

Cardiac arrhythmia

Cardiac arrhythmia

**Any abnormalities in cardiac -
rhythm**

**It may cause sudden death, -
syncope, heart failure, chest pain,
dizziness, palpitation, or no
symptoms at all**

**There are two main types of -
: arrhythmia**

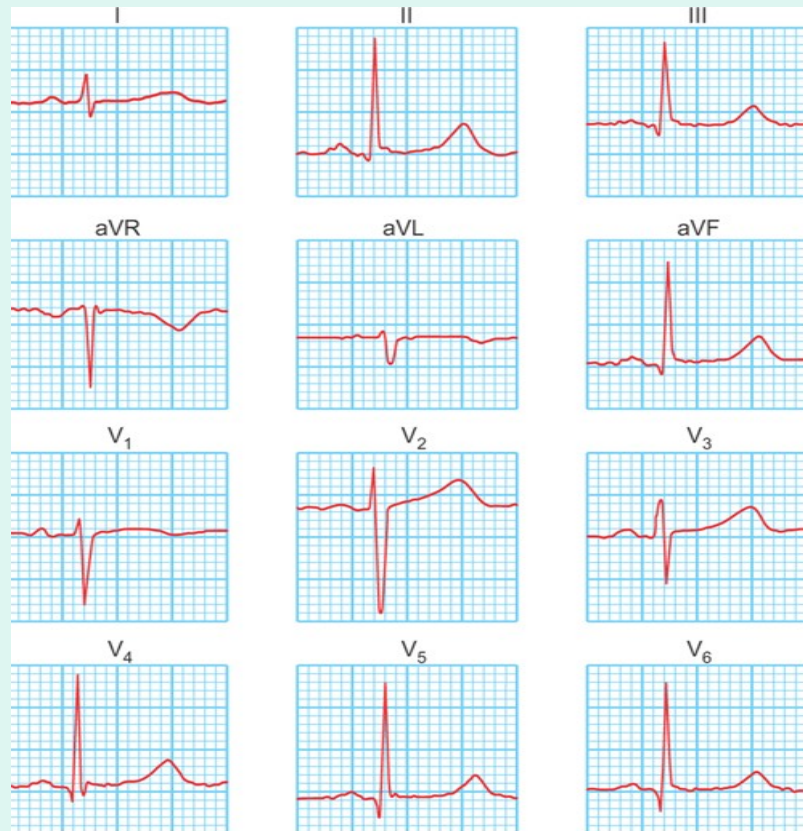
**Bradycardia ; the heart rate is -
slow (< 60 b.p.m.)**

**Tachycardia ; the heart rate is -
rapid (> 100 b.p.m.)**

Sinus node function

**The cardiac pacemaker is the sinus -
node, it depolarizes
.spontaneously**

**The sinus node is under the -
influence of the autonomic
nervous system, with a
parasympathetic predominance**



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
 Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Sinus arrhythmia

Change in rhythm during respiration, due to fluctuation in autonomic tone during breathing, with inspiration heart rate quickens, and on expiration the heart rate falls. This is normal variation -

Sinus bradycardia

A sinus rate < 60 b/min. during the day or < 50 b/min. at night -

It is asymptomatic, unless rate is very slow

Sinus tachycardia

.A sinus rate > 100 b/min -

Bradycardia and heart block

: Sinus bradycardia

Extrinsic causes

Hypothermia, Hypothyroidism, Cholestatic jaundice and raised intracranial pressure -

Neurally mediated syndromes are due to a -
reflex called (Bezold -Jarisch) which cause both
bradycardia (sinus bradycardia, sinus arrest and
AV block) and reflex peripheral vasodilatation.
They include Carotid sinus syndrome, and
Vasovagal syncope

Drugs like beta-blockers and digitalis -

Intrinsic causes

**Acute ischaemia and infarction of the sinus node -
as a complication of myocardial infarction**

**Chronic degenerative changes e. g. (sick sinus -
syndrome). Which is caused by idiopathic
fibrosis of the sinus node, ischaemic heart
disease, cardiomyopathy and myocarditis**

-It is characterized by episodes of sinus bradycardia or sinus arrest, alternating with paroxysmal atrial tachycardia (tachy-brady syndrome)

(a)



(b)



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Treatment

Sinus bradycardia :- Identify and treat any extrinsic cause

Temporary pacing for reversible causes

Permanent pacing for chronic degenerative causes

Sick sinus syndrome :- Permanent pacing with anti arrhythmic drugs or ablation therapy for tachycardia

. element

Vasovagal attacks :- Elastic stockings, beta-blockers ,or disopyramide

Heart block

**Atrioventricular block or
(BBB)**

**Bundle branch block
(AV BLOCK)**

There are three forms of AV block

First-degree AV block :- simple prolongation of the PR interval to more than 0.22s., all atrial depolarization are conducted to the ventricles but with delay



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Second-degree AV block :- There is a block to
some of the P waves

: There are three types

Mobitz I Block (Wenckebach phenomenon) -

There is a progressive PR prolongation until a
P wave fails to conduct

Mobitz II Block -

Occurs when a dropped QRS complex is not
preceded by progressive PR prolongation

or 3 : 1 (advanced) block 2:1 -

Occurs when every second or third P wave
conduct to the ventricles

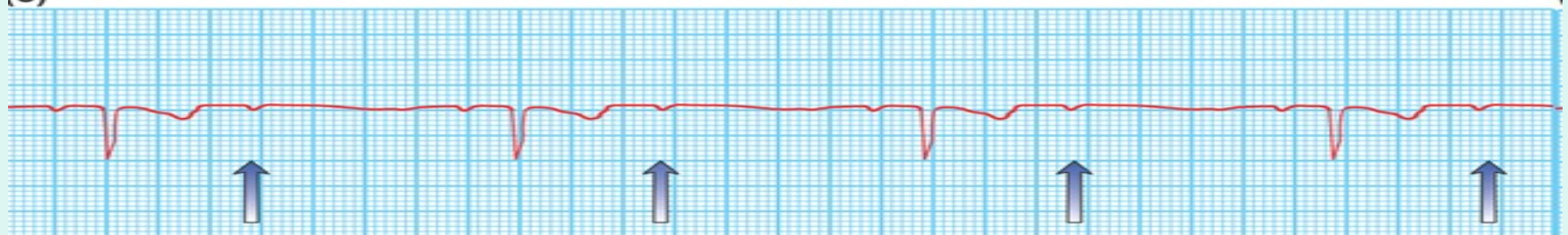
(a)



(b)

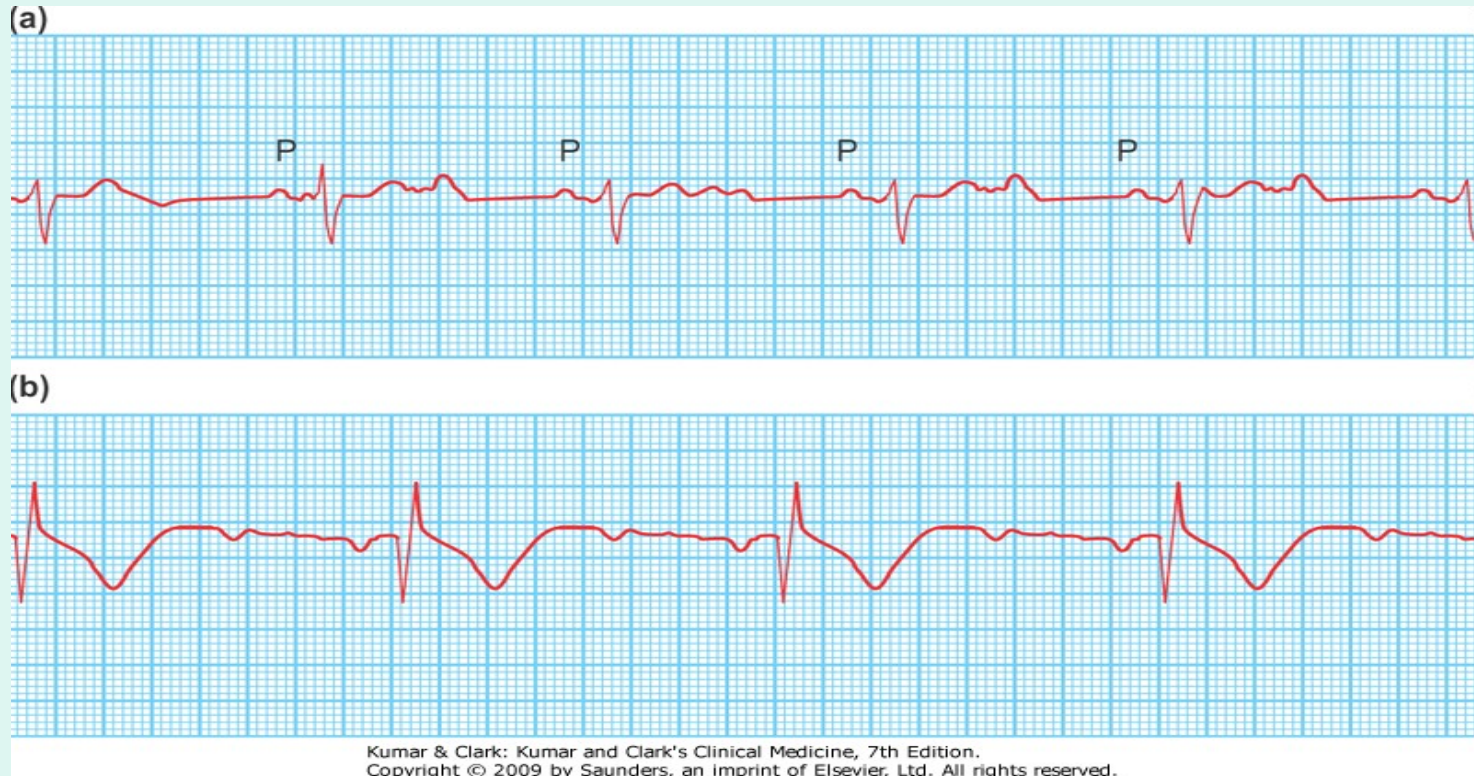


(c)



Third-degree (complete) AV block

Occurs when all the atrial activity fails to conduct to the ventricles



Causes

Congenital (structural or autoimmune) -

Idiopathic fibrosis (Lev`s dis. And Lenegre`s dis.) -

Ischaemic heart disease(MI and cardiomyopathy) -

Non-ischaemic heart disease (calcified aortic stenosis ,dilated cardiomyopathy & sarcoidosis) -

Cardiac surgery -

Iatrogenic -

Drugs (digoxin, beta-blockers, amiodarone) -

Infection (endocarditis, Lyme dis., Chagas dis.) -

Rheumatic autoimmune disease (SLE, rh.arthritis) -

**Neuromuscular disease (Duchenne muscular -
(dystrophy**

Bundle branch block

The His bundle gives rise to the right and left branches. The left branch subdivides into anterior and posterior division

-: Types

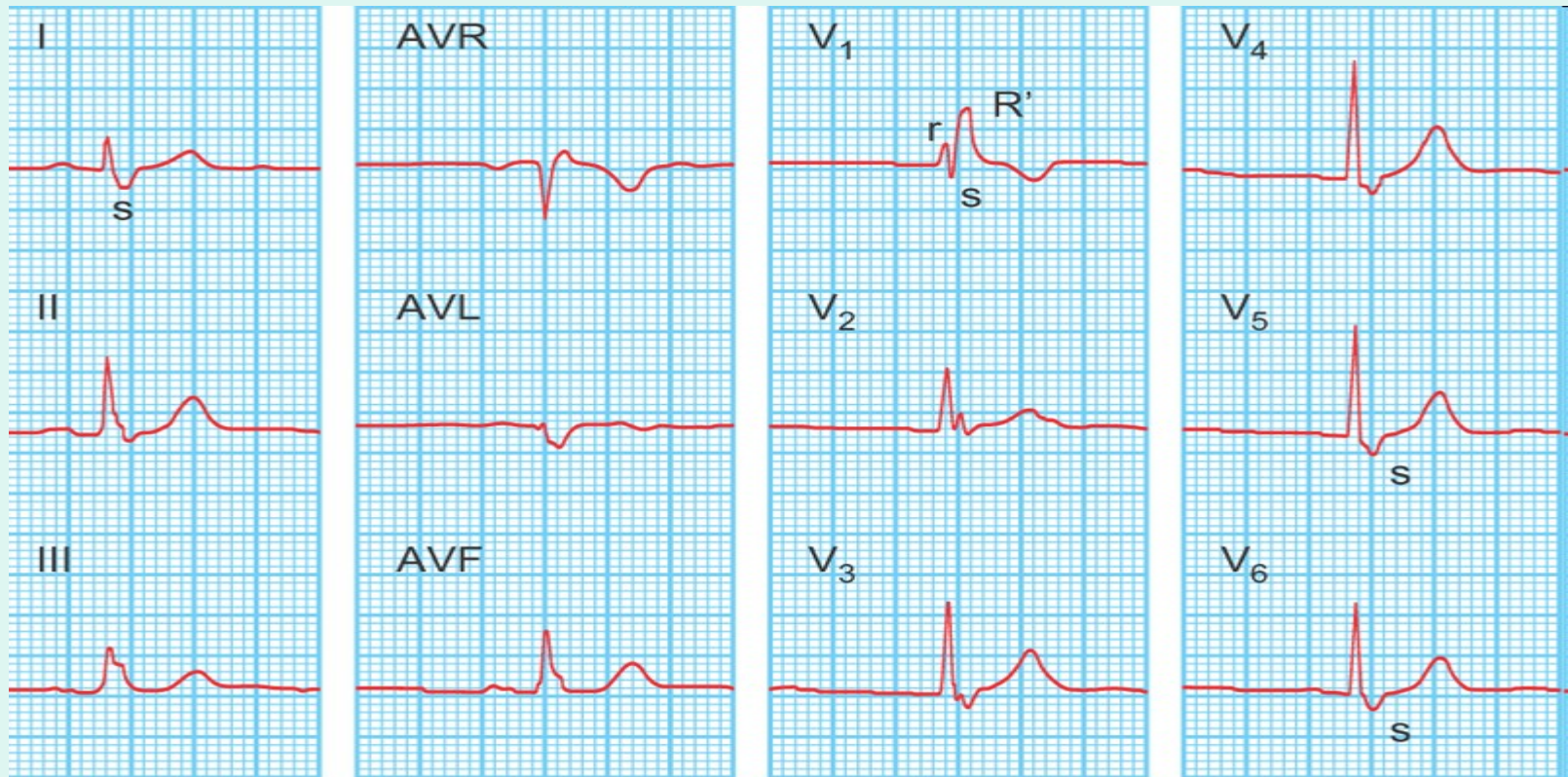
Partial bundle branch block -

This produces slight widening of the QRS complex (up to 0.11s.) also called incomplete BBB

Complete bundle branch block -

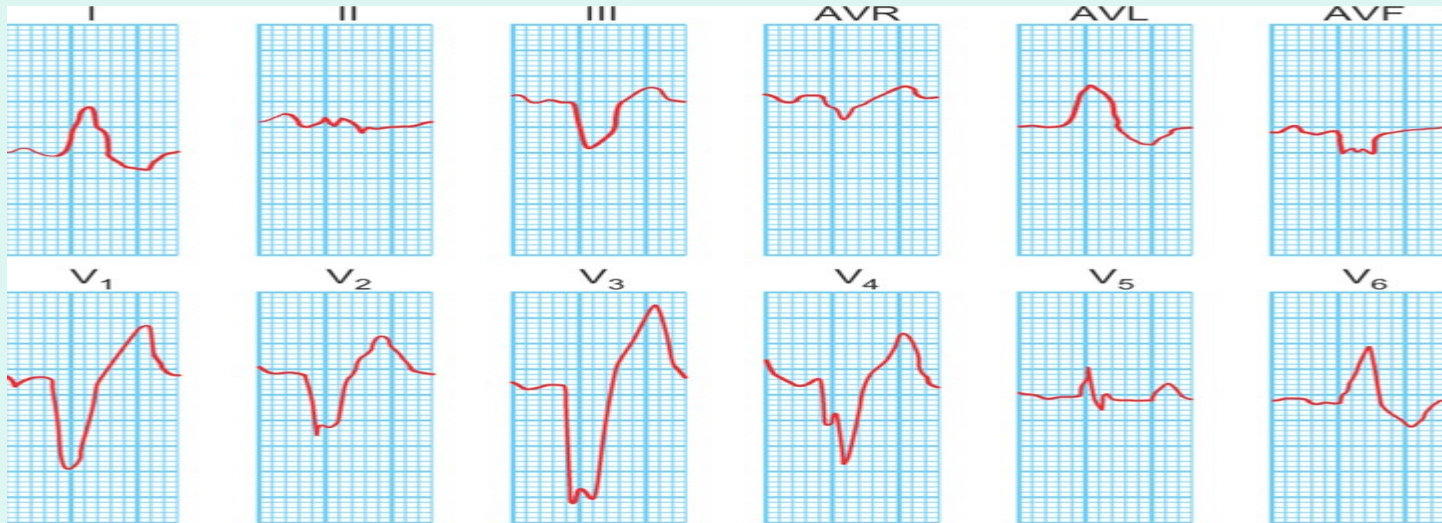
This is associated with a wider QRS complex (more than 0.12s.) this can be R or L BBB

Right bundle branch block :- there is late activation of the right ventricle , seen as deep S wave in leads I and V6 and as a tall R wave in V1



(a)

**Left bundle branch block (LBBB) •
produces a deep S in V1 and tall late R in lead I
and V6**



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Hemiblock :- when there is block in one of the divisions of the left bundle, either anterior division or posterior division, this will produce a swing in the electrical axis of the heart

Anterior hemiblock ;-cause left axis deviation, while

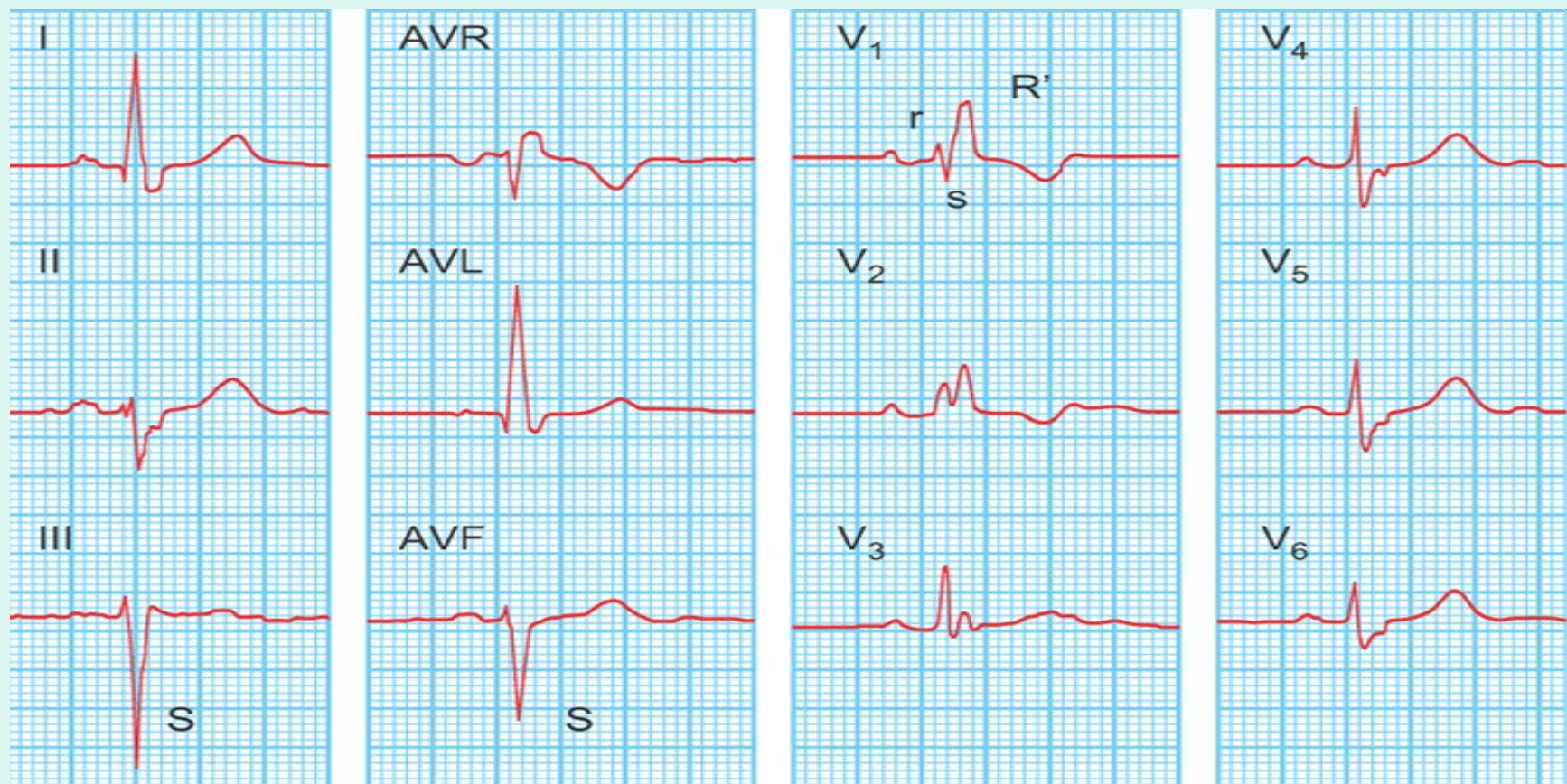
Posterior hemiblock :- cause right axis deviation

Bifascicular block :- when there is a block in any two, of the following right bundle branch block

left anterior hemiblock

left posterior hemiblock

A block in all the above three will cause complete heart block



Causes

RBBB

**Normal finding in 1% of young adults -
and in 5% of elderly adults**

Congenital heart disease (ASD, Fallot's -
(tetralogy. Pulmonary stenosis. VSD

Pulmonary disease (Corpulmonale, Acute -
(or recurrent pulmonary embolism

Myocardial disease (Acute MI, Conduction -
system fibrosis, cardiomyopathy, Chagas
(disease

Causes of LBBB

Left ventricular outflow obstruction -

Aortic stenosis

Hypertension

Coronary artery disease -

Acute myocardial infarction

Sever coronary disease

Clinical feature of BBB

Asymptomatic (usually) -

In RBBB there is wide physiological splitting of the second heart sound -

In LBBB there may be reversed splitting of the second heart sound -

ECG is the only way for diagnosis of BBB -

Supra ventricular tachycardias

It includes

Sinus tachycardia

Atrioventricular junctional tachycardia

Atrial fibrillation

Atrial flutter

Multifocal atrial tachycardia

Atrial ectopic beats

Sinus tachycardia :- it is persistent increase in resting sinus beats, the P wave and QRS complex are of normal morphology

Atrioventricular tachycardia :- also referred as paroxysmal SVT, the P wave is invisible, inverted or follow QRS complex ,also it includes tachycardia associated with Wolf-Parkinson- White (WPW syndrome)

Causes of sinus tachycardia

Intrinsic sinus node dysfunction is rare -

-: Extrinsic Acute causes like -

,exercise, emotion, pain, fever, infection)

acute heart failure, acute pulmonary

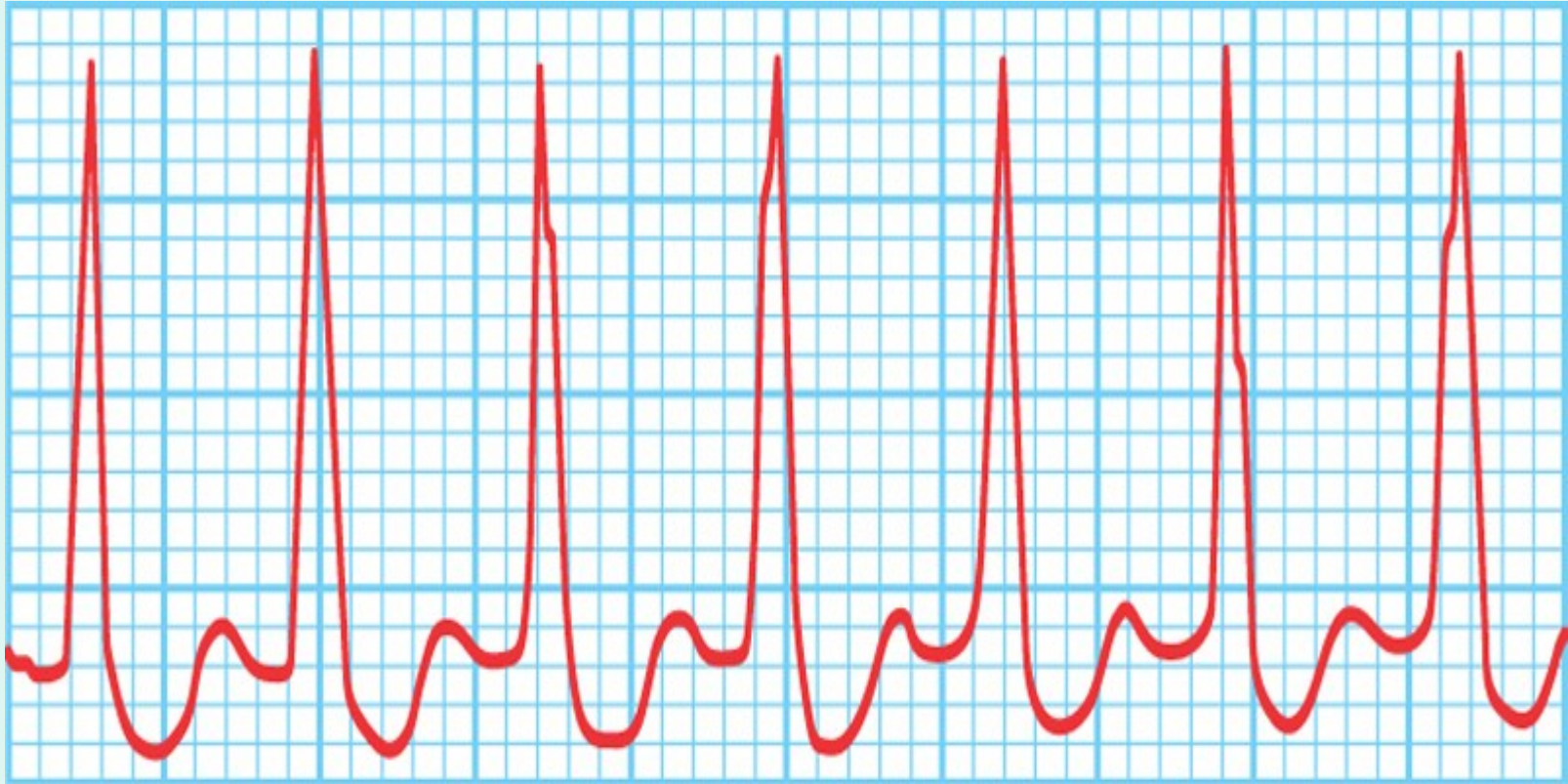
(.embolism, and hypovolaemia

-: Chronic causes like

pregnancy, anaemia, hyperthyroidism)

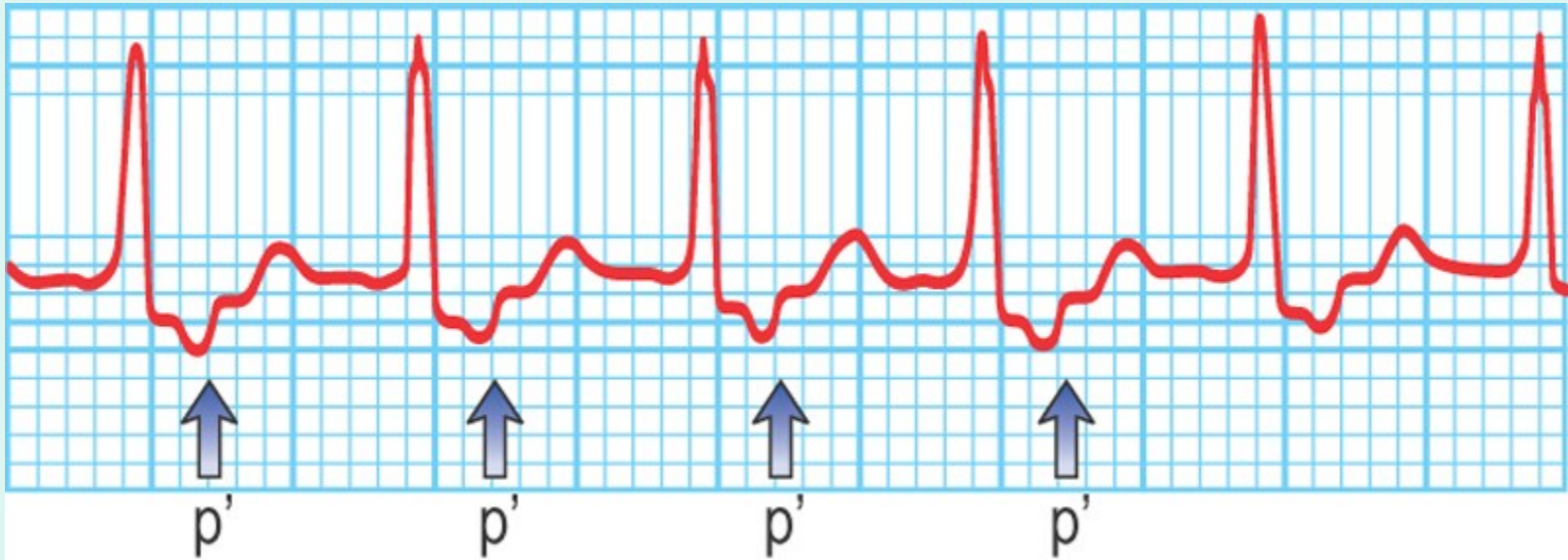
(.and catecholamine excess

Supraventricular tachycardia (junctional) •

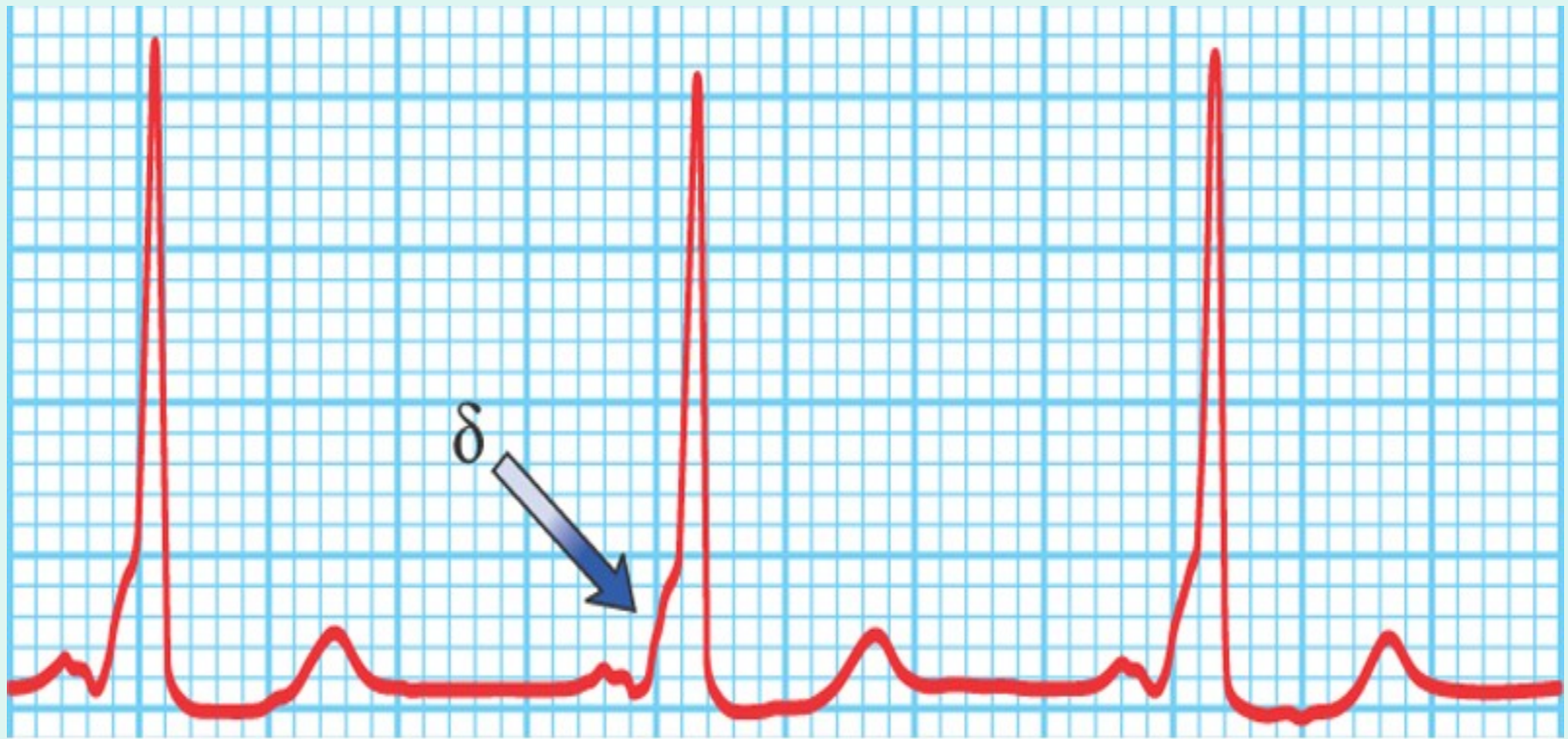


Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

SVT (Wolf- Parkinson- White -WPW • syndrome)



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Symptoms of SVT

Palpitation, rapid regular , with abrupt onset and sudden termination, which occur spontaneously or .be precipitated by simple movement

Anxiety, dizziness, dyspnoea, central chest pain, polyuria weakness and Syncope

Acute management

Patient with haemodynamic instability (hypotension, pulmonary oedema) require emergency cardioversion -

If the patient is stable vagal manoeuvres , including right carotid massage ,Valsalva manoeuvre and . facial immersion in cold water can be used also -

If no effect then IV adenosine (6 mg.) it acts within one second causing abrupt termination, the side effect include bronchospasm, flushing, chest pain it is contraindicated in asthmatics -

Verapamil 5-10 mg. i.v. over 10 minutes, diltiazem or beta-blokers -

Long-term management

Refer for electrophysiological evaluation -

Drugs like verapamil, diltiazem, beta-blockers, flecainide, sotalol, and amiodarone -

Catheter ablation -

Atrial fibrillation

It is a common arrhythmia, may occur in paroxysmal form in young patients -

Of the many causes, the classical are rheumatic H.D., alcohol intoxication, and thyrotoxicosis, also -

hypertension and heart failure are common causes

Lone atrial fibrillation is when there is no cause so it is idiopathic -

AF consist of continuous, rapid (300-600 per min.) activation of the atria by multiple re-entry wavelets -

there is electrical atrial response but there is no coordinated mechanical action -

Symptoms and signs

- Asymptomatic - Syncope -
- Palpitation - Chest pain -
- Dyspnoea - Worsening in a previous cardiac complaint -
- On examination : irregular pulse -
- ECG -
- Fine oscillation of the baseline (f waves)
- No clear P wave
- QRS rhythm is rapid and irregular

Management

Treat provoking cause -

-; Control ventricular rate by drugs -

Digoxin monotherapy or in combination

Calcium-channel blockers

Beta-blockers

-; Cardioversion by DC shock or by drugs -

**Class Ic agents (e.g. flecainide) for patients with no
significant heart disease**

**Class III agents (e.g. amiodarone) for patients with
significant heart disease**

Anticoagulation -

**Anticoagulation is indicated in patient with AF and
: one of the following risk factors**

Major risk

prosthetic heart valve --

rheumatic mitral valve disease --

previous history of CVA or TIA --

Minor risk

age > 75 years --

congestive heart failure --

diabetes mellitus --

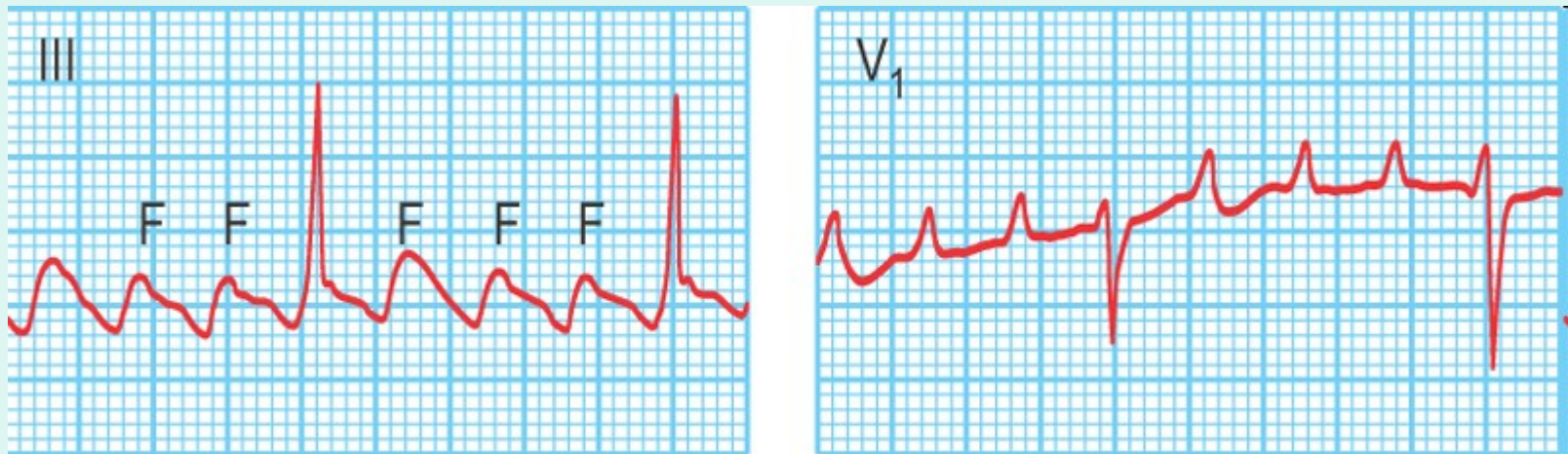
Atrial flutter

It is usually with a. fibrillation -

It is usually an organized atrial rhythm with a rate -
.between 250-350 b/min

ECG shows regular sawtooth - like atrial waves -
between normal QRS complexes (F waves)

Variable degrees of AV block -



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Management

Cardioversion for acute attack _

Cardioversion preceded by anticoagulation for 3 - weeks

Prevention of recurrent attacks by oral medication - class Ic or class III

AV nodal blocking agents may be used to control - the ventricular rate

Catheter ablation is indicated in resistant cases -

Atrial ectopic beats

They usually cause no symptoms -

May need treatment with beta- blockers -

ECG early abnormal P wave followed by normal QRS complex -

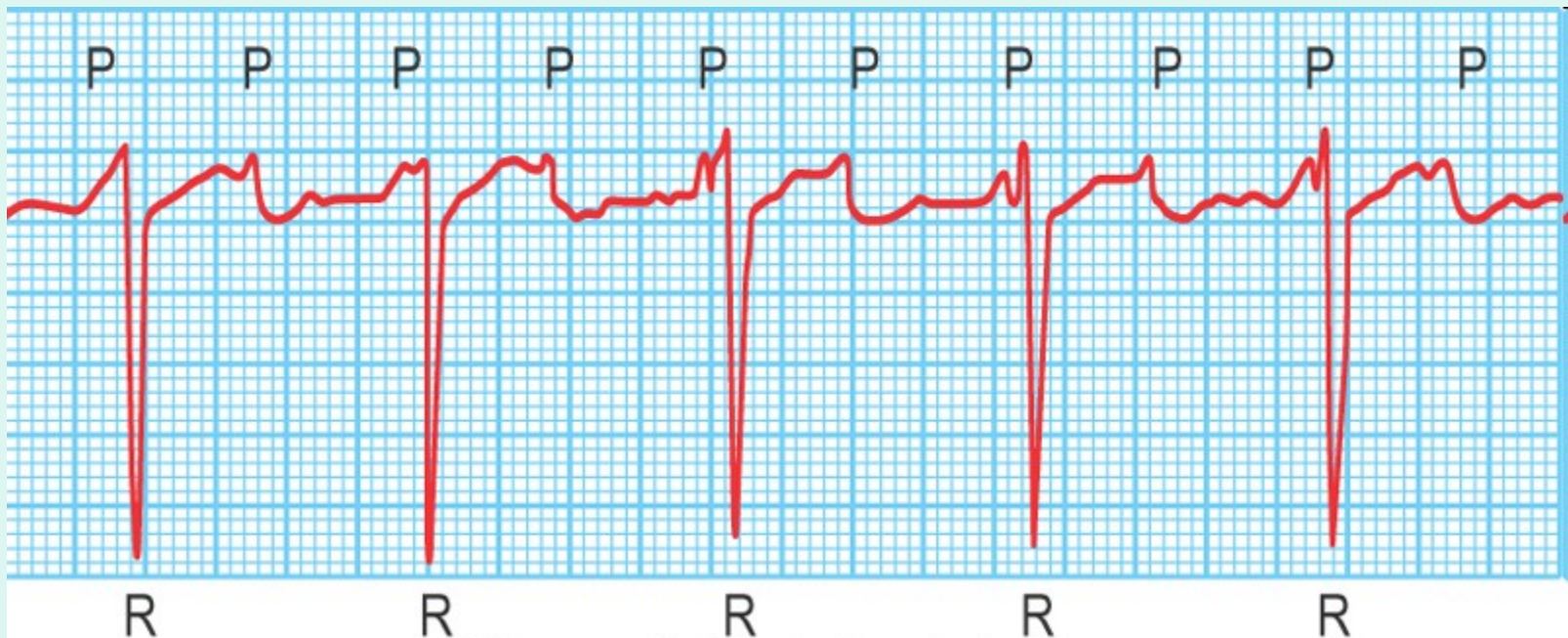


Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Atrial tachycardia

Rare , may be idiopathic -

When present with a block it is often due to digitalis poisoning -



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Ventricular tachyarrhythmias

Life-threatening ventricular tachyarrhythmias -

Sustained ventricular tachycardia -

Ventricular fibrillation -

Normal heart ventricular tachycardia -

Non- sustained ventricular tachycardia -

Ventricular premature beats -

Ventricular premature beats

May be uncomfortable especially when frequent -

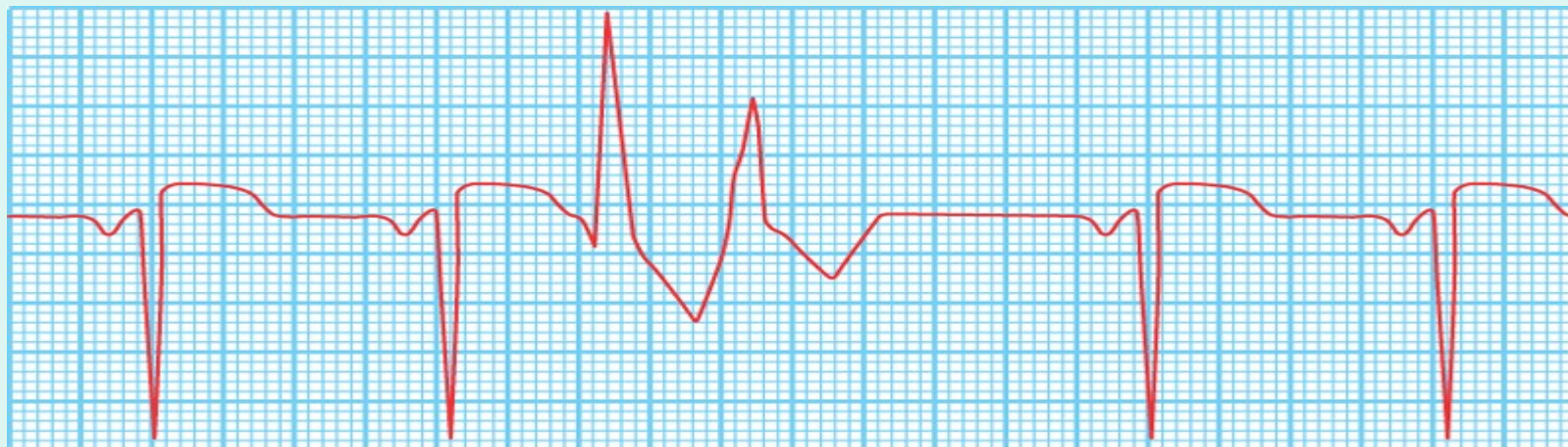
Complaint : extra beat ,missed beat ,or heavy beat -

Irregular pulse -

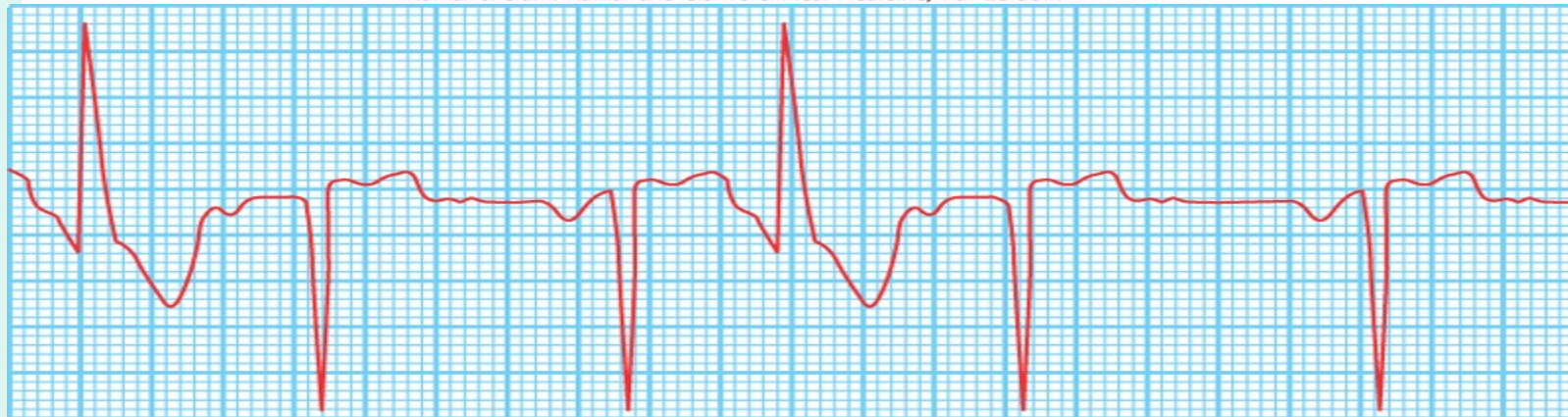
ECG ,the premature beats have a broad ($>0.12s$) and bizarre QRS - complex, then fallowed by compensatory pause



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.

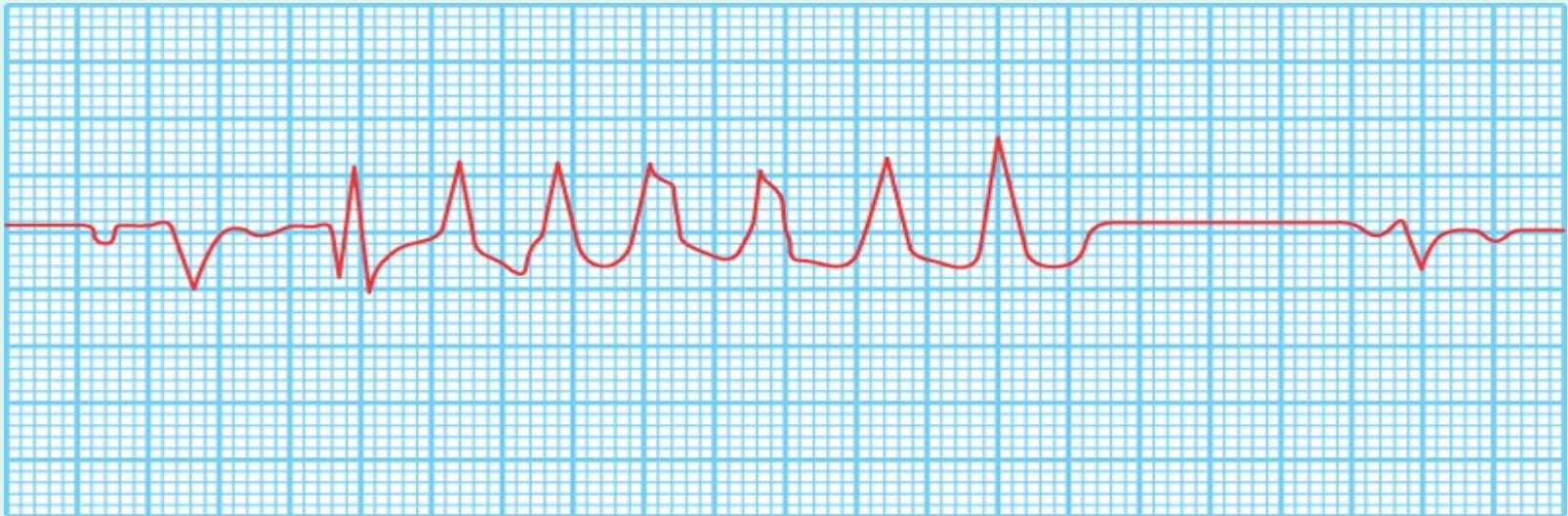


Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Non-sustained ventricular tachycardia(NSVT)

It is VT that is > 5 consecutive beats but lasts < 30 s -

**It is usually benign and does not require any -
treatment**



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Normal heart ventricular tachycardia

It is usually benign -

It is idiopathic and monomorphic -

Excellent long- term prognosis -

If symptomatic ,treatment with beta-blockers ,verapamil or catheter ablation -

Life- threatening ventricular tachyarrhythmia

This life threatening condition with haemodynamic instability (e.g. syncope, hypotension) presents as

Sustained ventricular tachycardia

Ventricular fibrillation

Sustained ventricular tachycardia

**It last (>30 s) causing pre- syncope (dizziness)
, syncope, hypotension and cardiac arrest**

**.On examination pulse rate between 120-220 b.p.m -
with variable degrees of atrio-ventricular
dissociation (cannon a wave)**

**ECG shows rapid ventricular rhythm with -
broad (0.14s or more) abnormal QRS
complexes . AV dissociation with
occasional P waves**

**SVT with bundle branch block may resemble -
VT on ECG**

**Treatment is urgent:- i.v. class I or -
amiodarone or DC cardioversion**

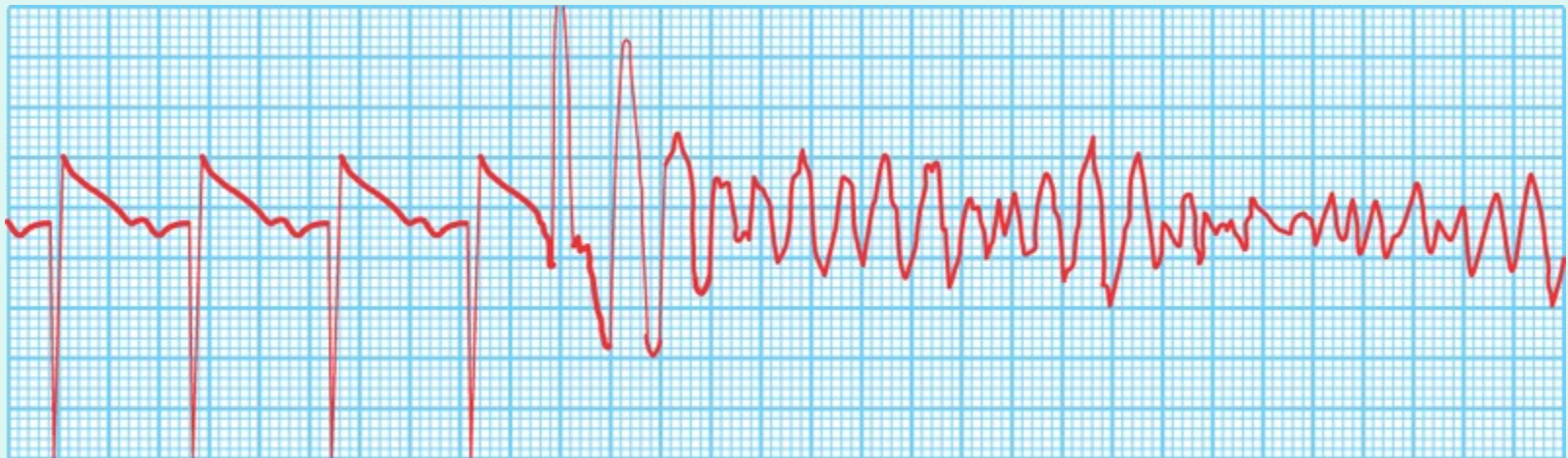
Ventricular fibrillation

**This is rapid and irregular ventricular -
activation with no mechanical effect**

**Patient is pulseless and rapidly becoming -
unconscious with respiratory arrest**

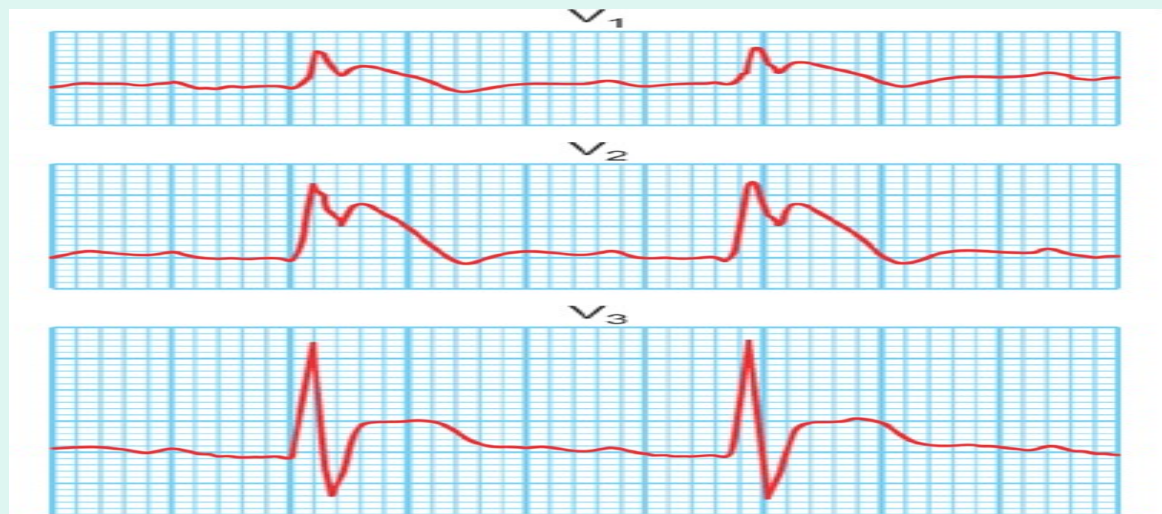
**ECG shapeless, rapid oscillations with no -
complexes**

The only effective treatment is defibrillation -



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Brugada syndrome

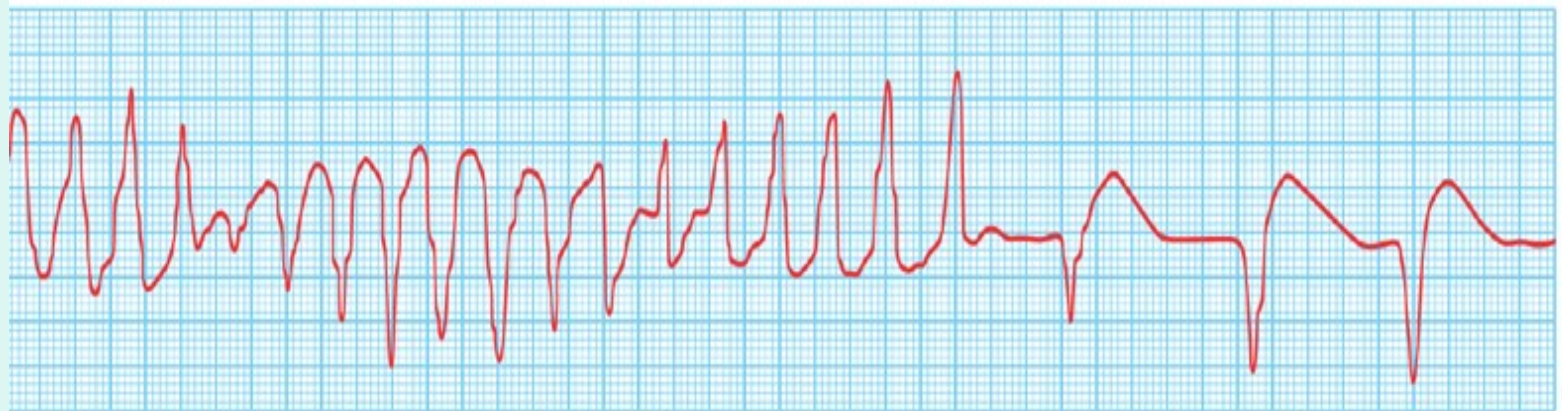
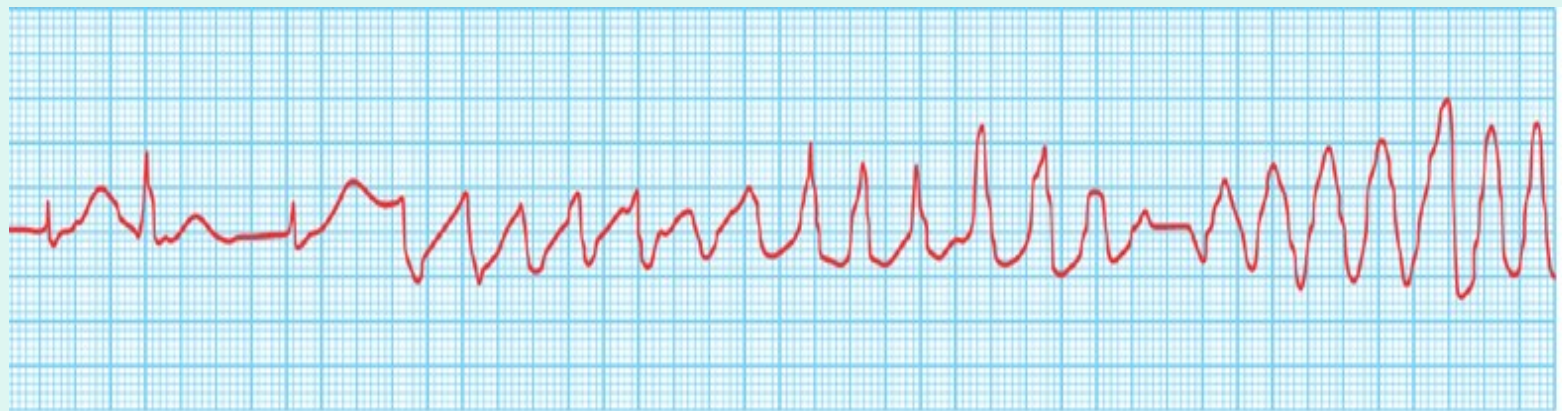


Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Long QT syndrome



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.



Kumar & Clark: Kumar and Clark's Clinical Medicine, 7th Edition.
Copyright © 2009 by Saunders, an imprint of Elsevier, Ltd. All rights reserved.

Acquired causes of long QT syndrome

-: Electrolyte abnormalities -

Hypokalaemia ,Hypocalcaemia, Hypomagnesaemia

Drugs :- Quinidine, disopyramide -

Sotalol, amiodarone

Tricyclic antidepressants

Phenothiazine drugs e.g.chlorpromazine

Haloperidol, olanzepam

Macrolides e.g. erythromycin

Quinolone, e.g. ciprofloxacin

Methadone

-: Poisons -

Organophosphate insecticides

Miscellaneous -

Bradycardia

Mitral valve prolapse

Acute myocardial infarction

Diabetes mellitus

Prolonged fasting & liquid protein diet

CNS disease e.g. dystrophia myotonica

Antiarrhythmic drugs

Classification

Class I (sodium channel blockers)

Ia Disopyramide

Ib Lidocaine, mexiletine

Ic Flecanide, propafenone

.Class II (Beta- blockers) e.g

Atenolol ,propranolol

.Class III (Prolong action potential) e.g

Amiodarone, sotalol

.Class IV (Calcium- channel blockers) e.g

Verapamil, Diltiazem

(Others Adenosine, Digoxin)