Accessory pathways

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In 1930, Wolff, Parkinson and White described surface ECG findings of short PR interval and RBBB pattern in patients with paroxismal supraventricular tachycardia. (1)

In1932, Holzman and Scherff (2) attributed the ECG abnormalities described by Wolff, Parkinson and White to an abnormal AV connection bypassing the atrioventricular node and preexciting the ventricles and proposed a circus movement involving the multiple AV connections as a mechanism of tachycardia.

Wolferth 1933 (3) and Wood 1943(4) provided histologic proof of muscular connections between the right auricle (RA) and right ventricle (RV) on autopsy in a patient with WPW syndrome.

In1944, Segersetal. (5) proposed the term delta wave for the initial slurred component of the QRS complex.

In1944, Ohnell, (6) coined the term —preexcitation, as a phenomena whereby, in relation to atrial events, the whole or part of the ventricular muscle is activated earlier by the impulse originating in the atrium than would be expected if the impulse reached the ventricles by way of normal conduction system.

Kent's description of the presence of multiple muscular connections was denied by many investigators. In a study of 22 fetal and new born hearts, Lev and Lerner (1966) did not find any muscular communications outside the normal conduction system. (7)

In 1937, Ivan Mahaim, (8) phrased —para-specific conduction, a term he used to describe properties of fibers directly connecting the lower portion of the AV-Nodeand the ventricular septum or between upper part of the His bundle or each bundle branch and the ventricular septum or any part of the ventricle. In his communication, he opined that if conduction by Kent's fibers is accepted, it should be regarded as an accessory form of conduction: para-specific conduction. His original description of such conduction tracts have (8) since been recognized historically by an eponym, as —Mahaim fibers. Although Kent's description of the presence of multiple muscular connections were denied by many investigators, it must be stated that another group of anatomists, i.e., Anderson et al.(1972, 1974) (9;10) were able to confirm Kent's description of specialized connections in the RS wall only. They, too, however, were unable to find multiple muscular connections across the AV annulus as postulated by Kent

The controversy and lack of proof of their existence, the original description of multiple muscular connections have been erroneouslly historically recognized by the eponym as “Kent bundle”.

Meanwhile, James 1961 (11) detailed distinct conduction pathways, separate from the AV myocardium, which included pathways connecting RA and LA and inter-nodal tracts connecting the sinus to the AV node. Per his description, a majority of these fibers enter at the superior margin of the AV node; a distinct subset bypasses the upper and central AV node, connecting directly with the lower third of the AV node or the bundle of His. He postulated that conduction over such a bypass tract would result in electrographic finding of a short PR interval, with resultant preexcitation, albeit with normal QRS duration, during sinus rhythm.

Brechenmacher 1975 (12) described fibers in a patient with ECG finding of short PR interval and normal QRS duration, which bore no similarity to the ones described by James. Again, notwithstanding the lack of proof of their existence or functional significance, these connections have historically been described with the eponym as —James fibers. (13)

To circumvent the myriad of complexities involving the description of preexcitation syndromes, Anderson et al. in 1975, (14), proposed a nomenclature suitable to both the anatomist and the clinicians. Central to the above was the concept that AV node is that portion of the cardiac tissue responsible for AV delay. For preexcitation to occur, it is necessary for the delay (15) producing area, be either short-circuited, or modified by anatomic or physiologic changes.

The proposed classification defined the following variants:

1. Accessory AV Muscle Bundle: Pathway connecting the atrial to ventricular myocardium outside the AV node-His-Purkinje system (the normal pathway). These were further subdivided into septal and parietal bundles: Right parietal connection was named as Type B preexcitation pattern and left parietal connection was named as Type A preexcitation pattern on surface ECG. (16).

2. Accessory Nodoventricular Muscle bundle: Pathway connecting the AV node directly to the ventricular myocardium, short-circuiting the distal/lower part of the AV node-His-Purkinje system. (17).

3. Atrio-Fascicular Bypass Tract: Accessory pathway inserting into specialized tissues, producing preexcitation variant of short PR interval with a normal QRS duration. (18)

4. Intra-nodal Bypass Tract: Postulated as anatomically small and may not be functioning so as to produce normal delay. (19).

5. Fascicular-Ventricular Accessory Connections: Connecting specialized conduction system to the ventricular myocardium and may excite the ventricle earlier than would be via normal conduction route.

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