THE LUMLEIAN LECTURES ON THE PRINCIPLES WHICH GOVERN TREATMENT IN DISEASES AND DISORDERS OF THE HEART.

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LECTURE III.

EXERCISES IN THE TREATMENT OF HEART DISEASE.

EXERCISES have been reduced to a system in three grades: massage, the resistance exercises, or their equivalent in the mechanical methods introduced by Zander of Stockholm in 1872,¹ and others, and the graduated walking exercises of Oertel.

MASSAGE.

The principal object of massage is to stimulate the arterial circulation in the muscle, to hasten the venous currents, and to promote also the passage of lymph through the lymphatic vessels. The metabolism of the body is thus maintained, and secondary and therefore primary digestion improved in those who from any cause are unable to take active exercise. We have here a means of helping on the convalescent stage of acute heart affections and of combating the tendency to stagnant circulation in those who are disabled by chronic heart disease. Still more useful is the treatment in maintaining the circulation, and mildly but sufficiently stimulating the coronary circulation in those who, bed-ridden or sofa-ridden from any other cause, tend on that account to impairment of heart nutrition, and suffer from chilly extremities, feeble pulse, torpid digestion, and passive congestion of the lungs. In regard to acute heart affections, it will be gathered from what has been already said that the treatment is not to be advised. Most cases of acute endocarditis occur in young people whose hearts are not disposed to degeneration, and whose muscles, although they become weak, recover with a rapidity and develop an energy that has to be restrained rather than encouraged. The heart is always in exercise, the coronaries are in full function, and whilst there is any activity or softness about the valve lesions, our object is in no way to excite the heart to increased action. The thermometer is our guide, and, so long as there is any daily rise of temperature, all such treatment, unless for some very special reason, should be discouraged.

RESISTANCE EXERCISES.

Resistance exercises, now so well known by the name of Schott or Nauheim exercises as to require no description, are governed by more complex considerations. By being brought to act successively against regulated resistance every set of muscles in the body can be exercised, and by graduating the degree of resistance and securing a short rest after each set of movements, every gradation in the severity of the exercises can be obtained.

Certain special effects are claimed by Dr. Schott and his disciples to be produced upon the heart under almost all forms of disablement and disease by the graduated exercises, in combination with aerated brine baths; but although the effects of these two treatments are a little confused, it seems clear that in Dr. Schott's opinion the benefit of the exercises in these cases arises from:

1. The periodical and regulated stimulation of the heart leads to increased action, the muscles of that organ obeying the natural law of the relation between exercise on the one hand and nutrition or growth on the other, as surely as do other muscles in which the changes are more apparent to the eye.
2. It is further maintained by Dr. Schott and his coadjutors that contraction of the dilated heart and distinct gain in the force of the pulse, as well as relief of dyspnoea, etc., are clearly observed to be rapidly induced by both baths and gymnastic exercises.
3. Schott, apparently as a later observation, finds that the gymnastic course is capable of inducing the same results as the baths, the heart being stimulated to more complete contraction by reflex stimulation of the cardiac centres through the influence of exercise upon the motor

nerves (that is, similar in effect to the influence of aerated brine water upon the sensory nerves reflecting upon the same centres), and in this opinion Dr. Bezly Thorne agrees.

Whilst I think no one could for a moment dispute the accuracy of the first proposition—which is, indeed, a matter of every-day knowledge—there do not seem to me to be any sufficiently trustworthy data in support of either of the other two. The occurrence of shrinking of the cardiac area as an immediate effect of the bath or resistance exercises has been denied by very competent observers—Groedel, Guntz, Leyden—and the question of baths and exercises producing their alleged effects by reflex influence upon nerve centres is still undecided.

4. Dr. Oliver has thrown some scientific light upon the effect of exercise in showing by a very simple experiment that the mass of blood in the muscles is thereby increased—so that, for example, an arm after exercise would displace a larger volume of water than before.

5. Dr. Oliver² has further shown that as a result of muscular exercises the blood thickens, the proportion of corpuscles in a given measure being increased, and he attributes this to the transfer of fluid ingredients from the blood into the substance of the muscles and lymphatic spaces.

6. Dr. Oliver quotes Brunton's and Tunncliffe's experiments in confirmation of the previously-recognised effect of muscular exercises in (a) raising and (b) lowering the blood pressure.

7. It is probably true that the circulation through muscles in action is more rapid and easy—after the first pressure effect of the muscle upon the vessels has passed off—and that the determination of blood to them may relieve congestion of other organs.

It is difficult to see how such replacement of blood should have any special effect in depleting the chambers of the heart except by facilitating the general circulation.

8. The effect of resistance exercises in slowing the pulse is not constant, and would naturally vary with the degree of exercise and the condition of the circulation beforehand. Walking smartly across a room once or twice will often diminish the rapidity and increase the force for the time of a quickly and weakly-acting heart.

The effect of the Nauheim exercises may then be said to be a stimulation of the heart's action, with some steady effect and increased completion of systole, an improved circulation through the coronary vessels, and an increased mobility of the blood by its readier passage in greater bulk through the muscles, thus relieving stagnation in the great internal organs, especially on their venous side.

In what cases are these exercises to be advised? It seems to me that the carefully graduated and observed exercises of Schott and Oertel may be regarded as a counsel of perfection to be advised for those who can afford them as a preliminary to the return to that measure of active life of which their heart condition admits, and as a guide indicative of what that measure will be, and by what degrees of ordinary exercise it may be arrived at.

Resistance exercises are especially adapted for the initial treatment of those flabby, irritable, "stuffy" hearts, if I may use the term, as applied to cases of fatty infiltration and impaired metabolism which are met with in people of venous plethora.

In cases of chlorosis with dilated heart after a preliminary week or two of complete rest, the Schott treatment is valuable if combined with a dry bracing climate and some chalybeate.

In the first, commencing failure of heart in chronic valve lesions, the treatment may be employed combined with a more or less complete cessation from all other exercises, and similarly after such cases have been restored up to a certain point by digitalis treatment. Further, certain cases in which from the symptoms and signs we recognise the presence of atheromatous change in the coronary vessels, the treatment may be cautiously tried in combination with much rest. These cases are characterised by a certain degree of plethora and by breathlessness, attended with cardiac pain on arriving at a certain stage of walking or inclined walking exercise. If the treatment be mainly confined to these lines, it is undoubtedly an aid to our therapeutics. There are other cases, again, in which it should not be employed. All cases of acute endocarditis, whilst there is any trace of activity of lesion remaining, are still more unsuitable for this than for the massage treatment. Cases of advanced cardio-vascular changes of the nature of sclerosis, and particularly when associated with granular kidneys, are absolutely unsuited. In cases of introspective people with neurotic hearts, the treatment is best avoided. The numberless cases of imaginary weak hearts that would naturally flock to specified "cures" require a diagnosis and a better occupation than that of indoor gymnastics. The exercises have in my experience not proved suc-

cessful in tachycardial cases. For exophthalmic goitre in the early stages they seem eminently unfitted.

OERTEL'S TREATMENT:

A still more pronounced treatment is the Oertel method of graduated walking exercises with a dietary restricted in fluids, a dry, highly-nitrogenous diet, with avoidance of fats and a very sparing allowance of starch, with fluids restricted to 36 ounces a day all told, and steady walking exercises for distances and steepness of ascents adapted to the condition of the patient. The gentlest incline walks can be arranged with frequent rests, or the exercise can be pushed to the point at which deep gasping respirations are excited, and a profuse action of the skin is produced. This treatment is fully described in *Ziemssen's Cyclopaedia*. It has been replaced very much by the Schott exercises, to which, however, it may be regarded as a sequel. The guiding principles and restrictions of its use are sufficiently obvious. Its chief advantage is that it is undertaken in the open air. There is no doubt that some of the discomfort that ensues from massage and passive exercises, the unexpected sense of fatigue and languor, may often be attributed to want of good air in abundance adapted to the increased oxidation produced. And this leads me to mention another point of great importance in the treatment of impaired hearts, and that is the desirability of taking full inspirations, especially during the limited open air exercise allowed to them. The constant aspiration of the elastic lung as an aid to the circulation is scarcely yet appreciated in practical medicine. I endeavoured to emphasise its importance many years ago as a force of constant action even through the whole period of expiration, and as increasing with the inspiratory expansion of the lungs.³ I have been in the habit often of advising bed-ridden people to take an occasional series of deep inspirations with the view of lessening venous stagnation. Dr. Oliver in his Croonian Lectures, and quite recently in his remarks at the Balneological Society, has drawn attention to the effects of deep, slow inspirations with firm, contraction of the abdominal parietes in emptying the hepatic and other abdominal veins, and in increasing splanchnic vasomotor tone.

EXERCISE IN GENERAL.

All the points that have been noted with respect to formulated exercises are common to other less regulated kinds of exertion of similar degree and severity. The wielding of a salmon rod is a resistance exercise equal to and more amusing than any of those of Nauheim. My friend, Dr. Oliver, would find the muscles swell, the blood thicken, the blood pressure at first rise and then fall, the venous currents quicken, and internal congestion relieved after a similar manner. We have many of us seen for years past, perhaps since the teachings of Stokes sank into the professional mind, the beneficial effects of well-advised and guarded exercises in cases of heart disease; it is nevertheless certain that we have learned from the advocacy of elaborate exercises by Beneke, Oertel, and Schott, and Dr. Thorne in this country, a greater confidence in their use from a more precise knowledge of their effects. Exercises of most varied kinds can be devised suitable to all degrees of cases in which any exercise at all is desirable. Level walks with frequent pauses, similarly taken inclined walks combined with a numbered succession of deep inspirations, golf, croquet, cricket, fishing, shooting, tennis, cycling, and such-like sports taken in the open air can be graduated with considerable nicety, and are certainly, as a rule, to be preferred to mere gymnastics indoors.

Formerly weak-hearted people were not allowed to move, now they are made to walk. The swing of the pendulum is tending perhaps too much towards exercise. Schott,⁴ with the exception of aggravated cases beyond the reach of any treatment, allows only two conditions of heart to contraindicate the treatment by baths and resistance exercises, namely, aneurysm and progressive arterio-sclerosis, and not all cases of the latter. One has witnessed many an apparent triumph of quickly restored strength and apparent well being in young people with acute endocarditis, who have been too soon allowed to resume their exercises. It is only in the later months that the effects of the chronic deforming arteritis of the strained softened valves are manifested.

BATHS.

The strong brine and aerated baths of Nauheim and other

places are unquestionably of much service in some circulatory disorders. They are, perhaps, most suitable for cases of chronic rheumatism and gout associated with high arterial tension and secondary cardiac disturbances. In cases of functional excitement of the heart's action in connection with quiescent or only imperfectly-compensated valvular affections they may be used—in the latter cases at first in combination with more or less complete rest, then with graduated exercises. In the high tension and less quiescent cases the higher temperatures, calculated to lower tension and stimulate surface circulation, are the more useful. In the more neurotic cases with sound hearts, the more tonic and comparatively lower temperatures may be employed of shortened duration. It is well pointed out by Dr. Groedel that the baths and exercises are two separate therapeutic agents, and that in perhaps only 20 per cent. of the cases are they usefully employed in combination, although massage may be more frequently employed. Beneke, who originated the bath treatment at Nauheim, was very sound in his doctrine to avoid all gymnastic exercises until after the lapse of six months from any acute endocarditis.

ACUTE HEART FAILURE.

The treatment of acute heart failure may perhaps be best referred to in connection with that acute disease in which it is frequently met, and of which it too often forms the fatal turning point, namely, pneumonia, in which disease the invalidating conditions affecting the heart are:

1. Stress of labour.
2. Blood supply and nutrition impoverished and vitiated.
3. Innervation, excited and debilitated by the effects of shock and pyrexia.

All rational treatment of the early stages of pneumonia tends to lessen the blood pressure in the lungs. It is in the latter stages, towards the crisis, when the lungs are most extensively consolidated, when the nervous excitement of early pyrexia is yielding to exhaustion, and when the blood aëration is most defective, that acute heart failure is apt to supervene. A running pulse, irregular from loss of vagus control, is the first symptom, soon to be followed by œdema of the unconsolidated portions of the lungs frothing up through the bronchial tract to produce that ominous tracheal rattle with which we are too familiar—these are the signs of heart failure threatening life. There can be little doubt that an exhausted nerve centre is at the root of most of the cases of cardiac failure rather than mere overstrain from impeded pulmonary circulation, and there are two symptoms which especially tend to heart failure, and are largely instrumental in causing the nerve exhaustion which brings it about—namely, a temperature above 104° and sleeplessness. It will be generally noted that the failure comes on suddenly; there may have been one or two preliminary warnings of partial collapse, with running pulse and cold extremities, from which the patient may rally, but which are generally followed by more severe and often fatal attacks. At the very commencement of such signs, ammonia, which my experience would lead me to infer, after a few days of usefulness, tends rather to produce cardiac depression, should be changed for a mineral acid, of which dilute phosphoric acid is the best. Some digitalis or strophanthus should be added to the mixture, and strychnine should be given separately, either in an extra quantity of stimulant or subcutaneously, if the absorbing powers of the patient are at all doubtful. But the most powerful remedial agent is oxygen, since it attacks one of the chief causes of cardiac failure by securing a supply of oxygenated blood to the coronary vessels, and the pulse will be observed to become slower and fuller under its influence. It should be at hand in all severe cases, and should be given in good time as an occasional inhalation. Whilst, as a rule, we need not in pneumonia attach much importance to a high temperature, in any case where heart failure threatens it must be reduced to a safer level, that is, by a degree or two by hot or cold sponging or if necessary by the dripping cold pack. Another question presses at about this time: it is that of sleep. Most cases of pneumonia get frequent short snatches of "dog sleep," which is all that we can expect, and serves to tide them on to the crisis, but who has not witnessed that wide-eyed delirious vigil in pneumonia, and especially in influenzal pneumonia, in which the mind is painfully alert and the senses preternaturally acute, sleep being entirely absent? I am in the

habit of suggesting help for wakefulness in pneumonia in the form of a small dose of 10 grs. or 20 grs. of sulphonal taken in hot fluid at 8 or 9 P.M., and with this preliminary a 20 gr. dose of bromide taken at 10.30 P.M. is often sufficient to secure some restful sleep. When the temperature is high a single dose of 7 to 10 grs. of phenacetin may be added to the bromide. When delirium is a marked feature hyoscin in doses of $\frac{1}{10}$ gr. subcutaneously, and repeated once or twice, may be used sometimes with great advantage. Cases of persistent sleeplessness almost invariably prove fatal with heart failure, a running pulse, the cardiac action becoming at last merely peristaltic as the blood clot accumulates in the auricles. Bromides, chloral, and sulphonal are almost useless and with the gathering serum in the tubes one hesitates to give opiates. And yet I believe that in these severe cases morphine should be given to secure a few hours' sleep, and to give the nervous system time to recuperate, and to allow of some restoration of heart power before it is too late. I have seen some cases in which death has appeared to be averted by (1) a strong dose of food and stimulant, and (2) $\frac{1}{4}$ gr. morphine with atropine; (3) aëration being maintained by the oxygen current being frequently played over the mouth and nostrils for a few minutes at a time. The oxygen may be warmed as it enters the bag by passing it through a coil of tubing immersed in hot water, or a modification of the little warming apparatus known as the "instal" may be used. It has seemed to me that strychnine has rather favoured this peculiar sleeplessness of patients when utterly exhausted, but its power as a cardiac stimulant is unrivalled, and its use in cases severe enough to lead up to this condition is quite essential, and it may be renewed on the effects of morphine passing.

The remarks I have just made are applicable to heart failure in pneumonia, and I have endeavoured to indicate the measures that tend to avert it, and to combat it when present. I have not dealt with the treatment of pneumonia in any other sense, for to treat the vast majority of cases of pneumonia with alcohol, strychnine, oxygen, morphine, and the like, would be at best like storming a mud hut with Armstrong guns; to use dangerous remedies in cases which require only the gentlest treatment and careful nursing is a great blunder.

The fatigue of heart that follows such tempestuous periods is sometimes very great. It is partly nerve fatigue, and is associated with an often greatly depressed temperature lasting for many days. It is in part also muscular fatigue. The pulse either remains quick and very soft, or it may become very slow and vacillating. Patients should always remain in bed until the temperature, which after the crisis frequently descends considerably below the normal, has had at least a sufficient interval to return to or near the normal range, and cardiac and nerve tonics, such as strychnine, caffeine, and the hypophosphites will prove valuable on convalescence. Exercise in these cases must be cautiously resumed, keeping well within the limits of fatigue until heart power is quite restored. Acute heart failure in other diseases and from other causes requires a similar handling, varied to meet varieties in the case. Time will not permit me to allude to them further. I should like, however, to draw attention to the great value of oxygen inhalations in the treatment of heart failure due to fatty degeneration of the organ in old people. These cases are characterised by the usual signs of a rather large and feebly acting heart, together with irregularity of rhythm, there being, perhaps, twenty or thirty beats fairly reaching the wrist, whilst amongst them are twice as many beats which only very imperfectly do so. Cheyne-Stokes breathing is another remarkable symptom in these cases, which is especially apt to supervene after any fatigue and to come on during sleep. This form of breathing bears no direct relationship to the pulse, and is probably an associated degenerative neurosis. The employment of oxygen inhalations several times in the twenty-four hours has a decidedly strengthening influence upon the heart, no doubt by sending some extra-oxygenated blood through the coronary arteries, and it also lessens the Cheyne-Stokes breathing and refreshes the patient. Strychnine is the most useful cardiac stimulant in these cases.

SUBACUTE OR CHRONIC HEART FAILURE.

That large class of subacute or chronic heart failure,

dependent upon degeneration or other changes in the heart wall, may be classified for the purposes of treatment into those in which the impairment is temporary and remediable, as from (1) anæmia, (2) fatty infiltration, (3) overstrain, and into those in which it is permanent, as in (1) fatty or fibrofatty change from coronary disease; (2) chronic fibroid change from other causes—syphilis, alcoholism, or associated with chronic high arterial pressure in gout, renal disease, etc.; (3) senile changes.

In anæmia the atonic and badly-nourished heart frequently yields before the blood pressure, is slightly enlarged, irritable in function, and, besides the usual hæmic *bruits*, presents a murmur at the mitral area. Such cases are frequent in hospital practice, and it may be said that the routine treatment of cases of chlorosis bad enough to come into hospital is a fortnight's rest in bed, with the necessary laxatives and ferruginous tonics, and further treatment at a convalescent hospital.

OVERSTRAIN.

The heart is capable of being severely taxed provided it be a healthy organ in a fairly young subject without being overstrained, the difference being that between functional fatigue and actual damage to valve or muscular wall. Of course, too frequently-repeated overtaxation will cause permanent enlargement with some change in the muscular texture, not only of the heart but also of the vessels.

It is, however, prolonged taxation of the heart extending over the period of fatigue that is very apt to cause changes of a more or less permanent kind which constitute overstrain. The irritable heart of soldiers described by Da Costa, the forms of heart disease found so frequently in lightermen and professional athletes, are of this source. It is extremely important that in young people undergoing active growth and development sports should be so arranged as not habitually to tax the heart and circulation beyond the period of fatigue, the point to be remembered being that young people can do almost anything in short spells or spurts, with rest between, but their hearts will not bear with advantage prolonged and fatiguing exertion, the reason being that nutritious changes of waste and restoration are quick, and cardiac innervation excitable. In full grown adult life great exertion can be more prolonged, and as life advances the heart is much more liable to damage from quick spurts of effort than from prolonged and steady exertion.

In my belief, with perhaps the single exception that in some cases long runs and paper chases are not sufficiently supervised with regard to the various ages and physique of the boys, the usual public school sports are admirably adapted for them. I would here make an observation which is probably in accord with the experience of others, although I have not seen it alluded to, namely, that in young people, especially boys between 7 and 12 years of age, it is common to find the heart relatively large, the apex beat slightly outside the normal, the impulse of the left ventricle relatively strong. I believe this condition to be by no means abnormal, and that it is attributable to the restless activity of early youth, and to the cardiac development being somewhat ahead of the pulmonary. It would be an error to regard it as morbid.

My own limited experience of those who have overdone it in training is that they become anæmic, that their cardiac innervation suffers, and that the ventricles yield from impairment of muscular nutrition. An anæmic condition of such patients and an occasional hesitation in the cardiac rhythm are the earliest phenomena.

The treatment of an overtaxed heart and the lighter degrees of overstrain is simply a short period of complete rest, followed by steady but carefully-graduated exercise, calculated to maintain cardiac and general muscular circulation and nutrition without exciting the heart's action or increasing the blood pressure. I think special heart exercises are better avoided; we do not want to make heart "corks" of our young people. Children have great powers for complete recovery in their rapid renewal of tissue.

Overstrain of unsound hearts is, of course, a matter of daily experience, and is the immediate cause which brings such cases under observation. Its treatment is involved in that of the heart disease upon which it supervenes, and the same remark applies to the more severe effects of strain, such as rupture of valves, aneurysms, and the like.

INFECTIVE ENDOCARDITIS.

The pathology of infective endocarditis will be broadly covered for our present purpose by saying that it is a disease most commonly—61 cases out of 69 (Coupland)—supervening upon valve changes, the result of former endocarditis, that it is produced by the lodgment and local cultivation of microbes, and that its secondary results are occasioned by the toxins yielded to the blood by such organisms and by the detachment of microbe-bearing fibrinous emboli, occluding vessels in various organs and parts. That the organisms regarded as capable of setting up infective endocarditis are of more than one kind—Dr. Dreschfeld⁶ enumerates twelve kinds of organisms as having been found—but that streptococci and staphylococci pyogenes are the most frequently found, pneumococci next in frequency, gonococci and others occasionally met with. It is stated that in some cases organisms have been found peculiar to the lesions.

The salient facts with regard to infective endocarditis are the frequent concomitance of previous valve defect and exposure to sewer gas emanations or septic absorption, and these factors will be found to underlie and initiate the whole pathology of the disease in the vast majority of instances. They are in my belief the objectives of our prophylactic and therapeutic treatment. A due recognition of these facts will add to the care with which, on sending a patient convalescent from rheumatic fever with endocarditis to a seaside or country resort, we should satisfy ourselves as to the sanitary condition of the house to be occupied. Obviously the first inquiry in any case presenting symptoms suggesting infective endocarditis is into his sanitary surroundings, and into every possible source of autogenetic infection, such as otitis, chronic gleet, pelvic abscess, and the like, and to at once deal with any such defect.

The next point which strikes the clinical observer is the fact that with a mild remittent fever there are associated more or less periodical outbreaks of high temperature with great fluctuations of from a few hours to two or three days duration. We can often prevent this appalling malady, we may sometimes nip in the bud by prophylactic measures its dire development. What can we do in its treatment? Of drugs, arsenic is the only one under a course of which I have seen this disease get well. I do not remember to have seen any appreciable result from quinine, sulpho-carbolates, guaiacol, mercury, or other remedies of the antiperiodic or antiseptic class. But in the face of the dreadful mortality of at least 80 per cent. of the cases that prevails, arsenical treatment must promptly be abandoned for any more promising remedy. And looking to the pathology of the disease, it would seem that in the modern development of serumtherapeutics there is most to be hoped for in its future treatment.

It is hazardous to trust the reports of any new method of treatment until a sufficient time has elapsed for the favourable cases which have brought it into vogue to be duly apportioned to those in which it has failed.

There have been recently reported four cases treated by the antistreptococcus serum with the very encouraging result of three recoveries. It must not be concluded, however, that this represents anything like a just account of the results of the treatment. A considerable, and as yet unpublished, experience at the various large hospitals and in private has already gone far to moderate enthusiasm for this method of treatment. I have here a table of all the cases that have come within my personal knowledge through inquiry amongst my friends and at some of the principal London hospitals. They are 12 in number, which include the 3 successful cases already published, 7 deaths, and 2 in which no favourable result has ensued. Allowing for the fact that in some of these cases the antistreptococcus treatment has, from a natural hesitancy with regard to its efficiency and some timidity of possible risks in its employment, been employed only in later and almost hopeless stages of the disease when already large embolic detachments have set up centres of cultivation in many positions, the table may not be regarded as so discouraging as would at first appear. It may be laid down as a principle governing treatment by this particular serum that the more distinct the history of a previous endocardial lesion, and a subsequent exposure to infection through a suppurative medium or a sewer gas sepsis, the more appropriate the case for the treatment. This rule would discourage its

employment in cases in which the pneumococcus, gonococcus, or some other microbes divergent in character from the streptococci and staphylococci were concerned; and if with the recognition of this principle and its earlier and bolder carrying out more encouraging results are obtained, it will certainly follow that analogous measures will be found for the circumvention of the other forms of microbic action. There is a further point in the natural history of infective endocarditis which is well illustrated in this chart—namely, that towards the close of the case, when the vital powers are at a low ebb, the temperature tends to fall apart from any treatment, and the reactions to embolic incidents are much less marked or do not occur at all. It is possible that thus if the serum be used late in the case, it may have effects attributed to it which should be otherwise accounted for.

I will venture now to allude to a case treated by the subcutaneous use of another material—namely, yeast. Although it occurred four years ago, and struck me very much at the time, it did not seem then advisable to publish it, for as it stood it might equally well illustrate the value of a treatment or the fallacy of drawing any deduction from a single case.

I had some months previously seen a case of infective endocarditis of long standing with Sir W. Broadbent, in which he had for a time employed yeast given by the mouth with the apparent effect that during the several weeks of the treatment the temperature had preserved a lower, although not a normal, range; the patient, however, became nauseated, and would not continue the remedy, and finally died of the disease.

CASE OF INFECTIVE ENDOCARDITIS TREATED BY YEAST.

A young gentleman, aged 21, with slight defect at the aortic valve, lived in a room over an archway which covered a former inlet of the Thames, and presented a surface of stagnant Thames mud, sometimes dry, often wetted with surface water from the extended basement of an ancient building. He was given to violent exercises, bicycling, gymnastics, and engineering work, and the presumption is that he overstrained an old-standing valve lesion. On May 15th, 1895, he was taken ill with vomiting and faintness. He was seen by Dr. Davis, of Dorset Square, on the 16th, when he had a temperature of 102°, general *malaise*, and a cardiac murmur of aortic regurgitant character. I saw him in consultation with Dr. Davis on the fourth day. The temperature continued raised. There were no rheumatic symptoms, nor were there any special symptoms of enteric fever. On about the eighth day he had a severe rigor, and at intervals of four or five days afterwards he would have rigors, with the temperature running up to 105° with deep fluctuations. With the rigors there was sometimes sharp pain over the splenic region, and the spleen was distinctly enlarged. On June 1st he was removed to a perfectly sanitary nursing home, but the symptoms remained unaltered. Salicylate of soda was at first administered, and quinine was then given in 5-grain doses without result, and moderate doses of arsenic were tried, but these drugs did not influence the symptoms. The aortic regurgitant murmur became very marked, and a curious rough, somewhat churning, but mainly systolic murmur was heard over the left auricular region.

On July 1st injections of yeast culture (a fairly concentrated cultivation of yeast in saccharine water prepared by Messrs. Burroughs and Wellcome) was employed, 20 to 30 minims of the yeast being injected into the cellular tissue each second day, and these were steadily continued until September 1st. Soon after the commencement of the yeast treatment he had acute right pleurisy with some effusion. With this interruption, the intervals of four days between the rigors, which had pretty steadily been observed, appeared broken by the yeast injection and prolonged to six or seven days. The temperature became normal, or nearly so, in the intervals, and altogether normal about August 14th, three months from the commencement of the illness. The patient went to Brighton on September 1st, and rapidly convalesced, and has remained active and well since. In this case the yeast culture was obtained from Messrs. Burroughs and Wellcome. It was an inconvenient and unstable preparation, although it seemed to serve a very good purpose.

Dr. de Backer, of Paris, seems to have originated the yeast ferment treatment of microbic diseases, and it was from a reference (after my observation of Sir W. Broadbent's case) to his experiments⁷ with "backerin," an aseptic preparation of fermentable material containing the yeast fungus, that I was induced to use the yeast preparation subcutaneously. de Backer⁷ explained the efficiency of the yeast fungus in microbic diseases by the cells attracting into their interior and finally killing various microbes, and thus helping the germicidal function of the white corpuscles.

I have used yeast subcutaneously in four other cases, in one of the four using it also in the form of dry yeast in 30-grain doses by the stomach, but I cannot say that any marked result followed. The cases were, it is true, all rather advanced with splenic and other embolisms. One case was a sequel to gonorrhoea, one to suppurative otitis, and the other two of less defined source.

Dr. Vaughan,⁸ Professor of Hygiene and Physiological Chemistry at Michigan in 1894, advocated the use of solutions of

nuclein and nucleinic acid in the treatment of microbic diseases; but I am not aware that it has been tried except in the treatment of tuberculosis, although it has been advocated both in the form of the original preparations of de Backer and as nuclein solutions in the treatment of all microbic affections. It occurred to me that nuclein derived from the young yeast cells may have been the material responsible for the apparent usefulness of yeast in Sir W. Broadbent's and my cases, and that it was worthy of trial in cases at all events in which antistreptococcus serum would not be applicable.

The only case of infective endocarditis in which I have used nuclein is one seen by me in consultation with Dr. Christopherson of Hastings. The effect appears to be very striking, the temperature coming down to normal for twenty-two days, after which, however, another rise occurred.

CONCLUSION.

I regret that time has not allowed me to allude more fully to some forms of cardiac disease, more especially to the subject of senile and prematurely degenerative diseases of the heart. A reference to them must have been somewhat discursive, for whilst they admit of much management, they necessarily allow of little direct treatment. And, indeed, in trying to seek out points for treatment which are scattered here and there amidst groups of symptoms, I fear I have already been too discursive. My endeavour has been to illustrate the principles of treatment rather than to touch upon details, the recognition of a neuropathic state, the principle of rest, of exercise, of drug administration, of restrictions in diet, upon which we formulate our more precise management of individual cases. Finally, we must accept in cardiac therapeutics the principle of submission, so that we may better help patients to recognise the necessity of a restricted life caged within the narrowed limits of those conditions under which alone life can be maintained.

REFERENCES.

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THE HUNTERIAN LECTURES ON THE SURGERY OF THE KIDNEY.

Delivered at the Royal College of Surgeons of England,

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LECTURE II.

RENAL CALCULUS: THE DIFFICULTIES AND ERRORS IN DIAGNOSIS IN THEIR RELATION TO EXPLORA- TION OF THE KIDNEY: UNSUSPECTED, QUIES- CENT, AND MIGRATORY CALCULI.

MR. PRESIDENT AND GENTLEMEN,—To-day I wish to draw attention to some renal calculous disorders. If I put them in the very forefront of surgical affections of the kidney, I do so for the following reasons:

1. They are the most frequent and most painful of the surgical diseases of the kidney. Probably no disease, except acute tetanus, is capable of causing worse suffering.
2. Renal calculus, whilst slowly destroying the kidney, often physically disables its victim by its unrelenting irritation, and its unyielding resistance to every form of medical and dietetic treatment.
3. No disease gives rise to such a variety of morbid changes in the kidney as calculus; and none is more certainly fatal when allowed to progress without surgical interference.
4. Few operations in surgery are so successful as nephrolithotomy, by which a calculus is removed from a kidney not disorganised by the calculus or otherwise. No great operation is followed by a smaller mortality. Nephrolithotomy

gives absolute cure, saving the kidney from progressive destruction, and the patient from what at any moment may prove to be an imminent danger to life.

5. Renal surgery will grow in confidence and in favour with the profession and the public as nephrolithotomy anticipates and displaces nephrotomy and nephrectomy.

I attempted to show, in the latter part of the first lecture, that nephrectomy is being rapidly restricted in its application as advances are made in ureteral operations. It may also be safely asserted that nephrotomy—at present the most frequent operation resorted to for calculous affections—will be required but rarely if nephrolithotomy is earlier and oftener performed. Calculous pyonephrosis is the result of long-standing irritation and progressive destruction of the kidney, and there is no reason why it should ever occur if physicians would recommend and surgeons would practise early operations for stone in the kidney. That this is a consummation much to be desired is seen by comparing the mortality of nephrolithotomy with that of nephrotomy and nephrectomy for calculous conditions. The figures are as follow:

	Cases.	Recoveries.	Deaths.	Percentage.
Nephrolithotomy ...	34	33	1	= 2.9
Nephrotomy ...	43	23	10	= 23.25
Nephrectomies ...	17	12	5	= 29.4

[Case 21 amongst the nephrotomies and Case 16 amongst the nephrectomies are excluded for reasons which are obvious on a glance at the tables.]

6. Another reason why calculous disorders take so prominent a lead amongst the surgical affections of the kidney is because of the difficulties and errors attending their diagnosis.

These difficulties arise from four chief causes:

1. Several other renal and ureteral affections give rise to the same symptoms as stone.
2. Several diseased conditions of other organs cause symptoms which simulate those of renal calculus.
3. Symptoms caused by renal calculus may be transferred to other organs; or may be of a psychological order, with or without high temperature, and not referred at all to the kidney itself.
4. Calculi may be for an indefinite time masked, giving rise to no symptoms whatever, yet causing the while progressive destruction of the kidney.

When calculi have been previously passed, when well-marked attacks of renal colic occur, when crystals of uric acid or calcium oxalate are frequently found in the urine, and when the urine is intermittently mixed with a good deal of blood, or persistently contains a microscopic quantity, there are the strongest *a priori* grounds for thinking that a stone is present. This evidence is strengthened if attacks of colic and hæmaturia are readily induced by exercise or jolting, and readily subside with rest; and if a sharp pain or distinct tenderness is always caused by bimanual examination of the renal region. In many cases, however, mistakes in diagnosis are bound to arise. Morbid conditions other than stone will be found, from time to time, in cases in which the character of the pain and the state of the urine point to calculus as the probable cause. These mistakes are apt to excite a prejudice against renal exploration; but the results obtained by those who have had large practice in renal surgery ought to correct this. The experience gained by operations has taught us much as to what the conditions are which cause symptoms typical of stone when no stone exists.

In 1892 I published some lectures¹ on the conditions simulating renal calculus as verified by surgical exploration in 28 cases. To these I now add 16 cases, making 44 in all. In a few instances a calculus was possibly in the ureter at the time of the exploration, because one was passed some little time subsequently. But in the greater number of the 44 cases some other morbid state of the kidney was found and remedied. It is certain that the diagnosis of calculus, though incorrect, was advantageous to these patients, for the very reason that it led to the exploration, and in this way to the discovery of the true cause of the disease. The expression "negative exploration" is often applied to every operation in search of renal calculus, but which does not result in the discovery of a stone. This expression is very misleading. It is not a "negative" result to find and excise commencing