ON THE THERAPEUTICAL ACTION OF DIGITALIS.

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THIS remedy would be more generally and successfully employed in dropsical cases, but for a doubt that exists in many minds with regard to its real action on the heart. It is this doubt which I specially propose to face, and which I hope to replace by clearer thought. May we expect digitalis to strengthen and make regular a feebly beating heart, or must we dread its depressing pulsation to the verge of extinction? I answer that we may expect the former, under circumstances which I will indicate by collating the following clinical evidence.

CASE I.—(Dr. Handfield Jones, *Medical Times and Gazette*, December, 1862.) Male, aged 65. He was anasarctous; dyspnoea was so great, that he could not lie down; the heart-sounds were weak, the impulse diffused, the area of dulness increased; no evident murmur; no arcus senilis; no albumen in urine. On February 22nd he began to take ten minims of tincture of digitalis with ten minims of tincture of sesquichloride of iron and chloric ether. On February 25th he was reported better; no panting; pulse and heart's action stronger and firmer. No doubt the rest in hospital helped to this improvement; but on April 2nd he had relapsed since the digitalis had been omitted for ten days and cinchona substituted; whereas "on the 6th of April he was improved again, digitalis having been resumed in about five-drachm doses of infusion." The drug was given then, "when the heart's action was certainly failing, with the effect of strengthening that action."

In the same paper Dr. Jones reports a case of "dilatation and enfeeblement of heart: no better case could be imagined to test the influence of digitalis, and the result was unequivocal. Instead of causing any further depression of the enfeebled organ, it decidedly increased its tone and power, and that more than any other remedy given."

CASE II.—(Dr. Stirling, *Medical Times and Gazette*, March, 1864.) Mrs. F., aged 69, for six years had had occasional attacks of dyspnoea, with irregular heart's action. In March, 1862, a severe attack came on suddenly. Soon afterwards there set in congestion of the lungs, cough with hæmoptysis, cedema and ascites; the pulse at the wrist was almost imperceptible, and the action of the heart tumultuous, without *bruit*. In spite of stimulants, diuretics, and counter-irritation, the case seemed hopeless, when ten drops of tincture of digitalis were prescribed every four hours; and "from a state of agony she enjoyed comparative quiet in less than three days; the heart's action became daily stronger, as indicated by less tumultuous movement, and by slower pulse."

Two other and analogous cases are reported by Dr. Stirling in the same communication. A somewhat similar case, but complicated with valvular disease, is recorded by Dr. Murray (*Medical Times and Gazette*, March, 1865).

CASE III.—J. K., aged 56, was admitted into the General Hospital, Birmingham, under Dr. Russell, March 24th, 1865. There was no history of rheumatism, but of a severe fall and striking the chest against a wagon forty years previously; also of winter-cough and dyspnoea for twenty years. He was strongly built, but his muscles were now flabby; the face was pale, and the venous circulation embarrassed. The legs were anasarctous; the heart's impulse was very feeble; the sounds were scarcely to be heard; there was no *bruit*; the pulse was so fluttering as to be uncountable; respiration 22, regular, but at times much hurried; he had much cough; there was dulness over the base of the lungs, and over a larger than normal cardiac area.

March 26th. He was ordered to take three times a day five minims of tincture of digitalis with ether and ammonia.

March 28th. The pulse was rather stronger, but still too fluttering to be counted; the sounds of the heart could not be distinguished from each other; the urine was scanty, loaded with lithates. He was ordered to increase the tincture of digitalis to nine minims, to have a colocynth aperient, two glasses of gin, and to have his legs punctured.

March 30th. The legs were discharging; the bowels were free; the urine was scanty; dyspnoea was urgent at times. He was ordered an extra glass of gin, and one-eighth of a grain of morphia every four or six hours. (The administration of morphia in heart-disease is made a special point in Dr. Russell's practice; in the present instance it is considered to have assisted the action of digitalis). This was continued; and on the following day (April 1st) he was greatly improved; breathing easier; pulse 100, regular; he passed last night 238 ounces of urine in twelve hours; the morphia did not cause sleep.

April 4th. He continued better; pulse 90, regular; his breathing was quieter, though he could not lie down; the anasarca was much less; he passed 96 ounces of urine in the last twelve hours.

April 6th. The impulse of the heart was diffused, abrupt, heaving; the dulness was almost obliterated; the sounds were exceedingly feeble, especially the second. He was ordered twelve minims of tincture of digitalis with ten minims of tincture of sesquichloride of iron three times a day.

April 11th. Breathing was easy; he could lie down; the cedema was nearly gone; the change for the better was most striking. He passed 84 ounces of urine in twelve hours.

Let me add briefly these "opinions". Dr. Gull (*Medical Times and Gazette*, July 29th, 1865) observes: "I look upon it as a fact, which clinical experience has clearly and definitely settled in my own mind, that digitalis is capable of diminishing the frequency of the heart's beat, and of increasing the power of the heart's impulse; and is especially useful in cases of disease of the left side, in which the action of the organ is very rapid and feeble."

Dr. Wilks (same reference) remarks of a case of "dilated enfeebled heart," that "this was just one of those cases in which digitalis might be expected to do good;" and relates an example of it.

Dr. Fuller says: "During many years I have observed that the cases of heart-disease most benefited by digitalis have been those in which the heart has been weak and dilated, and pulse feeble and irregular."

Granted, then, that digitalis is indicated in the conditions alluded to, let us examine whether any complications likely to be present will contra-indicate it.

(a.) Will a state of fatty degeneration do so? If far advanced, it certainly will; for its subject will be liable to sudden death, which the action of digitalis may hasten. Some illustrative cases and opinions are recorded in the *Medical Times and Gazette*, July, 1865. This is one of the most difficult points to consider with regard to the administration of the drug; for doubtless many weak hearts are weak because they are fatty; and, if this condition is to prohibit digitalis, how can it be said to be useful in weak heart? Moreover, it is difficult to ascertain how far the degeneration has advanced, though we may be sure of its presence. (See Dr. Stokes; and Kennedy on Fatty Heart. *Edinburgh Medical Journal*, 1859, part i.) But this suggested caution and difficulty are not greater or more unusual than with some other powerful drugs, and do not invalidate the conclusion derived from the above series of cases; only they call for this rule in a dubious case: commence with a small dose (five minims), better combined with an ether; watch carefully; increase gradually; and stop occasionally.

(b.) Will mitral regurgitation contra-indicate digitalis? No, it will not; and this is generally—though by no means universally—acknowledged. An interesting case, illustrative of the value of the remedy in this form of disease, has been kindly forwarded to me by Dr. Keyworth.

CASE IV.—"J. C., aged 62, in 1866, passed fragments of lithic acid calculi. In June 1867, his urine became scanty, and contained blood, and his legs became cedematous. He began to have much dyspnoea, and palpitation, and was found to have a systolic *bruit*, more distinct at the apex of the heart. In the following December, the ascites and anasarca were so great that he could not walk; and his breathing was so distressed that he could not lie down. He had continued cough with scanty expectoration, which often contained blood. In the interval he had taken at various times, and with slight benefit, tincture of perchloride of iron, squills and ether, acetate of potass, broom, and digitalis in small doses, elaterium and gamboge, quinine and acids. On 19th December he had been taking acetate of potass with spirit of sulphuric ether and tincture of opium, which mixture relieved his breathing a very little. Then I began to give him, in addition, digitalis upon the plan suggested by Dr. Mackey (in a paper which I read about that time); viz., half-drachm doses night and morning, in a little water. His girth was then forty-six inches and a half. By January 15th, 1868, he had diminished to thirty-five inches. His urine had become gradually clearer, and less albuminous, often nearly free from blood. He continued the medicine up to the end of March, by which time the ascites was removed, and he could walk about the house and eat and sleep well. He can now (May) walk three or four miles, and, though he has occasionally cedema of the ankles, he is practically convalescent."

The effect of the remedy on the pulse was to increase its strength, to diminish its frequency, and to make it less intermittent.

(c.) Will mitral obstruction contra-indicate digitalis? No; it will not.

CASE V.—M. M., aged 40, had history of heart-disease for seventeen years. She had had rheumatic fever twice, and bronchitis at intervals. In October, 1865, the heart's action was irregular, tumultuous, and painful; the sounds were not clear; over the aortic valves there was marked roughness with the first sound, scarcely a *bruit*; when the heart was quieter a presystolic *bruit* could be distinguished, of which one could say, that it was, *perhaps*, more distinct at the apex; the radia pulse 60-64, visible, weak. She had giddiness; had never had epis-

taxis; the liver was congested; the urine was scanty; the extremities cedematous. I prescribed one grain of powdered digitalis, with two of mercury and squill, to be taken night and morning, and a saline diuretic three times a day. After the third pill, there was slight soreness of the gums, and copious diuresis began. Within a week she felt better than she had done for many years, and was able to walk without much difficulty of breathing. She then took one pill daily, and then on alternate days, and the improvement continued for many weeks. Later on she relapsed, to be again relieved by the same remedy; but, in the summer of 1866, she was found dead in bed (she had not been under treatment for many weeks); and Mr. Denny, who examined the body, informed me that the prominent morbid condition was an extreme ossification of the mitral valves.

(d.) Will aortic regurgitation contra-indicate digitalis? I so far believe that it will, that I have never thought it prudent to treat that disease with the drug; and I am satisfied that the majority of the profession think similarly,—impressed no doubt by the strong language of Sir D. Corrigan (*Edinb. Med. and Surg. Journ.*, vol. 37, 1832).—"In every case of this disease in which digitalis has been administered, it has invariably aggravated the patient's sufferings." I have examined a large number of hospital reports of cases of aortic regurgitation, without being able to add definite facts to our knowledge upon this subject; but I was anxious to do so, because I am sensible of some contradiction to facts previously recorded indicative of a tonic action of digitalis. If the drug be regarded, as no doubt Sir D. Corrigan regarded it, as a sedative and depressant (he does not mention the dose given), one would fairly expect that it should injure a patient with compensatory hypertrophy in the disease under consideration; but, if the drug be regarded as a tonic to the heart, then surely it ought to relieve. A heart with aortic regurgitation is improved by strengthening measures of all kinds; either then digitalis (in small doses) ought to improve its condition, or it is no tonic.

I would answer, either that the decision against the remedy in this disease is formed from the action of too large doses, and that the question deserves reconsideration; or that the remedy acts as a tonic under certain circumstances, but not precisely under these—which would be a fact not unusual in the action of tonic remedies; or, again, that, granting a state of compensatory hypertrophy or dilatation of heart, in cases of aortic regurgitation, the very slowing of the heart's action may explain injurious effects, though the slowing be not necessarily from impaired power.

(e.) However this may be, I am sure that this remedy may be most useful in aortic obstructive disease; and such, I believe, are the cases which I often find alluded to in reports, published and otherwise, as "aortic disease benefited by digitalis". There has not been sufficient accuracy in distinguishing between even the two marked varieties of aortic disease—the regurgitant and the obstructive: in the former, I am content at present to believe digitalis hurtful; in the latter, I have a good deal of clinical evidence to prove its use. Space, however, allows me to insert only one illustrative case, for which I have to thank Dr. Russell.

CASE VI.—A. W., aged 20, had acute rheumatism two years ago. After some months of failing health, dyspnoea, and dropsy, she was admitted into the General Hospital, Birmingham, on October 14th, 1864. She was anæmic and emaciated; could not lie down because of sense of suffocation. Pulse 100; respiration 24. There was some anasarca. There was no albumen in the urine. For the first week she took little but wine. October 23rd. There was strong impulse of the heart over the whole left side of the chest, and distinct pulsation of the carotids. Pulse 108, exceedingly small. There was loud, shrill bellows-sound preceding the heart's impulse, at the apex (mitral). After improvement under remedies there was also a systolic *bruit* over the aortic valves, propagated up to aorta; and this, I consider, we may fairly take as evidence of aortic obstruction. The pulmonary sounds were clear.

October 25th. Pulse 108; respiration 32. She could not lie down. She was ordered four minims of tincture of digitalis, with ether, every four hours.

October 29th. Pulse 116; respiration 30. She appeared much relieved, and passed twenty-four ounces of urine in twenty hours. The tincture of digitalis was increased to nine minims.

November 1st. She was able to lie down lower, and was better. The urine was not increased. She was ordered to take fifteen minims of tincture of digitalis three times a day.

November 3rd. Pulse 100; respiration 22. The urine in forty-eight hours was forty ounces. She felt much better, and could lie down.

November 8th. The action of the heart was much quieter. Pulse 100, still very feeble; urine forty-eight ounces in forty-eight hours.

November 12th. She could walk about. She was ordered to take citrate of iron, and omit the digitalis.

December 6th. She left, much improved.

(f.) Will hypertrophy of the heart contraindicate digitalis? That will depend upon its cause, which will either be one of cardiac conditions already referred to, and which will, of course, guide the decision, or obstruction to the pulmonary circulation, or uræmia, which diseases do not by any means contraindicate this remedy. I have not met, nor do I expect to meet, with a case of uncomplicated hypertrophy; but such a condition affecting the left ventricle is reported (*Medical Times and Gazette*, March 1865), in which "digitalis was fairly and carefully tried, and aggravated the symptoms." Dilatation, also, is a secondary disease, and its treatment must be guided by its cause. In itself, it is likely rather to lead one to expect benefit from digitalis than to contraindicate it.

(g.) Is the drug likely to benefit functional disorder, palpitation, etc? Not at all, as far as I know or can learn.

I proceed to inquire what preparation and dose will be suitable for a given case in which we may have decided that the drug is desirable. I find digitaline still rather distrusted in English practice, and teaching and custom in favour of the use of the tincture when any special effect on the heart is desired, and of the infusion when a diuretic action is wanted. The objection to the two former preparations is their uncertainty of strength or of operation, to the latter its tendency to nauseate. For general use, I have myself found the tincture the most reliable; but, if one is to depend upon it, great care must be taken in selection and keeping of the leaves. It is remarkable how independent sometimes are the cardiac and diuretic actions of the drug (Conf. Christison, *Edinburgh Medical Journal*, vol. xx, 1855; and Munk, *Guy's Hospital Reports*, 1844.) As to the dose, it will be better, in any case when the heart's action is very feeble, to commence with five or ten minims of the tincture every four or six hours. I have seen it in such cases rapidly increased to fifteen, twenty, and thirty minims, and with benefit; but, as a general rule, such a dose as thirty minims is often enough, repeated twice in the twenty-four hours. An equivalent dose (practically) I consider to be one tablespoonful of fresh infusion, or one grain of the powder; but a patient taking such a dose should be kept recumbent, at least for half an hour before and for two hours after. I should hesitate before prescribing a larger dose than fifteen minims of the tincture to any patient following his occupation. There is no doubt about the fact that a dose of half a drachm of the tincture repeated several times at short intervals, especially in the upright position, may produce dangerous interference with the circulation, whether it be from over-stimulus (Jones) or from a partial paresis—a tonic action. But, given as I have described, I have found no untoward results of "cumulative action" (Conf. Dr. Fleming, *Edinburgh Medical Journal*, December 1862). I can well believe that the drug is given less frequently and more carefully than it was thirty years ago. We must by no means ignore its external application. It is rather common in France. I find it praised by Christison (*Edinburgh Medical Journal*, 1850); and more recently, we have valuable testimony in favour of poultices of the fresh leaves (*Medical Times and Gazette*, January 25, 1868, Dr. Brown). The application of a strong decoction (two ounces of the leaves to a quart of water boiled to a pint) with lint and oiled-silk has been of use; but I have found more satisfaction from a compound liniment of equal parts of tincture of digitalis, tincture of squills, and soap liniment.

CASE VII.—H. N., aged 10, had slight general anasarca after mild scarlatina. The urine was of specific gravity 1.010, pale; one-eighth of the volume was albumen blood-corpuscles and fibrinous casts. He was ordered fifteen grains of compound jalap powder; and three grains of potassium-tartrate of iron with five grains of bitartrate of potash three times a day. Three days afterwards he seemed better, but sudden and general increase in the dropsy took place; the breathing became hurried, the lips discoloured; the child grew drowsy, and vomited; he passed very little urine for thirty-six hours. Then I saw him again, and applied immediately linseed poultices to the loins, the liniment over the kidneys, and gave him two drops of the tincture of digitalis in combination with one grain of iodide of potassium and three grains of bitartrate of potash every four hours. Within an hour he passed urine, and within twelve hours two pints; and from this time forward he progressed uninterruptedly.

CASE VIII.—W. H., aged 2, had mild scarlatina. At the end of twelve days, general dropsy began, and in forty-eight hours was already so great as to threaten life. There was constant cough, and dulness at the base of both lungs. He has passed very little urine lately. I began the liniment, a mixture similar to the last, with tincture of squills and a jalap powder—all the remedies at once—about 8 P.M. Within an hour the child passed urine freely; and before morning he had excreted a pint and a half, and was relieved. He eventually recovered.

(To be concluded.)