THE LIMITATION OF DIGITALIS IN MITRAL AND AORTIC REGURGITATION.*

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While this subject has been thrashed over and ground up before various medical societies and by numerous eminent authorities, there yet remains much to be done in the crystallizing and refining process. What I have to say may seem erratic and dogmatic to some, but I shall try to show by reason of the anatomic location and the physiologic action of the mitral and aortic valves, that in mitral insufficiency when compensation has failed or is failing digitalis is the sheet anchor, the general in command, while in aortic insufficiency with the same condition, it too often plays the rôle like the soldier, Jack Falstaff, of old.

In treating any heart lesion the careful clinician must study closely the cardiac state and the condition of the blood vessels, and he must take into consideration the various organs that are complicated.

The mitral valve, located as it is, at the gateway between the great arterial reservoir, the left auricle and the great arterial pumping station, the left ventricle, can, when it fails to close with systole, throw its burdens on various organs, particularly the right heart, the lungs, liver and kidneys. When compensation has failed or is failing the pathologic picture is that of venous stasis.

The column of blood is forced back on the left auricle. This chamber of the heart can not perform its functions as a reservoir, receiving the blood from the pulmonary veins and sustain this backward flow at the same time. As a result the pulmonary veins are obstructed in their efforts in carrying the systemic blood to the auricle. The right ventricle has to contract against resistance. It has to pump the venous blood of the right side through the lung already engorged from the backward pressure through the pulmonary veins, hence the marked hypertrophy of the right ventricle which ensues. The lungs are overwhelmed, this condition giving rise to dyspnea as an evidence of edema, and to cough denoting bronchitis from irritation to the terminal branches of the bronchial tree. This edema and bronchitis will be in proportion to the degree of obstruction and stasis, and the condition of the cardiac muscle.

This backward pressure exerts its force further on the liver, giving rise to marked engorgement of this organ through the inferior vena cava; on the stomach, spleen and intestinal tract through the portal vein; on the kidneys through the renal veins. Thus it can be seen that we have hyperemia of the lungs, liver, stomach, bowels and kidneys. We have stasis everywhere, beginning at the incompetent valve and ending in a great many cases in the rectum, in the form of hemorrhoids. It is seldom that one sees a classical mitral regurgitation with failing compensation but what hemorrhoids are also found. All these organs enumerated have important functions to perform. Nutrition is profoundly disturbed as a result of this stasis and engorgement. The governing band of metabolism has run off. The constructive and the destructive forces are in a state of unstable equilibrium. We have perverted secretions, faulty excretions, bad nutrition, low blood pressure, vitiated blood and leaking

blood vessels. Dropsy, in mitral insufficiency, if properly treated, very often yields readily.

With this clinical picture before you, with all the organs stagnated and overflowed, is there any necessity for dwelling on the marked effects of digitalis in mitral insufficiency with failing compensation? The very location of the mitral valve when the muscle becomes incompetent is conducive to marked hyperemia and venous stasis. The right heart, in other words, must suffer the brunt of nearly all the evils as a consequence of failing compensation. Now let us consider the other great valvular lesion, aortic insufficiency. The aortic valve stands as a sentinel at the very gateway of life, the aorta. This great blood vessel arises from the great pumping station, the left ventricle. When this valve becomes incompetent from disease, and when the left ventricle fails to compensate and cries for help, it has not the neighbors to call on as the mitral valve has. When it does sound the alarm and cries for help it is, alas, too often too late. When the aortic valve becomes incompetent and can not close with diastole, we have a backward column of blood from the aorta thrown on an organ highly endowed with muscular structure, the left ventricle. For a long period of time the left ventricle is the only portion of the heart that comes to the rescue of the incompetent valve when it cries for help. The ventricle responds with vim and vigor. It puts forth all of its energies. Its fight and struggle is something to be applauded. In its efforts to relieve the leaking valve it becomes enormously hypertrophied. The beef heart attains to its most classic and highest degree in aortic regurgitation. In nearly all cases of aortic incompetency there is naturally a high blood tension.

There frequently exists a well-defined arteriosclerosis. There is not the hyperemia of all the organs which we find in mitral insufficiency, except in the terminal stage when death is close at hand. With this evidence before you let me ask, Has digitalis any place in aortic insufficiency? Nearly all of the eminent authorities teach us that when the left ventricle fails in its efforts to come to the rescue of the incompetent aortic valve, and becomes dilated and relaxed to such a degree as to produce leakage at the mitral valve, then digitalis is indicated.

The argument is that this secondary or relative, or more properly speaking, muscular insufficiency on the part of the mitral valve gives the mitral symptoms of engorgement and stasis added to the aortic symptoms. Therefore, digitalis must be given, just as we would in a frank case of mitral insufficiency with failing compensation. In other words, they teach that failing compensation, it matters not from what source, means digitalis as a remedial agent. I wish to oppose these views most emphatically. Digitalis in my hands has no place at all in aortic insufficiency, it matters not what may be the condition of the muscular structure of the heart. The conclusions reached have not been on theoretical grounds, as some of our authorities are so accustomed to charge, but from a careful clinical bedside study in the hospital wards and in the outdoor clinic.

As we said in the outset, in mitral insufficiency with failing compensation it is the general in command. It tones up the walls of the blood vessels by its vaso-constrictor action. It comes to the aid of the left ventricle, which does not primarily undergo that marked hypertrophy which we have in aortic insufficiency. By its actions on the ventricles, particularly the right, and the walls of the blood vessels, engorgement is relieved, blood tension is raised, stasis is overcome, absorption of serum through the blood vessels and lymphatics takes place.

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very often symptoms disappear and the patient is made fairly comfortable.

As Broadbent well says in his book on diseases of the heart: "Mitral insufficiency with dropsy is the disease that brings patients to the outdoor clinic. Dropsy can be relieved, their symptoms can be materially alleviated so that they can resume for a time their occupation."

My experience at the outdoor clinic voices the sentiment so well expressed by Broadbent. Dropsy, however, in aortic insufficiency means preparation for a funeral in a short while.

It can readily be seen why this is so. The ventricles, particularly the left, become hypertrophied and dilated, relaxed, worn out and degenerated to such a degree that the administration of digitalis is of no use.

To give digitalis in aortic insufficiency, where we have secondary mitral leakage from ventricular dilatation, calls to mind the fable of the crawfish and the worm. They became engaged in a heated argument. Harsh words followed. They challenged each other to a duel. When they met on the field of battle the worm entered a protest that the crawfish had all advantage of him because he (the worm) could not tell which end of the crawfish to attack, because, as you know, the crawfish can move as freely backward as forward.

So it is in giving digitalis in aortic insufficiency with failing compensation. You do not know which end of the circulation the digitalis is going to attack. In aortic insufficiency with failing compensation, where the mitral valve is relatively incompetent, we have leakage both at the mitral and aortic openings. The leakage at the mitral valve spins its force backward with systole on the pulmonary veins, lungs and the right heart. The backward current from the aorta through the incompetent aortic valve spends its force on the left ventricle.

Let me ask the authorities who contend that digitalis is as much indicated in aortic insufficiency with failing compensation as in mitral insufficiency: Does not the digitalis by its action drive as much blood back through the incompetent mitral valve as it does forward through the incompetent aortic valve? Does it not in this way increase the already existing stasis in the left auricle, pulmonary veins, lungs, right heart and liver? The authorities will answer by saying that digitalis will contract the ventricle, and by so doing will close the mitral valve, thus checking this backward flow, thereby relieving stasis.

Let me ask: When you close the mitral valve do you not put too much work on the left ventricle already overburdened from its continued efforts to come to the rescue of the incompetent aortic valve? Is there not danger by increasing this pressure within the ventricle of paralyzing the left ventricle already dilated to its utmost degree? Do you not put too much work on it while the coronary arteries are crying out for blood to maintain nutrition in the muscle? You are giving the heart more work to do and a stone for food, while it is crying out for rest and bread.

Dropsical symptoms in aortic insufficiency are very late manifestations. They are the expressions of a heart tired and fagged in its efforts to relieve the incompetent valve, and in the majority of cases the dropsical manifestations have their origin in the mitral and not in the aortic valve. To give digitalis in these cases is like trying to make a wick burn when there is no oil in the lamp, or like trying to make an engine pull a heavy train up grade with the brakes on, with the flues burnt out and no steam in the boiler. When compensation fails in aortic insufficiency the left ventricle goes to pieces very much

after the fashion of Dr. Holmes' masterpiece, "The Deacon's One Horse Shay."

Let me quote from our own Dr. Babcock, in his most excellent book on diseases of the heart. You may read between the lines just which way the pendulum is swinging in his analytical mind. He says: "In cases, therefore, of aortic defects manifesting dropsy, the indication is for the administration of cathartics and digitalis the same as in mitral disorders. I believe, however, that the latter should be administered with judgment. There are some physicians who advocate the employment of large doses of digitalis in all cases of aortic regurgitation with broken compensation. My experience leads me to agree with Broadbent when he says that a distinction should be made between cases of aortic insufficiency with edema and those without. When loss of compensation is shown by symptoms pointing to the left ventricle's feebleness, rather than by edema and back pressure consequent on relative mitral regurgitation, then I am emphatically of the opinion that digitalis must be given with caution." He cites the following case: The man had aortic insufficiency with failing compensation. He says: "Edema was not present, yet the state of the heart seemed to call for heroic doses of digitalis in the forlorn hope of lessening the dilatation of the left ventricle. Instead of doing this, however, the digitalis appeared to aggravate the back pressure, and at last death came suddenly and unexpectedly."

There is no more eminent authority on heart disease than Dr. Babcock. If you will follow him closely you will note that he qualifies to a great extent, the reference to digitalis in the treatment of aortic insufficiency with failing compensation. He wants a string tied to the digitalis so that he can guide it.

In my own experience, as I said at the outset, I can see no rational reason why digitalis should be given in this great valvular lesion. Broadbent says in his book on diseases of the heart: "In the absence of mitral symptoms it is rarely that digitalis is indicated in aortic incompetence or is of service, and it may undoubtedly do harm. It may set up sickness, which is an ominous symptom in this form of disease and induces a condition of asthenia difficult to remedy."

In my opinion, this argument as set forth above can best be applied in aortic incompetence where mitral symptoms are present. There is more reason for discrimination as to the indications for digitalis in these two valvular lesions than there is for the administration of quinin in the various malarial disorders. The subject has always been of particular interest to me, and I have reached the conclusion, after a careful study from bountiful clinical material, that there is but one valvular lesion where digitalis is indicated, and that is mitral insufficiency, and not until compensation has failed.

Tuberculin in Diagnosis.—The *Beiträge zur Klinik der Tuberkulose* is a new periodical, just entering its second volume. It is issued by Professor L. Brauer of Heidelberg. No. 4 contains an article by Bandelier, of the sanatorium at Kottbus, who states that out of 500 persons to whom the tuberculin test was applied, 92.6 per cent. responded positively. All those who failed to exhibit the specific reaction have remained apparently healthy to date. Out of 114 patients tested as they left the sanatorium, 38 per cent. gave no reaction, and 22 of these patients, tested again twelve to twenty months later, were found permanently cured with but 2 exceptions. He urges the application of the tuberculin test as a current measure, not only by specialists, but in hospitals and in general practice. In order to have a uniform standard for comparison he pleads that Koch's technic should be followed.