Preexcitation syndromes:

Clinical presentation:
Symptoms associated with the WPW syndrome are a result of arrhythmia with a rapid heart rate due, for example, to preexcited AF or atrial flutter with a rapid ventricular response. 50-60% of individuals report symptoms such as palpitation, anxiety, dyspnea, chest pain or tightness, syncope and sudden death due to ventricular fibrillation. Approx 25% will become asymptomatic over time. Those over age 40 who are asymptomatic are likely to remain symptom free. The absence of pre-excitation on ECG despite the discovery of accessory pathways in asymptomatic patients identify a group at low risk for developing symptoms. Fortunately, the incidence of sudden death in patients with the WPW syndrome is quite low, ranging from 0 to 0.39 percent annually in several large case series, with the lowest risk seen in asymptomatic patients.

ECG Features:
In 1930, Louis Wolff, Sir John Parkinson, and Paul Dudley White published a seminal article describing 11 patients who suffered from attacks of tachycardia associated with a sinus rhythm electrocardiographic (ECG) pattern of branch block with a short PR interval. The PR interval is short (less than 0.12 sec) due to rapid AV conduction through the accessory pathway and bypass of the atroventricular node. The QRS complex consists of fusion between early ventricular activation caused by preexcitation and the later ventricular activation resulting from transmission through the AV node and to the ventricles. The initial part of ventricular activation is slowed and the upstroke of the QRS complex is slurred because of slow muscle fiber-to-muscle fiber conduction; this is termed a delta wave. The more rapid the conduction along the accessory pathway, the greater the amount of myocardium depolarized via the accessory pathway, resulting in a more prominent or wider delta wave, and increasing prolongation of the QRS complex.

Type A, due to a left sided bypass tract, in which there is a tall R wave in leads V1-V3 (ie, a positive or upward delta wave).
Type B, due to a right sided bypass tract in which there are QS complexes in leads V1-V3 (ie, a negative or downward delta wave).

Accessory pathway:
The bypass tract or bundle of Kent may be located anywhere along the AV ring (groove) or in the septum. The most frequent locations are:
left lateral (50 percent),
posteroanterior (30 percent),
right anteroseptal (10 percent),
right lateral (10 percent).

Other ECG findings:
A negative delta wave (presenting as a Q wave) may mimic a myocardial infarction pattern. In addition, such a wave may mask the presence of a previous myocardial infarction. Intermittent WPW may be mistaken for frequent ventricular premature beats. If the WPW pattern persists for several beats, the rhythm may be misdiagnosed as an accelerated idioventricular rhythm. The WPW pattern is occasionally seen on alternate beats and may suggest ventricular bigeminy. An alternating WPW and normal pattern may occasionally suggest electrical alternans.

Prevalence:
(WPW Pattern): On the surface ECG is 0.15 to 0.25 percent in the general population. The prevalence is increased to 0.55 percent among first-degree relatives of affected patients, suggesting a familial component. Incidence in M:F (2:1); highest in first year of life and secondary peak in young adulthood.
(WPW Syndrome): WPW on ECG and arrhythmia
Review of 22.5K aviation personnel, 0.25% noted to have pattern noted on surface ECG, and 1.8% of that population documented to have arrhythmia.
In 228 patients followed with WPW for 22 years, arrhythmia noted only in 1% per patient per year. Sudden cardiac death 0.39% annually.

Arrhythmias associated with WPW:
80%-AVRT
15-30% Atrial Fibrillation
5%- Atrial Flutter
occurrence of arrhythmias is related to age at time pre-excitation is discovered.
In Olmstead county population 1/3 patients <40 had symptoms, while none of those over age 40 had symptoms.

Familial WPW
Autosomal Dominant trait
Among patients with WPW, 3.4% have first-degree relatives with a pre-excitation syndrome.
2 studies in 3 families mapped gene to ch 7 q34-q36.
WPW associated with familial hypertrophic CM has been mapped to ch 7 q3.

Conduction:
Conduction from the atria to the ventricles normally occurs via the atrioventricular node (AV)-His-Purkinje system.
Patients with a preexcitation syndrome have an additional or alternative pathway, known as an accessory pathway, which directly connects the atria and ventricles and bypasses the AV node.
In the Wolff-Parkinson-White (WPW) syndrome, AV conduction is through an AV bypass tract (the bundle of Kent).
This results in earlier activation (preexcitation) of the ventricles than if the impulse had traveled through the AV node.

Non-pharmacologic management:
external DC cardioverters
temporary pacemakers, and permanently implanted antitachycardia (or overdrive) pacemakers (limited due to RFA).
Cardioversion and temporary pacemakers are used for the acute termination of arrhythmias.
Ablative therapy (RFA and surgical ablation).

Non-pharmacologic management and recurrence:
Recurrence (return of delta waves on the electrocardiogram or spontaneous paroxysmal supraventricular tachycardia) reported in 5 to 12 percent of patients.
Higher with ablation of multiple pathways or right or left free wall or septal accessory pathways.
Approximately one-half of recurrences occur in the first twelve hours after the procedure.
Intravenous adenosine administered immediately after the ablation procedure, unmasks residual accessory pathways by creating transient AV nodal blockade; it may therefore identify patients who are likely to experience arrhythmia recurrence
Recurrent AF is more common. In one series of 91 patients with documented episodes of intermittent AF before successful ablation of accessory pathways, older age was the only independent predictor of recurrent AF at two years.

Pharmacologic management:
AVRT:
Orthodromic: If the tachycardia has a narrow QRS complex; the antegrade limb (ie, the pathway that conducts the impulse to the ventricle) is the AV node/His-Purkinje system; in this setting, the delta wave seen during sinus rhythm is lost since antegrade conduction is not via the accessory pathway (ie, the ventricle is not preexcited).
Antidromic: If the tachycardia has a wide QRS complex; the antegrade limb is usually the accessory pathway.
Orthodromic AVRT may be associated with a wide QRS complex in the presence of a preexisting or rate-related functional bundle branch block.