


Cardiac Surgical Diseases

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Color Index:

● Important

● Doctor's Notes

● Extra

● Davidson's

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Objectives:



Cardiac Diseases

Common Cardiac Operations:

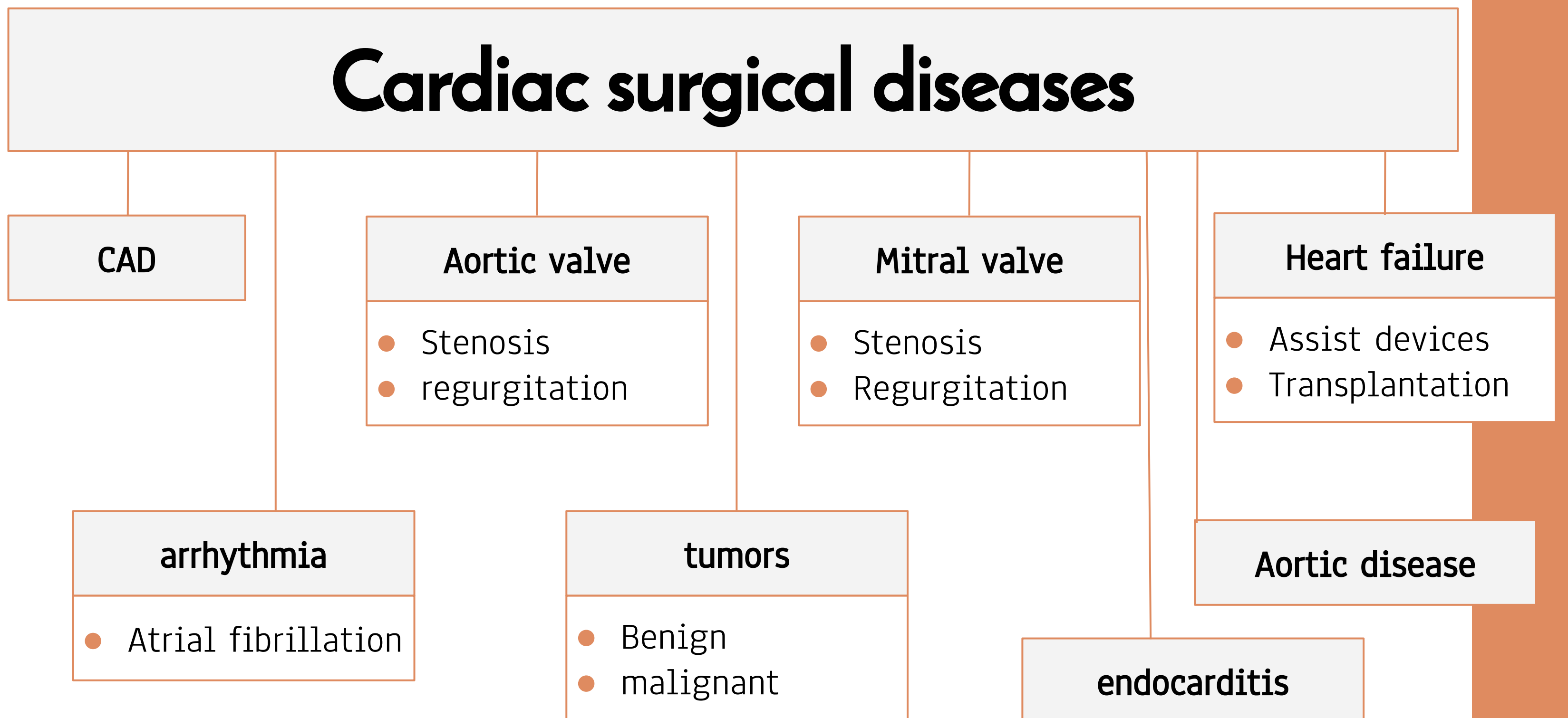
1. -Coronary Artery Bypass Grafting (CABG) (most common)
2. -Valve Replacement / Repair
3. -Repair of congenital defects: VSD or ASD
4. -Heart Transplantation

The doctor focused mainly about:

The surgical indications for different cardiac diseases not the procedures.

Cardiac diseases categories: -
Arrhythmias - CAD -
Valvular diseases (Mitral + Aortic) -
Cardiac tumors -
HF - Aortic surgery disease - Endocarditis

Types of Cardiac Diseases:



First of all and to understand you have to know the classes of surgical indications(for better understanding):

| Classes | Explanations |
|-----------|---|
| Class I | There is confirmed benefit from surgery We have to do surgery |
| Class IIa | The studies which show benefit is more than studies show no benefit |
| Class IIb | The studies which show no benefit is more than studies show benefit |
| Class III | No study shows benefit-Do not do it |

1) Made up of an odd bunch of things.

Coronary Artery Bypass Surgery

| indication | Asymptomatic or mild angina | Stable angina | Unstable angina / NSTEMI | Poor LV function |
|---|-----------------------------|---|--------------------------|-------------------------------------|
| Left main stenosis > 50%(most important vessel) | Class I | Class I | Class I | Class I |
| Stenosis of proximal LAD(Most commonly affected artery in IHD) and proximal circumflex > 70% | Class I | Class I | Class I | Class I |
| 3 vessel disease | Class I | Class I | | Class I, with proximal LAD stenosis |
| 2 vessel disease | | Class I if there is large area of viable myocardium in high-risk area | Class IIb | |

| Revascularization N=no,Y=yes,C=need consultation | CABG (Dr focused on it) | | | DES (drug eluting stent)Dr didn't focus on it | | |
|---|-------------------------|----|-----|--|----|-----|
| | No-risk | DM | LVD | No-risk | DM | LVD |
| 1-vessel | N | N | N | Y | Y | Y |
| proximal LAD | Y | Y | Y | N | N | N |
| 2-vessel without LAD | N | N | N | Y | Y | Y |
| 2-vessel with LAD | Y | Y | Y | Y | Y | Y |
| 2-vessel + proximal LAD | Y | Y | Y | N | N | N |
| 3-vessel | Y | Y | Y | C | C | C |
| 3-vessel + proximal LAD | Y | Y | Y | N | N | N |
| LMC +/- other lesions | Y | Y | Y | N | N | N |

- 1) Ventricular septal defect
- 2) Left anterior descending most commonly affected artery in IHD
- 3) Circumflex coronary artery

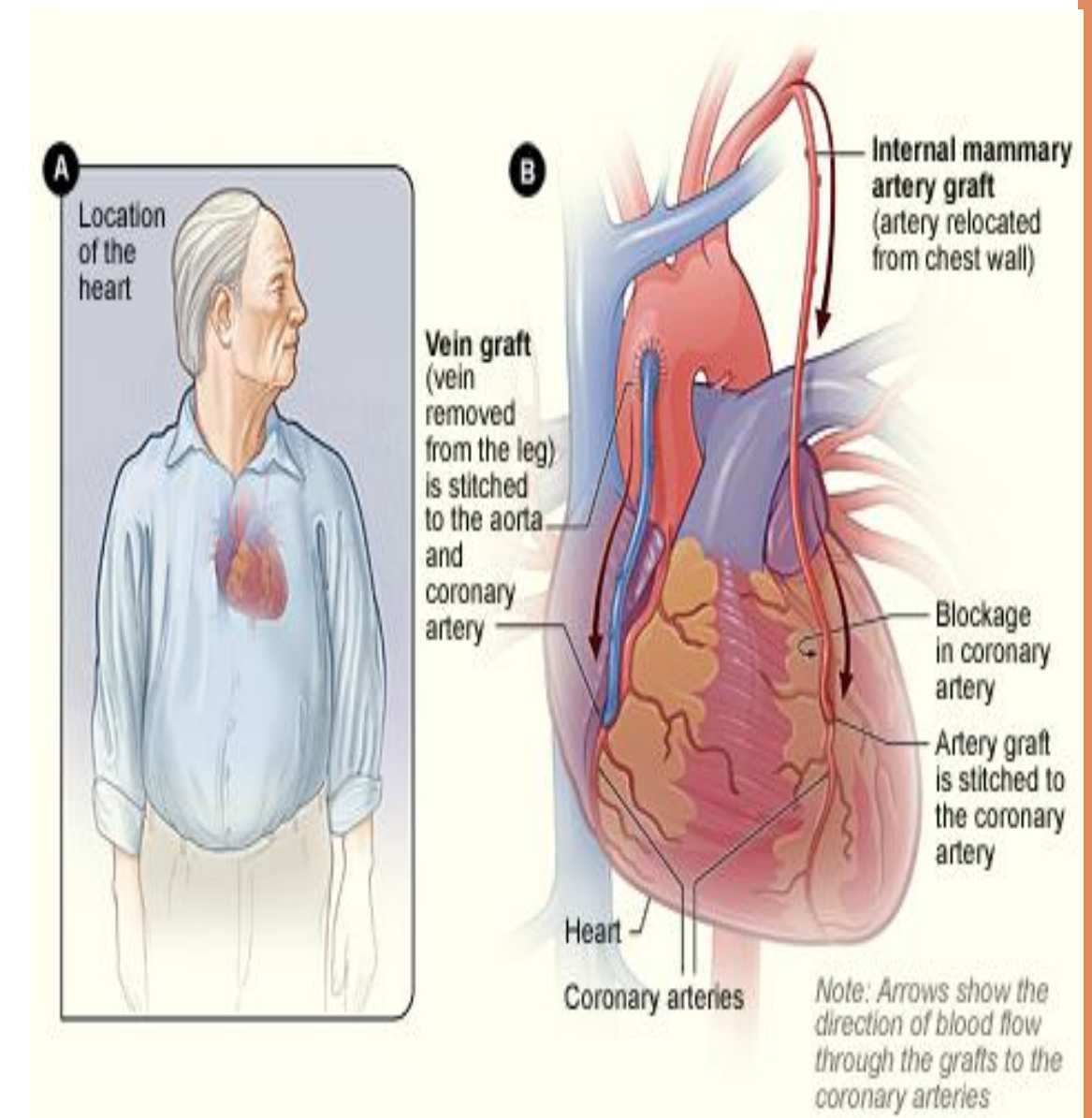
Coronary Artery Bypass Surgery

Mechanism: A vascular graft (either artery or vein) is sutured to the coronary artery beyond the stenosis.

Function: Improves blood flow to the heart.

Coronary conduits for CABG:

- arterial : **Internal thoracic artery** Also called **internal mammary artery**. It has a very high graft patency (exceeds 95% at 5 years and 90% at 10 years)
- Venous: Long saphenous vein.



There are 2 Ways to do CABG:

1. Without (off) pump:

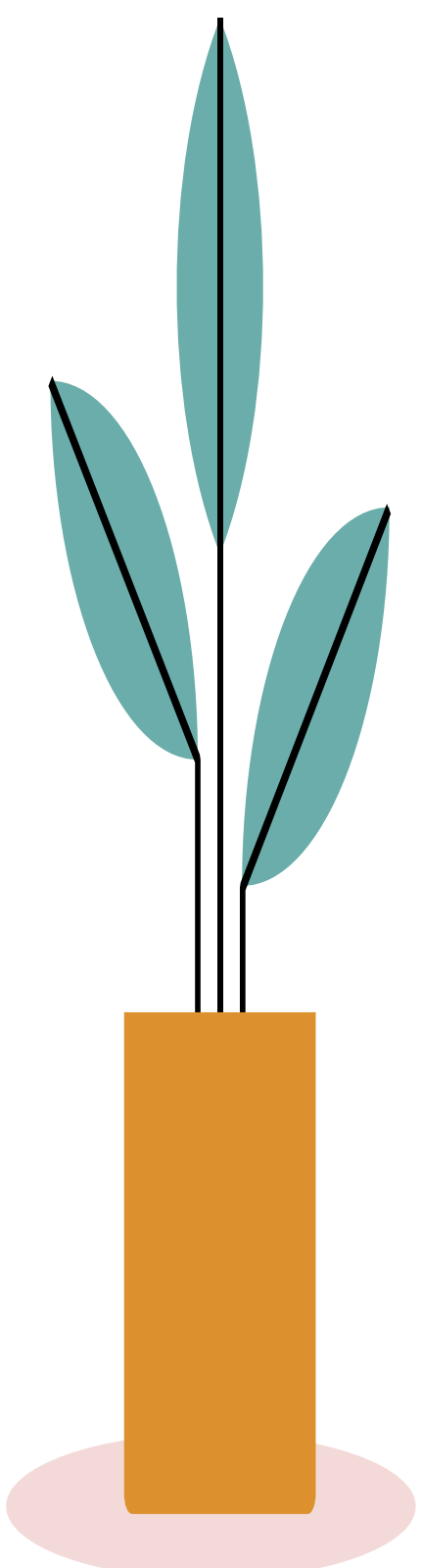
- ↳ [Do the surgery while the heart is working]
- ↳ Risk of bleeding
- ↳ No end organ damage

2. With pump:

- ↳ Can effect the organs > sever systematic Inflammatory reaction
- ↳ May cause end organ damage
- ↳ The younger the patient > The better, because they can tolerate inflammation more [Not recommended for elderly patients]

Benefits of Off Pump CABG(it's better than the ones with pump):

1. Reduced incidence of stroke and cognitive .
2. Lesser coagulopathy requirements of blood transfusion and less bleeding .
3. Reduced morbidity and mortality rate.



Valvular Heart Disease

1-Mitral stenosis (check the notes page):

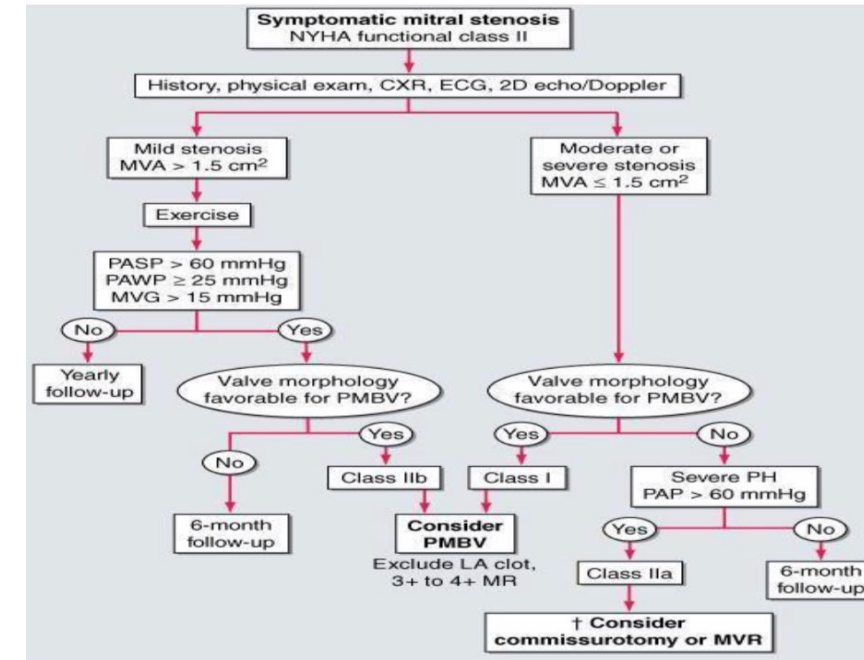
It is the restriction and narrowing of the Mitral valve + impairment of left ventricular filling

Etiology:

- Rheumatic, Congenital, L.A. Myxoma

Symptoms:

- Asymptomatic for many years
- Easy fatigability
- **Dyspnea, Orthopnea and PND**
- Palpitations
- Dysphagia



Signs:

- Tapping non-displaced apex beat
- in longstanding MS, RV gets enlarged so you feel the tapping of RV instead of LV which got pushed posteriorly
- Loud S1
- **Mid-diastolic rumbling murmur**
- **Signs of PH: central cyanosis, Loud P2, TR², PR³.**

Treatment:

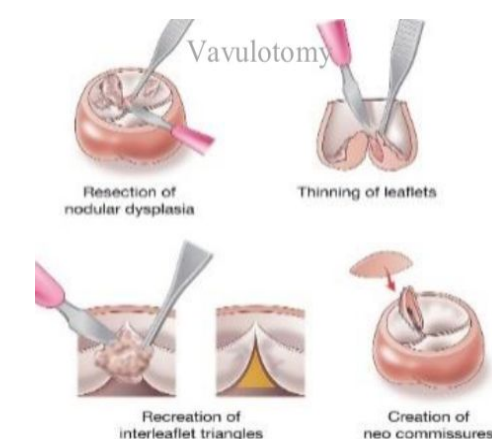
If it is symptomatic:

Surgery:

- Balloon valvuloplasty
- Closed mitral commissurotomy (also called valvulotomy) now obsolete
Commissurotomy is an open-heart surgery that repairs a mitral valve that is narrowed from mitral valve stenosis
- **Open mitral commissurotomy (if there is thrombus in LA).**
- **Mitral valve replacement / repair (If its calcified).**

If it is not symptomatic:

Medical treatment.



Indication for surgery

Mitral valve surgery for mitral stenosis is recommended for symptomatic severe M.S. when the valve is not favorable for Percutaneous balloon commissurotomy (presence of L.A. clot, significant mitral regurge) Dr said we usually use mitral vlave replacment .

1) Ventricular septal defect Pulmonary hypertension
2) Tricuspid regurge
3) Pulmonary regurge

2-Mitral Regurgitation

MR is defined as retrograde flow of blood from the LV into the LA due to impaired systolic coaptation between the anterior and posterior leaflets.

Etiology:

- Rheumatic, Degenerative, Endocarditis, others

Types:

- A. **Chronic mitral regurgitation:** Rheumatic fever, Myxomatous degeneration, ischemic cardiomyopathy
- B. **Acute mitral regurgitation:** chordal rupture¹, infective endocarditis, papillary muscle rupture following MI.

Symptoms:

- Fatigue and weakness
- Dyspnea, Orthopnea², PND³
- Pulmonary hypertension and right heart failure.

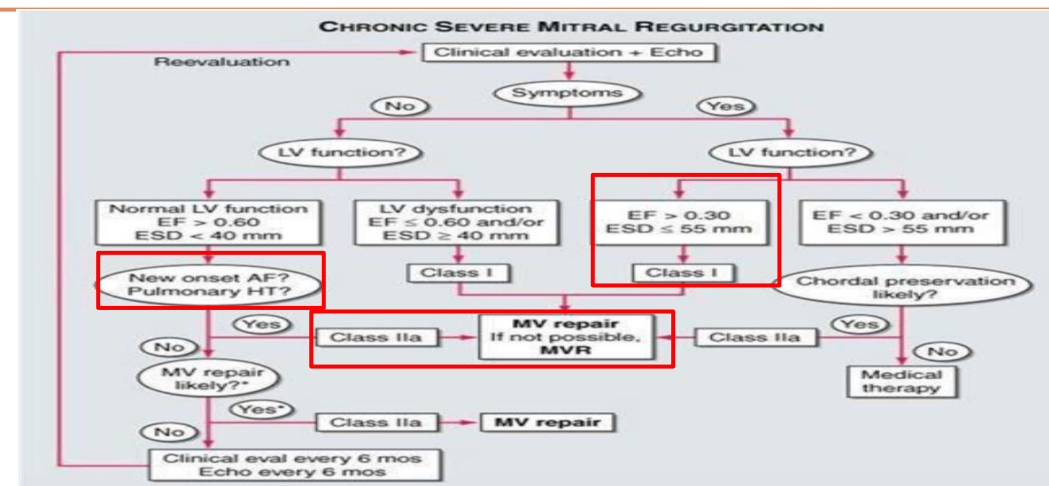
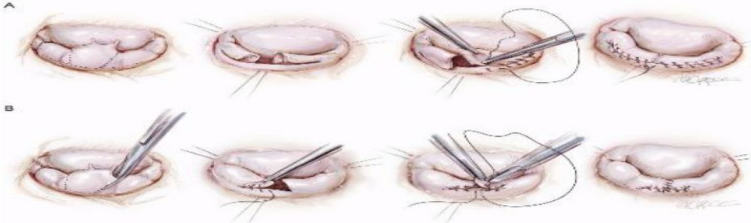
Note that: Asymptomatic patients can have a long latent period before the onset of symptoms as chronic MR⁴ is well tolerated if LV⁵ function is still preserved.

Signs:

- Displaced apex beat.
- Apical thrill⁶.
- Apical pan-systolic murmur.
- Signs of pulmonary hypertension.

Treatment:

- Medical therapy.
- **Valve repair / replacement**



Indication for surgery

1. **Prompt mitral valve surgery is indicated for the symptomatic patient with acute severe primary MR.**
2. In chronic mitral regurgitation, surgery is done for symptomatic or asymptomatic patients with evidence of **LV dysfunction, new onset A.F., or pulmonary hypertension.**
3. Asymptomatic patients with chronic severe MR and decrease LV (**doctor said less than 60% of EF go for surgery**).

1) Several common diseases such as rheumatic heart disease and infectious diseases have been known to cause chordae rupture. Severe mitral valve prolapse had been reported to be at increased risk for chordal rupture.

2) Shortness of breath (dyspnea) that occurs when lying flat.

3) Paroxysmal nocturnal dyspnea.

4) Mitral Regurgitation.

5) Left ventricular.

6) Murmurs may be so loud as to be palpable as thrills.

3-Aortic stenosis (check the notes page):

Etiology:

- Rheumatic, Congenital, Degenerative.

Symptoms:

- Asymptomatic.
- Chest pain.
- syncopal attacks.
- Dyspnea and Congestive heart failure.

The interval from onset of symptoms to death tends to be 2 years for CHF, 3 years for syncope, and 5 years for angina.

Signs:

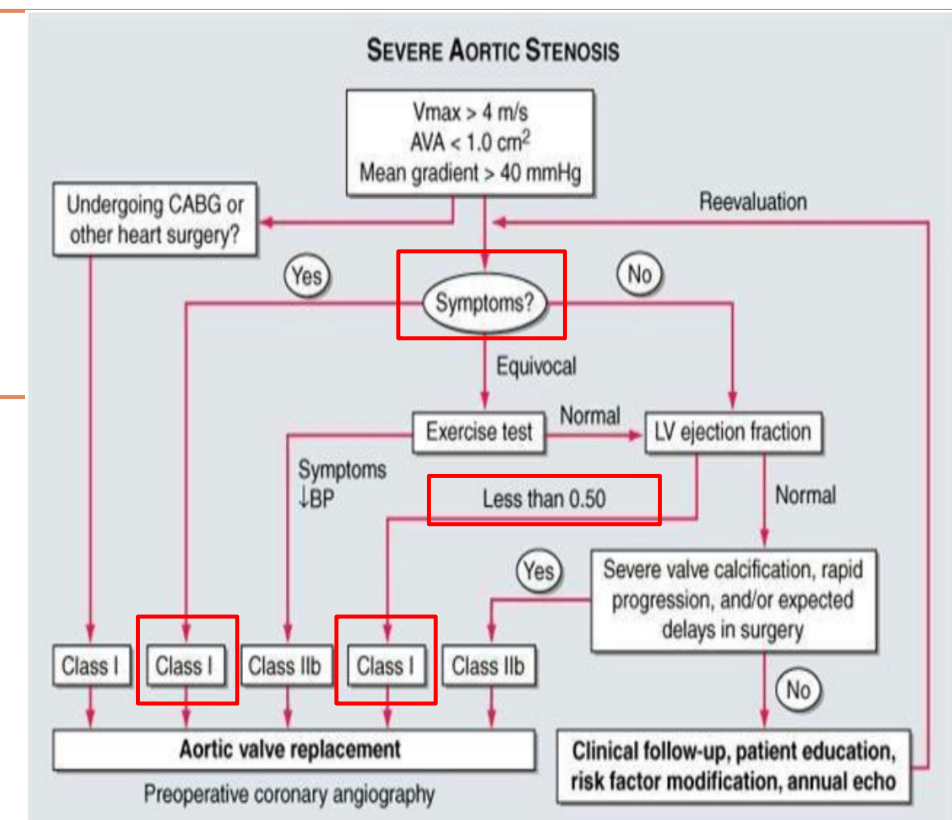
- Slow-rising pulse.
- Small amplitude pulse.
- Sustained apical pulse.
- Harsh ejection systolic murmur.

Treatment:

- Surgical AVR(mostly used).**
- Transcatheter AVR (TAVR).
- Percutaneous balloon valvuloplasty.**

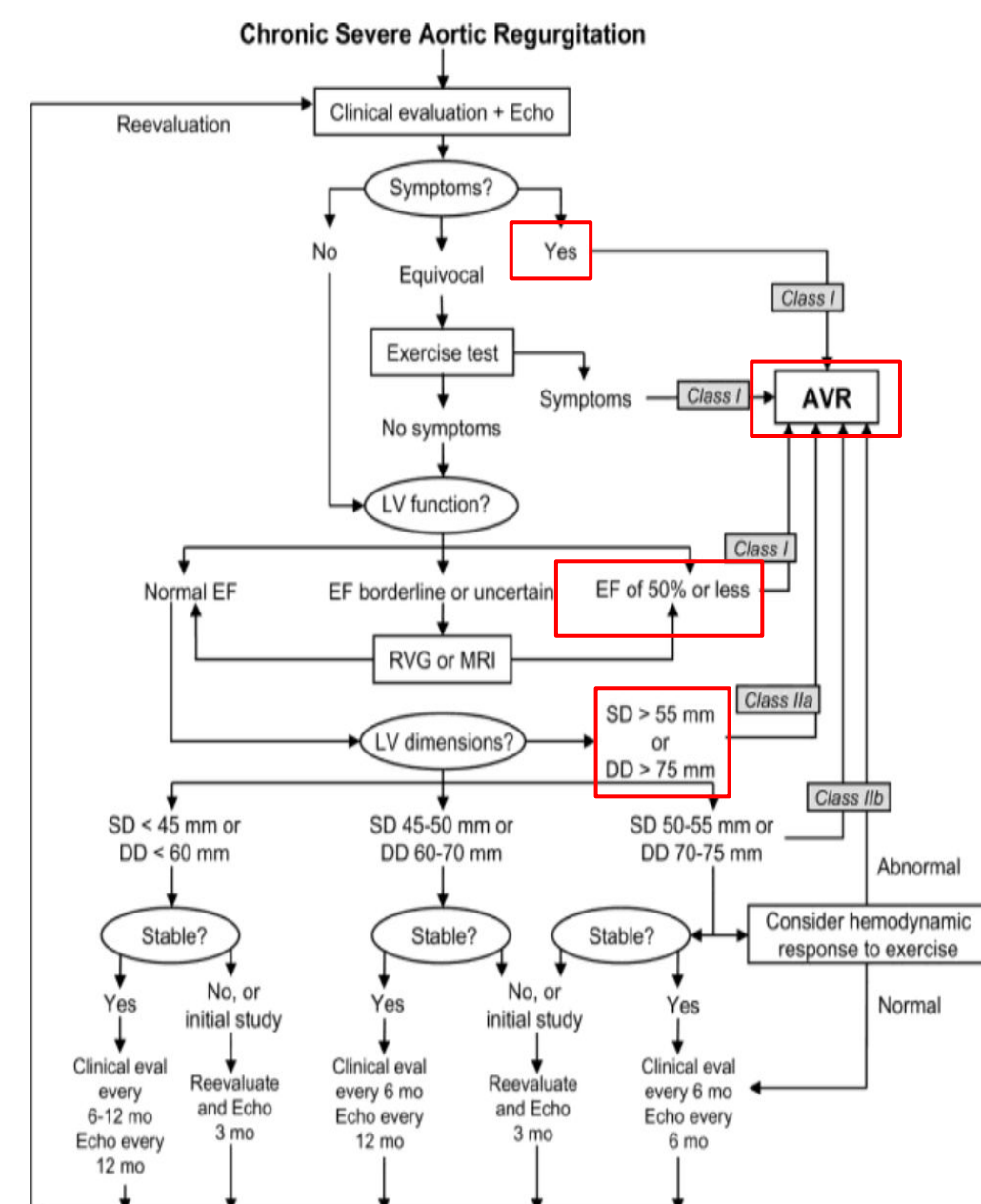
Surgical indications for AVR

- Patients with severe symptomatic AS
- Asymptomatic patients with moderate or severe AS undergoing cardiac surgery for coronary or other valve disease.
- Asymptomatic patients with severe AS and reduced EF(Less than 50%).



4-Aortic regurgitation:

- AR is the diastolic reflux of blood from the aorta into the LV due to failure of coaptation of the valve leaflets at the onset of diastole.
- Etiology:** Rheumatic, Endocarditis, Connective tissue disorders, Aortic dissection or aneurysm. AR can be acute or chronic.
- Management of acute aortic regurge** is by early surgery to replace it.
- Current recommendations for management of chronic AI depend on the presence of symptoms, LV function, and LV dimension (By dimension we mean the size, if its more than 55mm in systole or more than 75mm in diastole go for surgery).



Thoracic Aortic Diseases

1. **Thoracic aortic aneurysm:** Symptoms are usually due to pressure on surrounding structures.
2. **Aortic dissection:** Tear in the intima allowing blood to enter and flow in a false channel. There are 2 lumens separated by the dissecting membrane.

Patients with aortic dissection present with uncontrolled hypertension, and "tearing / ripping / cutting" pain. CXR shows widened mediastinum.

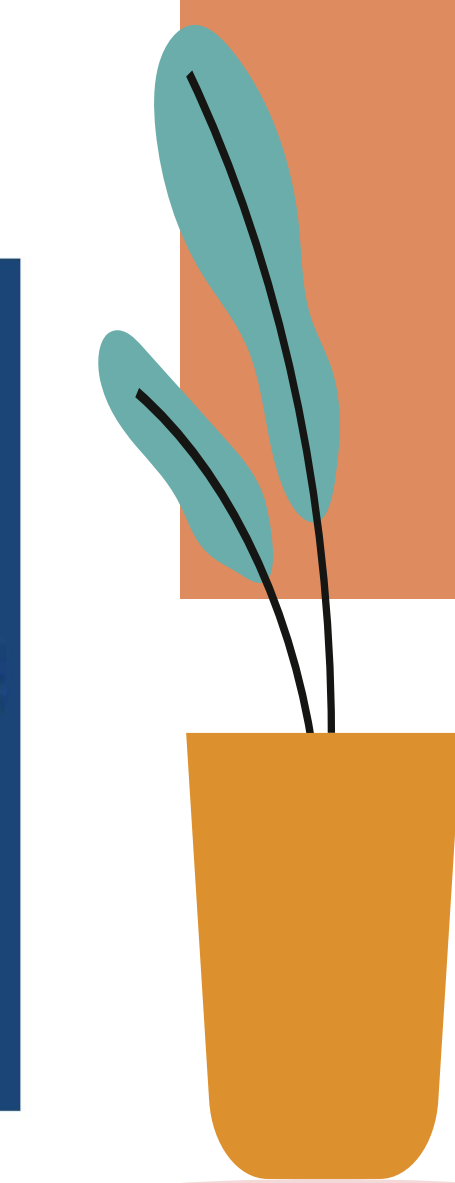
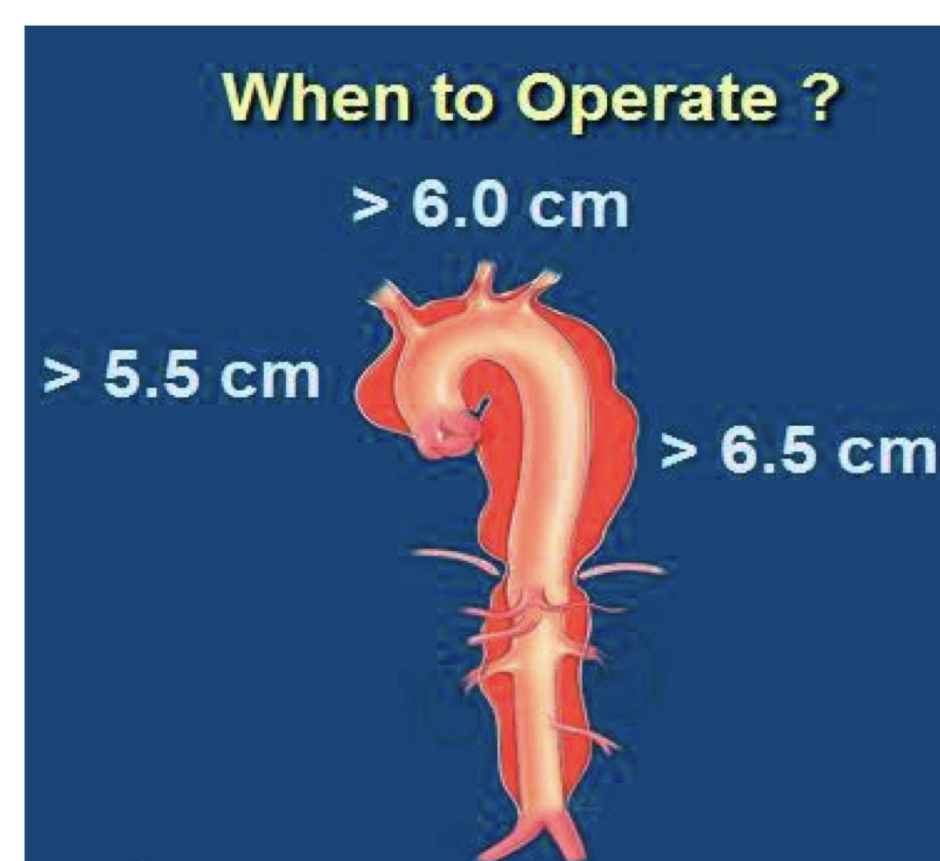
| Aortic dissection | |
|---|---|
| Type A | Type B |
| <ul style="list-style-type: none"> ● Arising in the ascending aorta. ● Are a medical emergency and require immediate surgery. ● Mortality rate up to (1 - 2%) 5% per hour. | <ul style="list-style-type: none"> ● Arising in the descending aorta. ● Carry a lower mortality rate and can be managed medically. ● May cause symptoms due to vascular compromise to other areas e.g. acute limb ischemia, renal ischemia, paraplegia, mesenteric ischemia. |

Aortic Aneurysm (abnormal dilatation of the aorta)

- Commonly accepted criteria for surgical intervention on ascending Aortic aneurysm:
- • Connective tissue disorders like **Marfan's syndrome** : 5cm (we drop the criteria by 0.5cm)
- Bicuspid aortic valve: 4.5cm (In those patient we drop the criteria in Ascending aorta by 1 only the other parts of the aorta will be the same as low risk patients.
- Undergoing AVR: >4.5cm
- Growth of aneurysm >0.5cm/year

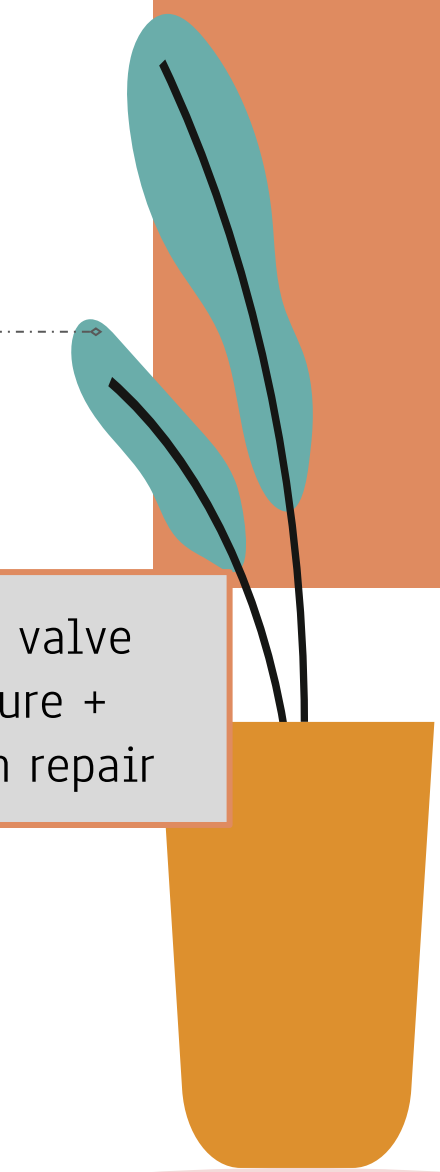
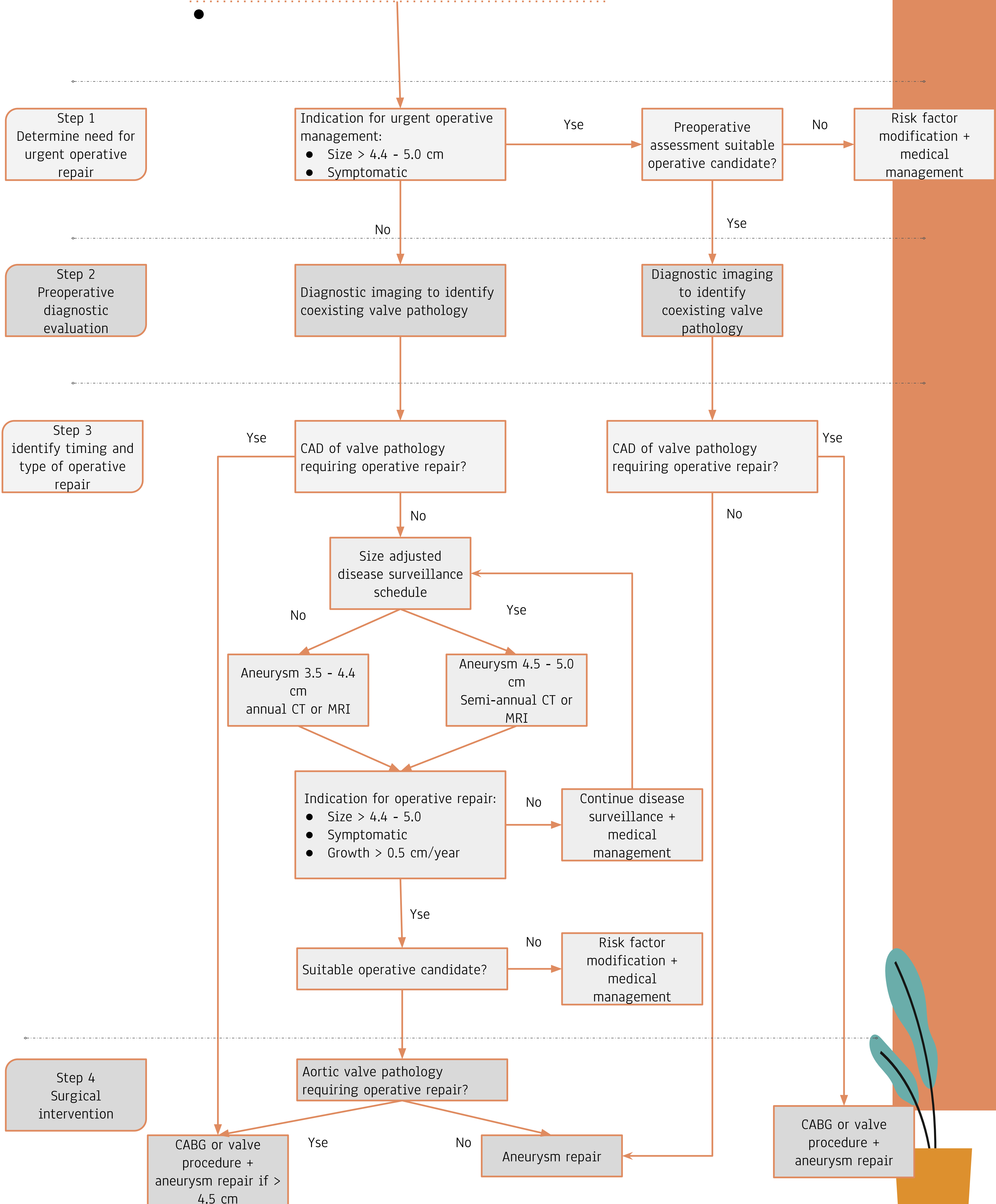
For patients with **Marfan's syndrome** , Connective tissue disorders we drop the criteria for Surgery cut-off (in image by 0.5cm) so it will be:

- 5cm in ascending aorta
- 5.5 cm in arch of aorta
- 6cm in descending aorta

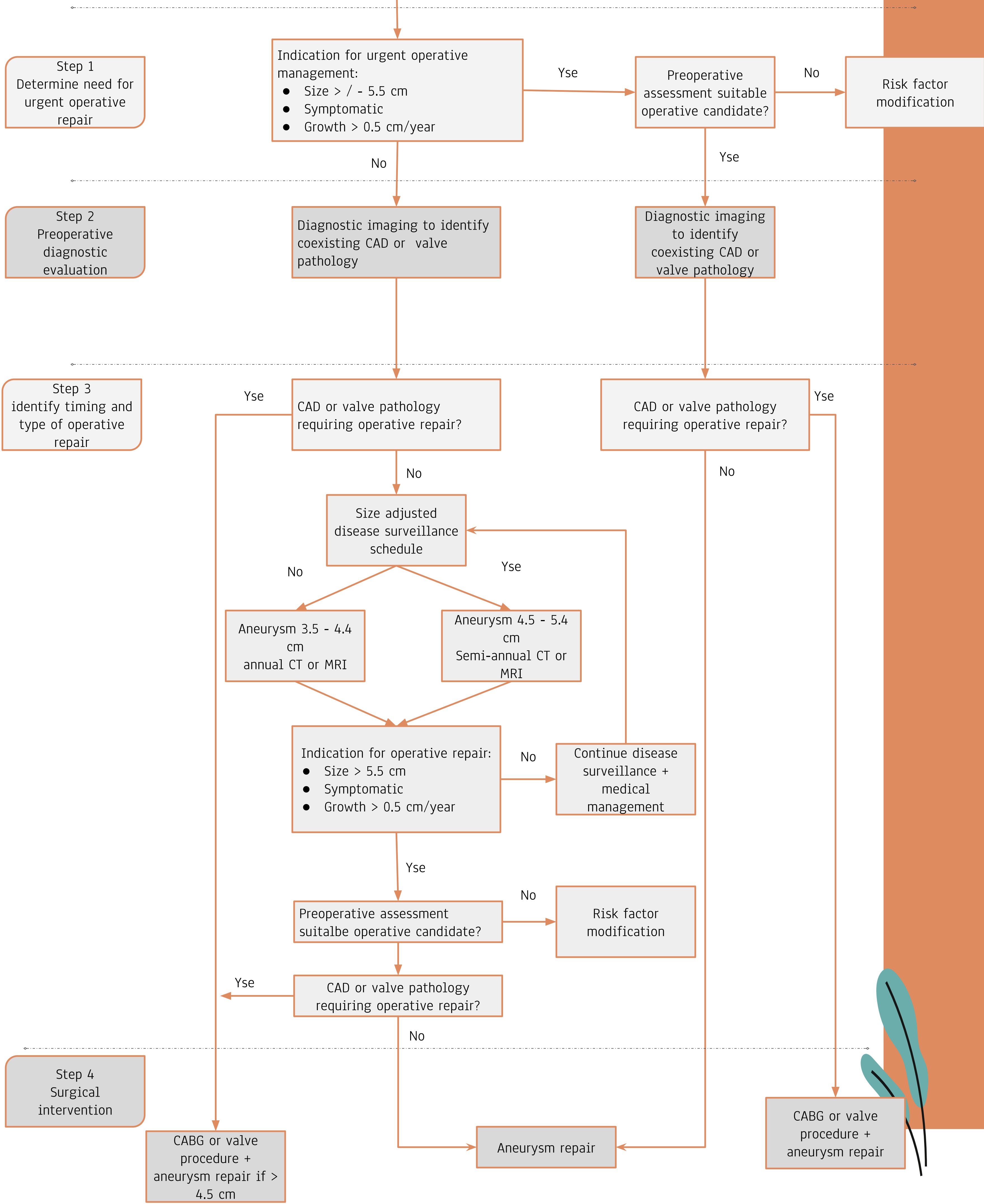


Ascending aortic aneurysm associated with:

- Marfan syndrome
- Bicuspid aortic valve
- Other genetically mediated disorder (don't panic check the notes page)



Ascending aortic aneurysm of degenerative etiology (don't panic check the notes page)



- 1) Ventricular septal defect
- 2) Left anterior descending most commonly affected artery in IHD
- 3) Circumflex coronary artery

Heart Failure

Ventricular Assist Devices (Dr did not focus on it just read it)

| Indications | Absolute Contraindication |
|---|--|
| Frequent hospitalizations for HF ₍₁₎ . | Irreversible hepatic disease. |
| Intolerance to neurohormonal antagonists . | Irreversible renal disease |
| NYHA ₍₂₎ IIIb-IV functional limitations despite OMT. | Irreversible neurological disease. |
| End-organ dysfunction owing to low CO . | Medical nonadherence(don't take thrombolytic therapy). |
| Increasing diuretic requirement . | Sever psychosocial limitations. |
| CRT ₍₃₎ nonresponder. | |
| Inotrope dependence. | |
| Low peak Vo2 (<14mL/Kg/min). | |

Heart Transplant (any end stage heart disease)

| Indications | Absolute Contraindication |
|---|--|
| Cardiogenic shock requiring mechanical assistance.=Medications didn't work | Pulmonary hypertension (TPG > 15 mmHg, SPAP > 50 mmHg, PVR > 4 WU, PVRI >6). |
| Refractory heart failure with continuous inotropic infusion. | Systemic disease (anticipated to limit long-term survival) won't live long) |
| NYHA functional class 3 and 4 with a poor 12 months' prognosis. | Elevated creatinine (>200 umol/L). |
| Progressive symptoms with maximal therapy. | Psychosocial (substance abuse, smoking, medical noncompliance). |
| Severe symptomatic hypertrophic or restrictive cardiomyopathy(end stage). | Active infection |
| Medically refractory angina with unsuitable anatomy for revascularization. | Malignancy (within 5 years) |
| Life-threatening ventricular arrhythmias despite aggressive medical and device interventions. | Marked cachexia (<60% ideal body weight). Morbid obesity (>140% ideal body weight). |
| Cardiac tumors with low likelihood of metastasis. | Osteoporosis. |
| Hypoplastic left heart and complex congenital heart disease. | Peripheral or cerebrovascular disease. |
| | Diabetes mellitus with end organ damage. |

1) Heart failure.

2) New York Heart Association.

3) Cardiac Resynchronization Therapy: The procedure involves implanting a half-dollar sized pacemaker, usually just below the collarbone. Three wires (leads) connected to the device monitor the heart rate to detect heart rate irregularities and emit tiny pulses of electricity to correct them. In effect, it is "resynchronizing" the heart.



Endocarditis

Modified Duke criteria: Major criteria.

1. Microbiologic evidence:

- Typical microorganisms consistent with IE from 2 separate blood cultures.
- persistently positive blood cultures with other organisms:
 - i. At least 2 +ve cultures drawn >12 hours apart.
 - ii. All 3 or majority of 4 separate cultures with the first and last at least 1 hour apart.
 - iii. Single +ve culture for Coxiella burnetti.

2. Evidence of endocardial involvement:

- a. Oscillating intracardiac mass
- b. Abscess
- c. New partial dehiscence of prosthetic valve
- d. New valvular regurgitation.

A definitive clinical diagnosis can be made on the following:

2 major criteria, 1 major and 3 minor, or 5 minor criteria.

Indication for and timing of surgery in patient with left sided , native valve infective endocarditis.

| Indication (check the notes page) | Timing of surgery |
|--|-------------------|
| Heart failure | |
| Aortic or mitral valve infective endocarditis with severe acute regurgitation or obstruction causing refractory pulmonary edema or cardiogenic shock. | Emergency |
| Aortic or mitral valve infective endocarditis with fistula into a cardiac chamber or pericardium causing refractory pulmonary edema or cardiogenic shock. | Emergency |
| Aortic or mitral valve infective endocarditis with severe acute regurgitation or obstruction and persistent heart failure(not responding to therapy)or signs of poor hemodynamic tolerance (early mitral valve closure or pulmonary hypertension). | Urgent |
| Aortic or mitral valve infective endocarditis with severe regurgitation and heart failure easily controlled with medical treatment. | Elective |
| Uncontrolled infection | |
| Locally uncontrolled infection (abscess , false aneurysm, fistula, enlarging vegetation, or dehiscence of prosthetic valve). | Urgent |
| Persistence fever and positive blood cultures for >5-7 days. | Urgent |
| Infection caused by fungi or multi drug resistance organisms , such as pseudomonas aeruginosa and other gram negative bacilli . | Elective |
| Prevention of embolism | |
| Aortic or mitral valve infective endocarditis with large vegetation (>10mm=1cm in length) after one or more embolic episode, despite appropriate antibiotic therapy, especially during the first 2 weeks of therapy. | Urgent |
| Aortic or mitral valve infective endocarditis with large vegetation (>10mm in length) and other predictors of complicated course (heart failure, persistence infection with staph aureus or Fungal, or abscess). | Urgent |
| Isolated, very large vegetation (>15mm) : surgery may be preferred if a procedure preserving the native valve is feasible. | Urgent |

Arrhythmias

| Recommendations | Class | Level |
|---|------------|-------|
| Surgical ablation of AF should be considered in patients with symptomatic AF undergoing cardiac surgery. | IIa | A |
| Surgical ablation of AF may be performed in patients with asymptomatic AF undergoing cardiac surgery if feasible with minimal risk. | IIb | C |
| Minimally invasive surgical ablation of AF without concomitant cardiac surgery is feasible and may be performed in patients with symptomatic AF after failure of catheter ablation. | IIb | C |



Cardiac Tumors

| Primary Cardiac Tumors | |
|---|--|
| Benign (75% of the cases). | Malignant (25% of the cases). |
| <ul style="list-style-type: none"> ● Myxoma. ● Rhabdomyoma. ● Fibroma. ● Lipoma ● Atrioventricular node tumor. ● Papillary. ● fibroelastoma. ● Hemangioma | <ul style="list-style-type: none"> ● Rhabdomyosarcoma. ● Fibrosarcoma. ● Angiosarcoma |

cardiac Tumors

- Benign? We excise it but we take the size under consideration
- Malignant? Regardless the size we never excise it

Valvular Prosthesis

Prosthetic Heart Valve

1. Biologic (Bio-prosthetic valve)

- Lasts 8 - 10 years
- No anticoagulation
- No click
- We use biological valve for old age and contraindication for anticoagulant like in female childbearing age.

2. Mechanical (metallic)

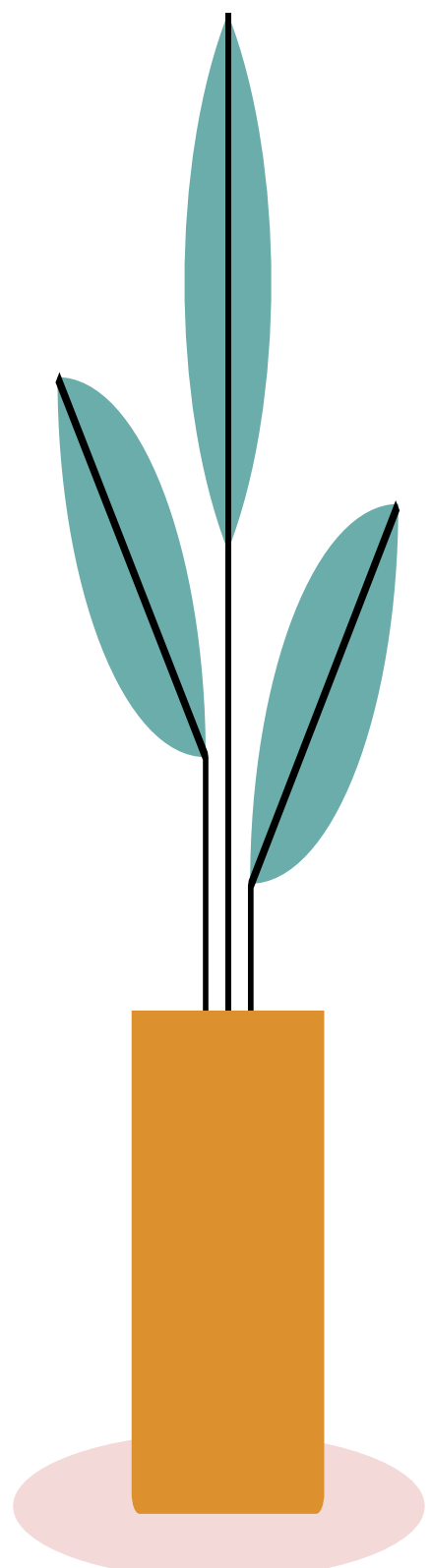
- Lasts > 20 years
- Lifelong anticoagulation
- Click
- Unless there is contraindication to anticoagulation, mechanical valves are commonly used in a younger age group.

Overview of AVR Options

| Prosthesis | Description | Advantages | Disadvantages | Lifespan |
|------------------------|-----------------------------|--|----------------------|---------------|
| Mechanical | Bileaflet | Best durability | Anticoagulation | Lifetime |
| Stented BIoprsthesis | Porcine/ Bovine pericardial | No anticoagulation | Durability | 10 - 15 years |
| Homografts/ Autografts | Human aortic valves | No anticoagulation, excellent dynamics | Technical complexity | |

Complications of prosthetic valves:

1. Thrombosis
2. Bleeding complications
3. Infective endocarditis
4. Paravalvular leak



Dr notes:

First part: Surgical Indications

Surgical diseases categories:

- Arrhythmias
- CAD
- Valvular diseases (Mitral + Aortic) - Cardiac tumors
- HF
- Aortic surgery disease
- Endocarditis

Coronary bypass surgery

- The best intervention is **medical therapy** (for stable angina), once the Condition reach the level of MI and unstable angina, we do the other **interventions**.
 - We have 2 intervention for coronary diseases (Rather than medical):
 1. Percutaneous intervention (PCI)
 2. Surgery
 - We decide the type of the intervention according to the following:
 1. **Left main coronary Disease > Class I > Bypass Surgery [regardless patient symptoms]**
 - ↳ Why left? Left coronary serve 75% of the heart muscle
 - ↳ Why Not PCI? because any mistake happen during PCI > patient arrest
 2. **Stenosis at proximal LAD and proximal circumflex > Bypass surgery**
 - ↳ why proximal? because Left main bifurcate to give these to so proximal is equivalent to left main.
 3. **3 Vessels disease [All the coronary Arteries are blocked] > Bypass surgery**
 - ↳ Why?
 - 1) because the whole muscle is ischemic
 - 2) number of stents that needed to open All the arteries will cause high risk of occlusion of stent that is why surgery is preferred
- if we have single vessel occlusion > one stent then PCI
 - if we have double vessels occlusion > 2 Stents [40% Risk > Acceptable]
 - more than 2 stents > better to go with surgery

Aortic valve [Stenosis or Regurgitation]

Think about 5 things:

Class 1 indications:

1. **Symptoms** (most important one) (think about onset not severity or duration)
2. 2- Size
3. LV Function(EF)

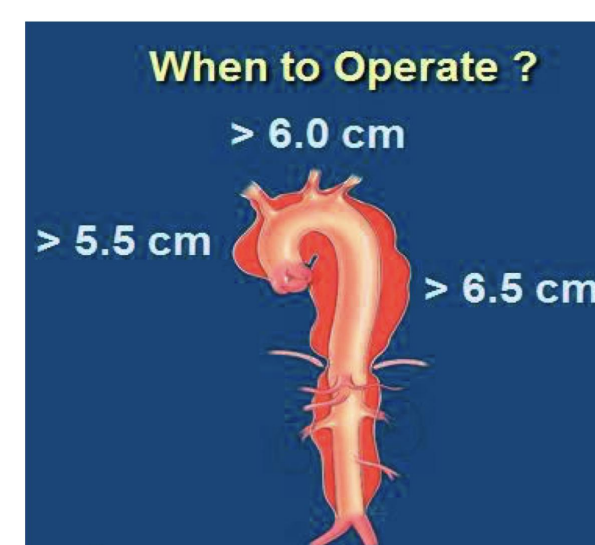
Class 2 indications:

4. Pulmonary pressure
 5. AFib
- if any of these 5 get affected > indication of surgery [stenosis or regurgitation]
 - if the patient is going to have another surgery better to have the valvular surgery at the same time [Even if moderate stenosis]
 - sever AS, AR > confirm the diagnosis by ECHO+ do stress test if theres symptom or not > look for the 5 things
 - ↳ Any one is present > surgery

Cont. Dr notes:

Aortic Diseases

- Morphology and the ability to expand of the Aorta is different in different parts of the Aorta - Autopsy Studies shows that rupture of aorta when they exceeded 6 cm for the ascending aorta, 6.5 cm for the arch of aorta and 7 cm for the descending aorta.
- People are not same, So we make the decision according to the patient normal not autopsy criteria [but for exam stick to the Autopsy value]
- Divide patients into low / High risk according to the quality of the tissues
- **Marfan's syndrome and Connective tissue disease, bicuspid aortic valve [high risk conditions]**
 - ↳ very weak tissue > High Risk to rupture or grow quickly
- High risk > expected to rupture earlier
- For low risk patient, There is 4 important factors:
 1. Symptoms or patients under surgery
 2. Absolute size
 3. Growth rate
 4. If the patient is going for another surgery (the number is depending upon the surgeon)
- For High risk patient we drop of 0.5-1 cm from the criteria
 - ↳ . e.g: The highest limit for Ascending aorta is 5.5 normally but in high risk patients it is 4.5cm



The autopsy criteria for aortic rupture The aorta should be below the written values

Heart Failure

Indications for heart transplant are basically 2 things:

1. Patient have problem that can't be corrected by any other method = End stage heart disease
2. Expected survival > 1 year

* if the patient is expected to die due to any other cause? No transplantation

Contraindications (We don't do cardiac transplantation):

1. Patient not expected to survive > 1 year
2. Patient that expected that the transplant will fail
 - ↳ e.g pulmonary HTN ☐ Transplant ☐ the HTN will cause HF for the transplanted heart
3. Systemic disease that affect survival
4. High creatinine
5. Active infection
6. Psychosocial reasons

So what do we do for the contraindicated patients?

- we use Assist devices [Artificial devices that take over the function of the heart] , it has multiple roles: "only remember these 3"
 - ↳ Bridge to transplant [long waiting list]
 - ↳ Bridge to recovery
 - ↳ Destination therapy [Not candidate for any other therapy]

Cont. Dr notes:

Endocarditis

- 1st thing to do is to confirm the diagnosis
- Not All patients with endocarditis will need surgery, some will be treated by medications
- When do we decide that this patient need surgery? If he has structural problem, e.g.. As
 - ↳ The second question is do we do it now or after 1 month or after a full course of antibiotics [Right valves 2W, left valves 6W]? "The initial duration can be extended if blood culture is still positive after antibiotic course until we get it negative

*** There is certain conditions that need urgent surgical intervention [immediate]:**

- vegetations > 1cm
- staph. Aureus: its aggressive and causes tissue damage
- Abscess in the heart
- Heart block
- Fungal infection
- Patients with prosthetic valve (with period less than 1 year) and he develops endocarditis .

*** Conditions that we wait for treatment and we assess [early intervention]:**

- Stoking on antibiotics [emboli and on antibiotics]
- HF not responding to therapy
- Sepsis not responding to antibiotics

*** Conditions that we wait until he finish his course [Late intervention]:**

- Patient doesn't have any criteria but he has valve structural problem ex: AS,MR,MS.

Arrhythmias

- Some patients get Arrhythmia, because of other problems, e.g. MS > AFib [secondary]
- Some patients have only AFib [primary]

When do we do surgery?

1. Symptomatic AFib undergoing another cardiac surgery

- ↳ eg. patient has AFib and going for coronary bypass

*** if only AFib we don't do surgery unless he failed to be controlled by any other methods**

2. Asymptomatic patients undergoing cardiac surgery with minimal risk

Q: Patient with AFib only what do you do?

1. Investigate for the reason
2. Go for medication
3. Medication failed? go for catheter 4-Catheter failed? go for surgery

cardiac Tumors

- Benign? We excise it but we take the size under consideration
- Malignant? Regardless the size we never excise it

Second part: Cardiac Surgical Treatment

[Not that important if you don't remember it, it is fine]

Cardiopulmonary bypass machine

- Take the blood from venous system > oxygenator > back to the arterial system

Aortic stenosis

Can be done by:

- 1- Surgery [open intervention]
 - ↳ Surgical replacement at the valve
- 2- Catheter [percutaneous intervention]
 - ↳ for patients who can't go for surgery
 - ↳ have a risk of causing stroke
 - ↳ Cause paravalvular leak
 - ↳ Not recommended for younger patients

Aortic Regurgitation

- Only surgical intervention to:
 - 1- Repair the valve
 - 2- Replace the valve

Mitral:

- **Stenosis** → surgical replacement [there is no percutaneous yet]
- **Regurgitation** → Replace it or Repair it (For any valvular regurgitation do that)
- * In any valvular problem Repair is better than Replacement when feasible

Prosthetic valves

- 1- **Bio-prosthetic** valve (usually better for elderly above 60)
 - ↳ Degenerate [need another surgery in the future]
 - ↳ 70%-80% will have it for 10-15 years
 - ↳ if we put it for child it will degenerate in 3 years
 - ↳ if we put it for an adult (e.g. 35 y.o) it will degenerate in 10-15 years
 - ↳ if we put it for elderly people (e.g 70 y.o) it will degenerate in 30 years
- 2- **Metallic value** [usually better for **younger below 60**)
 - ↳ Will not degenerate
 - ↳ 40% will need replacement due to clotting and infection
- * At the end the patient has the right to choose what ever he want

Q: Females in childbearing age we recommend to put bio prosthetic, why? - Because if they have metallic valve they Should take warfarin → fetal congenital anomalies # Again the patient will make the decision at the end

Aortic surgery

- Done by stent [percutaneously we enter from the groin] or open surgery

Arrhythmias

- The aim of the surgery is to maintain the conduction between SA and AV nodes, and cut All the other pathways by interrupt them with different lines

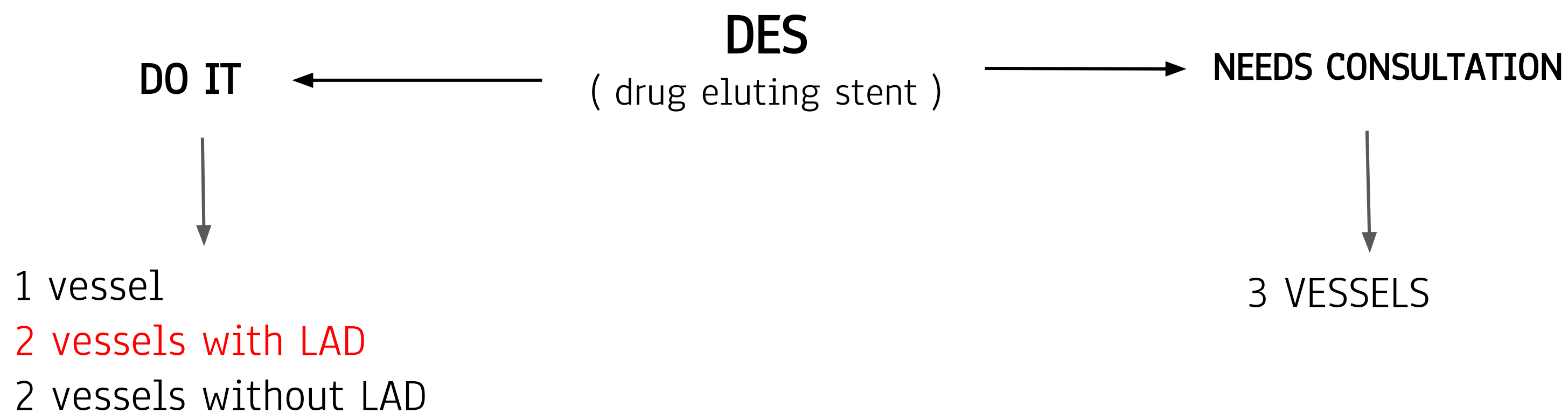
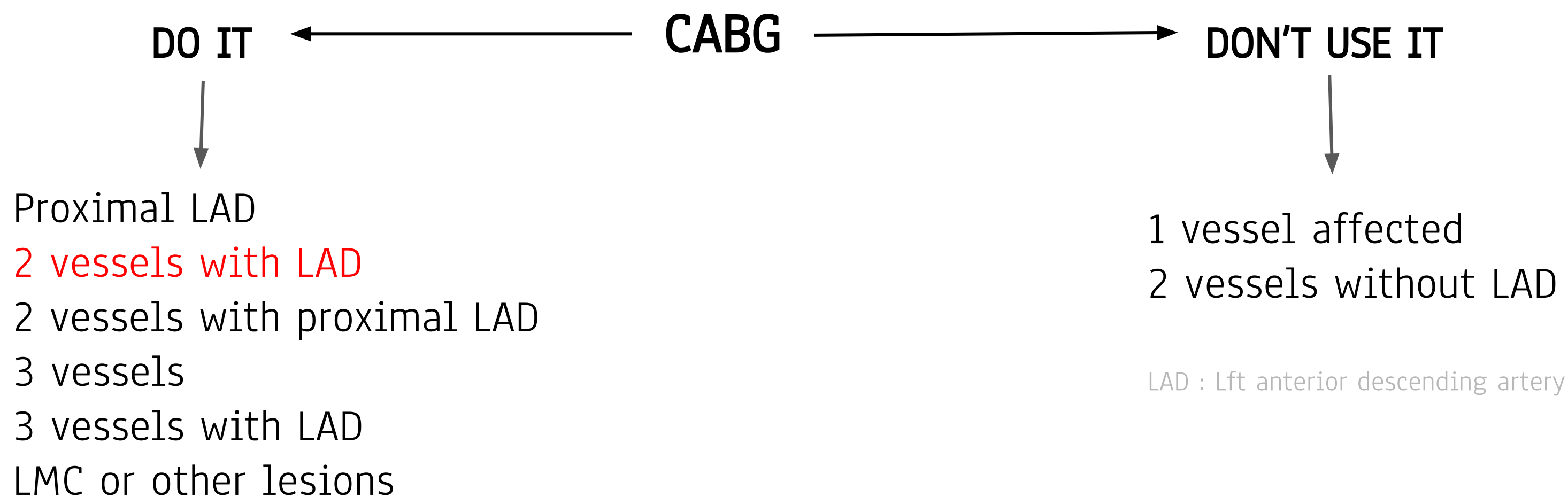
* Don't have to worry about HF transplant technique

Summary

1 - Coronary artery bypass graft surgery (CABG)

Left main stenosis more than 50%
 Stenosis of proximal LAD and circumflex > 70%
 3 vessels blocked
 2 vessels blocked with stable angina
 2 vessels blocked with unstable angina

Class I "regardless of the symptoms"
Class I "regardless of the symptoms"
Class I "regardless of the symptoms"
Class I
Class IIb



2 - Aortic valve replacement

In "severe aortic stenosis" or "chronic severe aortic regurgitation"

- undergoing CABG or other heart surgery
- If there is symptoms
- Left ventricular ejection fraction 50% or less
- Equivocal symptoms + positive exercise test
- Severe valve calcification, rapid progression and/or expected delay in surgery

Class I aortic valve replacement
Class I aortic valve replacement
Class I aortic valve replacement
Class IIb aortic valve replacement

Class IIb aortic valve replacement

(in aortic regurgitation only)

- Left ventricular dimensions:
 SD > 55mm or DD > 75mm
 SD 50-55mm or DD 0-75mm

Class IIa aortic valve replacement
Class IIb aortic valve replacement

SD : systolic dimension , DD: diastolic dimension

3 - Mitral valve repair/replacement

Symptomatic mitral valve stenosis :

- Mild stenosis + valve is favorable for PMBV **Class IIb** "PMBV"
- Moderate or severe stenosis + favorable for PMBV **Class I** "PMBV"
- Moderate or severe stenosis + NOT favorable for PMBV
+ severe PH, PAP > 60 mmHg **Class IIa** "MVR"

Chronic severe mitral valve regurgitation :

- Symptoms + LV ejection fraction **more** than 30% **Class I** MV repair, not possible? Replacement
- Symptoms + LV ejection fraction **less** than 30% **Class IIa** MV repair, not possible? Replacement
- NO symptoms + LV ejection fraction less than 60% **Class I** MV repair, not possible? Replacement
- New onset AF or pulmonary HT **Class IIa** MV repair, not possible? Replacement

PMBV: percutaneous mitral valve valvuloplasty

4 - Aortic aneurysm

(when to operate ?)

| CATEGORIES | Ascending aorta | Aortic arch | Descending aorta |
|--|-----------------|-------------|------------------|
| Low risk patients | > 5.5 cm | > 6 cm | > 6.5 cm |
| Marfan's syndrome, connective tissue disorder | > 5 cm | > 5.5 cm | > 6 cm |
| Undergoing AVR | > 4.5 cm | > 4.5 cm | > 4.5 cm |
| Bicuspid Aortic valve | > 4.5 cm | > 6 cm | > 6.5 cm |

5 - Heart failure

(Heart transplant)

| | |
|--------------------------|--|
| Indications | Cardiogenic shock requiring mechanical assistance NYHA functional class 3 and 4 with a poor 12 months' prognosis. Severe symptomatic hypertrophic or restrictive cardiomyopathy(end stage). Life-threatening ventricular arrhythmias despite aggressive medical and device interventions. |
| Contraindications | Pulmonary hypertension Systemic disease (anticipated to limit long-term survival Elevated creatinine (>200 umol/L). Psychosocial (substance abuse, smoking, medical noncompliance). Active infection |

MCQs :

1 - In which case you should use DES rather than CABG ?

- A - 2 vessels with LAD
- B - 2 vessels without LAD
- C - 3 vessels with LAD
- D - proximal LAD

2 - which patient should have mitral valve replacement ?

- A - patient with Mild mitral valve stenosis
- B - Symptomatic Patient with severe MV stenosis not favorable for PMBV
- C - symptomatic patient with MV regurgitation + No chordal preservation
- D - none of the above

3 - when to operate an ascending aorta surgery for patients with marfan's syndrome ?

- A - 5 cm ascending aorta aneurysm
- B - 4.5 cm ascending aorta aneurysm
- C - 4 cm ascending aorta aneurysm
- D - 5 cm descending aorta aneurysm

4 - All the following are causes of mitral regurgitation except:

- A - Rheumatic
- B - Degenerative
- C - Endocarditis
- D - Congenital

5 - Which of the following is a malignant cardiac tumor

- A - Hemangioma
- B - Myxoma
- C - Rhabdomyosarcoma
- D - Rhabdomyoma