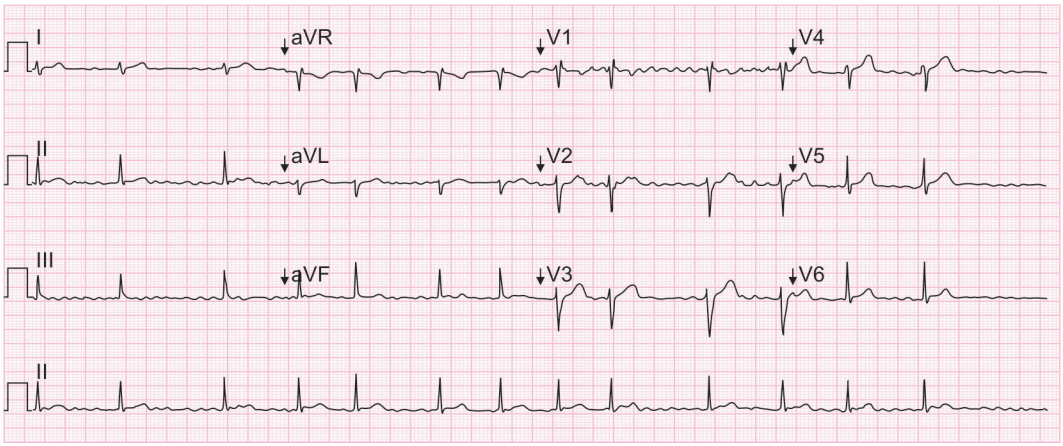
Chapter 11

Atrial Fibrillation

Atrial rate is more than 350/minute with no definite visible P wave seen in surface ECG but fibrillatory waves may be visible. Mechanism of atrial fibrillation (AF) is usually ectopic (multifocal) or rarely it can be reentry. Atrial fibrillation (AF) may be coarse (mitral stenosis), fine (thyrotoxicosis) or sometime straight baseline (irregularly irregular placed QRS complexes are the only evidences of AF in such cases). Changing block is the reason for irregular and lower ventricular rate. Etiology of AF includes rheumatic heart disease, ischemic heart diseases, thyrotoxicosis, degenerative heart disease, cardiomyopathy, hypertension, syphilitic heart disease or lone (idiopathic).

Patient may present with palpitation (rapid ventricular rate), or systemic or pulmonary embolization (clot in LA or RA) or rarely asymptomatic. On examination pulse is irregularly irregular with apex pulse deficit of more than 12/minute and absent 'a' wave in JVP. If patient has additional diagnosis of mitral stenosis (MS), then some auscultatory finding of MS will be modified (changing intensity of M1, disappearance of presystolic accentuation of mid-diastolic murmur). Regular pulse in a diagnose case of AF is not a good sign. It probably suggests complete heart block (digoxin toxicity).



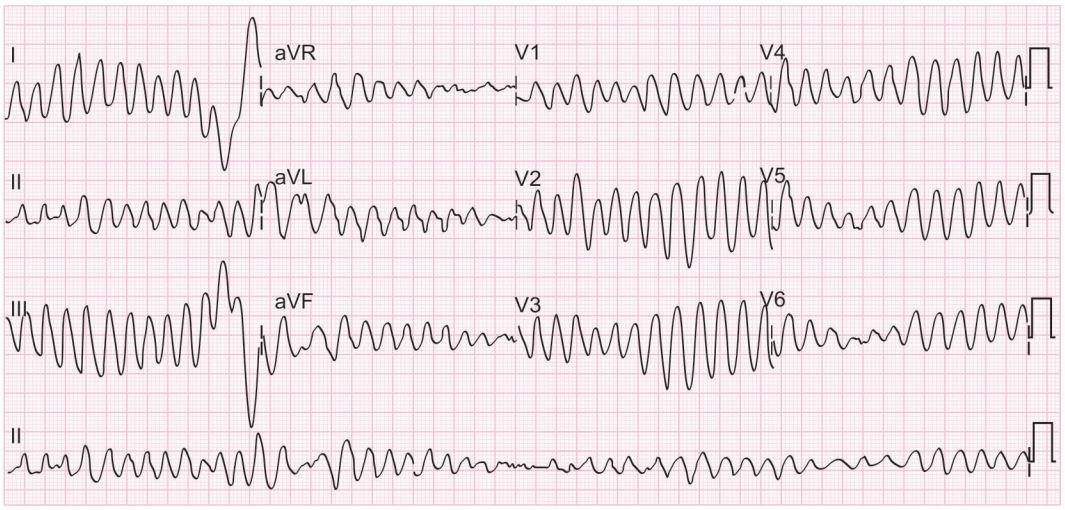
ECG shows fibrillatory waves, narrow QRS complexes and changing RR interval (AF)

- **Biphasic VT:** A ventricular tachycardia with a QRS complex that alternates from beat to beat. It is associated with digoxin intoxication and long QT syndrome.

Ventricular tachycardia can be differentiated from supraventricular tachycardia (SVT) with wide QRS complexes (LBBB, RBBB, WPW syndrome). Prior P wave before QRS complexes present before SVT but sometimes it is difficult to differentiate between two types of arrhythmia.

TORSADE DE POINTES

Torsade de pointes is an uncommon and distinctive form of polymorphic ventricular tachycardia (VT) characterized by a gradual change in the amplitude and twisting of the QRS complexes (twisting of the points) around the isoelectric line. It is associated with a prolonged QT interval, which may be congenital or acquired. Congenital causes include Jervell and Lange-Nielsen syndrome (i.e. congenitally long QT associated with congenital deafness) and the Romano Ward syndrome (i.e. isolated prolongation of QT interval). Both of these syndromes are associated with sudden death due to ventricular fibrillation. Acquired conditions include hypokalemia, hypomagnesemia, antiarrhythmic drugs (quinidine, procainamide, disopyramide, encainide, flecainide, sotalol, amiodarone), antihistamines (astemizole and terfenadine) alone or in combination with azole antifungal drugs or the macrolides. Torsade usually occurs in bursts that are not sustained; thus, the rhythm strip usually shows the patient's baseline QT prolongation.

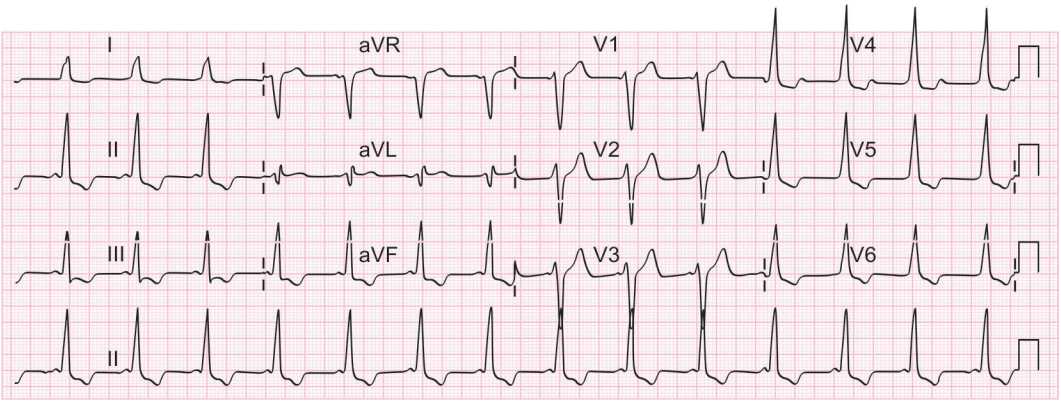


ECG shows torsade de pointes

Chapter 17

Pre-excitation Syndrome

Wolff Parkinson-White (WPW) syndrome: WPW syndrome is caused by the presence of an abnormal accessory electrical conduction pathway between the atria and the ventricles. Electrical signals traveling down this abnormal pathway (known as the bundle of Kent) may stimulate the ventricles to contract prematurely, resulting in a unique type of supraventricular tachycardia referred to as an atrioventricular re-entrant tachycardia. It is manifested as short PR interval (impulse passing through Kent fibre bypassing normal conducting system), a delta wave (slurred upstroke in the QRS complex, ventricular muscles stimulated through Kent fibre with muscle to muscle conduction), broad QRS complex but normal QT interval and T wave inversion.



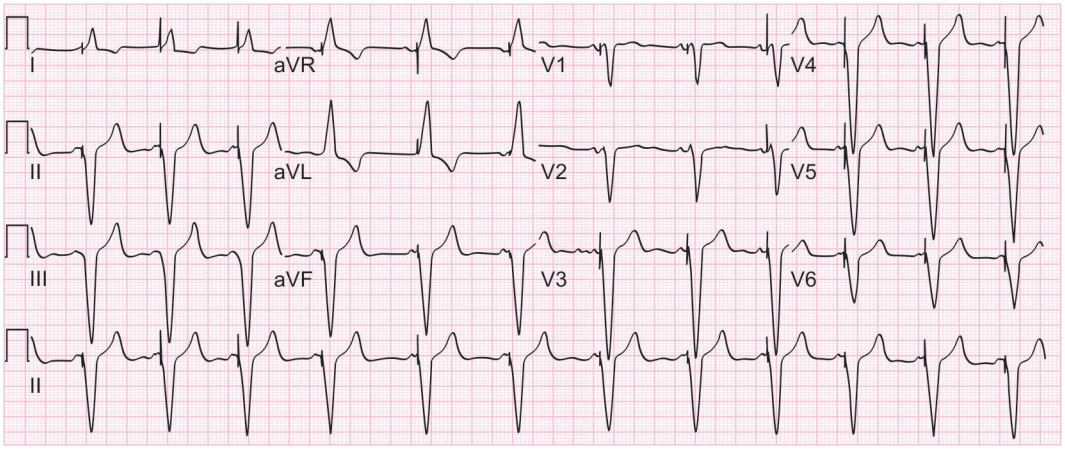
ECG shows short PR interval (0.10 seconds), delta wave on upstroke of R wave, broad QRS complexes and T wave inversion (WPW syndrome)

Lown-Ganong-Levine (LGL) syndrome: There is an accessory path connecting atria to bundle of His or left or right bundle (fiber of James). Hence it has only short PR interval with normal QRS complexes (without delta wave) and paroxysms of clinically-significant tachycardia. Individuals with a short PR interval found incidentally on ECG were once thought to have LGL syndrome. However, subsequent studies have shown that a short PR interval in the absence of symptomatic tachycardia is simply a benign ECG variant.

Chapter 21

Pacemaker

Cardiac pacemaker is a medical device implanted subcutaneously over chest in a subclavicular area and connected to right ventricular mass or rarely right atria (overdrive pacemaker) by electrical wires. It gives desired electrical impulses to heart so as heart contracts at normal rate and rhythm. The primary purpose of a pacemaker is to maintain an adequate heart rate, either because the heart's natural pacemaker is not fast enough, or because there is a block in the heart's electrical conduction system. Modern pacemakers are externally programmable and allow a cardiologist to select the optimum pacing modes for individual patients. Combined pacemaker and defibrillator in a single implantable device is also available. Newer pacemakers have multiple electrodes stimulating differing positions within the heart to improve synchronization of the lower chambers (ventricles) of the heart.



ECG shows vertical straight line before each QRS complex (pacemaker wire)