Review Article

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WOLFF-PARKINSON-WHITE SYNDROME

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Abstract

WPW syndrome is a congenital heart disease that is characterized by the presence of an abnormal electrical connections between the atria and ventricles of the heart. In 1930, Louis Wolff, Sir John Parkinson, and Paul Dudley white published a seminal article describing the 11 young patients who suffered from attacks of tachycardia associated with an electrocardiographic pattern of 'bundle branch block' with a short PR interval. So from there onwards, it is called Wolff Parkinson white [WPW] syndrome. The normal conduction of the AV node occurs slowly than the accessory pathway conduction. Preexcitation is a process that the cardiac ventricles are activated earlier than the impulse of the AV node which leads to the shorter PR interval and formation of a delta wave. The supraventricular tachycardia associated with WPW syndrome is called AV reentrant or reciprocating tachycardia (AVRT).WPW syndrome is that there is an accessory pathway between the atrium and ventricles which cause rapid heartbeat or tachycardia.

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PREEXCITATION

It is the propagation of depolarization wave front that occurs more quickly than normal due to presence of an accessory conduction pathway that bypasses the normal conduction system. Normally the conducting system starts from the implue of the SA node than it passes to AV node, HIS bundles,bundle of fibres,and purkinjie fibers

Impulse move to the conducting system normally with a brief delay occurring at the AV node so that the right and left artium gets depolarized as soon as AV node fires with a beating heart to an atrial contraction then after AV delay then this depolarization neutralizes the efficient and quickly HIS-PURKINJIE SYSTEM.

The consequences of this in the EKG is that P-wave with PR interval lasts for 120-200-m/s followed by the shrap QRS complex of 120m/s. In the abnormal accessory pathway ,when the impulse bypasses the avnode that has no intrinsic delay but due to connection in the atrium and the ventricles so that ventricular myocardium depolarized early which leads to short pr interval.

In addintionally the accessory pathway usually but not always inserts into non-specialised myocardium instead of directly into the his-purkinjie system.the propagation of the aberrant conduction ,once it gets to the venticle conduction is relatively slow.this slow

in the intraventicular conduction leads to wide qrs comple.the qrs complex has specific characteristic addition in the initial slurring of the complex usually well defined as the primary cause of the qrs complex.The slurring is called delta wave. BUNDLE OF KENT –the extra or the accessory pathway between the atria and ventricle leads to preexcitation.

It has been estimated that most accessory pathways (60 to 75 percent) are capable of bidirectional conduction (antegrade and retrograde) between the atrium and ventricle. However, some accessory pathways (17 to 37 percent) are only capable of conduction in a retrograde fashion from ventricle to atrium [2]. When accessory pathways conduct exclusively in the retrograde direction (so-called "concealed" accessory pathways), they do not generate a delta wave (ie, slurred upstroke of the QRS complex) and the WPW pattern on the surface ECG but are still capable of supporting reentrant tachycardia. Retrograde conduction can occur following ventricular pacing or premature beats, and it can form the retrograde arm of an orthodromic AV reentrant tachycardia (AVRT) circuit. The vast majority of concealed accessory pathways are left-sided [3].

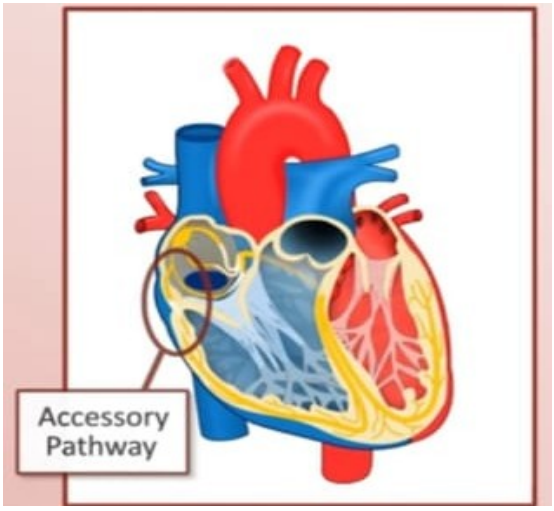


Fig 01: Accesssory Pathway

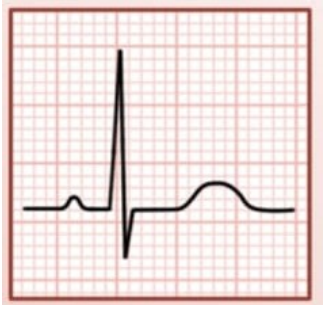


Figure 02: NORMAL EKG

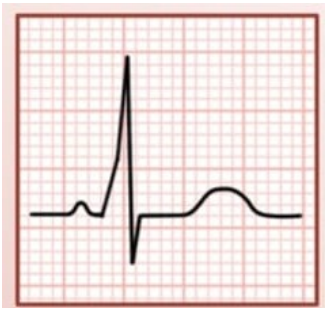


Figure 03: Delta Wave

TYPES OF ACCESSORY PATHWAY

1. ATRIOVENTICULAR –MOST COMMONLY
2. ATRIOFASCICULAR
3. NODOFASCICULAR
   NODOVENTICULAR
4. FASCICULOVENTICULAR
5. ATRIONODAL-JAMES
6. FIBRES/LGL PREEXCITATION
7. ATRIO HISIAN-BRECHEN MACHU FIBRES.

MAHAIM FIBRES

SYMPTOMS

- ✓ Rapid palpitation
- ✓ Chest discomfort
- ✓ Shortness of breath
- ✓ Lightheadedness or syncope.
- ✓ Dizziness
- ✓ Sweating
- ✓ Onset and offset of the actions are typically sudden.
- ✓ Some patients may have the precipitating factors such as stress, coffee, menstrual period or pregnancy.
- ✓ Mostly symptoms are sporadic and unpredictable.
- ✓ Sudden death is rare but may sporadically be the initial presentation in previously asymptomatically individuals.
- ✓ A hstory of syncope raises concerns regarding a veryrapid arrhythmia with haemodynamic compromise.

HISTORY

- ❖ The earliest description of the accessory pathway was reported by Stanley kent in 1893 who suggested that impluses can travel from the atrium to the venticle over a node like structure other than the atrioventicular node
- ❖ Cohn and fraser reported the first case of the preexcitation syndrom in 1913.
- ❖ In 1930, Louis Wolff, Sir john parkinson and Paul dudley white published a seminal

article describing 11 young patient who suffered from attacks of tachycardia associated with an electrocardiographic pattern of 'bundle branch block' with a short PR interval.

- Ohnell was the first to use the term 'PREEXCITATION',whereas Seters described the slurred initial componemt of the qrs comlex as a 'DELTA WAVE'.
- Curative theraphy of WPW syndrome as demonstrated in 1976 .when Cobb et al. successfully ablated an accessory pathway during open-hear surgey.
- The first successfully catheter ablation of an accessory pathway by delivering direct current energy was reported by Moraday and Scheinman in 1984.
- In 1987,Borggrefe et al.successfully ablated a right-sided pathway by delivering RF current.radiofrequency ablation of accessory pathways has become a first line theraphy and is favoured over the medical treatment in most of the patients.

PATHOPHYSIOLOGY

In WPW sundrome there is abnormal electrical connection of heart by atria and ventricle.WPW symptom is the abnormal fast heart beat which is called tachycardia. In normal conduction the electric impulse start from the sa node and travel throughout the atria before they reach the av node.av node is the gate way to the ventricles. It relays the passage of the electric impulse to the ventricles and see that the all the amount of blood is ejected to the ventricles before theventicles contract. This refactory property of the av nodeis the centre in limiting the electrical activities to reach the ventricles. In this situation the atrial rate is excessively high during atrial fibrulation or atrial flutter. These fast ventricular rates can degenerate into ventricular fibrillation (VF) and cardiac arrest [4][5][6][7][8]. The avnode blocks most of the impulses from passing to the ventricles keeping the heart rate under control. In WPW there is an additional connection between the atria and ventricle which is the accessory pathway which is also called the bundle of kent. This pathway is ssentially a patch of the conducting tissue which previse the shook up to the ventricles by passing the av node. It allows the of part of the elctrical impulse to arrive to the ventricles soon which cause the preexcitation, which leads to shorten the PR interval in ECG because the part of the vetrivles depolarise occur nd ventriculrar depolarisation develops more gradually and lasts longer ,resulting the slow rise in the intial complex of QRS know as delta wave[QRS is prolonged].

The presence of the accessory pathway along doesn't cause the tachycardia. Most the people in WPW doesn't devlop any symptoms which is called WPW pattern and when it is symptomatic then it is called WPW syndrome.

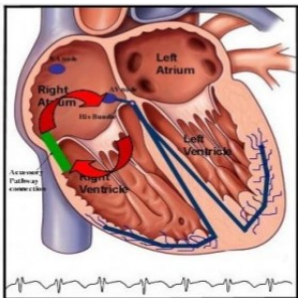
MECHANISM WHICH MAY CAUSE WPW

1.ATRIOVENTRICULAR REENTRY TACHYCARDIA[AVRT]

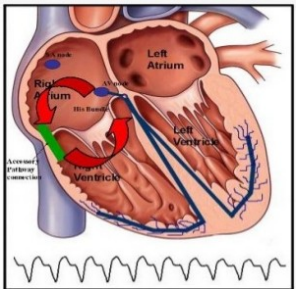
Most commonly tachycardia develops when electriacl impluse develops and travel down in one pathway either the noraml or accessory backup the other creating the self prophecating loop or reentrance circuit. The frequency of the loop determines the heart rate and cane be very fast from 150-250beats per minute. This is known as AVRT.

AVRT can be orthidromic or antidromic depending on the direction of the loop:

- Othrodromic –down via av node,95%.
  Descend –normal pathway
  Ascend – accessory pathway



- Antidromic- up via av node,5%
  Less common pathway
  Descend –accessory pathway
  Ascend –normal pathway



2.WPW COMBINED WITH ATRIAL FIBRILLATION

- In this condition, atria contract at very high rate that most of the electric impluses don't make it through the av node to the venticles. This is were WPW pathway can have a detrimetal effect. It provides a bypass to move impluses and reach the ventricles which causes the faster heart rate that could potentially fatal. The sevierty of WPW tachycardia depends on how fast the accessory pathways able to conduct .

MANAGEMENT

- Wolff-Parkinson-White (WPW) syndrome is a conduction disorder of the heart caused by pre-excitation accessory pathway resulting in tachyarrhythmias .WPW tachycardia varies from person to person and it can be evaluated by a procedure called progammed electrical stimulation. In which atria are stimmulated with progressively higher rate with atrial to ventricular conduction ratio is monitored. Pateints developing high risk with leathal tachycardia if the accessory pathway continues to the 1:1 ratio which is dangerous high atrial rates. High risk patients are treated with the catheter ablation to destroy the conductive tissue of the accessory pathway
- Patients are managed by class -1a drug called procainamide of IV infusion if thepatient is hemodynamically stable.
- If the patients are unstable due to immediate synchornised cardioversion then catheter ablation of accessory pathway is done. This is the definite treatment of WPW because it is adestruction of abnormal electrical pathway
- Administration of amiodarone, adenosine, beta blockers, and calcium channel blockers should be avoided as these will isolate the accessory pathway and thus predispose to fatal arrhythmias such as ventricular fibrillation by increasing the ventricular rate [9,10,11,12,13].
- AV node blockers should be avoided in atrial fibrillation [AF] and atrial flutter with WPW which includes calicum channel blockers[CCB],digoxin,diltiazem,adenosin ,verapamil and beta blockers.
- If the patient is haemodynamically stable
  Normal QRS in ECG-AV nodal blocking drugs.
  Narrow QRS without AF in ECG-adenosine,verapamil etc.
  Wide QRS in EGC[othrodromic AVRT/antidromic AVRT/AF/atrial flutter]-Procainamide,sotolol,amiodarone,flecainide.
- Ebsetin anomly and hypertropic cardiacmyopathy should be evaluated.[In case more than one accessory pathway].

CONCLUSION

WPW syndrome is a cardiac conduction disorder which is caused by the presence of an extra accessory AV pathway between atria and ventricle which is called bundle of kent and its main symptom is the palpitations.we have to take close attention the symptoms of the patients so that it help in making the crucial in the diagnosis. Once the diagnosis is done it helps in the futher evaluation and the management of this syndrome. For this syndrome the main and the first line treatment is the catheter ablation therapy.

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