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

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LECTURE II.

ACUTE INFLAMMATORY DISEASES OF THE HEART.

THE general line of treatment in the vast majority of cases of acute inflammatory diseases of the heart is the same. We might, after recognising the presence of heart disease, so far as treatment is concerned, keep our stethoscope in our pockets. For we have chiefly to consider the fundamental complaint of which the cardiac affection is in most cases a part, and this disease is, in the majority of instances, acute rheumatism. Now, from the heart point of view, and indeed from any point of view, I think all authorities are now agreed that the right treatment of acute rheumatism is absolute rest in bed in woollen wrappings, a free relief of the bowels, and the administration of sodium salicylate in efficient doses, in combination with such alkaline remedies as the condition of the urine may suggest.

It was shown very emphatically by the late Dr. Sibson¹ that the difference between absolute and incomplete rest in the treatment of acute rheumatism was an exemption from heart complication of 71 per cent. as contrasted with 44 per cent. We never see now those cases of acute rheumatism involving three to six weeks' acute suffering so little influenced by treatment as to render possible the warm discussions of not thirty years ago at our clinical societies respecting the relative merits of alkaline drenches, multiple blisters, or mint water drinks and dry cotton wool applications in that disease. But few cases now endure more than five days' suffering under the salicylate treatment, and a treatment of the general disease thus successful can scarcely fail with due care and foresight to prove in some degree preventive of cardiac lesions, which are true manifestations of the rheumatic poison, usually of somewhat later appearance than the joint phenomena.

The earlier statistics, both with regard to the influence of salicylates and other drug treatments in lessening the tendency to heart disease in rheumatism, are for the most part valueless, being based on hospital cases, the previous existence of heart affection not being certified, and the treatment before entering hospital not being given. It can scarcely be doubted, however, that the current view that salicylates do not lessen the liability to cardiac lesions is founded on the fallacy that cases early relieved of pain and fever by salicylates are often allowed to get up too soon. The so-called relapses are rightly described by Dr. Howard as rather "recrudescences of a disease not yet terminated." The average time spent in hospital for acute rheumatism—thirty days—is nearly the same under all treatments, the full alkaline treatment having a slight advantage; and during the greater part of this time the patient must remain in bed under strict treatment by warmth and rest and appropriate drugs. If, therefore, on the relief of pain and reduction of temperature the patient be regarded as convalescent, and be allowed out of bed, he assumes the position of one with acute rheumatism still upon him treated with incomplete rest, and so becomes doubly liable to cardiac manifestations.

I may pass by the local treatment of cardiac disease in rheumatism, with the remark that it varies according to the views of particular physicians. There is no doubt that a certain few cases are wisely treated variously at the physician's discretion by cold or warmth, by blisters or leeches, according to particular indications. It cannot be said that any one plan of treatment is to be recommended as superior in all cases.

Why should rest, absolute recumbency, be so important in

acute heart affections? We cannot still the heart, but we can lighten its burdens and lessen its restlessness. The mere difference between lying down and standing up to the healthy heart is 10 beats a minute, or 600 beats an hour. How much greater may it not be to the heart irritated by acute disease?

The pulse naturally quickens as the temperature rises. Hence by mitigating pyrexia we, *ceteris paribus*, rest the heart. It is generally held by pathologists that pyrexia lowers arterial pressure, but the conditions that attend rheumatic pyrexia, multiple joint inflammation, and excessive metabolism, with high density of urine, would favour heightened arterial tension. Our alkaline and salicylate remedies reduce arterial pressure both directly and indirectly by stimulating skin and kidney function. So that the general remedies most applicable to the fundamental diseases are at the same time specially suitable for the requirements of the local malady.

Are there any special remedies to be employed for the heart condition? There are but few. The group of heart medicines is not, as a rule, applicable until the case has fully emerged out from the general disease, and has become a single organ malady. It may be said, generally speaking, that digitalis and its class are useless in acute inflammatory heart affections; that aconite, with certain exceptions, is harmful; mercury has long been abandoned with venesection and other violent measures. There are two forms of cardiac lesion, however, which may frequently be treated by moderate doses of opium with great advantage. They are pericarditis and myocarditis, conditions often conjoined, the especial indications being pain particularly manifested in some (not all) cases of pericarditis and irregularity of rhythm, tending to tumultuous action with failing power, characteristic of myocarditis.

Endocarditis in rheumatic fever affects the mitral valve most commonly, the aortic orifice much less frequently; the more complex mitral flaps stiffened, and with their opposed surfaces thickened by vegetations, permit of regurgitation, whilst the aortic valves, losing their flaccidity, and being roughened by vegetation, are unduly salient during systole, and so cause obstructive murmurs. Neither of these conditions calls for or responds to, at this stage, any treatment additional to that already laid down for the dominant complaint. It is somewhat inadequately argued that sodium salicylate does not influence heart affections in rheumatic fever. This view is founded upon a double misconception. In the first place, the murmur, or pericardial friction, heard in endocarditis, is a result of altered mechanism, rather than an evidence of activity of lesion. Their continued presence does not show unchecked activity of lesion, nor could they be expected to disappear like the fading blush over the rheumatic joint. More than this, cardiac rheumatism affects a part in constant functional activity, to which the term rest is only relatively applicable, and further, the mild degree of daily pyrexia, which is often prolonged in endocarditis, is probably partly due to contamination of the blood stream by sero-fibrinous material exuded from inflamed surfaces, which, although not septic, has yet become foreign through alteration by products of cell proliferation. After the third or fourth week, the salicylates may be replaced by quinine and arsenic as remedies better suited to combat this phase of the malady.

There are various considerations which emphasise the importance of more prolonged rest in cases of acute rheumatism accompanied by cardiac lesions. The difference is a striking one between the ephemeral results of other inflammations in a joint or even in a fascial membrane, and the same affection of a cardiac valve, the pericardial sac, or even the pleura. But this different result is well accounted for by the condition of unrest that in different degrees obtains in each of the three latter parts. This condition depends on automatic mechanism happily beyond our control; but, as pointed out in speaking of the acute phase, we can very materially lighten the labour of the heart and lessen the strain upon the valves by maintaining the body in recumbent repose.

It is true that in the milder cases of endocarditis the inflammation may be mainly seated at, or even limited to, the lines of contact of the valves, the points of greatest strain, as has been pointed out by Moxon, Sibson, and other authors, but in more severe cases the whole valve partakes in the inflam-

matory hyperæmia, and is the more liable to become so involved the more it is subjected to premature functional strain. But for a considerable time after active inflammation has passed, a time varying much in different cases, a smouldering endocarditis goes on attended with a slight daily rise of temperature, so slight sometimes as to be ignored by the attendants, and yet during and beyond all this time absolute rest is necessary. The valves are softened and thickened by nuclear granulation tissue and new fibrous formation. They readily yield and become distorted under any increase of blood pressure, whilst the nuclear tissue further develops into hard and contractile cicatricial tissue, which fixes and further distorts the valves.

The infrequency with which aortic regurgitation and mitral stenosis are met with in primary cases of rheumatic fever cannot fail to have impressed clinical observers, but the lesson to be received from this fact has not been duly learned. Dr. Sibson² points out that of 24 cases of acute rheumatism with primary endocarditis, treated by a rigid system of rest, only 1 gave evidence of aortic as well as mitral disease, whereas in 19 instances out of 127, or 1 in 6.7 cases not so rigidly treated in this respect, aortic regurgitation was present. But even Sibson did not point the lesson, for he only insisted upon the importance of maintaining rest for "a period of several days after the complete disappearance of the local inflammation of the joints."

If it be true that aortic regurgitation and mitral stenosis—rarely met with in primary rheumatism—are the results of secondary changes in the valves caused by (1) strain upon the softened valves, (2) by cicatricial deforming changes in them, the first of these can be to a great extent prevented and the second to a great extent lessened and modified by maintaining the patient quiescent for a sufficient length of time.

The exigencies of hospital routine, the pressure of perhaps more urgent cases, and the natural anxiety of the patients themselves to get home, result in the discharge of rheumatic fever cases even with heart complications within a month or five weeks, when perhaps another month's rest would add many years to the life estimate. A very bad lesson is thus taught to students.

In private practice, in dealing with children and young people especially—and they are numerically by far the most important cases—it is not difficult, with sufficient firmness in explaining the position, to secure an adequate period of rest to allow of a complete subsidence of inflammatory change and a restoration of due resisting power in the weakened valve. At least two months after an attack of rheumatism involving the heart, and in some severe cases from four to six months, is necessary for this purpose. A minute attention to the temperature chart and pulse and careful investigation of the cardiac sounds will be the chief guides in regulating the rest treatment of these cases. For a further ill-defined period of months very gradual and careful return to an amount of activity suitable to the case must be permitted.

Under this system of management very striking results, in many instances practically complete cure, will be obtained, especially in children and young people. It was taught in my student times by the greatest of living clinical teachers that children grew into rather than out of heart disease. I have been surprised since to meet with many instances to the contrary, and I venture to think that the opinion was based largely upon the experience of the Children's Hospital dealing with poor children who were not maintained long enough at rest, and who returned later with the results of the deforming endarteritis.

I have pointed out that the cardiac group of drugs is of little value in the early stages of heart disease. Our object is to promote resolution and the healing process. Our primary object is not at this stage to increase heart power, which would indeed only antagonise our views of easing valve function. As the acute rheumatic features fade, general anæmia and cardiac fatigue often present themselves for consideration in treatment and such drugs as arsenic, strychnine, and iron are strongly indicated.

At this stage, particularly in pericardial and in some endocardial cases, the employment of moderate doses of iodide—for example, a 5-grain dose of combined iodides of soda,

ammonia, and potash three times a day, have seemed to me of some advantage in helping the resolution of the inflammatory thickenings. A due regard would, however, be paid to the toleration of the iodide, and it would in all cases be combined with some tonic, such as strychnine, arsenic, or iron. It is at this time, at the end of the pyrexial interval, that the question as to the usefulness of digitalis comes in. A quickened and irregular rhythm, one or both arising from want of power to deal with a valve defect, is the particular indication for the employment of digitalis. The drug is of little, if any, use, and may do harm if the quickened action be the result of inflammatory irritation. Hence, where the irregularity is attributable to pericarditis or myocarditis the drug is useless; when the soft, low pitched murmurs with raised temperature indicate active changes going on in the valves, digitalis should be withheld unless positively demanded by a failing ventricle, the special signs of which would be congestion of the lungs, enlarging liver, œdema of the limbs, and very scanty urine. But these symptoms are only present in very grave cases. In the majority of instances during active valve changes, as I have said, digitalis is not needed. In the selection of change of air for convalescent cases of endocarditis, the first consideration is freedom from wetness of subsoil. Seaside towns are generally preferable to country districts on account of the ground being well drained, the walks easy, the sunshine abundant, and facilities in the way of bathchair exercise, sunny balconies, etc., greater. I may here mention a matter of extreme importance, to which I shall allude again in speaking of ulcerative endocarditis, and that is the necessity of perfect sanitation, bearing in mind the susceptibility of the recently inflamed valves to bacterial invasion.

In cases in which the lesions are grave, the progress tedious, the necessity for rest prolonged, general nutrition may be maintained by judicious massage such as to stimulate muscle nutrition and facilitate venous circulation. Thus do they become better prepared for the gentler forms of exercise on first getting up. These exercises may be taken in some definite and prescribed form, as at a spa, or they may be simply directed by the knowledge and common sense of the doctor.

TREATMENT OF VALVULAR DISEASE.

In a case of valvular heart disease, having arrived at a diagnosis the physician's further deliberations mainly turn upon whether

- (a) The case is a suitable one for the employment of remedies of the digitalis order, and to what extent shall they be pushed.
- (b) Does the case require complete rest? or
- (c) What degree and kind of exercise will be beneficial, or may be permitted?
- (d) The general state of the patient, his nervous system, condition of nutrition, blood state, etc., will have to be considered, as well as those special functions of kidney and liver and the dropsical state, which are a part of the perturbed circulatory condition.

It is, of course, quite unnecessary for me here to discuss any points of physical diagnosis, and I will at once pass on to a brief consideration of the properties of digitalis upon which we have to rely in practical therapeutics.

What are the attributes of digitalis upon which we rely in our daily practice?

1. Digitalis slows the heart's action, concentrating the force expended upon fewer and more efficient contractions.
2. It is stated that digitalis also directly stimulates the heart's action (Williams³). The more obvious effect clinically is rather a concentration of force and gathering of small irregular beats into efficient contractions.
3. It is generally agreed that the drug affects the cardio-vascular muscles directly. Although the ultimate plasmic distribution of the vagus in the heart is presumably the special sphere of its influence, it is highly probable that its effects extend also to the nerve centres. It is difficult otherwise to explain the secondary effects of digitalis, especially its vasomotor effects and the peculiar nausea, resembling that of seasickness, which often proves so important a result of its continued use.
4. Digitalis contracts the arterioles, and this effect, in combination with the increase in the contractile force of the heart, raises the blood pressure in the arteries.
5. The effect of the contraction of the arterioles is to maintain the blood pressure between the cardiac beats.

This effect of digitalis in contracting the arterioles has been known for 30 years, and as Dr. Lauder Brunton was amongst the first to prove it experimentally, so he has by a series of experiments made with Dr. Tunnicliffe quite recently, maintained the importance of arteriole contraction in sustaining the blood pressure between the beats of the heart.

It must be remembered, as shown in both series of Dr.

Brunton's admirable experiments, that the blood pressure is maintained in the arteries in the intervals of systole, that is to say, that under digitalis influence, after closure of the aortic valves the aortic resiliency more gradually effects the emptying of the arteries through the capillaries. Now, this effect is of great clinical importance.

1. It maintains the blood longer in the arteries, and hence favours the more effectual irrigation of organs, particularly of the secreting organs.

2. By the better distribution of the ventricle force venous congestion is avoided, and the venous current more sustained; the heart has less immediately to overcome venous inertia, and the less bulky and stagnant venous stream is more readily respondent to *vis-a-fronte* influences.

3. Provided always, however, that corresponding with a longer maintained arterial pressure the digitalis produces a slower heart beat. For it is obvious that if with increased slowness of distribution of cardiac force we have no corresponding diminution in frequency of the cardiac contractions, we may get the resistance mounting up to a dangerous pitch.

From clinical observation I should have said that in medicinal doses digitalis affects the heart before the vessels, and so the proportionate conditions of its effective and beneficial action are in suitable cases secured, although experimentally with the drug introduced directly into the circulation in full physiological doses the vessels have been found to react sooner than the heart.

6. Pushed beyond its therapeutic limits digitalis appears to paralyse the cardiac vagus, the heart's action becomes rapid, peristaltic, and finally stops in systole. The failure in heart power seems to arise from inefficient and finally extinguished diastole, and the arterioles generally maintain their contraction to the end.

In considering the cases of cardiac disease, and for the moment speaking of valvular diseases of the heart, the first thing to remark is that there is to be observed a type of pulse and heart rhythm adapted to and characteristic of each form of valvular disease of the heart, which may be regarded as normal to that lesion, and it should be the object of the physician to consider whether the rhythm of heart and the result of estimated cardiac force as registered by the pulse are in full accord with the altered circumstances produced by the valve defect. How far the pulse varies from that of health is a preliminary part of the diagnosis, but the diagnosis made, the question for treatment is whether the character of the pulse is normal to the lesion found, or does it vary from what it ought to be under the circumstances, and to what is the variation due? On thinking the matter over in this light, we perceive that in the therapeutics of cardiac affections, after the acute stage, we do not treat the valve defect, but we treat the heart; whilst it will be remembered that in thinking over the treatment of cardiac affections in the acute stage, we found that our measures were not directed to the heart so much as to the affected valves or pericardium, and incidentally in this latter section of acute cardiac affections we found but little employment for drugs of the digitalis order, and that in many cases their employment was positively to be avoided.

DIGITALIS IN AORTIC DISEASE.

There has been much dispute as to whether digitalis—and in mentioning digitalis I speak for the whole therapeutic group—should be used in the treatment of aortic regurgitation. But in the most typical cases of aortic regurgitation the patients are very well; they may be quite unconscious that they have anything the matter with them, they lead active even athletic lives, and will be shocked on presenting themselves before an insurance society at being refused or very greatly surcharged. Except for accidents in the way of functional disturbances of reflex origin, vasomotor angina, to which they are very liable, and sudden or gradual overstrain to which their unguided energies tend to lead them, these patients, if they follow rationally prescribed lines of conduct, may go on very well until the degeneration period of life. Now the conditions of good compensation are steady, regular, forcible ventricle beats, an increase in the capacity of the left ventricle to accommodate a larger measure of blood in diastole, and a vigorous and truly muscular hypertrophy to enable the ventricle with little supplementary support from the aortic valves to propel the blood through the capillaries and maintain the venous current. Under these conditions, which are faithfully recorded in the steady regular pulse, with a strong abrupt beat, rapid subsidence, and low tension of artery, digitalis is not wanted, and a powerful drug, when there is no indication for it, cannot but be harmful.

In all cases, however, of aortic regurgitation which are not interrupted in mid career by some of the accidents to which I

have alluded, the time comes when the employment of digitalis is of the greatest value. What are the indications for its use? In one word, they are the symptoms of commencing failure of the left ventricle fully to respond to the heavy call upon it, provided that failure be under conditions otherwise normal to the disease. It may be, for instance, that the ventricle is temporally overburdened by the results of some nervous, dyspeptic, or gouty storm reflected upon the small vessels, and causing a measure of high tension to supervene upon that relaxed condition of the arterial system which is normal to aortic regurgitation, and which is probably a natural compensatory effect, induced by the relaxing influence of the depressor nerve in response to the increased pressure within the ventricle. Under the conditions of high arterial tension thus induced, it would be very faulty practice to give digitalis; any result it might have in forcing increased work out of the already willing muscle would be necessarily at the expense of later exhaustion, apart from the tendency of the drug itself to increase tension. Obviously, under these conditions, a mercurial and saline, or such other treatment as may specially meet the cause of the increased arterial resistance is the first measure, in combination with a little extra quietude, and to be followed by a tonic calculated to restore the fatigued heart. I have already dealt with the treatment of acute high tension, accompanied by anginal symptoms in aortic disease. It has been said that the heart in aortic regurgitation is sometimes too vigorous, its hypertrophy excessive, and that it is necessary to use drugs of the aconite order to lessen ventricular expenditure. I confess I have never recognised a case of the kind, and that, in my experience, unduly laboured heart's action in this disease is always to be explained by reflected functional disturbance or increased arterial resistance. The one thing we have to look to in aortic regurgitation is the maintenance of heart power, and any sign of over-struggle is rather to be met by measures calculated to diminish peripheral resistance:

1. Irregularity in the heart's action.
2. A want of precision and sharpness in the character of the pulse.
3. Increased displacement of the apex beat to the left, and extended impulse upwards.
4. The occurrence of irregular smaller beats as marked in the pulse, and appreciated at the heart.
5. The supervention of a soft systolic *bruit* over the mitral area.
6. Extension of the cardiac dulness to the right.
7. The almost complete replacement of the normal, regular, strong, slow, collapsing pulse, and simple hypertrophic heart's action, normal to aortic regurgitation by a rapid heart's action, irregular in force and frequency, with a corresponding small pulse having the characters of mitral rather than of aortic disease.

Such are in gradation the ingravescent signs of ventricle failure in aortic regurgitant disease, and the increasingly imperative indications for the employment of digitalis in its treatment. As the above signs develop, we observe important symptoms of the changed arena of struggle from the left to the right heart territories of the circulation. Congestion *râles* appear at the bases of the lungs, fulness to enlargement of the liver, oedema of the extremities, and scantiness of the urine.

Under those conditions the peculiar effects of digitalis are precisely called for to slow the action of the heart, to render its contractions more complete and regular, and thus to check the gathering of residual blood in the ventricle, and restore the efficient application of the mitral flaps by approximating their attachments.

I have before remarked that, clinically, digitalis appears to influence the heart before the vessels. There is, indeed, in all probability proportionate relationship between its effects upon these two sections of the circulation. If, as we believe, the drug acts directly upon the cardio-vascular muscle, we may safely infer that the bulk of the muscle concentrated in the heart being more than equal to that of the muscle distributed in the vessels, the predominant effect should remain with the heart. We must not, of course, push this argument too far; it is at least in favour of what I believe to be an observed fact in aortic regurgitant heart failure, namely, that digitalis rarely affects the vessels prematurely or disproportion-

tionately, but on the contrary, by improving arterial tone, it does no more than prevent that rapid emptying of the arteries which, although normal to aortic regurgitant disease, requires a corresponding rapidity or suddenness of ventricle contraction to maintain a sufficient arterial pressure for vital functions which is very exhausting to the enervated and failing hearts under consideration. The maintenance of a strict recumbency is, of course, essential in the grave cases I have described, and, with a suitable dietary, the heart soon begins to respond to a steady daily administration of from 30 to 90 or more minims of tincture of digitalis, or an equivalent preparation with proper adjuncts in the form of an occasional mercurial and saline. With the increasing efficiency of the *vis a tergo*, the blood pressure in the arteries rises, and with the similarly increased efficiency of the *vis a fronte*—for the drug not only indirectly helps, but directly stimulates the right heart as the left—the venous current is hastened, the pulse will begin to steady, and at about the third day the urine will increase in quantity, the signs of venous congestion begin to diminish, the pulse to assume more and more its proper aortic characters, and the patient gradually recovers to a point short, however, of that degree of health and heart power he before enjoyed.

Thus again and even again have we most of us seen patients with heart failure in aortic regurgitation restored, put on their legs by the action of digitalis. Having once passed through this ordeal, they can never be said to be entirely independent of the drug. I have put the extreme case; but it is needless to say that by watchfulness in recognising the earlier phenomena of heart failure, which I enumerated as nearly as possible in chronological order, and by the timely employment of an occasional course of digitalis the most desperate symptoms may be long postponed. One of the greatest difficulties in practical medicine is to decide when to omit treatment, and this difficulty is particularly felt by many in regard to digitalis. I shall allude, perhaps more fittingly, to this point later on, and will content myself now with the remark that the general condition of the patient—his anæmia or otherwise, his general nerve tone, the due activity of his other functions—must be carefully watched and regarded, and the use of other remedies accordingly employed, with a mitigation or suspension as the case requires of the digitalis treatment. The final word with regard to the treatment of aortic regurgitation would seem, then, to be: Await the distinct indication of altered pulse characters, even ascertain whether there are not general conditions of over-fatigue or strain, or impaired general tone from anæmia or other debility, before giving digitalis, and, having commenced with it, pursue the treatment boldly and steadily, and look under its influence, and as a sign of its success, for a return of the characters which are normal in the pulse of this disease.

With regard to aortic stenosis the same argument holds good—that is, that as soon as the normal pulse of this affection—a small, rather slow and regular pulse—becomes replaced by irregularity and frequency, accompanied by the usual signs of failing compensation, digitalis is needed. So long as the heart is beating quietly and regularly nothing but harm can come from the use of digitalis; with irregularity and disorder nothing but good, provided it be carefully watched and mitigated with returning regularity.

DIGITALIS IN MITRAL DISEASE.

In mitral stenosis the strain to effect this equilibrium of the two circulations falls upon the right ventricle, which, assisted by the left auricle, has to supply the left ventricle with sufficient blood notwithstanding the narrowed mitral orifice. In the pure funnel form of mitral stenosis, a disease which is, I am convinced, often of congenital origin, the right ventricle and left auricle undergo corresponding hypertrophy and increase of capacity, and are able without artificial aid to maintain the circulation, sometimes for the first 40 or 45 years of life. The features of mitral stenosis are a high pulmonary and a low systemic blood pressure, a regular slow pulse, a tendency to pulmonary congestion and systemic anæmia. Whilst these conditions are maintained digitalis can do no good; the right ventricle is in full work, the left has got scarcely work enough to do, the intrapulmonary pressure is already near the point of strain, and the prolonged

diastolic pause natural to the lesion is precisely adapted to the needs of the slowly filling left ventricle.

Any constriction of the systemic arterioles would be disastrous under such conditions, as was seen in the case I related of mitral stenosis with vasomotor constriction of vessels and pulmonary hæmorrhage. The first indication on cardiac distress arising in mitral stenosis would be to relieve the right heart by unloading the venous system by direct venesection or intestinal and hepatic derivatives, and a restricted diet and treatment of pulmonary complications as the urgency of the symptoms might require; but when, these conditions being satisfied, the pulse still remains quick and irregular, and the right heart embarrassed, the employment of digitalis is certainly indicated on the same principle as before; and in the presence of cardiac need we may as a rule disregard considerations of raised arterial tension, since, as I have urged, the first and predominating influence of the drug is upon the heart. The moment, however, the cardiac action is restored to regularity we must again remember the arterial effects of the drug, and endeavouring to maintain without increasing its effects upon the heart by greatly mitigated doses, to watch for and avoid any undue action on the vessels.

In mitral regurgitation, with commencing or established heart failure, we find all the conditions calling for the beneficial action of digitalis, and the mere presence of a mitral murmur is often regarded as an indication for the use—it may be the very guarded use—of the drug. It must be remembered that I am not speaking of acute cases, nor would digitalis be suggested by the mere presence of a mitral regurgitation in the senile heart, of which it is almost a characteristic and often a very advantageous factor; nor again, in those cases in which the regurgitation occurs as a compensatory safeguard in overstrained ventricle from chronic high arterial tension, is it often desirable, except with much caution, to prescribe digitalis. It is in commencing heart failure in chronic mitral lesion from rheumatic endocarditis that digitalis is so valuable. What are the features of this state? A quick small pulse is normal to mitral regurgitation, and even some irregularity of rhythm or force is of no great moment, although even now short tonic courses of the drug may be useful; but when irregularity is a marked feature, when a few beats are large and turbulent to be followed by several small beats, when the pulse no longer corresponds in number with the cardiac contraction, when the heart itself shows signs of hypertrophy and extending dilatation of both ventricles, with dulness extending upwards over the conus and left auricle, when the neck veins become full, fill from below and pulsate, the liver enlarges, the cellular tissue becomes dropsical, the lungs congested, and the urine scanty. With these symptoms and signs we have, with increasing urgency, the conditions calling for digitalis. These conditions begin, it will be observed, with the pulse and heart characters which replace those which are normal to other forms of cardiac disease when failure is commencing and digitalis is called for. This fact about mitral disease is to be noted in prognosis.

A congestion of the pulmonary and venous system, and an anæmia of the arterial system are the underlying factors in this condition as in mitral stenosis. But the difference is that in mitral regurgitation the congestion is all backward: each blood thrust of the right ventricle is met by a counterblast from the left, the left auricle is not protected by its valve from invasion backwards, and cannot therefore efficiently co-operate with the right ventricle, the cusps of the pulmonary valve have to take up in part the function of the mitral valve. Of course, there are cases and cases of mitral regurgitation. In some the leakage is so slight as to cause no inconvenience. The skilled practitioner can discriminate to a nicety as to the gravity of the case by the degree with which the first sound is replaced by murmur, and by estimating the relation between expenditure of force by the heart and the result effected in the pulse showing the degree of waste in the mechanism.

The most common mistake that one observes in the use of digitalis is that too large a dose is prescribed at first, which tends to premature arterial contraction and cumulative effects. Then, with the appearance of these physiological symptoms the drug is stopped, and some other medicine substituted, until the pulse again calls for its administration.

In this haphazard way of using digitalis the heart is never held in good control. In exceptional cases, where there is urgent need to push the drug, digitalin is best used subcutaneously. In ordinary cases a dose of 10 minims of the tincture every four, or 15 minims every eight, hours, or 5 minims every waking hour, is sufficient. Thus given, the patient being at rest, it generally takes about three days before the pulse is under control, and the urine begins to increase. When its decided effects are thus gradually developed the drug should be steadily continued in doses calculated to maintain its effect. With ordinary watchfulness there is no risk whatever; timely warning of excess is given by the pulse, which having become slow begins to exhibit small intermediate beats, and especially a tendency to go in couples. This is always a sign to reduce the doses or to omit for a few hours. The sickness that occasionally—too often—supervenes with digitalis, is most troublesome. An occasional mercurial will sometimes prevent it, a change to digitalin in equivalent doses may be tried, or a tumbler of very hot water taken occasionally. In some cases it is not to be overcome except by omitting the drug; the patient is usually well under the influence of the drug before this symptom appears, in which case a small dose of digitalin by the mouth or hypodermically may be sufficient to maintain its effect on the heart.

In speaking of digitalis, I have regarded that drug as representing the whole therapeutic group. Digitalis is, to my mind, so far in front of all the others in efficacy, that in critical cases I should never think of prescribing any other member of the group before it. Strophanthus comes next to it in usefulness, and in physiological experiment is even more powerful. Clinically one is not so well satisfied with it, and this may possibly be prejudiced, but I have had doubts about its stability in prescriptions. It causes the same troublesome nausea. The one reason for its use is that it affects the small vessels less; this gives it an advantage in some cases, particularly, perhaps, in carrying on the effects of digitalis in convalescent aortic regurgitant and mitral stenosis cases. But as I have endeavoured to point out, under most conditions calling for its use this very action upon the arterioles is one of the valuable attributes of digitalis, and explains, possibly, its superiority over strophanthus. I frequently, however, combine the two drugs when I want to secure an increased cardiac effect without using digitalis in doses large enough to contract the vessels too much. Convallaria comes next as a cardiac tonic in mild cases. I have only very occasionally used sparteine. One may observe that the earliest sign of amendment in cardiac failure is an increased flow of urine. A somewhat analogous relief of the stress of symptoms will often be observed with the commencement of dropsical effusion, provided that effusion, of course, be limited to the cellular and peritoneum tissue. The peculiar restlessness and discomfort that precede the onset of dropsy are sometimes very remarkable, and the dropsical effusion should rightly be regarded as one of those compromises of Nature which enable the vital machinery to go on a little longer. Dropsy is due primarily to a leakage from the congested capillaries into the cellular tissue. It is also due to a retarded removal of the fluids by the lymphatic vessels.

From a therapeutic point of view the osmotic circulation in the cellular tissue and serous and mucous cavities is scarcely less important than the vessel circulation discovered by Harvey. The interchange between the two circulations amounts normally to many pints in the twenty-four hours, and cellular tissue and lymphatic vessels conduct a considerable share of it. The current of lymph is of extremely low pressure, and a very slight backward pressure in the veins will embarrass it. In dropsy not only is there venous retardation in the capillaries encouraging excessive exudation, but the retarded current in the great veins is a further obstruction to removal by the lymphatic vessels. Hence a considerable collection of fluid, even many pints, may be removed from circulation. The immediate effect of this removal is often a very decided relief to the patient's distress. The occurrence of dropsy may thus sometimes afford time for the readjustment of the circulatory balance in the heart and vessels. But if with the help of remedies this does not take place and the dropsy advances the question comes, when to interfere? The answer is: Not until it is estimated that the

pressure in the cellular tissue becomes great enough to equal or exceed the pressure in the capillaries. At this point interference becomes imperative, and the fluid should be removed by the employment of Southey's tubes, incisions, or simple punctures.

Very striking instances of long-abiding relief are met with from time to time from this treatment. I may quote a very remarkable case in this connection, illustrating a point which I have observed, namely, that dropsy occurs in some cases in the absence of heart phenomena which would appear sufficient to produce it:

A lady, aged about 50, had been under my observation for some years for most intense chronic asthma, with emphysema and recurrent attacks of bronchitis. Her condition at many times seemed almost hopeless, but the one redeeming feature about her was the heart's action, which remained steady and well-sustained through her worst attacks; although there was undoubtedly some dilatation and hypertrophy of the right side of the heart, there was no sign of heart failure. Towards the end of a bad summer in 1896 her legs began to swell, and as her distress increased with the cold weather they filled up, and by December the thighs and abdominal walls were greatly distended. She was in other respects so ill at this time that I hesitated to tap the legs until they became too prominent a factor in her distress. Even now, although the heart's action was feeble, it was neither irregular nor very quick, and there were no murmurs. She was placed in a chair, and by means of four Southey's tubes 20 pints of fluid were withdrawn in the course of fifty-two hours. Now, it is remarkable that there has never been any return of the dropsy, although she has not been free from bronchitic attacks: the limbs are perfectly slim and natural, without a trace of oedema. The heart's action is as well maintained as before. It only partially failed for a few days after the removal of fluid.

I may say that this lady has never been able to take digitalis nor any drug of that series with advantage, and it has never been prescribed for her except for short times at rare intervals, and in very small doses. I should regard the retarded venous return from the great emphysema obstructing the lungs, in combination with an over-burdened right heart as responsible for the dropsy, but the case is one of a few I have seen of the kind, difficult satisfactorily to explain. It is possible that it may be an unusually prominent example of the effect of a mechanism that has more to do with dropsy than has been generally allowed, namely, obstructed venous return in the chest from great emphysema and dilated right heart, telling upon the lymphatic current in such a manner as to lessen the readiness of its escape into the innominate vein and so to hold in abeyance the share taken by lymphatic absorption in the removal of dropsical fluids.

REFERENCES.

¹ *Collected Works*, vol. iv, p. 347. ² *Ibid.*, vol. iv, p. 384. ³ Quoted with acceptance by Lauder Brunton, *Journal of Physiology*, vol. xx, 1896, p. 357.

THE HUNTERIAN LECTURES

ON THE

SURGERY OF THE KIDNEY.

Delivered at the Royal College of Surgeons of England,

By HENRY MORRIS, F.R.C.S.,

Surgeon to the Middlesex Hospital.

LECTURE I.

*(Continued from page 815.)*OPERATIONS ON THE URETERS *(Continued).*

Resection of the ureter is the operation whereby an inch or two, or a little more, of the duct is removed, and the ureter is united to the infundibulum, or the divided ends of the ureter to one another, as the case may be, so as to restore the continuity of the conduit.

It was first proposed by Marcel Baudoin in 1891, and first performed by Küster in May, 1891. Küster's case is a most important one, not only as being the pioneer case, but as a serious warning that we ought to practise conservatism in dealing with the kidney; and an indication that in hydronephrosis nephrectomy ought to give place to nephrotomy, or to ureterotomy, in any case in which either of these operations gives promise of success.

Küster reported his case at the Congress of Surgeons held in Berlin in 1892.¹⁵ The patient was a boy, aged 13, with only a single kidney, who for two years had passed all his urine through a fistula, following lumbar nephrotomy, for hydronephrosis. The cause of the hydronephrosis was a very tight stricture near the renal pelvis. The strictured