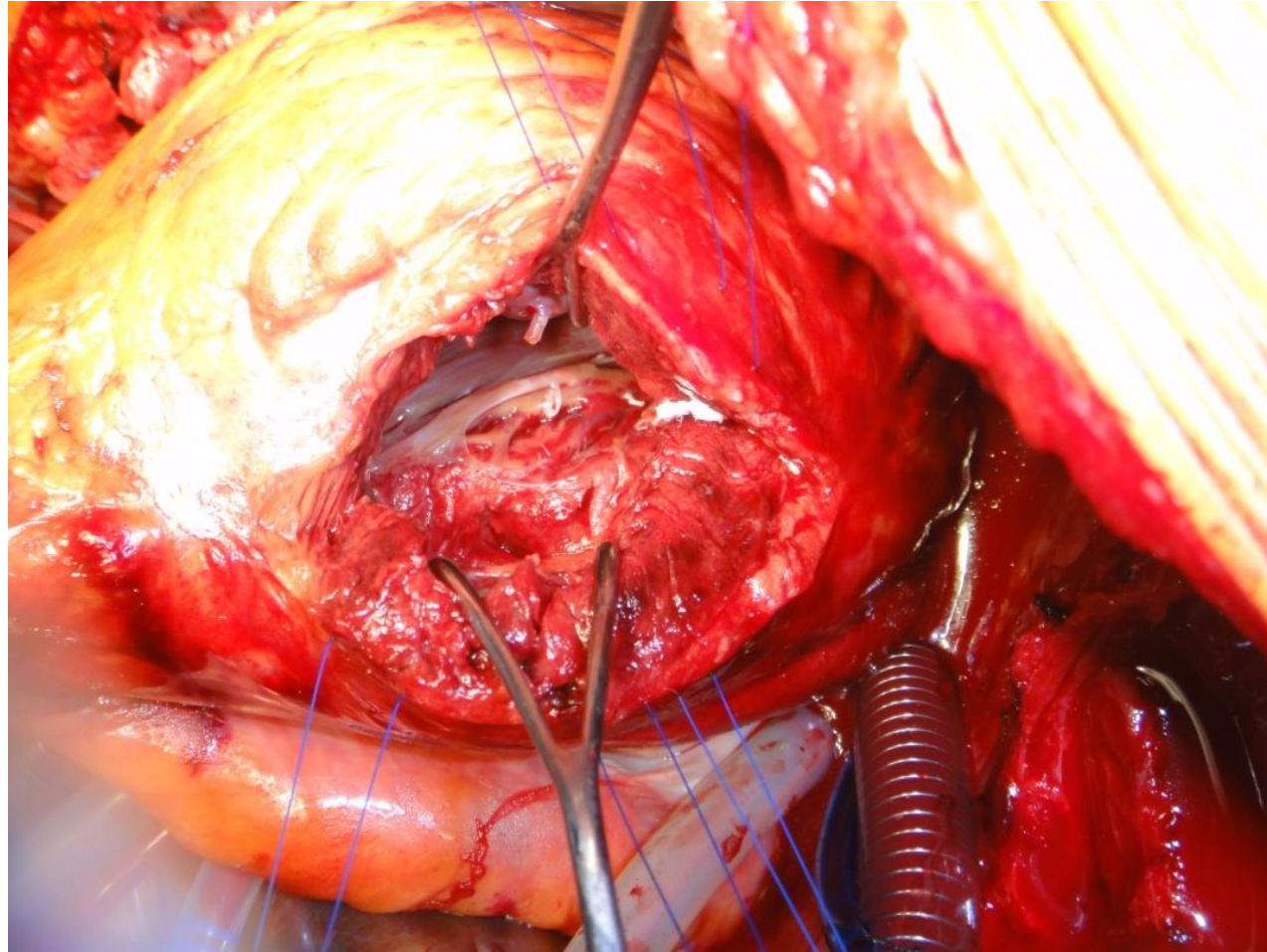
3 Day later



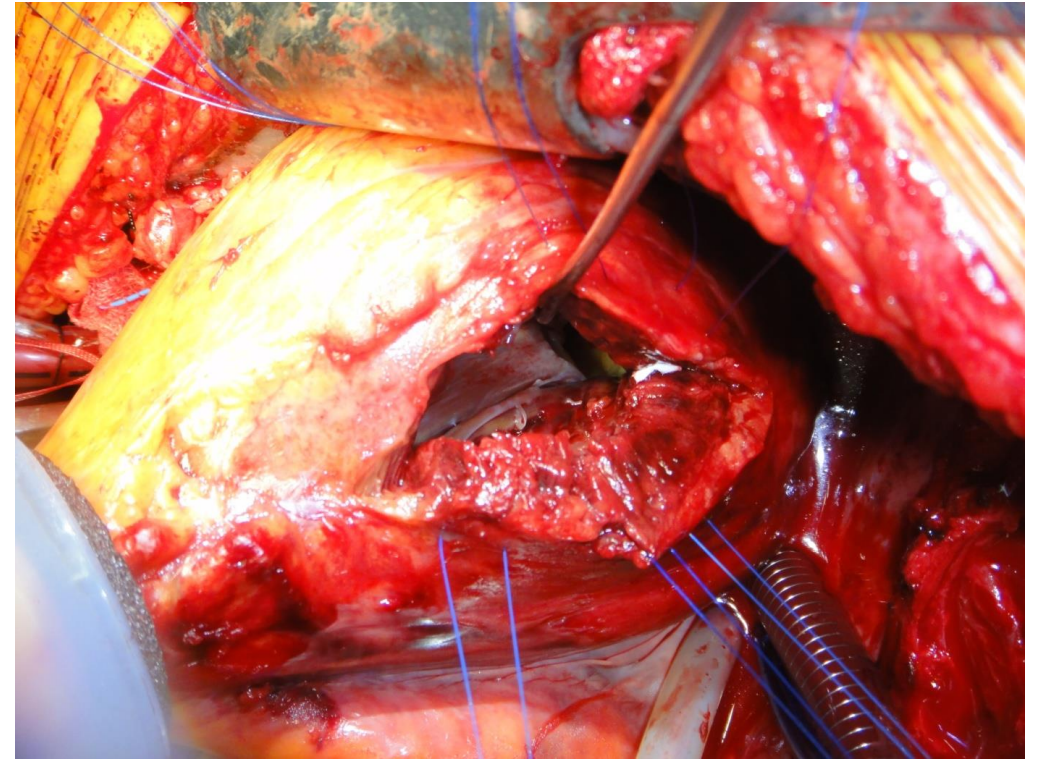
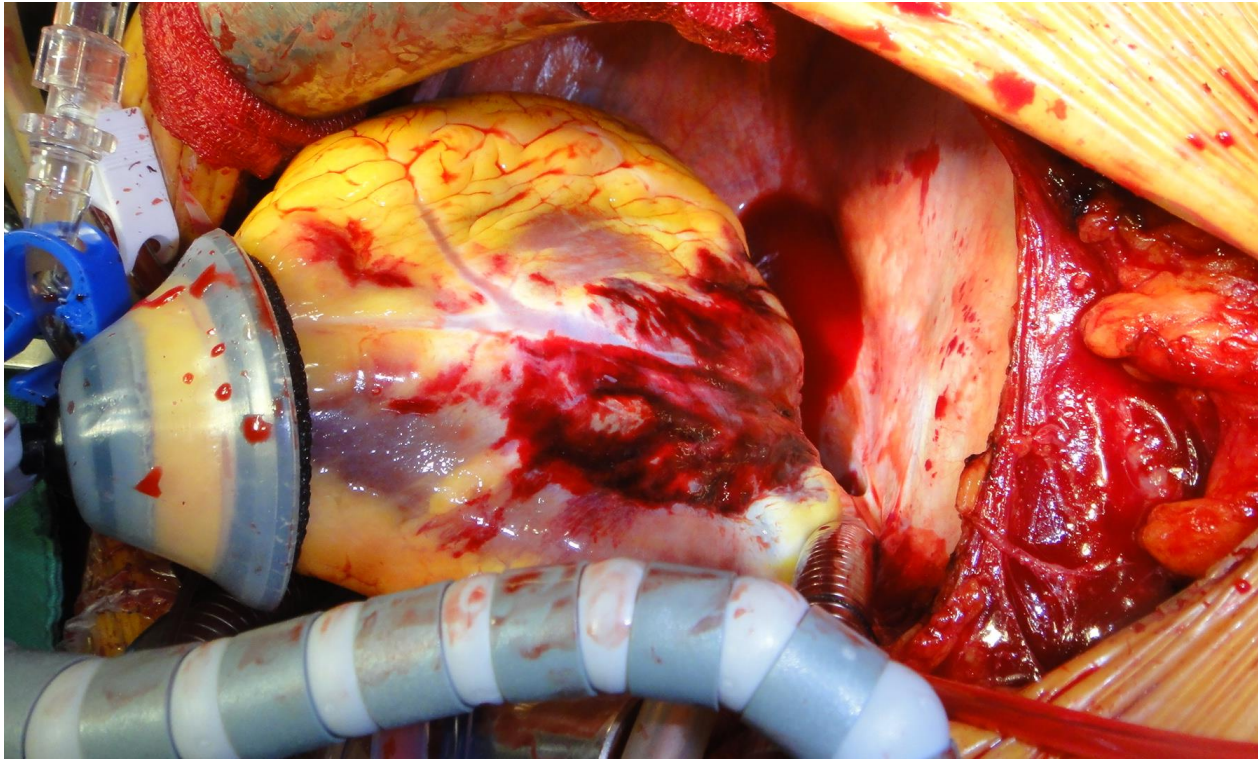
TTE



- Dx : Postinfarction VSD, apical wall
- Op : Bovine pericardial patch closure of VSD



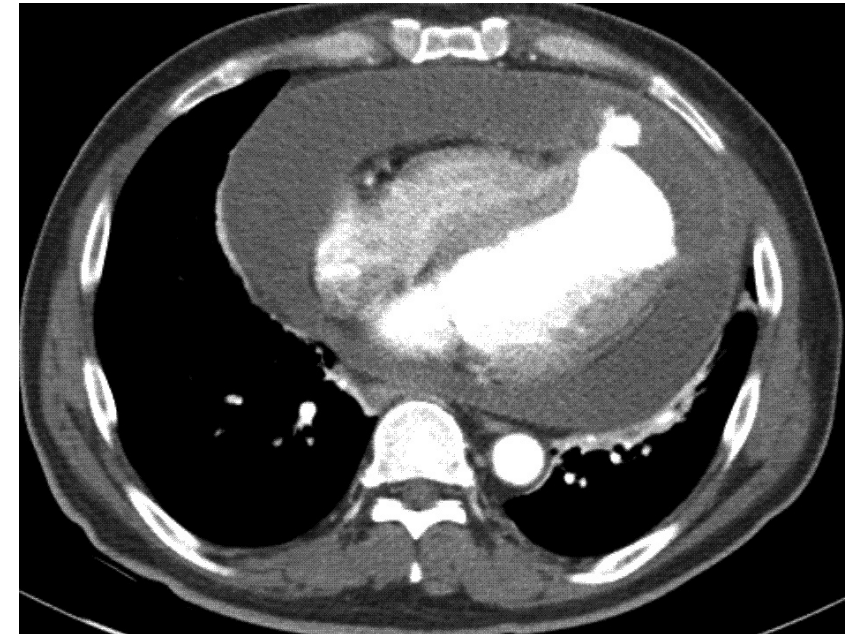
Posterior infarction



LV free wall rupture

Incidence

- Free wall rupture is similar to postinfarction VSD, but the location is different.
- 2nd m/c cause of death after AMI (1st : cardiogenic shock)
- Peak incidence : 5 days after AMI
 - Thrombolysis and early intervention -> earlier occurrence of free wall rupture



Pathophysiology

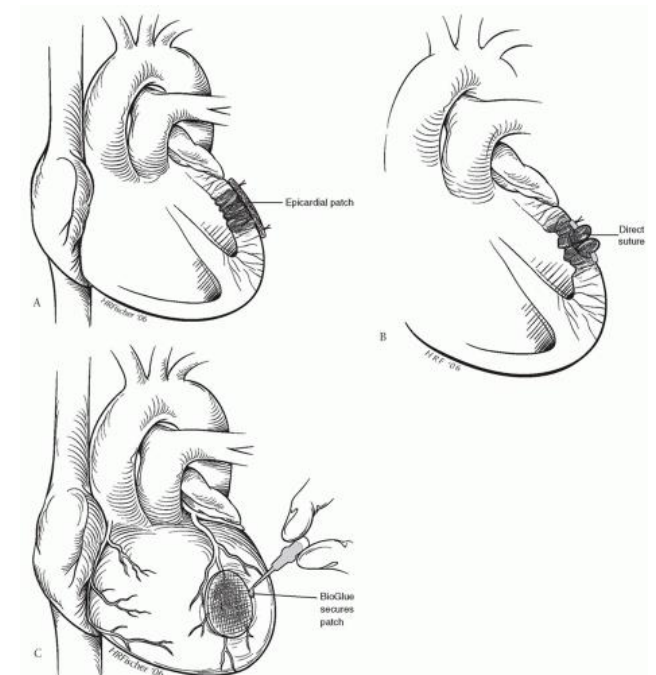
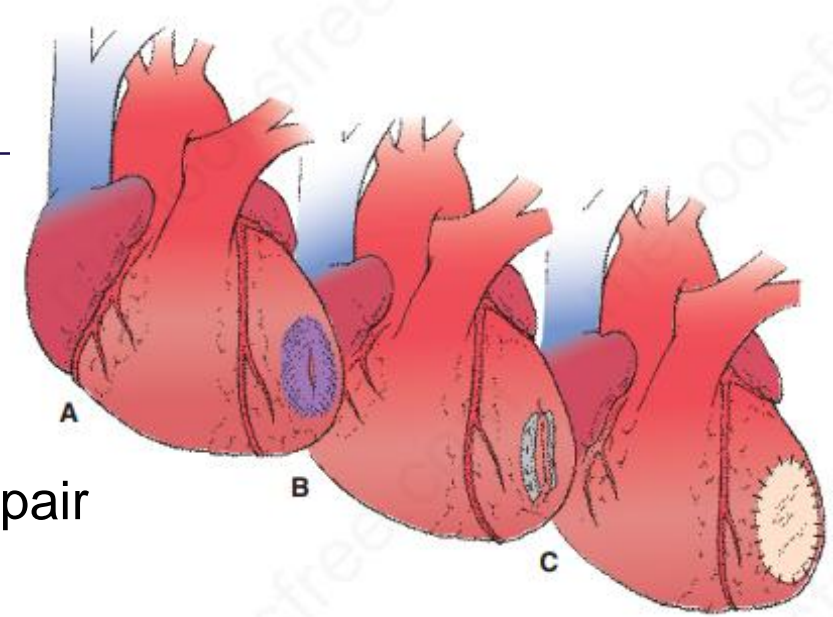
- Acute
 - Tamponade, shock, death (within a few minutes)
- Subacute
 - Small tear -> partly sealed by clot and pericardial adhesions
- Chronic
 - Pericardial adhesion (+) -> prevent rupture > 2 weeks
 - Chronic LV pseudoaneurysm : narrow neck, no myocardial cells in the wall
 - Cf. LV aneurysm (true aneurysm)

Natural course

- Acute free wall rupture
 - Die within minutes
- Subacute free wall rupture
 - Median survival 8 hours
- Chronic free wall rupture (pseudoaneurysm)
 - Less well-defined prognosis
 - Also associated with high probability of rupture

Operation

- Acute or subacute free wall rupture -> emergency op
- Surgical techniques resemble those for LV pseudoaneurysm repair
- Acutely or subacutely infarcted tissue is much more friable and has not had time to develop any fibrous content.
- Techniques
 - Standard linear closure with large horizontal mattress sutures buttressed by two strips of Teflon felt
 - Linear closure between strips of Teflon felt, infarct covered with a plastic patch
 - Excision and closure of the defect with Dacron patch



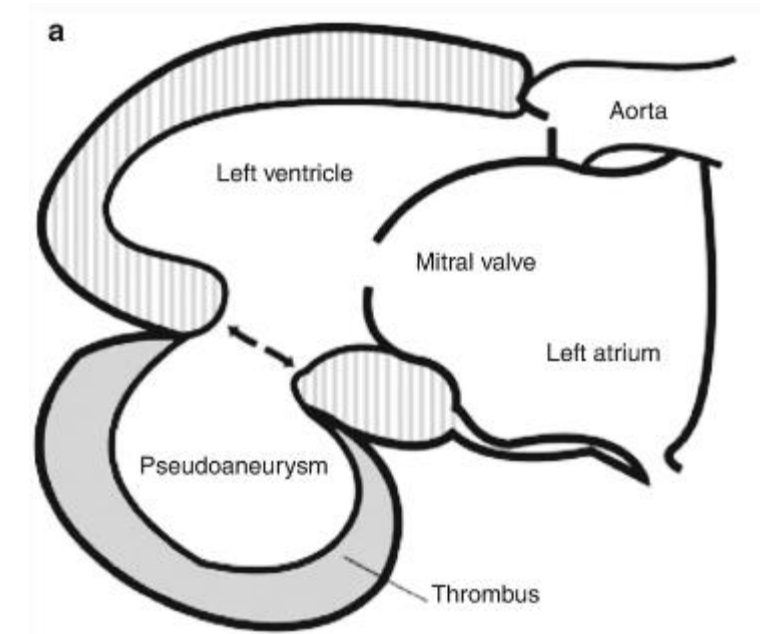
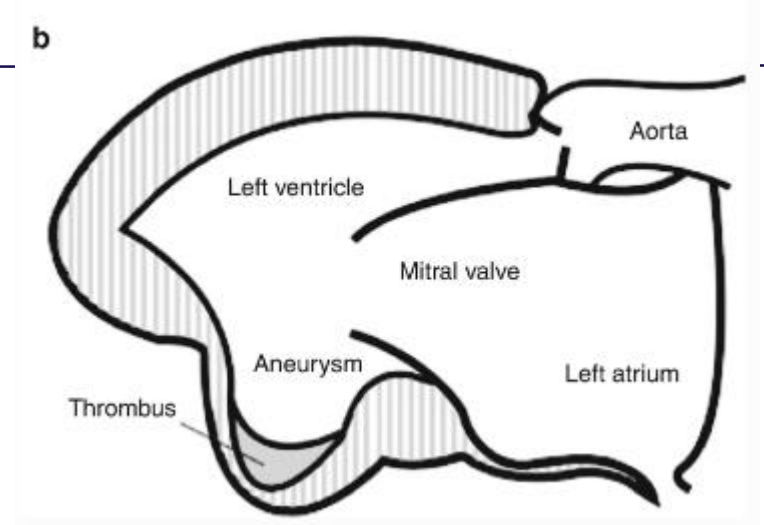
LV aneurysm

Definition

- Strict definition : abnormal LV diastolic contour with systolic dyskinesia or paradoxical bulging
 - Cf. any large area of LV akinesia or dyskinesia
- True aneurysm vs false aneurysm
 - Full thickness vs ruptured LV

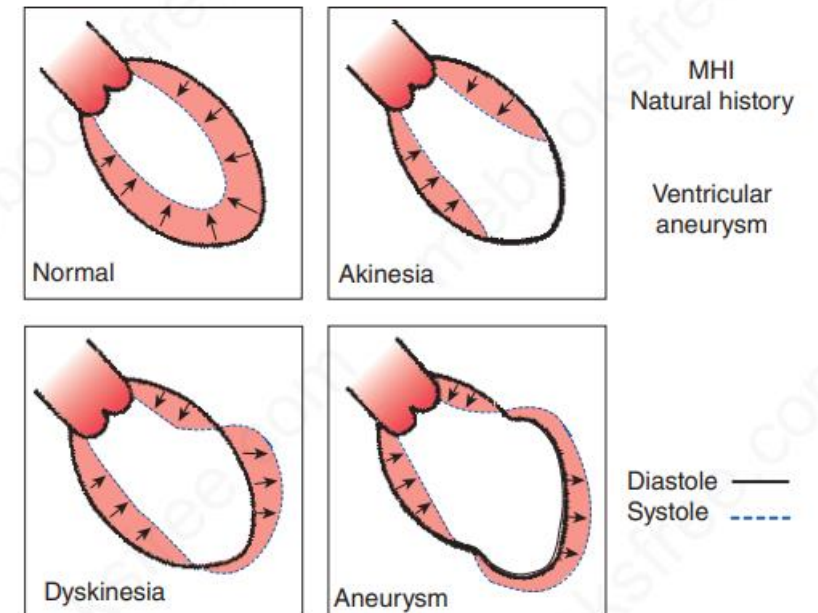
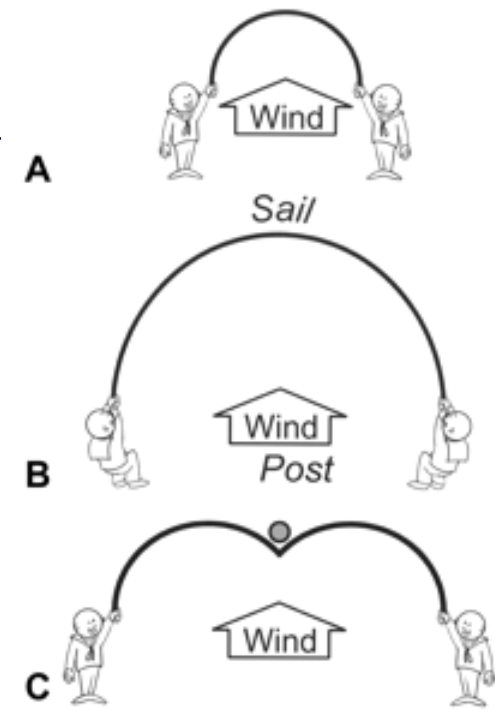
Etiology

- True aneurysm
 - Coronary artery disease / MI (95%)
 - Others : trauma, Chagas disease, sarcoidosis, congenital diverticulum
- False aneurysm (pseudoaneurysm)
 - AMI : 5-10 days after MI
 - Procedure related : after MVR, after transapical TAVI



Pathophysiology

- Early expansion phase
 - Within 48 hours after AMI
 - Laplace's law : $Tension = \frac{pressure \times radius}{2 \times wall\ thickness}$
- Late remodeling phase
 - 2-4 weeks after AMI
 - Infarction -> granulation tissue -> fibrous tissue

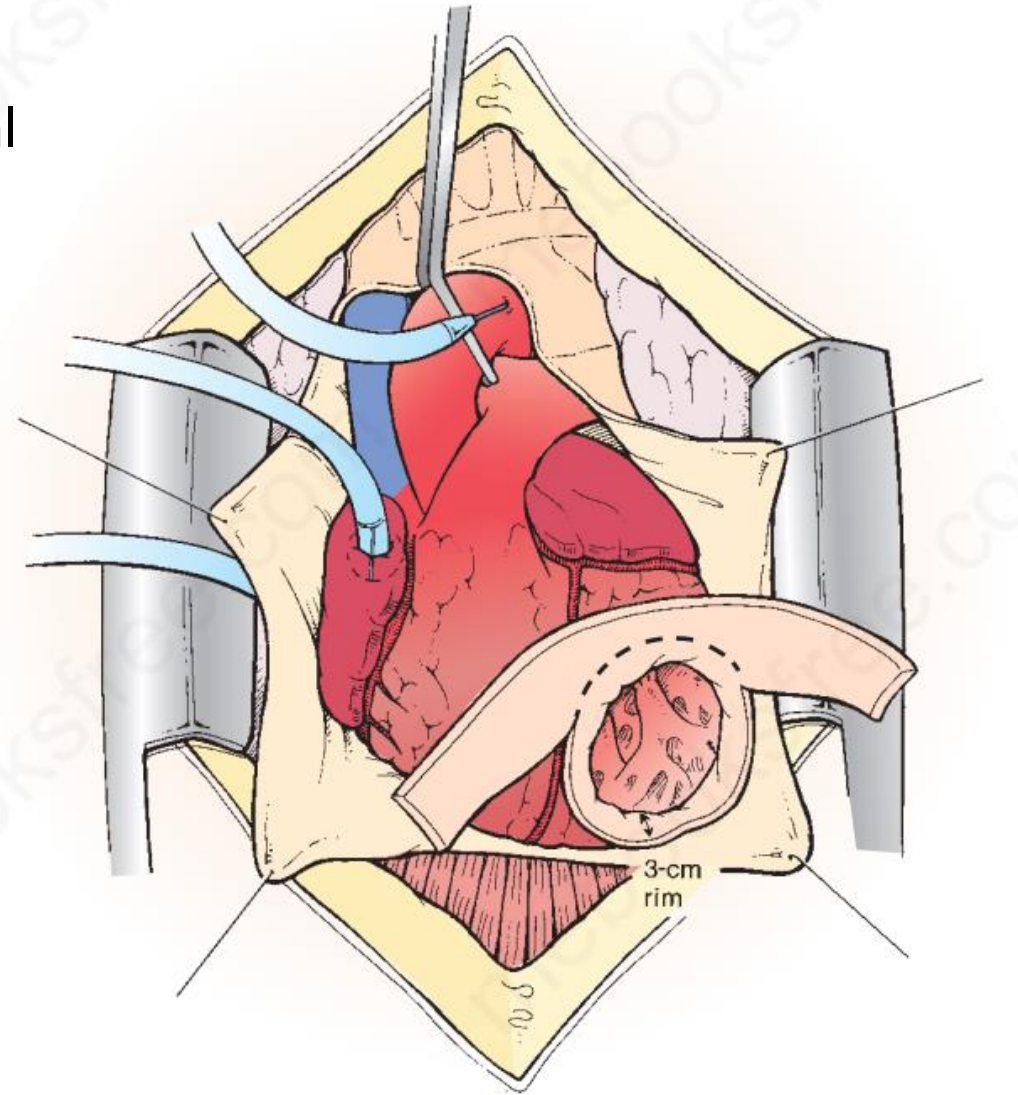
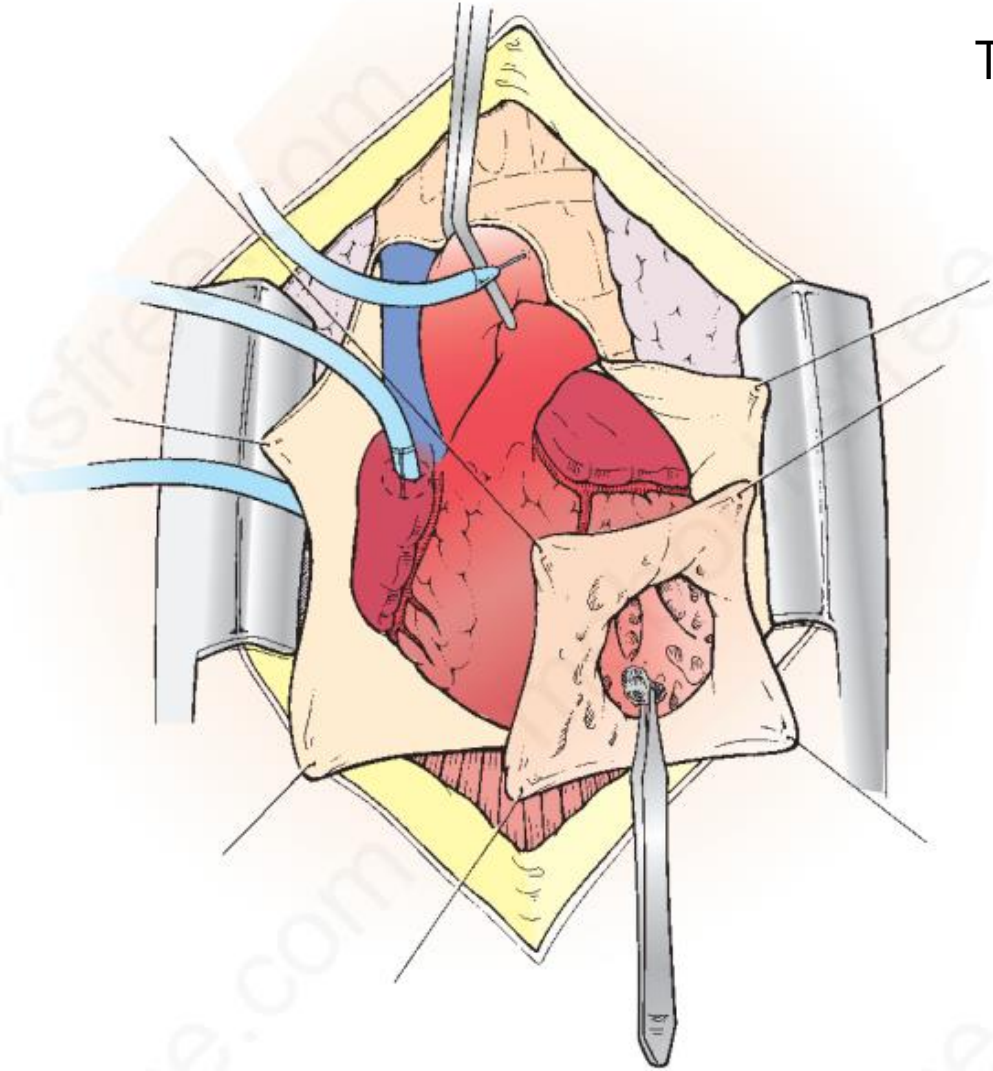


Operation

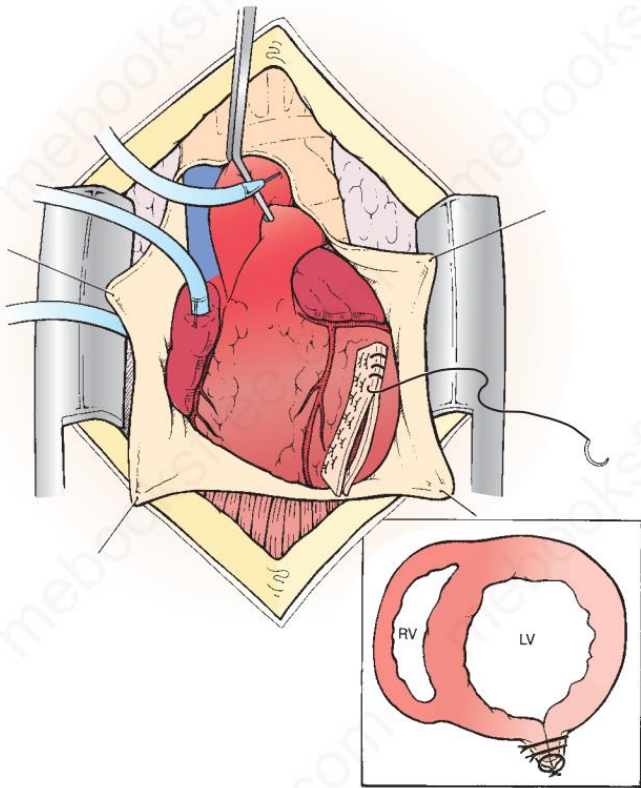
- Plication – only for small aneurysms
- Linear closure
- Circular patch
- Endoventricular patch

Aneurysm open

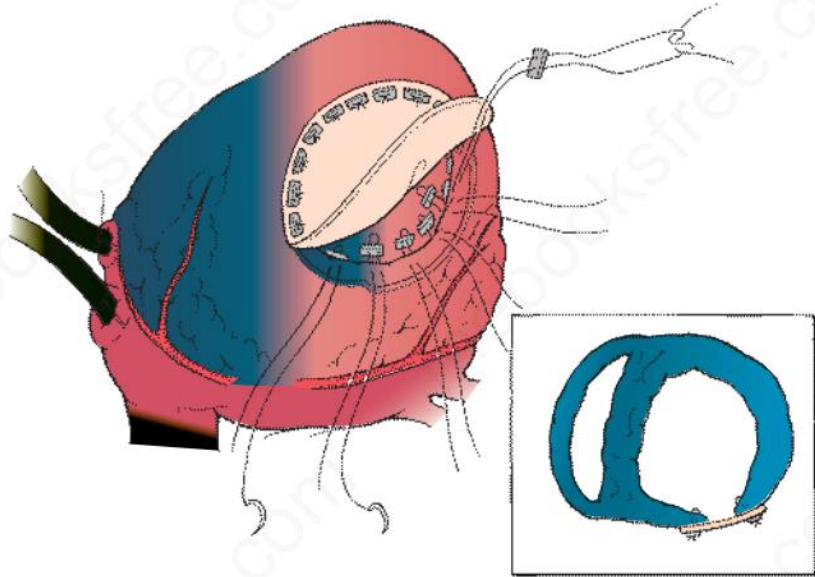
Thrombus removal



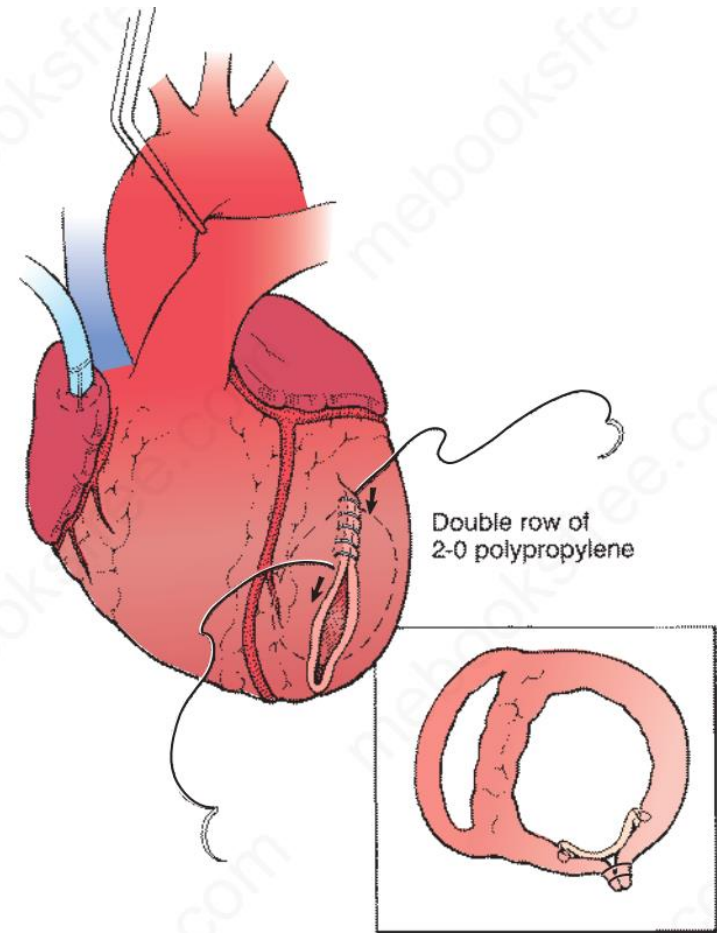
Linear repair



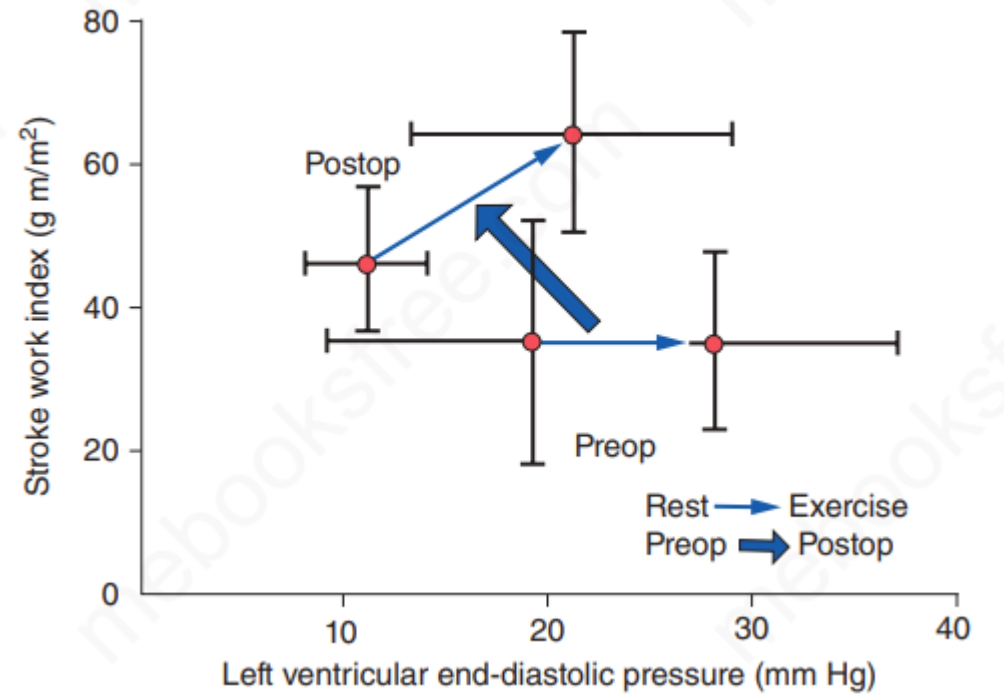
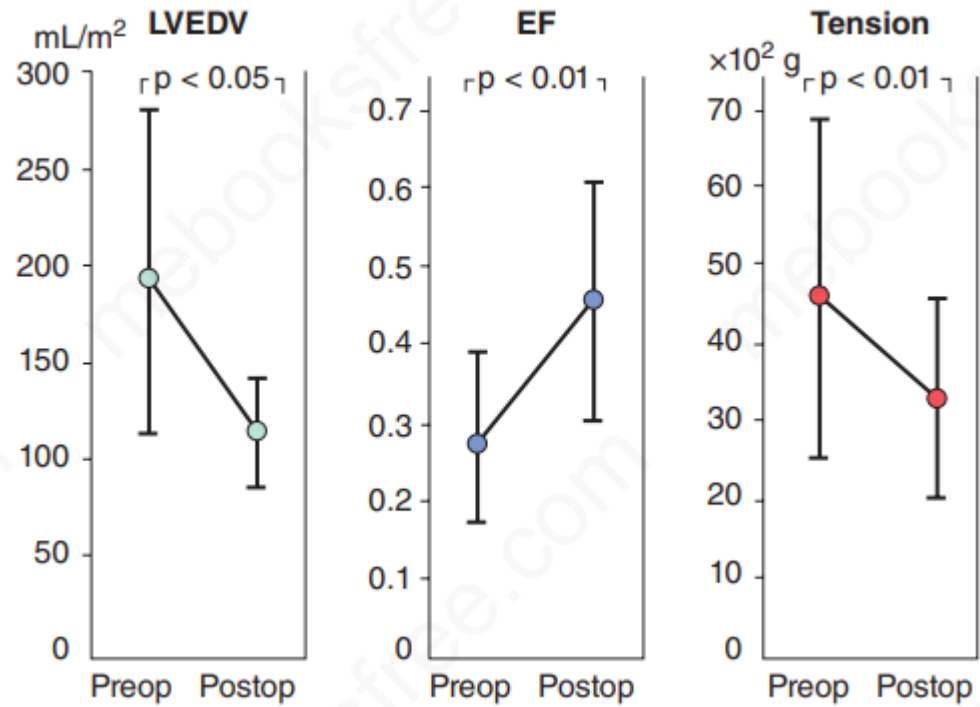
Circular patch



Endoventricular patch

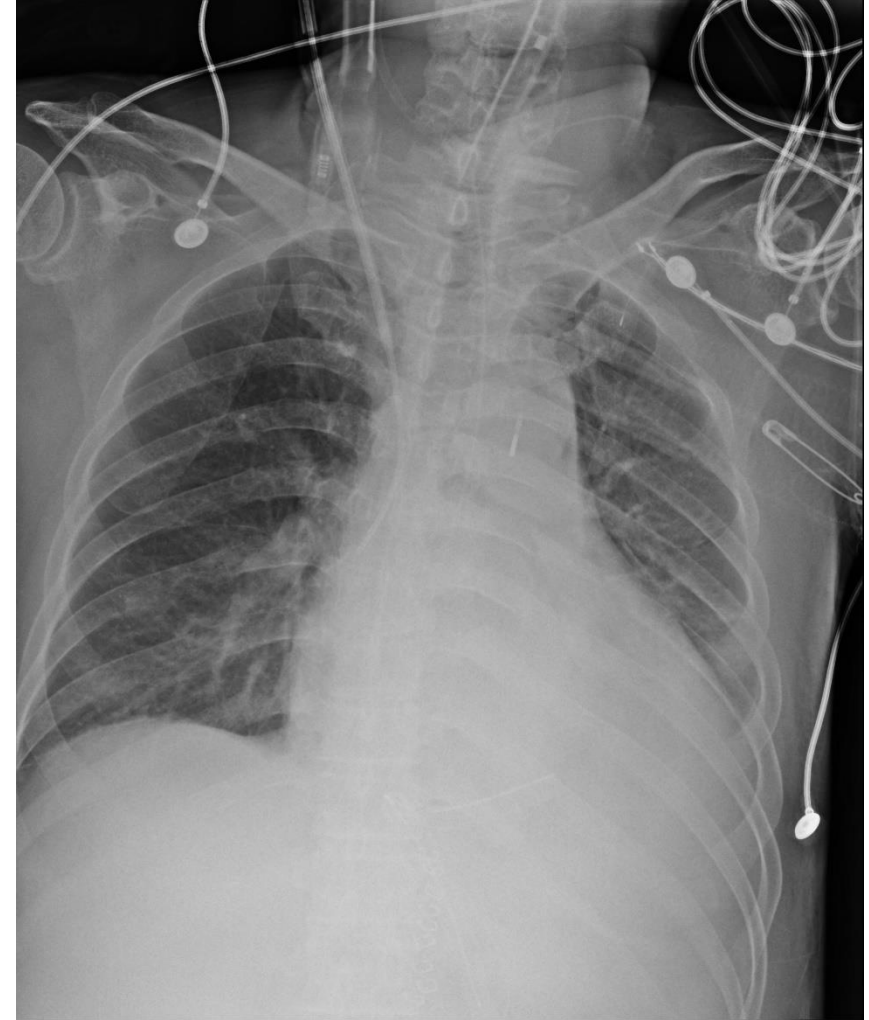


Physiologic effect after surgery



Case

- M/61
- AMI -> POBA to mLAD
- LV apex thrombus on warfarin
- 1mo later ; chest pain, dyspnea
- pericardial effusion, pleural effusion, LV apex aneurysm



Preop echo

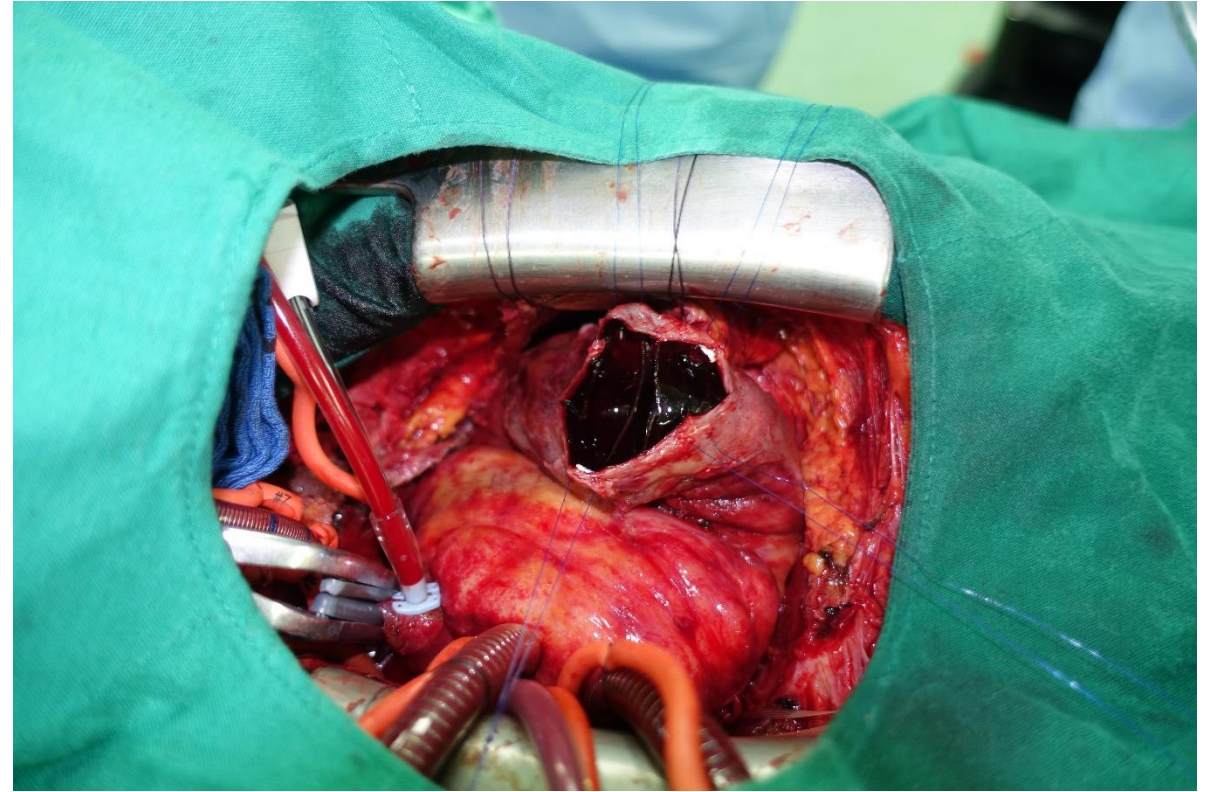
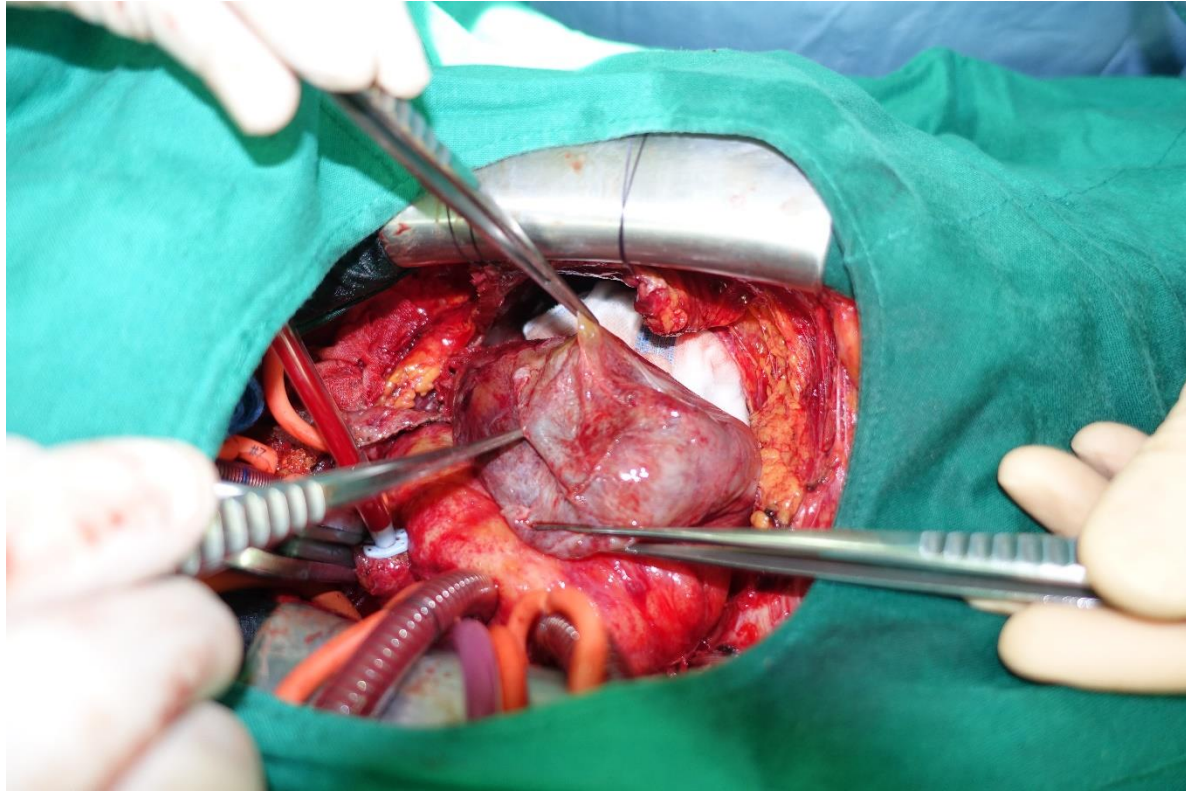


LVEDD 49mm

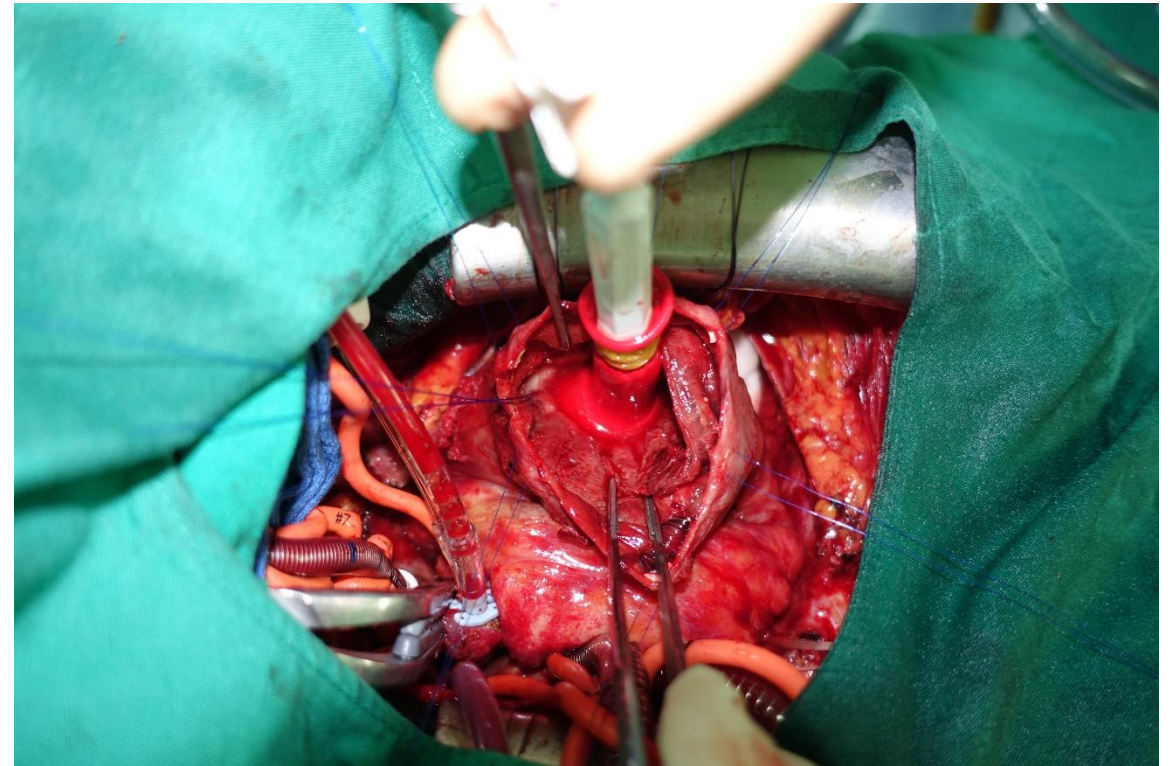
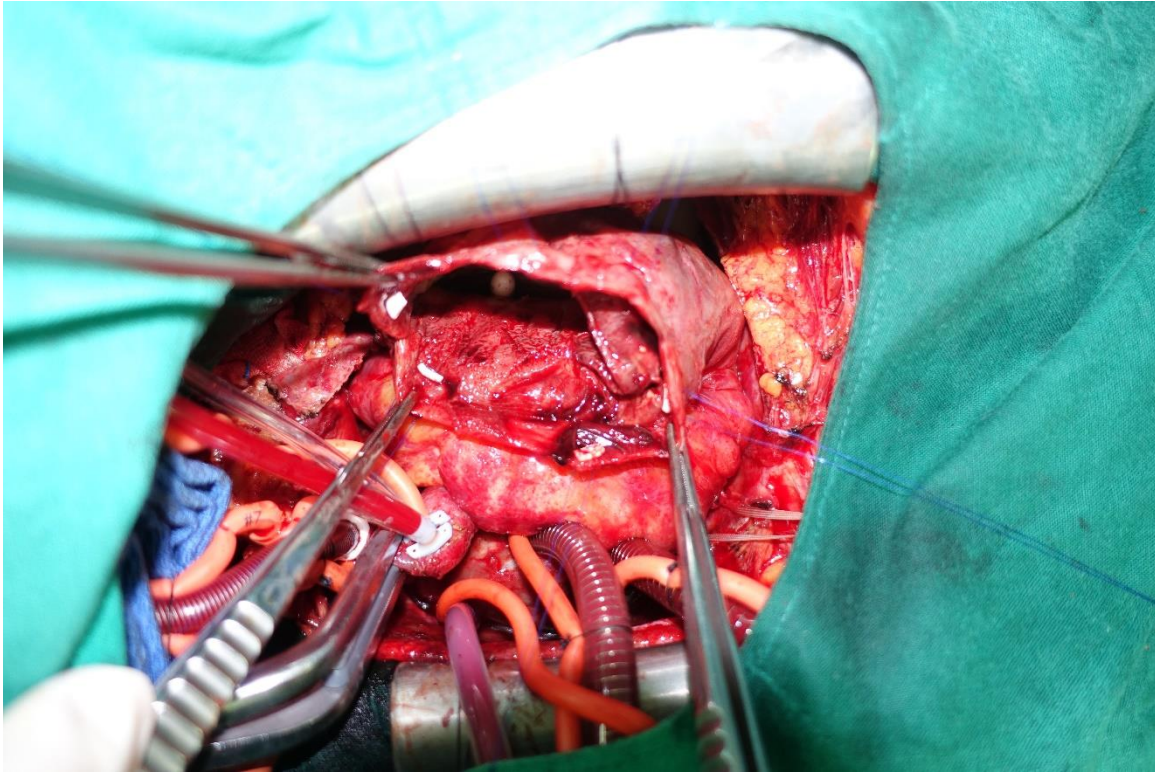
LVESD 36mm

EF 14%

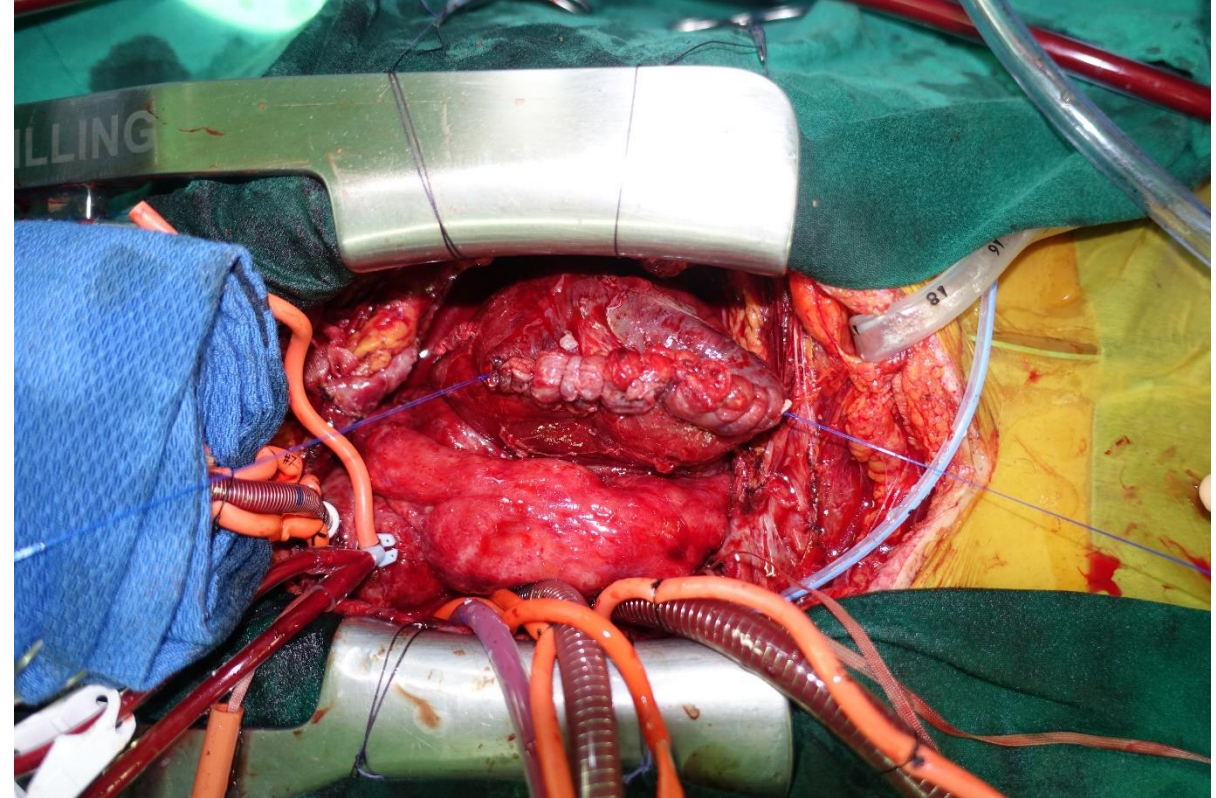
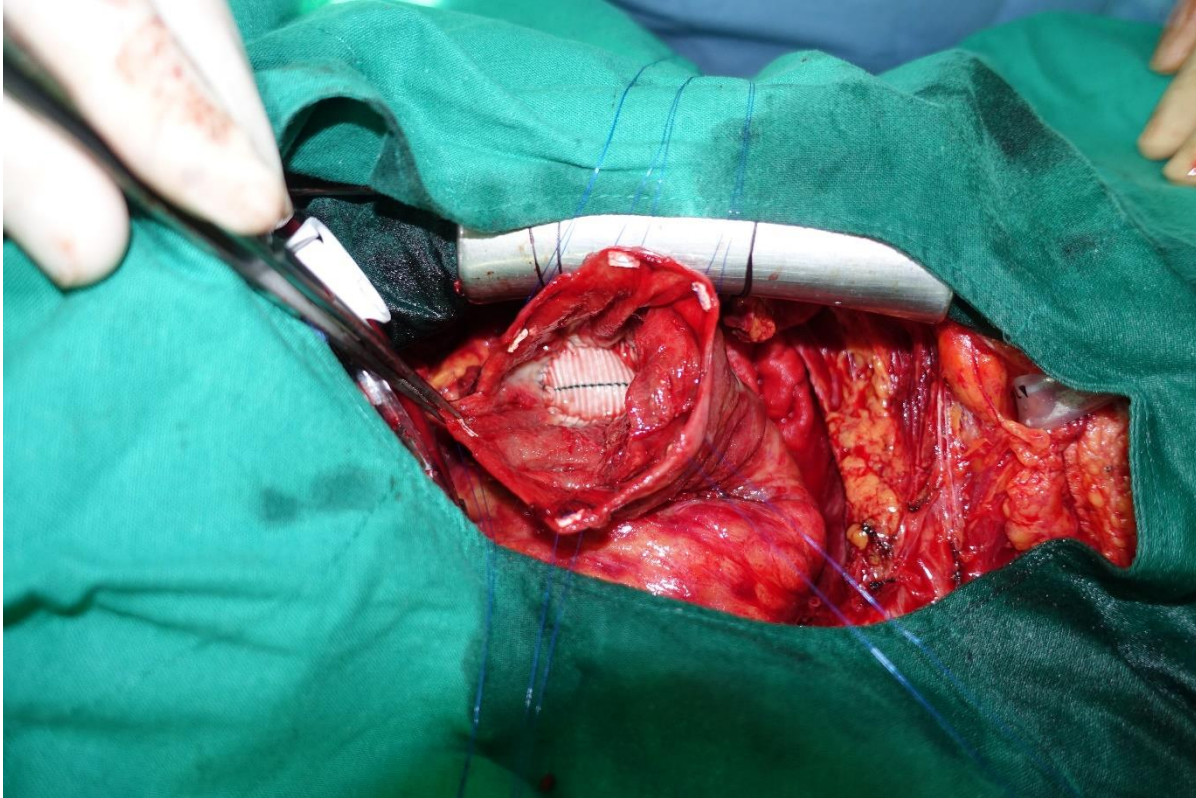
Op: endoventricular patch repair



Op: endoventricular patch repair



Op: endoventricular patch repair



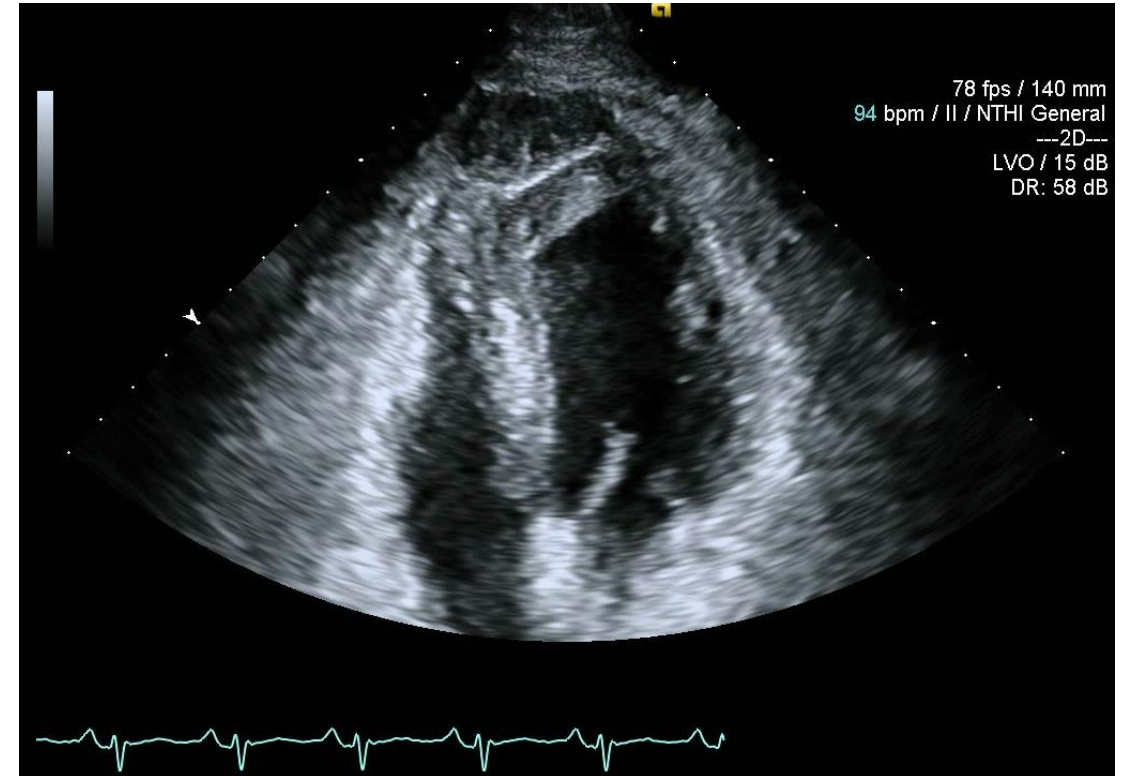
Postop

postop



LVEDD 48mm
LVESD 36mm
EF 50%

6mo f/u



LVEDD 49mm
LVESD 36mm
EF 61%

Thank you for your attention
