



# Cardiology Theme





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### Acute Coronary syndrome

- **NSTEMI:**

High score of TIMI or Grace → refer to angiography <72h

High risk patient MI or death → refer to angiography <24h

Low risk patients are managed by →

- |                       |                                     |
|-----------------------|-------------------------------------|
| 1- Aspirin.           | 2- ADP-Antagonist “anti-platelets”. |
| 3- $\beta$ -blockers. | 4- Nitrates.                        |

- **MI:**

- Diagnosed: by ECG and cardiac enzymes

- B-blockers are given to ↓ myocardial ischemia unless he has (asthma, AV block, Acute pulmonary edema)

❖ Treatment:

STRAT WITH:

- |            |             |          |
|------------|-------------|----------|
| 1- Aspirin | 2- Morphine | 3- $O_2$ |
|------------|-------------|----------|
- Revascularize within 90 min PCI, the patient should be given a dual anti-platelet: e.g. Aspirin + clopidogrel; heparin should be given

- if revascularization is unavailable use fibrinolysis.

- Fibrinolytics are a part of the management of STEMI ONLY.

- After giving Fibrinolytics 30-60 mins “No response” → PCI.

- Fibrinolytics → e.g. alteplase “best” tenecteplase” most specific”, Reteplase.

- angiography must be done before PCI or CABG.

- After discharge treatment → Aspirin,  $\beta$ -blockers, statins, ACEI.

# Aortic dissection: Tearing chest pain radiate to the back could be the jaw.

## Always start with Aspirin/ anti-platelet

# CCB → prevent acute vasospasm “variant angina”

# Variant angina usually affects young, smokers.

# ACEI HPT, HF, ↓protein urea, MI, Vasodilation.

# Variant angina causes → elevated ST segment.

# If the patient has one of the followings he doesn't have an ischemic pain →

1- pleuritic changes with respiration

2- changes with position

3- few minutes

5- sharp “knife like”





### Valve diseases

Disease	Cause	Symptoms	Treatment	Diagnosis													
<b>Mitral stenosis</b>	Most common Rheumatic fever (streptococcus infection).  # echocardiogram is the most important test in confirming diagnosis. # All stenosis and regurgitations us CXR for diagnosis "mitral and Aortic" CXR = chest X-Ray	1- Dyspnea on exertion. (exercise, emotional...) "mair" Others: orthopnea, fatigue, peripheral edema, palpitation, hemoptysis. — Could lead to Right Ventricular Failure (RVF) and pulmonary HTN.  # exercise and pregnancy will increase the symptoms.	1- Diuretics → mild symptoms or pulmonary congestion and edema 2- Digitalis 3- Antiarrhythmics 4- Antibiotics 5- Anticoagulants 6- $\beta$ -blockers # intervention: (surgery only in severe cases) 1- percutaneous transvenous... (PTMC) 2- surgical commissure 3- Mitral valve replacement # if the patient is asymptomatic don't treat him. # only diuretics and $\beta$ -blockers were mentioned in step up.	1- CXR LA enlargement. 2- Echocardiogram Most IM in confirming diagnosis. a- LA enlargement b- Thick calcified mitral valve c- Narrow fish mouth orifice d- signs of RVF if advanced													
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Disease	Cause	Symptoms	Treatment	Diagnosis
<b>Aortic stenosis</b>	<ol style="list-style-type: none"> <li>1- Rheumatic fever</li> <li>2- calcification of tricuspid aortic valve in elderly.</li> <li>3- calcification of congenitally abnormal bicuspid aortic valve</li> </ol>	<ol style="list-style-type: none"> <li>1- angina</li> <li>2- syncope</li> <li>3- HF</li> <li>4- parvus et tardus – diminished and delayed carotid upstrokes.</li> <li>5- pericardial thrill</li> </ol> <p># patients are often asymptomatic for years (until middle or old age)</p>	<p>Medical therapy has a limited role.</p> <p>1- TAVR or aortic valve replacement (treatment of choice).</p>	<ol style="list-style-type: none"> <li>1- CXR: calcified aortic valve, enlarged LV/LA (late)</li> <li>2- ECG: LVH, LA abnormality</li> <li>3- Echocardiogram <b>Diagnostic in most cases</b></li> <li>4- cardiac catheter: <b>definitive diagnostic test.</b></li> </ol> <p>Useful in symptomatic patients before surgery.</p>
<b>Aortic Regurgitation</b> (aortic insufficiency)	<p><b>Acute</b></p> <ol style="list-style-type: none"> <li>1- Rheumatic fever.</li> <li>2- endocarditis.</li> <li>3- aortic dissection.</li> <li>4- ruptured sinus of Valsalva aneurysm.</li> <li>5- failure of prosthetic heart valve.</li> </ol> <p><b>Chronic</b></p> <ol style="list-style-type: none"> <li>1- rheumatic heart disease</li> <li>2- syphilis Arthritides: <ul style="list-style-type: none"> <li>- Reiter's syndrome - ankylosing spondylitis.</li> <li>- Rheumatoid arthritis.</li> </ul> </li> <li>3- Marfan's syndrome</li> <li>4- Osteogenesis imperfecta</li> <li>5- aortic endocarditis</li> <li>6- bicuspid aortic valve</li> <li>7- HPT</li> </ol>	<ol style="list-style-type: none"> <li>1- dyspnea on exertion</li> <li>2- PND</li> <li>3- palpitation (worst when lying down)</li> <li>4- Angina</li> <li>5- cyanosis and shock</li> </ol>	<p># Aortic valve replacement definitive treatment.</p> <p>- conservative Rx: Salt retention, diuretics, vasodilators, digoxin, ACEI, restriction of strenuous activity.</p>	<ol style="list-style-type: none"> <li>1- CXR: LVH, dilated Aorta.</li> <li>2- ECG: LVH</li> <li>3- echocardiogram: <ul style="list-style-type: none"> <li>- Assess LV size and function</li> </ul> </li> <li>4- cardiac catheter: to assess the severity and degree of LV dysfunction.</li> </ol>





Disease	Cause	Symptoms	Treatment	Diagnosis
<b>Tricuspid Regurgitation</b>	<ul style="list-style-type: none"> <li>- 90% of cases occur in normal people.</li> <li>- TR usually secondary to RV dilation</li> <li>- LVF Most common cause</li> <li>- RV infraction cor pulmonary 2<sup>nd</sup> to pulmonary HTN.</li> <li>- tricuspid endocarditis</li> <li>- Epstein anatomy (congenital malformation of the tricuspid valve)</li> <li>- others: carcinoid tumor, SLE, Myxomatous valve degeneration.</li> </ul>	<ul style="list-style-type: none"> <li># mostly Asymptomatic unless the patient develops RHF/ pulmonary HTN.</li> <li>1- ascites.</li> <li>2- hepatomegaly</li> <li>3- edema</li> <li>4- JVD "distention"</li> </ul>	<ul style="list-style-type: none"> <li>1- diuretics</li> <li>2- valve repair (tricuspid ring)</li> </ul>	<ul style="list-style-type: none"> <li>1- echocardiogram:</li> <li>2- ECG: RV and RA enlargement.</li> </ul>
<b>Rheumatic heart disease</b>	<ul style="list-style-type: none"> <li>Result of streptococcal pharyngitis, group A streptococcus.</li> <li>Immune system involved</li> <li>Most common mitral stenosis but could be others.</li> </ul>	<ul style="list-style-type: none"> <li>To diagnose you need 2 major criteria and 2 minors:</li> <li>A- major:               <ul style="list-style-type: none"> <li>1- migratory poly arthritis</li> <li>2- Erythema marginatum</li> <li>3- Cardiac involvement</li> <li>4- chorea</li> <li>5- subcutaneous nodules</li> </ul> </li> <li>B- minor:               <ul style="list-style-type: none"> <li>1- fever</li> <li>2- elevated erythrocyte sedimentation rate</li> <li>3- polyarthralgia</li> <li>4- prior history of rheumatic fever</li> <li>5- prolong PR interval</li> <li>6- evidence of preceding streptococcus</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>1- Treat streptococcal pharyngitis with penicillin or erythromycin</li> <li>2- acute rheumatic fever is treated with NSAIDs.</li> <li>- C-reactive protein is used for monitoring</li> </ul>	



Radiate to carotid



Radiate to axilla



Abnormality	Systolic	Diastolic	S1	S2	S3	S4	thrill	PMI	Enlargement	Note
<b>Aortic stenosis</b>	Harsh Crescendo – decrescendo murmur	-	-	Soft	-	-	-	Sustained	LV/LA	Pravous et tradus
<b>Aortic regurg</b>	-	Decrescendo murmur	-	-	-	-	-	Displaced	LV	1- Widened pulse pressure (↑systolic, ↓diastolic). 2- Corrigan pulse (water hammer) 3- Austin flint murmur 4- murmur intensity increased
<b>Mitral stenosis</b>	-	-	Loud	V	-	-	-	-	LA	1- S2 followed by a snap 2- RVF if advanced
<b>Mitral regurg</b>	Pansystolic (holosystolic) Start at S1 → End S2	-	Soft	-	Prominent	-	Systolic	Laterally displaced	LV	1- AFib is common
<b>Mitral prolapse</b>	-	-	-	-	-	-	-	-	-	Squatting decrease murmur and click (because it increases the LV chamber size, delay the onset of the click and murmur)
<b>Tricuspid</b>	Blowing holosystolic	-	-	-	-	-	-	-	RA	1- RV pulsation 2- AFib 3- prominent V wave in jugular venous pulse





### Valvular Notes

- Myxomatous degeneration = MV prolapse / regurgitation.
- Right sided HD → change intensity with respiration.
- Graham steel murmur → pulmonary regurgitation.
- Most common valvular disease in elderly is aortic stenosis.
- Aortic stenosis/ Mitral Regurgitation → could cause AFib.
- Dyspnea is caused by → ↑ Left Atrial pressure.
- On CXR: Or echo

1- Mitral stenosis → LA enlargement (Fish mouth)

2- MR → LA+ LV enlargement

4- AR → LV enlargement + dilated ascending aorta

3- AS → LVH







### Heart Failure

- Compensatory changes occur when the heart fails to maintain CO (cardiac out-put) and peripheral perfusion:

1- Na Retention

2- Vasoconstriction

3- Renin Angiotensin Aldosterone system

Those changes after a while become pathological.

- Mild myocardial depression → HR will ↑ to compensate for the ↓ volume → to make CO normal.
- Sever myocardial depression → heart can't compensate, can't be maintained
- Frank starling mechanism = ↑ end diastolic volume → will ↑ strength of contraction → ↑ stroke volume.
- End diastolic volume = volume of blood in ventricles before contraction
- Stroke volume = volume of blood ejected from the heart per beat
- ↑ stroke volume = ↑ preload
- Preload = end diastolic pressure.
- ❖ Diagnosis:

1- CXR:

A- pleural effusion

B- Cardiomegaly

C- Kerley B lines

D- prominent interstitial marking

2- BUN (Blood Urea Nitrogen):

A- < 100 → 2% chance of HF

B- 100-400 → 70% chance of HF

C- >400 → 95% chance of HF

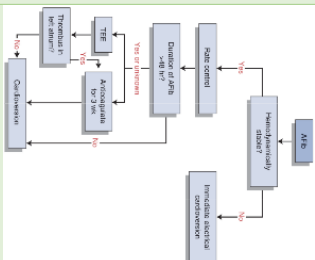
3- TTE: should be performed when CHF is suspected.





## Arrhythmia

	Character	Cause	Clinical	Diagnose	Treatment
<b>Atrial fibrillation</b>	1- ↑ Atrial foci = rapid V Rate 2- Atrial rate = 400 bpm 3- Ventricular rate = 175-75 (because AV node blocks most impulses)	1- Heart diseases (MI, HTN, mitral valve disease 2- pericarditis, pericardial trauma. 3- pulmonary disease including PE. 4- hyperthyroidism 5- systemic illness e.g. sepsis + malignancy. 6- stress. 7- excessive alcohol. 8- sick sinus syndrome. 9- pheochromocytoma.	1- Fatigue and exertional dyspnea. 2- palpitation, dizziness, angina, syncope. 3- irregular pulse. 4- blood stasis	1- ECG: irregular PR interval	# in acute Afib hemodynamically Unstable: Immediate electrical cardioversion to sinus rhythm. # in acute Afib hemodynamically stable: <b>a. Rate control</b> : if it's too fast it must be controlled (target is 60-100); <b>β-blocker</b> (better), or <b>CCBs</b> (alternative). -if ventricular systolic dysfunction is present consider <b>digoxin</b> or <b>amiodarone</b> <b>b. cardioversion</b> : (after control) use with people how are having their first ever Afib. - Pharmacological cardioversion ONLY if electrical cardioversion FAILS. (ibutilide, procainamide, flecainide, sotalol, amiodarone) <b>c. anticoagulation</b> : 3weeks before cardioversion and 4weeks after cardioversion. Unless you did a TEE and it came -ve for a thrombus, you should give IV heparin we are performing <b># Chronic Afib</b> : Rate control β-blockers or CCBs Similar to Afib
<b>Atrial flutter</b>	250-350 bpm	1- heart diseases ( <b>HF</b> most common", RHD, CAD) 2- COPD 3- Atrial septal defect.	-	ECG: saw tooth baseline, QRS appearing every 2-3 tooth	Similar to Afib
<b>Multifocal Atrial Tachycardia</b>	-	Sever pulmonary disease e.g. COPD 3- Atrial septal defect.	-	ECG: p wave morphology, Variable PR and PR intervals. - Wandering atrial pacemaker with normal HR 60-100 bpm. ECG: Narrow QRS	1- improving oxygenation and ventilation 2- if LV functioning → β-blocker, CCBs, digoxin, amiodarone, <b># Electrical cardioversion is NOT effective and should not be used.</b>
<b>Paroxysmal supraventricular Tachycardia</b> a. AV nodal re-entrant tachycardia	-	1- supraventricular tachycardia (most common)	-	ECG: Narrow QRS	↓





	Character	Cause	Clinical	Diagnose	Treatment
<b>Paroxysmal supraventricular Tachycardia</b> <b>b. Orthodromic tachycardia</b>	-	<b>#For both:</b> 1- ischemic heart disease 2- digoxin toxicity 3- AV node re-entry 4- Atrial flutter 5- AV reciprocating 6- Excessive caffeine	-	ECG: Narrow QRS P wave may be discernible	<b>#For both:</b> 1- manoeuvre to stimulate the vagus delay AV conduction. <b>2-Acute treatment:</b> IV adenosine ( <b>agent of choice</b> ) IV verapamil DC cardioversion <b>if the drugs are NOT effective</b> <b>3-prevention:</b> a. Pharmacologic → verapamil or β-blocker b. radiofrequency catheter.
<b>Wolff - Parkinson- white Syndrome</b>	-	-	-	ECG: narrow complex tachycardia short PR interval Delta wave	1- radiofrequency catheter. 2- <b>Avoid</b> drugs active on the AV node e.g. (digoxin, verapamil, β-blocker,) 3- Type IA, IC antiarrhythmics are better choices.
<b>Ventricular tachycardia</b>	Rapid repetitive PVC (premature ventricular contraction) at a rate of 100-250	1- CAD with prior MI is the <b>most common cause</b> . 2- Active ischemia, hypotension 3- cardiomyopathies 4- congenital defects 5- prolonged QT syndrome 6- Drug toxicity.	1- palpitation, dyspnea, light headedness, angina, impaired consciousness (syncope or near-syncope), 2- may present with sudden cardiac death. 3- sight of cardiogenic shock 4- may be asymptomatic if rate is slow 5- Canon A wave	ECG: Wide and bizarre QRS complexes.	1- Identify and treat reversible causes 2- Sustained VT a. Hemodynamically stable patients with mild symptoms and systolic BP >90—pharmacologic therapy - New advanced cardiac life support (ACLS) guidelines recommend IV amiodarone, IV procainamide, or IV sotalol b. Hemodynamically unstable patients or patients with severe symptoms - Immediate synchronous DC cardioversion - Follow with IV amiodarone to maintain sinus rhythm c. Ideally, all patients with sustained VT should undergo placement of an ICD, unless EF is normal (then consider amiodarone) 3- Nonsustained VT d. If no underlying heart disease and asymptomatic, do not treat. These patients are not at increased risk of sudden death. e. If the patient has underlying heart disease, a recent MI, evidence of left ventricular dysfunction, or is symptomatic, order an electrophysiologic study: if it shows inducible, sustained VT, ICD placement is appropriate. f. Pharmacologic therapy is second-line treatment. However, amiodarone has the best results of all of the antiarrhythmic agents.





Character	Cause	Clinical	Diagnose	Treatment
<p><b>Ventricular fibrillation</b></p>	<p>1- Ischemic heart disease 2- antiarrhythmic drugs 3- AFib with very rapid ventricular rate in patients with wolf - Parkinson-white syndrome.</p>	<p>1- Can't measure BP absent heart sounds and pulse 2- patient is unconscious 3- if untreated, leads to eventual sudden cardiac death.</p>	<p>ECG: No atrial P wave can be identified NO QRS complexes can be identified.</p>	<p>This is a medical emergency! Immediate defibrillation and CPR are indicated. Initiate unsynchronized DC cardioversion immediately. If the equipment is not ready, start CPR until it is. Give up to three sequential shocks to establish another rhythm; assess the rhythm between each. If VF persists: Continue CPR. Intubation may be indicated. Epinephrine (1 mg IV bolus initially, and then every 3 to 5 minutes)—this increases myocardial and cerebral blood flow and decreases the defibrillation threshold. Attempt to defibrillate again 30 to 60 seconds after first epinephrine dose. Other options if the above procedures fail (refractory VFib): IV amiodarone followed by shock—new ACLS guidelines recommend the use of amiodarone over other antiarrhythmic agents in refractory VFib. Lidocaine, magnesium, and procainamide are alternative second-line treatments. If cardioversion is successful: Maintain continuous IV infusion of the effective antiarrhythmic agent. IV amiodarone has been shown to be the most effective. Implantable defibrillators have become the mainstay of chronic therapy in patients at continued risk for VF. Long-term amiodarone therapy is an alternative.</p>





### Arrhythmia Summary

Arrhythmia	On ECG	Rx
<b>1- AFib</b>	No P wave	Look at the chart
<b>2- VFib</b>	No P wave No complex	Emergency defibrillator, CPR And epinephrine
<b>3- Atrial flutter</b>	Saw tooth	Same as AFib
<b>4- Atrial tachycardia</b>	Wondering pace maker	No Cardioversion, Beta CCB Digoxin
<b>5- Paroxysmal Supraventricular Tachycardia</b>	Narrow QRS	IV adenosine IV verapamil DC cardioversion
<b>6- ventricular tachycardia</b>	Wide QRS	<b>1- sustained VT</b> (hemodynamically <u>stable</u> ): IV amiodarone, IV procainamide, IV sotalol. <b>2- sustained VT</b> : (hemodynamically <u>unstable</u> ): CV then IV amiodarone - Ideally all patients should get ICD ----- <b>3- Nonsustained VT</b> : If asymptomatic don't treat Second line → anti arrhythmic amiodarone is the best
<b>7- Wolf Parkinson</b>	Delta wave And a narrow QRS	Avoid Beta, <del>CCB</del> , Digoxin. Verapamil Treat with anti-arrhythmic.

