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Electrocardiographic Changes in Pneumonia.

A. M. MASTER AND A. ROMANOFF.

From the Cardiographic Department and Medical Service of Dr. Leo Kessel, Mount Sinai Hospital, N. Y.

Twenty-one patients with lobar pneumonia, and 5 patients with broncho pneumonia were electrocardiographed *daily* to learn whether there was any graphic evidence of myocardial involvement during the disease. For the most part the patients were young adult males. No patient had received digitalis before admission or during his stay in the hospital. It is important to rule out this drug for it produces changes in the electrocardiogram.

Cohn and Jamieson[1] took one or 2 and occasionally more electrocardiograms in each of 56 patients who had received no digitalis. They used these patients as controls in their study of the action of digitalis in pneumonia. It is essential, however, to take daily records as some of the changes in the electrocardiogram are transient and disappear in a day or two. Cohn and Jamieson noted 2 cases with P-R and T changes, and 8 cases with T changes alone. What criteria were used for T-wave changes is not made clear, but we have only considered inversions or flattening of the T-wave, not mere change in size of a normal T-wave.

Early in pneumonia, and in very severely ill patients, T-wave inversions may appear; during the height of the illness or in beginning convalescence R-T deviations may be present; but during convalescence increased auriculoventricular conduction disturbances occur.

The *T-wave inversions* occurred in 4 individuals; 2 of the patients showed changes in leads II and III, the other 2 in leads I, II

[1] Cohn, A. E., and Jamieson, R. A., *J. Exp. Med.*, 1917, **25**, 15.

and III. The latter 2 patients died, one had a lobar and the other a broncho-pneumonia. In all 4 cases, the T-wave inversions disappeared in 24-48 hours. Flattening of the T-wave in lead I or II occurred 3 times and appeared of more significance when present in lead I. The *P-R intervals* were increased to 0.20 seconds in 7 cases; 0.22 seconds in one case; and 0.24 seconds in another. We feel that 0.20 seconds indicates an increase beyond normal as earlier in the disease the auriculoventricular conduction time was 0.16 seconds and usually less in every one of these 7 cases. The partial heart-block occurred in the stage of convalescence. Cohn and Jamieson reported one such case in which the P-R reached 0.21 seconds in the fourth week of convalescence. The *RST intervals* were abnormal in 20 cases. These changes were most common in leads I and II, and in all but 4 instances, were above the isoelectric level rather than below. In 4 of these patients the R-T transition intervals were markedly abnormal and similar to alternations in the electrocardiogram noted in acute coronary closure. Levine and Brown[2] and more recently Shearer[3] described one such case each in pneumonia. The slight or moderate changes in the R-T were definite. Either at the beginning or the end of the disease these intervals were normal. It is of interest that 19 out of 21 patients with lobar pneumonia showed R-T changes and only one in 5 of the broncho-pneumonia group.

Other findings were: a sinus arrhythmia 11 times; a change in the form of the P-wave in lead III, 3 times; a change in the T-wave in lead III, 15 times; a change in voltage of the QRS group, 4 times; a change in ventricular preponderance, 3 times; auricular fibrillation, once; "alternation" of the QRS complex, once; and a change in form of the QRS group, once.

The six patients who died all had tachycardia. T-wave and R-T changes were more common than in the patients who survived. On the other hand no increased P-R intervals were observed.

The electrocardiographic changes in pneumonia are very similar to those found in rheumatic fever and coronary artery disease. The increased P-R intervals and the T-wave inversions are similar to those found in the former illness, and the T-wave and R-T abnormalities are similar to the changes seen in patients with acute coronary artery closure.

[2] Levine, S. A., and Brown, C. L., *Medicine*, 1929, **8**, 245.

[3] Shearer, Margery, *Am. Heart J.*, 1930, **5**, 801.