FOUR-LEAD ELECTROCARDIOGRAMS TAKEN 53 HOURS BEFORE AND AFTER THE ONSET OF AN ATTACK OF CORONARY OCCLUSION

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By a rare coincidence a four-lead electrocardiogram was taken of a patient fifty-three hours before and again fifty-three hours after the onset of an attack of coronary occlusion.

Case History

The patient is a woman of 76 who is known to have been suffering from hypertension for at least fourteen years: in 1924 her blood pressure was found to be 220. At the time of her first consultation her chief symptoms were general exhaustion, giddiness, and dyspnoea on exertion. On examination she presented the typical features of a case of essential hypertension of long standing: marked dilatation of the heart to the left, accentuation of the second sounds over the base, blood pressure 240/130 on the right and 230/120 on the left arm; no signs of congestive heart failure. The electrocardiogram showed normal rhythm of about 68, left axis deviation, slight slurring of the descending limb of R, and the ascending limb of S, QRS of 0.08 second, a deep S wave in Lead II, and a depression of 1 mm. of the R-T interval in Lead I with a corresponding elevation of S-T in Lead III. A small Q wave of 1 mm. is present in Lead I. The chest lead, taken by means of a technique described elsewhere (Schott, 1938), shows a well-developed R (normal), deformation of S-T, and inversion of T (Fig. 1a).

Fig. 1a.

Fig. 1b.

Fifty-three hours after this record was taken the patient developed the symptoms of an attack of coronary occlusion, with agonizing precordial pain which necessitated the giving of morphine. At the time of the second consultation the pain had largely subsided, but the patient was very weak and at times delirious. Her temperature was 100°, pulse rate 107, and blood pressure 100/75. The second electrocardiogram (Fig. 1b), taken fifty-three hours after the onset of the attack, shows in the three standard leads the typical features of a recent occlusion in the anterior wall of the heart, so-called T₁ type: high take-off of T from the descending limb of R and dome-shaped R-T interval in Lead I, low take-off of T and curved S-T interval in Lead III, the initial ventricular complexes in Lead II having become much smaller and one ventricular extrasystole being visible in Lead III. The chest

lead shows that the initial upstroke of the ventricular complexes has completely disappeared and the intrinsic deflection is monophasic; the S-T interval is greatly displaced upwards and is deformed; T is inverted. These features of the chest lead are in agreement with those first published by Wood and Wolferth and subsequently confirmed by various authorities (see the extensive bibliography in Bohning and Katz, 1938).

Commentary

The comparison between the two records is, moreover, of interest when evaluating the clinical significance of changes in the S-T intervals and T waves in cases of long-standing hypertension with marked left axis deviation. Whereas some authors hold the view that in cases of pronounced hypertrophy of the left ventricle with left axis deviation inversion of T and depression of S-T in Lead I with corresponding elevation of S-T and positive T in Lead III is a result of the hypertrophy itself (Barnes and Whitten, Wilson and Herrmann), others find that these changes are indicative of additional myocardial disease (Freundlich, Proger and Minnich with regard to a flat T₁). Van Nieuwenhuizen and Hartog (1937) come to the conclusion that a negative T₁ and positive T₃ in cases of left axis deviation usually occurs in cases with myocardial damage, whereas the convexity of S-T₁ and concavity of S-T₃ is the result of pronounced dilatation. In the case under discussion the depression of R-T₁ and elevation of S-T₃ was only 1 mm., and T₁ was positive although flat; yet the fact that this patient developed coronary occlusion such a short time afterwards constitutes strong clinical evidence that advanced coronary changes must have been present. So far as it is possible to draw any conclusion from a single observation, these findings tend, therefore, to support the view that displacements of the S-T and R-T intervals, and even flattening of T₁, may mean more than just an expression of gross hypertrophy. In this connexion it is noteworthy that the chest lead taken before the attack showed conspicuous deformation of S-T and inversion of T. In view of the findings of van Nieuwenhuizen and Hartog, changes of this kind in the chest lead cannot be regarded as being caused by the hypertrophy or dilatation of the left ventricle. In cases of hypertension with left axis deviation and flattening or inversion of T in Lead I, positive T in Lead III, and deformation of R-T (S-T) in Leads I and III, it may therefore be possible, by correlating the findings of the chest lead with those of the standard leads, to arrive at a more accurate evaluation as to the clinical significance of those changes in the standard leads.

REFERENCES

- Bohning, A., and Katz, L. N. (1938). *Arch. intern. Med.*, **61**, 241.
Schott, A. (1938). *Lancet*, **1**, 1163.
Van Nieuwenhuizen, C. L. C., and Hartog, H. A. P. (1937). *Amer. Heart J.*, **13**, 308.

P. Pederzdi (*Minerva med.*, 1938, **29**, 311), who records a personal case, illustrates the frequency of primary carcinoma of the gall-bladder by the following statistics. Giordano found it in every seventeen cases of operation for calculous cholecystitis, or in about 6 per cent.; Bertolini's estimate was 16 per cent. in one series and about 4 per cent. in another. In 23,675 necropsies performed at Parma, Dalla Valle found tumours of the gall-bladder in thirty-nine. Cancer of the gall-bladder is from two to five times more frequent in women than in men, and is commonest about the age of 50, though Moxon described a case in a child of 4 years. Its association with cholelithiasis ranges according to different observers from 60 per cent. (Borkowski) to 100 per cent. (Janowski; Siegert). Experiments on animals confirm the aetiological importance of cholelithiasis in the production of cancer of the gall-bladder.