Interesting Electrocardiogram

Myocarditis Versus Pericarditis

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The electrocardiogram on the next page was taken during the course of underwriting a large amount life insurance policy. The applicant was a 49-year-old man who ten years earlier—at the age of 39—had an episode of chicken pox (varicella), was hospitalized for it and was found to have an abnormal electrocardiogram during this illness. The abnormalities were described as T wave inversions. Since this illness he has been well. Specifically he has had no symptoms or signs of coronary artery disease and has been worked up by several physicians who have mentioned the electrocardiographic findings as "residual abnormalities" of the infectious illness.

Myocarditis of infectious origin is often difficult to diagnose solely from the ECG because, in contrast to pericarditis, the ECG abnormalities may be slight and limited to low T waves (with prolonged QT interval) that are not impressive. Inappropriate sinus tachycardia, arrhythmias, and conduction defects however may occur in more extensive disease and then the diagnosis is easier. If these are accompanied by an enlarged heart and congestive heart failure, the impression of infectious myocarditis is confirmed. None of these findings obtains in this case. It is noteworthy that deeply negative T waves (as seen here) are not seen with myocarditis.

The electrocardiogram shows abnormalities in all twelve leads. There are ST elevations (1 mm) in V1 and V2 and T waves are negative in leads I, II, III, aVF, V3-V6. The T is upright (abnormal) in aVR and T is low in aVL. The rhythm is sinus and the intervals including (notably) the QT, are normal.

The differential diagnosis rests between viral pericarditis and/or viral myocarditis. The herpes zoster virus, agent for varicella, is known to produce cardiac and pericardial inflammation. The common viruses producing pericarditis and myocarditis are the coxsackie, influenza, poliomyelitis (comonly in severe or fatal cases) hepatitis viruses, infectious mononucleosis, rubella and rubeola, cytomegalic virus, arbovirus, yellow fever, herpes simplex with encephalitis, psittacosis, mycoplasma pneumoniae. The rare causes are the herpes zoster virus in varicella (the agent in this case), echovirus, adenovirus, mumps, rabies, small pox (variola and vaccinia). The diagnostic decision between healed pericarditis or myocarditis rests largely on the ECG findings and, of course, on the history. Hence a review of the ECG findings in each is useful.

Pericarditis produces ST elevations at first, often in eleven of the twelve leads with ST depression in the twelfth, aVR. Later on only T abnormalities, usually negative waves, are present and these occur in all leads. This is in contrast to myocardial infarction or ischemia where ST-T changes are localized to certain specific lead sets and are not widespread. The cause for the widespread, and often permanent, T abnormalities is probably that the inflammation of the pericardium extending over the whole heart involves a very small rim of subpericardial (or epicardial) myocardium. This theory is confirmed by the recent finding of small increases in cardiac isoenzymes at the onset of pericarditis in some cases. These quickly return to normal. In myocarditis, by contrast, the cardiac myocardial enzymes are very high and remain elevated for much longer.

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To summarize, in this applicant with widespread negative T waves which are unchanging for many years and no cardiac symptoms, the diagnosis is healed pericarditis. This agrees with his attending physician who stated he had "pericarditis in 1971 with residual ECG abnormalities."
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