Hb 50%; erythroblasts and normoblasts present in moderate numbers. The child was treated by blood transfusion and recovered. Father abroad; mother, Group A Rh-negative; child, Group A Rh-positive. The mother's serum, taken 3 weeks after her delivery, reacted against 3 Rh-positive Group A bloods and gave no reaction against 3 Rh-negative Group O bloods. The titre of the antibodies was not determined.

Case 3.—Child aged 2 days; jaundiced since birth; moderately severe hyperchromic anaemia. R.B.C. 2.15 millions per c.mm.; Hb 48%; moderate numbers of erythroblasts and normoblasts. Blood transfusion was given, but the child died. Father, Group O Rh-positive; mother, Group A Rh-negative; child, Group A Rh-positive. The mother's serum, tested 4 weeks after her delivery, reacted against 11 Rh-positive bloods (2 Group A, 9 Group O), but gave no reaction with 9 Rh-negative bloods (2 Group A, 7 Group O). When titrated against 3 Rh-positive Group O bloods the serum reacted in dilutions up to 1:32.

Case 4.—Child aged 3 weeks; jaundiced since birth; moderately severe anaemia. Small numbers of erythroblasts and normoblasts were present in the blood film. The child died before any treatment could be given. Father, Group A Rh-positive; mother, Group A Rh-negative; child, Group A Rh-positive. The mother's serum, 2 weeks after her delivery, reacted against 14 Rh-positive Group O bloods—to a titre of 1:32 with two of them and 1:8 with one. There was no reaction with 2 Rh-negative Group O bloods.

Case 5.—Child aged 10 days; jaundiced since birth; very severe hyperchromic anaemia. R.B.C. 830,000 per c.mm.; Hb 27%; large numbers of erythroblasts and normoblasts seen. The child received blood transfusion, but died. Father, Group O Rh-positive; mother, Group A Rh-negative; child, Group O Rh-positive. The mother's serum, 2½ weeks after delivery, reacted against 6 Rh-positive bloods (2 Group A, 4 Group O). There was no reaction with 3 Rh-negative bloods (1 Group A, 2 Group O). The titre was 1:16 when tested against 3 Rh-positive Group O bloods.

In all the five cases described above the father and child were Rh-positive while the mother was Rh-negative. In all cases the mother's serum contained Rh antibodies, and in four of the cases its titre ranged from 1:1 to 1:32. Case 4 was of interest in that the titre was 1:8 with some bloods and 1:32 with others used for test purposes. Both the "sediment pattern" and the centrifuge method were used in the determination of the titre. They gave the same reading. In one case only was the antibody of the cold type.

I should add that at the time these cases occurred the reports that Rh-negative blood often survived longer in the circulation of cases of erythroblastosis foetalis than Rh-positive blood had not appeared, and as there was no theoretical reason against the use of Rh-positive blood, the Rh grouping of the transfused blood was not determined. A-B-O grouping and careful cross-matching tests were of course done.

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REFERENCES

- Boorman, K. E., Dodd, B. E., and Mollison, P. L. (1942). *British Medical Journal*, 2, 535, 569.
Landsteiner, K., and Wiener, A. S. (1941). *J. exp. Med.*, 74, 309.
Levine, P., and Stetson, R. E. (1939). *J. Amer. med. Ass.*, 113, 126.
— Katzin, E. M., and Burnham, L. (1941). *Ibid.*, 116, 825.
Wiener, A. S. (1942). *Amer. J. clin. Path.*, 12, 302.

A NOTE ON THE REHABILITATION OF HEART PATIENTS

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As with all other branches of medicine, the aim of rehabilitation in heart disease is restoration of function and physical capacity to the fullest possible extent. For the achievement of such an objective it is essential that the general programme of treatment in cardiac patients shall include all such remedial measures as are likely to ensure the use of their physical capacity to the best advantage.

Fortunately the trend of modern opinion entirely reverses the long-accepted teaching which doomed patients with heart affections to a life of inactivity and permanent invalidism. We recognize in broad principle the varying degrees of debility

which cardiovascular diseases involve, but equally also we appreciate the fact that in such conditions the circulatory reserve may be relatively well maintained. The practical demonstration of circulatory reserve or compensation is not far to seek, for it is common knowledge that organic disease is frequently recognized during the casual examination of normally active individuals, and it quite often happens that patients with well-defined heart disease continue in strenuous employments and survive long professional careers of average duration. As expected, the records of such cases have provoked considerable interest, for they show conclusively that cardiac disease need not signify total incapacity and they adduce prima facie evidence that an efficient circulation can be maintained, under favourable circumstances, in patients suffering from structural heart affections.

The significance of the term "cardiac reserve" has become increasingly apparent, and it is recognized nowadays as the essential pivot on which revolves the whole process of circulatory compensation, incidentally also all the problems of rehabilitation. Suitable preparations for their ultimate rehabilitation should be included automatically when formulating schemes of treatment for patients with circulatory affections, and there is good reason to assume that under favourable circumstances they may be permitted ultimately to enjoy all the economic advantages of appropriate employment.

Accepting these principles, the wide scope of our duty in regard to the management of cardiac cases becomes amply defined. We must not only be prepared to prescribe all the essential remedies that may be required by our patients during the initial stages of their illnesses but we must also assume full responsibility for their convalescence. We must envisage the time when they will be able to resume their original employment or, alternatively, we must be prepared to recommend educational training for some suitable occupation, our assessment in this respect depending upon the extent of such physical defects as may be present, the patient's age, temperament, and social circumstances. The intervention of Nature both in the cure and in the readjustment of cardiac patients cannot be too strongly emphasized. Assuming an average level of general health, we are justified in expecting that Nature, *per se*, will limit cardiovascular disease, that it will determine adequate compensation, and that, in general terms, it will promote a favourable prognosis.

Preludes to Rehabilitation

The natural development of compensation is obviously an essential prelude to rehabilitation, and the latter depends more particularly on the physiological capabilities of the myocardium. As the result of experimental research and clinical investigation we know that the pulse rate and the stroke volume increase during exercise and that the venous return to the heart is proportionately accelerated. These changes materially improve the range of the myocardial efficiency, it being a well-established axiom that, within limits, the greater the initial length of the heart-muscle fibres at the beginning of systole the more forcible is the subsequent contraction. Such considerations are of outstanding importance in the rehabilitation of patients convalescent from heart affections, the rational deduction being that in appropriate cases exercise and occupation promote the efficiency of both the cardiac and the circulatory functions.

It may be inferred from the above that heart patients require suitable exercise to maintain their general resistance and that, according to their degree of compensation, their circumstances, inclinations, etc., some form of regular employment is, in all cases, a most desirable prescription.

A further and important factor in rehabilitation therapy is reassurance, the value of which cannot be over-emphasized. All classes of heart patients, particularly children, are naturally impressionable, and if encouraged in adequate fashion during the whole course of their illness they may be relied upon to assist materially their curative treatment and future prospects. Bedside discussions concerning the gravity of any particular condition, its response or otherwise to treatment, the question of prognosis, and the possibility of complications should be avoided as a general rule. The heart-disease atmosphere should be obviated so far as is possible, and frequent examinations

of the heart are not desirable, there being ample evidence—i.e., the sleeping pulse rate, the blood count, the sedimentation rate, the temperature chart, the general appearance, nutrition, etc.—on which for all practical purposes the disease process can be assessed.

The therapeutic value of assurance is far-reaching; it ensures the encouragement and confidence of patients—also, incidentally, that degree of co-operation which is of vital consequence to their recovery and rehabilitation later. It may imply a certain amount of legitimate deceit, but it tends to stabilize the general environment of patients and obviates the development of neurotic symptoms which may be likely to supervene with little provocation in rheumatic children, whose temperament is often characteristically nervous in type.

The rehabilitation of children suffering from heart affections has been the subject of considerable investigation in recent years, and well-standardized schemes based on institutional methods have now been formulated. A comprehensive service for the welfare of children suffering from heart disease is provided in hospitals specially adapted for the purpose, where, in addition to constant medical supervision, the young inmates enjoy all the advantages of juvenile society in their programme of games and graduated exercises, and where, at the same time, facilities for general education and vocational training are also available.

Early Stages of Rehabilitation

In many respects the rehabilitation of adults is a more complex problem than it is in children. They have naturally an inborn dread of heart disease, frequently they are apprehensive regarding their supposed limitations for exertion, and, unless vigorously persuaded to the contrary in these respects, their introspective tendencies may rapidly mature into confirmed neuroses. Such, in point of fact, is more often than not the sequence of events in the group of cases nowadays listed under the title "traumatic heart disease." Admittedly the heart may be seriously injured as the result of accidents affecting the thorax, but in a considerable number of cases the diagnosis is built up on inconclusive evidence and perpetuated by litigation, with disastrous results to any chance of the patient's re-employment subsequently.

When, on the other hand, patients are reassured in the early stages of their illness, they visualize their future with an increasing degree of confidence, and under these circumstances their rehabilitation becomes a natural process. Suitable remedies, medicinal and otherwise, having been prescribed to alleviate the initial stages of the illness, and all urgent symptoms having subsided, a course of light general massage, with passive and later resistance movements at the larger joints, should be begun at the earliest possible moment. Assuming that the patient shows no sign of intolerance to this treatment he may cautiously begin a programme of graduated exercise. Having accommodated himself to the sitting position, first in bed and later in a chair, breathing exercises should be prescribed, and he may next be allowed to test his walking capacity on his bedroom floor, then about the house, and in due course out of doors.

After a varying number of weeks, or possibly months, the circulatory reserve becomes stabilized and the patient may be regarded as having achieved the primary or ambulatory stage of his rehabilitation. Continuing with light general massage and breathing exercises, he may now be allowed to extend his walks by degrees—first on the level, later on easy gradients—and, in general terms, to ensure the maximum of sunshine and fresh air. While the patient is symptom-free the graduated-exercise scheme may proceed in uninterrupted fashion, but any suggestion of intolerance—e.g., complaints of sternal pain, breathlessness, palpitation, faintness, fatigue, etc.—will need investigation, with some revision of the daily routine and probably, for a time, additional allowances of rest. Otherwise it frequently happens that the smooth convalescence of cardiac patients is materially delayed by some degree of obesity, and this condition should always be regarded as a complication of major importance. It constitutes a grave menace to rehabilitation therapy, and in a certain number of cases may be the one outstanding factor that perpetuates incapacity in heart patients and renders them unfit for employment.

Remedial measures should be taken at the earliest possible moment. Certain forms of physiotherapy—e.g., massage, graduated exercise, electrical treatment, recreational activities, etc.—are helpful in varying degree, and in conjunction with these it is essential that dietetic modifications shall be included—e.g., a restricted intake of carbohydrates and fats, with fast days at regular intervals—also thyroid medication in adequate dosage if the basal metabolism happens to be subnormal.

Exercise and Recreation

In the absence of complications patients may be expected to evince in due course a natural urge to regain, through muscular activity, their normal range of physical fitness. As a general rule the first objective should be forms of exercise to which they were accustomed before their illness, also such games and amusements as may be in keeping with their age, physique, and personal inclinations. Certain principles, as follows, are fundamental to the question of exercise and recreation in recovered heart patients:

1. They must not involve extensive muscle-group exertion, either sudden or prolonged.
2. They must not admit of undue exposure to weather extremes or tests of endurance, and, except in mild degree, they must not include contests for athletic supremacy.
3. They must be regulated according to the exercise tolerance of each individual patient, which can be ascertained partly by objective examination, partly also by the patient's own description of his effort sensations.

Suitable Occupations

Having accommodated themselves to appropriate forms of exercise and resumed in other respects their normal routine of domestic habits, patients ultimately arrive at the final stage of their rehabilitation, implying that they are again capable of employment. In general terms recovered heart patients should choose moderately light occupations which do not entail sudden or prolonged physical effort, which admit of relaxation during the working hours, and which afford opportunities for reasonable allowances of fresh air and easy exercises. It may happen that the patient's previous employment conforms to these requirements, otherwise it will be necessary for him to choose an alternative occupation that will be appropriate to his diminished circulatory reserve and, at the same time, suitable to his personal qualifications and natural instincts.

Medical Memoranda

Misadventure under Convulsant Treatment

Treatment by electrically induced convulsions (I prefer the short word "electroplexy") is such a useful and, on the whole, successful treatment for depression that its various hazards should be well publicized.

CASE HISTORY

A youth aged 19 was brought to the out-patient department suffering from adolescent depression. He also had delusions of reference and hallucinations of sound and sight. It was thought that the florid symptoms were signs of a schizoid tendency uncovered by the depression rather than the signs of a primary schizophrenia. It was therefore decided to induce a convulsion once a week in the out-patient department.

On recovering from his third treatment he complained that his two upper central incisors were missing. Two bleeding sockets could be seen, and in their depths the stumps of the two teeth. The teeth themselves could not be found. The couch, the floor, the patient's clothes, the nurse were all searched and radiographs were taken of the chest and abdomen. The x-ray sister then suggested that the teeth may have been lost upwards; she had found a tooth lately in an antrum, where it had been driven by an uppercut. The patient's face was radiographed and the complete teeth were seen lying in the maxilla. On digital examination the roots could be felt protruding immediately above the gum. What had been taken for stumps on the first examination were really the crowns. The teeth had been driven up by the force of the tonic spasm in the second stage of the fit.

It is gratifying to report that the patient has recovered from the psychosis.

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