TREATMENT IN GENERAL PRACTICE

This article concludes the series on the management of some cardio-vascular disorders met with in general practice. A further series, on the treatment of diseases of the nervous system, will begin early in September.

THE ELECTROCARDIOGRAM IN PROGNOSIS AND DIAGNOSIS

BY

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The writings of the electrocardiograph are still in an unknown language to many practitioners, yet the reading of it is easily acquired, for its alphabet is confined to five letters, and one of these, Q, is little used.

The Normal Electrocardiogram

Auricular contraction alone causes the P wave, known as the auricular complex, and ventricular contraction alone causes the QRST waves, known as the ventricular complex. (See Fig. 1.) The space between any two adjacent perpendicular lines on the electrocardiogram represents an interval of $1/25$ of a second. The normal interval of time between the beginning of the auricular complex P and of the ventricular complex R is $1/5$ of a second or rather less. An interval of over $1/5$ of a second shows a delay in conductivity known as heart-block of slight grade.

An electrocardiogram is a record of the shadow thrown by the oscillations of a galvanometer fibre connected by wires and electrodes to a patient and projected on to a moving photographic film. There are usually three lines corresponding to the three leads. The top line, Lead I, is a record of the movements of the fibre when electrodes on the right forearm and left forearm are connected by wires to the upper and lower ends of the fibre respectively. In Lead II the electrodes are applied to the right arm and left leg, and in Lead III to the left arm and left leg.

Coronary Thrombosis

At the present time the greatest value of the electrocardiogram lies in its aid to the satisfactory diagnosis of coronary thrombosis. There are numerous departures from the normal record in this disease, and any one, or more, of the following changes may be found:

1. RT and ST intervals are not iso-electric (Pardee's sign)—that is, the T wave rises high on the down stroke of

R or low on the up-stroke of S.

2. There is an inversion of the T wave in Lead II accompanied necessarily by an inversion in either Lead I or Lead III (Fig. 2).

3. Sometimes inversion of the T wave in Lead I only. Inversion of the T in Lead III alone is very seldom of pathological significance, and is often a feature of healthy hearts.

4. Widening of the QRS interval to $3/25$ of a second, or more, is due to depression of conduction through the main branches of the auriculo-ventricular bundle, a condition known as bundle-branch block (Fig. 6).

5. Very occasionally a PR interval of over $1/5$ of a second with or without dropped beats, due to partial heart-block.

6. Complete heart-block with an auricle (P wave) beating at about 80 and a ventricle (RST waves) at about 30 beats per minute (Fig. 5).

7. Almost any of the irregularities of rhythm, particularly auricular fibrillation (Fig. 4) and paroxysmal ventricular tachycardia.

The complications of coronary thrombosis are so often fatal that the prognosis may be said to depend, primarily, on its accurate diagnosis. There are few outstanding or common features of the electrocardiogram which definitely foreshadow either a fatal or a favourable result. The

exceptions are those showing the features of either 4, 6, or 7 above, any one of which is an added danger.

It should be realized that angina pectoris—that is, angina of effort—does not give any abnormal electro-

FIG. 1.—A normal electrocardiogram. The P waves are caused by auricular contractions and the RST waves by ventricular contractions.

FIG. 2.—An abnormal electrocardiogram due to coronary thrombosis. The T waves are inverted in all leads.

FIG. 3.—Premature ventricular contractions. In each lead a normal beat PR or PRT is followed by a premature beat R'T' or S'T'.

cardiogram in most of the patients who are victims of it. This serious heart disease must be recognized and diagnosed on an analysis of symptoms. Graphic support for the diagnosis should be regarded as accessory evidence when abnormalities are present.

The Arrhythmias

The irregularities of the heart or pulse can be accurately differentiated by electrocardiograms. In children the commonest irregularity is sinus arrhythmia. It is characterized by an increase of rate during inspiration and decrease during expiration. It is often a striking feature of convalescence after an acute infection, when the heart is still slow before the child is getting up again. Its presence after an attack of acute rheumatism was for long considered to be evidence that the heart had escaped infection, but this is not a correct prognostic deduction, for it can be present after the heart-block of rheumatic myocarditis. The presence of sinus arrhythmia should never be regarded as of any pathological importance.

The commonest irregularity in adults is, of course, the premature beat or "extra-systole," so often described by the patient as a "dropped beat." Its abnormal ventricular complex can be easily recognized as distinct from all other waves. The safest prognostic significance of this beat is to exclude it entirely from being considered of ill omen. (See Fig. 3.)

Auricular fibrillation is by far the commonest of the irregularities associated with heart disease. The absence of the P wave and the continuously irregular rhythm are diagnostic. There is little help in prognosis to be obtained from the electrocardiogram after it has established the diagnosis. The more rapid the rate, uncontrolled by digitalis, and the larger the heart the less favourable is the prognosis (Fig. 4).

Auricular flutter has a characteristic electrocardiogram, as the abnormal P waves occur at a rate of about 300 to the minute; the ventricular complexes are much less frequent and in varying ratios. The lesion is relatively uncommon. It can seldom be diagnosed

clinically. It is a rather more serious condition than fibrillation, into which it sometimes, indeed often, changes.

Partial heart-block can only be satisfactorily diagnosed by an electrocardiogram. The PR interval is over 1/5 of a second and may be over 2/5. Its presence in acute rheumatism, about 25 per cent. of cases, is clear evidence of rheumatic myocarditis, and is of prognostic significance. The second degree of heart-block, characterized by dropped beats, is quite rare. Complete heart-block is usually a degenerative myocardial change. Rarely paroxysmal, it is most often established for life, and the condition is present not uncommonly for many years of useful life. Often it is erroneously thought to be a syphilitic lesion, but such is only rarely the correct view (Fig. 5).

FIG. 4.—Auricular fibrillation. There is an absence of the normal P wave in all leads, and the rhythm is continuously irregular. The high R in Lead I and the low S in Lead III also indicate left ventricle preponderance.

FIG. 5.—Complete heart-block. The auricles, P waves, are beating at a rate of 60, and the ventricles at a rate of 33 to the minute.

FIG. 6.—Bundle-branch block. The QRS interval is widened to 3/25 of a second in all three leads.

Bundle-branch block has a characteristic electrocardiographic appearance (see Fig. 6). The QRS in all or some leads is 3/25 of a second or more. It is not very common, but sometimes reveals the seriousness of the cardiac condition when symptoms are only suspicious of a cardiac lesion or physical signs are disarming. From a prognostic point of view it is of great importance. While it is true that a few patients live comfortably for years with this lesion, it is more often associated with a sudden, and otherwise unexpected, death than any other single electrocardiographic finding.

The pathological condition of pulsus alternans has no characteristic electrocardiogram. Sometimes there is alternation of the heights of the R wave in the electrocardiogram when there is alternation of the pulse, but more often there is no such precise evidence of this condition.

Cardiac Murmurs

The diagnosis of the exact type of valvular disease in a patient derives but little or no assistance from the electrocardiogram. In aortic disease there is a high R in Lead I and a low S in Lead III, characteristic of

left ventricle preponderance; the same changes also occur in hyperpiesis and commonly in the middle and later years of life. Mitral disease shows the reverse picture, with a low S in Lead I and a high R in Lead III, characteristic

of right ventricle preponderance; the same changes may appear in pulmonary disease. The graphic record can, however, be of definite help in assessing the value of a mitral or other systolic murmur. The absence or presence of preponderance suggests its functional or its organic nature respectively.

THE ROYAL SANITARY INSTITUTE

CONGRESS AT BOURNEMOUTH

The scientific work of the annual congress of the Royal Sanitary Institute at Bournemouth from July 15th to 20th was arranged in six sections: preventive medicine; architecture, town planning, and engineering; maternity, child welfare, and school hygiene; veterinary hygiene; national health insurance; and hygiene in industry. In addition, there were conferences of representatives of sanitary authorities, medical officers of health, engineers and surveyors, sanitary inspectors, and health visitors. Some of the more salient pronouncements were as follows.

IMMUNIZATION OF THE COMMUNITY

Addressing a joint meeting of the Section of Preventive Medicine and of medical officers of health on some aspects of herd immunity, Professor W. W. C. TOPLEY distinguished the two types of immunity—the type which was dependent on the social or biological structure of the herd (exemplified by the British immunity to plague, malaria, typhus, and enteric) and that type which was determined by the individual immunity of some or all of the herd members resulting from natural infection or artificial immunization. Reporting the results of investigations on mice colonies, he said that immunization against enteric infections had proved disappointing, but the environmental conditions probably accounted for the results being so different from those obtained by the T.A.B. protective immunization in the war. In the case of the virus disease ectromelia, however, immunization had raised the expectation of life to 85 per cent. of the normal, even though resistance had not been raised to the point where the mice became entirely indifferent to infection. In influenza, now recognized as a virus disease, there were at present two strains of virus being propagated in ferrets and mice. Professor Topley thought it would not be long before it became possible to immunize effectively against this infection, and that this achievement would rank as one of the major victories of preventive medicine. In whooping-cough again, although the reports were conflicting, it appeared to be probable that an effective vaccine for prophylaxis would soon be available, though it was as yet too soon to envisage a campaign of wholesale immunization. There must first come a stage of field trials, conceived in a frankly experimental spirit; even though this presented special difficulties to the administrator, it must be regarded as the most important link in the chain which led from observations in the laboratory to successful prophylaxis in the community. Wherever else the methods of experimental epidemiology might fail, they at least permitted the putting of any prophylactic reagent to a trial so severe that any reagent which proved effective under the test conditions might be relied upon to prove effective in the field.

EXPERIMENTAL AND FIELD EPIDEMIOLOGY

Following this address, Dr. DUNSTAN BREWER, medical officer for Swindon, dealt with the biological aspects of parasitic diseases, classifying them in four groups: those which were always present in the community (pneumococcal and streptococcal infections); those which appeared intermittently though the parasites were always present (influenza and diphtheria); those which were normally absent from the community though the parasites were always present (amoebic dysentery, poliomyelitis, cerebrospinal fever, and the typhoid infections); and those which were normally absent and the parasites were also normally absent (plague and cholera). In such a case as human

plague a chain of events was necessary; the rats and fleas must be of the correct species in happy environment and symbiosis, the human hosts must be susceptible to Pasteurella, and the last-named be suitable to the host. The dominance in this country of the brown rat broke the chain, and while this was so it was unlikely that an outbreak of plague could ever occur. Variability of the parasites in virulence was probably an important factor, and another was the occurrence of mass infection. Such problems in the biology of parasitism would have to be cleared up before progress could be made in the prevention of disease. In this country at present the two reigning diseases were those due to pneumococci and haemolytic streptococci, and Dr. Brewer thought that light on our knowledge of epidemics would come from the study of migratory locusts. There was a herd immunity which was different in character from personal immunity and not dependent on it. It might be that there was some occasional element in herds which prevented from time to time the production of a disease which was prevalent elsewhere.

VENEREAL DISEASE AND MATERNITY AND CHILD WELFARE

Dr. VIOLET RUSSELL, ante-natal medical officer, Kensington, read a paper before the Section of Maternity, Child Welfare, and School Hygiene, in which she urged the necessity of having a routine Kahn or Wassermann test made in the case of all women attending ante-natal clinics in the early months of pregnancy. This might well succeed in almost eliminating congenital syphilis in this country. Blood examination could also be utilized in the much-needed campaign against the prevalent anaemias of pregnancy. By associating these two tests the objections of many patients might be quietly overcome. If a syphilitic reaction was obtained the test should be repeated, and a second positive reaction should be followed by specific treatment at the venereal diseases centre, or possibly at some of the infant welfare centres at special sessions. Treatment should be repeated at the subsequent pregnancies. The possible relation of gonococcal infection with puerperal sepsis might be elucidated by having the gonococcal complement-fixation test performed on every case of puerperal fever in the isolation hospitals. The appropriate ante-natal treatment of gonorrhoeal infection greatly reduced the risk of sepsis after confinement.

Dr. D. NABARRO, dealing with venereal disease in children, said that in the last ten years there had been a very considerable reduction in the incidence of cases in infancy, possibly owing to the maternal treatment in clinics before parturition. Routine Wassermann tests should be enforced at ante-natal clinics, as should adequate treatment. It should be legally possible to enforce the continued attendance for treatment of congenital syphilitic patients for as long as might be necessary. When a child had been proved to have contracted syphilis or gonorrhoea from a source other than its parents, the medical practitioner should be permitted to communicate the facts to the local medical officer of health, with a view to preventing the possibility of further dissemination from that source. Miss M. D. HEARN, assistant almoner in the venereal diseases department of St. Thomas's Hospital, described the important work performed by the social worker in regard to mothers and children suffering from venereal diseases. Great assistance in securing attendance for treatment could be given by the sympathetic and understanding social worker, to whom the patient could go for the oft-needed mental relief and advice.

CARE OF THE MOTHER IN INDUSTRY AND RURAL DISTRICTS

Dr. J. J. PATERSON, medical officer of health for East Berkshire, reviewed the work of the League of Nations in this connexion and the conditions obtaining abroad. The international conventions on the employment of women and expectant mothers had done an immense amount of good in opening the eyes of State authorities, especially in countries wrecked by the war, to the duty owed to