Interesting Electrocardiograms

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1. ATRIAL FIBRILLATION WITH SLOW VENTRICULAR RATE

This tracing was taken on a 90-year-old female admitted for congestive heart failure. There is atrial fibrillation present, as seen by the F-waves in leads I, II, III, aVF, V1. The patient was not on digitalis and hence the striking fact of a slow ventricular rate (50/min.) suggests AV nodal block due to organic disease.

The etiology of this arrhythmia - atrial fibrillation with slow ventricular rate - has quite recently become much more specific. There is one group of patients with chronic atrial fibrillation who are on digitalis preparations and in whom, therefore, the slow ventricular rate results from pharmacologic blockage at the AV node. Another group of chronic fibrillators with slow ventricular rates and who are not on digitalis form a separate entity and one which until recently had no real explanation. SA node disease and dysfunction is now well recognized, and the end stage of this sick sinus syndrome (S.S.S.) may indeed be death of the SA node with sinus rhythm replaced by rescue rhythms. If much atrial disease is present in the S.S.S. then atrial or junctional rescue rhythms (normally the first to arise) cannot arise and atrial fibrillation ensues. The use of chronic atrial fibrillation as a marker of the late stage of the S.S.S. depends not upon the presence of the arrhythmia itself but upon the slow ventricular rate in the presence of untreated atrial fibrillation. The slow rate tags the additional finding of organic AV nodal disease and, by implication, probably some junctional and His bundle disease as well. It is well known that 30-40 percent of subjects with diseased SA nodes also have disease of the AV node and adjacent conduction system tissues.

Perusal of other ECGs in this subject revealed that daily tracings taken for four days before the present ECG showed severe sinus bradycardia (with rates of 36-40/min.) with prolonged PR interval and intra-atrial block. Very rarely a single junctional escape beat was found with a rhythmicity equivalent of 35/min. - a very sluggish response for the junctional tissue. The patient had an electronic pacemaker implanted and her congestive failure cleared.
2. LOW VOLTAGE OF QRS COMPLEXES AND T WAVES AND
ITS RELATIONSHIP TO CARDIAC TUMORS

This tracing was on a 53-year-old man admitted with a diagnosis of metastatic melanoma with fever and intestinal obstruction. The electrocardiogram shows sinus rhythm at 81/min. with normal PR and QRS intervals. The striking features are very low voltage of the QRS complexes not only in the six limb leads (I, II, III, AVR, aVL, aVF) but also in the six precordial (V) leads. In addition, the T waves are also of low amplitude in all leads. Thus, low QRS-T of marked degree is present.

The markedly low voltage of QRS complexes and T waves affords considerable clinical information in this particular clinical setting. The low QRS voltage present in all 12 leads is unusual as this voltage finding is usually seen only in the six limb leads. Hence for the relatively high QRS voltage in the V leads to be so blunted indicates much more advanced pathology. The presence of pericardial effusion of some size is therefore likely. The accompanying T wave abnormalities could, of course, also be the result of pericardial reaction but, in this case, could reflect an electrolyte disturbance (hypokalemia, for example) since intestinal obstruction is also present.

The picture seen on the electrocardiogram strongly suggests metastatic cardiac and pericardial involvement from the melanoma. This could be checked by echocardiography, radionuclide cardiac blood pool scan with technetium-99m, or cineangiography. Marked pericardial effusion, or, less likely, massive mediastinal metastases producing constrictive pericarditis and gross cardiac encasement, must be considered.

Metastatic cardiac involvement is 20-40 times more common than primary cardiac tumors. Eighty percent of all primary cardiac tumors are benign and 20 percent are malignant; myxomas account for about 50 percent of all primary tumors and are benign.

Metastatic cardiac invasion is found in 5-10 percent of all patients who die of malignant disease. However, symptoms relating to this cardiac involvement occur in only 5-10 percent of those with heart metastases.

Any tumor can metastasize to the heart, and tumors of the lung and breasts, as well lymphomas and leukemias, are some of the most frequent offenders.

Pericardial effusion and myocardial metastases are particularly frequent with malignant melanomas. Often malignant pericardial effusions are hemorrhagic and hence the danger of cardiac tamponade is real and may require direct therapy. Thus the ECG provided an important diagnostic, and possibly therapeutic, item in this man.