CASE REPORTS

COMPLETE A-V DISSOCIATION IN ACUTE RHEUMATISM

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In acute rheumatism, dissociation can occur between the action of the auricles and ventricles as a temporary or permanent effect. The dissociation may be complete or partial, and the resulting rhythm will depend on the relative rates of the S-A and A-V nodes and on the presence and degree of conduction disturbance between these two nodes.

In complete auriculo-ventricular dissociation (usually termed complete heart block), the auricles and ventricles are totally independent. The auricles respond to the sinus stimulus and with it may show respiratory arrhythmia, while the A-V node is in control of the ventricles and discharges itself more regularly. The ventricular rate is classically slower than the auricular and it is usually very slow. This very slow pulse, however, is less constant in rheumatic cases, and Crawford and Di Gregorio (1947) describe ventricular rates within the normal range, one woman of 29 having a pulse rate of 81. In the present case, the ventricular rate exceeded that of the auricles.

Case Report

Geoffrey S., aged 9, was admitted on 7/4/49. There was no past or family history of rheumatism, but he had had recurrent sore throats and lived in a damp squatter's hut. For some months he had been vaguely unwell, with pallor, lassitude and nervousness. On 5/4/49 he again developed a sore throat with fever, headache, vomiting, and pain in the legs. On the day of admission both feet and the left knee had become swollen so that he could not walk.

On examination he was ill, pale, and sweating, with a temperature of 102°F. His pulse was regular and compressible, its rate being 120 a minute. The heart was slightly enlarged, and there was a soft apical systolic murmur and a loud split pulmonary second sound. The blood pressure was 110/60. The tonsils were infected. The right ankle was hot and swollen but not very painful. A blood count was normal, but the erythrocyte sedimentation rate was 39 mm. in one hour. He was regarded as a case of rheumatic fever and treated with calcium aspirin.

The electrocardiogram on the day of admission (Fig. 1) showed complete auriculo-ventricular dissociation, with a ventricular rate of 112 and an auricular rate of 103. The auricles showed slight respiratory arrhythmia, but the ventricles were regular. No clinical note was made of variability of the heart sounds, and this peculiar rhythm had not been suspected.

On 8/4/49, the left knee was involved. By 11/4/49, the temperature was subsiding, but he was drowsy and confused: salicylates were therefore stopped. The cardiogram now showed a sinus rhythm with a P-R interval of 0.28 second.

By 14/4/49, the pulse was much slower, with prominent respiratory arrhythmia, and the P-R interval had shortened to 0.25 sec. (Fig. 2). Bradycardia persisted, but the P-R interval shortened steadily to 0.20 sec. on 22/4/49, and 0.18 sec. on 13/5/49. By this time his heart rate had risen from

FIG. 1.—Cardiogram on day of admission, showing complete A-V dissociation. Auricular rate: 103; ventricular rate, 112.

50 to 80, and the E.S.R. had become normal. He was allowed up gradually and transferred for convalescence on 7/6/49.

When last seen (20/7/49) he was very well, with a heart of normal size, a barely audible systolic murmur at the apex, and an E.S.R. of 3 mm. in one hour.

Discussion

In certain cases of rheumatic fever, the periodicity of the A-V node is increased above that of the S-A node, and in these the heart's action and the electrocardiogram depend on the presence and degree of auriculo-ventricular block. If there is no block, the whole heart is governed by the A-V node and the result is nodal rhythm.

If there is only retrograde block between ventricle and auricle, then the faster ventricular beats will not interfere with the slower auricular contractions. However, at intervals the impulse from the S-A node will reach the A-V node before it has discharged itself, but after its refractory period: the ventricle will then respond with a premature contraction and then resume its A-V nodal rhythm without a compensatory pause. This arrhythmia is usually called interference dissociation. Unfortunately the nomenclature is confused. Interference dissociation may be called "complete A-V dissociation" (Zuidema, 1949) although the dissociation is not complete. Kirby (1948) calls it "ventricular escape." Thus one may be uncertain of the exact arrhythmia under discussion unless electrocardiograms are reproduced. Since the term interference dissociation implies the two main features of the abnormal rhythm, it would seem the most reasonable name to use.

Transient ventricular escape is more common and may occur in normal subjects, as for example when deep expiration causes such vagal inhibition of the S-A node that it is temporarily producing stimuli more slowly than the A-V node. In interference dissociation, the A-V node is the more irritable of the two for a longer period—perhaps several days (Cutts, 1937).

Interference dissociation has been reported in 6–12 per cent of various series of cases of rheumatic fever, almost always as an early finding (Oettinger and Neslin, 1932; Wendkos and Noll, 1944; Stein and Bartlett, 1946). Cutts (1937) reports 12 cases of this and similar rhythms, 6 arising during

rheumatic fever: moreover, all these six were febrile. He goes so far as to say that interference dissociation in a young person is highly suggestive of rheumatic fever. The latest report is that of Kirby (1948), whose Case 1 presented typical interference dissociation, and is one of the few described where this anomaly of rhythm has been found in a child. His Case 2 seemed rather different—an arrhythmia arose terminally in a fatal attack of rheumatic fever, the ventricular rate being slower than the auricular, and an occasional beat being dropped as in a Wenckebach period. This periodicity was later evident clinically when every sixth beat was dropped, but unfortunately no electrocardiogram was published corresponding to this clinical finding.

FIG. 2.—Cardiogram one week after admission, showing sinus rhythm at a rate of 80. Prolonged P-R interval of 0.25 sec.

It is reasonable to suppose that the rheumatic process is responsible for both depressing conduction and irritating the A-V node till its periodicity is faster than that of the S-A node. The former effect is still evident after reversion to sinus rhythm in the finding of a prolonged P-R interval. How the effect on the A-V node is produced is unknown. Certainly the lesions in the bundle of His described by Gross and Fried could not cause A-V dissociation, nor does their occurrence in necropsy material prove their existence in the early stages of rheumatic polyarthritis.

In our case, the disease seems to have caused increased periodicity of the A-V node, and also total auriculo-ventricular block, so producing complete heart block with ventricular rate greater than that of the auricles. This arrhythmia (if a regular rhythm can be called such) was undiagnosed clinically. Its finding seemed to confirm the diagnosis of rheumatic fever which had been questioned because of the relative painlessness of the joints.

As has been found in the rheumatic cases of interference dissociation, this anomaly of rhythm was transient and occurred early in the disease when fever was present. It was followed by evidence of conduction disturbance in the long P-R interval, but this disappeared and the heart seems to have been left with minimal damage. It would seem that both interference dissociation and the type of rhythm shown by this case may not have an unfavourable significance. Since both seem to occur early in the illness, perhaps often before the patient is transferred to hospital, they may well be more common than published reports would indicate.

Summary

A case is reported of transient total A-V dissociation, occurring on the first day of acute rheumatic fever in a boy of 9 years, in which the ventricular rate was faster than the auricular.

No previous record of an exactly similar case has been found.

The mechanism of origin of this disturbance of rhythm and of interference dissociation is discussed.

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