

case. As it is always better to have the co-operation of an intelligent patient, he should, as a rule, be told of the condition, but in this matter the physician must be guided by circumstances, and there are cases in which reticence is the wiser policy.

(b) **Stage of Broken Compensation.**—The break may be immediate and final, as when sudden death results from acute dilatation or from blocking of a branch of the coronary artery. Among the first indications are shortness of breath on exertion or attacks of nocturnal dyspnoea. These are often associated with impaired nutrition, particularly with anæmia, and a course of iron or change of air may suffice to relieve the symptoms.

Irregularity of the action of the heart cannot always be termed an indication of failing compensation, particularly in instances of mitral disease. It has greater significance in aortic lesions. Serious failure of compensation is indicated by signs of dilatation of the heart, the gallop rhythm, or various forms of arrhythmia, with or without the existence of dropsy. Under these circumstances the following measures are to be carried out:

(1) **Rest.**—Disturbed compensation may be completely restored by rest of the body. Both in Montreal and in Philadelphia it was a favorite demonstration in practical therapeutics to show the influence of complete rest and quiet on the cardiac dilatation. In many cases with œdema of the ankles, moderate dilatation of the heart, and irregularity of the pulse, the rest in bed, a few doses of the compound tincture of cardamoms, and a saline purge suffice, within a week or ten days, to restore the compensation. One patient, in Ward 11 of the Montreal General Hospital, with aortic insufficiency recovered from four successive attacks of failing compensation by these measures alone.

(2) The relief of the embarrassed circulation.

(a) **By Venesection.**—In cases of dilatation, from whatever cause, whether in mitral or aortic lesions or distention of the right ventricle in emphysema, when signs of venous engorgement are marked and when there is orthopnoea with cyanosis, the abstraction of from twenty to thirty ounces of blood is indicated. This is the occasion in which timely venesection may save the patient's life. It is a condition in which I have had most satisfactory results from venesection. It is done much better early than late. I have on several occasions regretted its postponement, particularly in instances of acute dilatation and cyanosis in connection with emphysema.*

(b) **By Depletion through the Bowels.**—This is particularly valuable when dropsy is present. Of the various purges the salines are to be preferred, and may be given by Matthew Hay's method. Half an hour to an hour before breakfast from half an ounce to an ounce and a half of Epsom salts may be given in a concentrated form. This usually produces

* For illustrative cases from my wards see paper by H. A. Lafleur, *Medical News*, July, 1891.

from three to five liquid evacuations. The compound jalap powder in half-drachm doses, or elaterium, may be employed for the same purpose. Even when the pulse is very feeble these hydragogue cathartics are well borne, and they deplete the portal system rapidly and efficiently.

(c) **The Use of Remedies which stimulate the Heart's Action.**—Of these, by far the most important is digitalis, which was introduced into practice by Withering. The indication for its use is dilatation; the contra-indication is a perfectly balanced compensatory hypertrophy, such as we see in all forms of valvular disease. Broken compensation, no matter what the valve lesion may be, is the signal for its use. It acts upon the heart, slowing and at the same time increasing the force of the pulsations. It acts on the peripheral arteries, raising their tension, so that a steady and equable flow of blood is maintained in the capillaries, which, after all, is the prime aim and object of the circulation. The beneficial effects are best seen in cases of mitral disease with small, irregular pulse and cardiac dropsy. Its effects are not less striking in the dilatation of the left ventricle, in the failing compensation of aortic insufficiency or of arterio-sclerosis. On theoretical grounds it has been urged that its use is not so advantageous in aortic insufficiency, since it prolongs the diastole and leads to greater distention. Practically, however, this need not be considered, and, when given with care, digitalis is just as serviceable in this as in any other condition associated with progressive dilatation. It may be given as the tincture or the infusion. In cases of cardiac dropsy, from whatever cause, fifteen minims of the tincture or half an ounce of the infusion may be given every three hours for two days, after which the dose may be reduced. Some prefer the tincture, others the infusion; it is a matter of indifference if the drug is good. The urine of a patient taking digitalis should be carefully estimated each day. As a rule, when its action is beneficial, there is within twenty-four hours an increase in the amount; often the flow is very great. Under its use the dyspnoea is relieved, the dropsy gradually disappears, the pulse becomes firmer, fuller in volume, and sometimes, if it has been very intermittent, regular.

Ill effects sometimes follow digitalis. There is no such thing as a cumulative action of the drug manifested by sudden symptoms. Toxic effects are seen in the production of nausea and vomiting. The pulse becomes irregular and small, and there may be two beats of the heart to one of the pulse, which, as pointed out by Broadbent, is found particularly in cases of mitral stenosis when they are under the influence of this drug. The urine is reduced in amount. These symptoms subside on the withdrawal of the digitalis, and are rarely serious. There are patients who take digitalis uninterruptedly for years, and feel palpitation and distress if the drug is omitted. In mitral disease, even when it does good it does not always steady the pulse. There are many cases in which the irregularity is not affected by the digitalis. When the compensation has been re-established the drug may be omitted. When there is dyspnoea on exer-

tion and cardiac distress, from five to ten minims three times a day may be advantageously given for prolonged periods, but the effects should be carefully watched. In cardiac dropsy digitalis should be used at the outset with a free hand. Small doses should not be given, but from the first half-ounce doses of the infusion every three hours, or from fifteen to twenty minims of the tincture. There are no substitutes for digitalis.

Of other remedies strophanthus alone is of service. Given in doses of from five to eight minims of the tincture, it acts like digitalis. It certainly will sometimes steady the intermittent heart of mitral valve disease when digitalis fails to do so, but it is not to be compared with this drug when dropsy is present. Convallaria, citrate of caffeine, and *adonis vernalis* are warmly recommended as substitutes for digitalis, but their inferiority is so manifest that their use is rarely indicated.

There are two valuable adjuncts in the treatment of valvular disease—iron and strychnia. When anæmia is a marked feature iron should be given in full doses. In some instances of failing compensation iron is the only medicine needed to restore the balance. Arsenic is occasionally an excellent substitute, and one or other of them should be administered in all instances of heart-trouble when pallor is present. Strychnia is a heart tonic of very great value. It may be given in combination with the digitalis in one or two drop doses of the one per cent solution.

Treatment of Special Symptoms. (a) *Dropsy*.—The increased arterial tension and activity of the capillary circulation under the influence of digitalis hastens the interstitial lymph flow and favors resorption of the fluid. The hydragogue cathartics, by rapidly depleting the blood, promote the absorption of the fluid from the lymph spaces and the lymph sacs. These two measures usually suffice to rid the patient of the dropsy. In some cases, however, it cannot be relieved, and then Southey's tubes may be used or the legs punctured. If done with care, after a thorough washing of the parts, and if antiseptic precautions are taken, scarification is a very serviceable measure, and should be resorted to more frequently than it is. Canton-flannel bandages may be applied on the œdematous legs.

(b) *Dyspnoea*.—The patients are usually unable to lie down. A comfortable bed-rest should therefore be provided—if possible, one with lateral projections, so that in sleeping the head can be supported as it falls over. The shortness of breath is associated with dilatation, chronic bronchitis, or hydrothorax. The chest should be carefully examined in all these cases, as hydrothorax of one side or of both is a common cause of shortness of breath. There are cases of mitral regurgitation with recurring hydrothorax as the sole dropsical symptom, which is relieved, week by week or month by month, by tapping. For the nocturnal dyspnoea, particularly when combined with restlessness, morphia is invaluable and may be given without hesitation. The value of the calming influence of opium in all conditions of cardiac insufficiency is not enough recognized. There

are instances of cardiac dyspnoea unassociated with dropsy, particularly in mitral-valve disease, in which nitroglycerin is of great service, if given in the one per cent solution in increasing doses. It is especially serviceable in the cases in which the pulse tension is high.

(c) *Palpitation and Cardiac Distress*.—In instances of great hypertrophy and in the throbbing which is so distressing in some cases of aortic insufficiency, aconite is of service in doses of from one to three minims every two or three hours. An ice-bag over the heart or Leiter's coil is also of service in allaying the rapid action and the throbbing. For the pains, which are often so marked in aortic lesions, iodide of potassium in ten grain doses, three times a day, or the nitroglycerin may be tried. Small blisters are sometimes advantageous. It must be remembered that an important cause of palpitation and cardiac distress is flatulent distention of the colon, against which suitable measures must be directed.

(d) *Gastric Symptoms*.—The cases of cardiac insufficiency which do badly and fail to respond to digitalis are most often those in which nausea and vomiting are prominent features. The liver is often greatly enlarged in these cases; there is more or less stasis in the hepatic vessels, and but little can be expected of drugs until the venous engorgement is relieved. If the vomiting persists, it is best to stop the food and give small bits of ice, small quantities of milk and lime water, and effervescing drinks, such as Apollinaris water and champagne. Creosote, hydrocyanic acid, and the oxalate of cerium are sometimes useful; but, as a rule, the condition is obstinate and always serious.

(e) *Cough and Hæmoptysis*.—The former is almost a necessary concomitant of cardiac insufficiency, owing to engorgement of the vessels and more or less bronchitis. It is allayed by measures directed rather to the heart than to the lungs. Hæmoptysis in chronic valvular disease is sometimes a salutary symptom. An army surgeon, who was invalided during the late civil war on account of hæmoptysis, supposed to be due to tuberculosis, has since that time had, in association with mitral insufficiency and enlarged heart, many attacks of hæmoptysis. He assures me that his condition is invariably better after the attack. It is rarely fatal, except in some cases of acute dilatation, and seldom calls for special treatment.

(f) *Sleeplessness*.—One of the most distressing features of valvular lesions, even in the stage of compensation, is disturbed sleep. Patients may wake suddenly with throbbing of the heart, often in an attack of nightmare. Subsequently, when the compensation has failed, it is also a worrying symptom. The sleep is broken, restless, and frequently disturbed by frightful dreams. Sometimes a dose of the spirits of chloroform or of ether, with half a drachm of spirits of camphor, given in a little hot whisky, will give a quiet night. The compound spirits of ether, Hoffman's anodyne, though very unpleasant to take, is frequently a great boon in the intermediate period when compensation has partially failed

and the patients suffer from restless and sleepless nights. Paraldehyde and amylene hydrate are sometimes serviceable. Urethan, sulphonal, and chloralamide are rarely efficacious, and it is best, after a few trials, particularly if the paraldehyde does not answer, to give morphia. It may be given in combination with atropine.

(g) *Renal Symptoms*.—With ruptured compensation and lowering of the tension in the aorta, the urinary secretion is greatly diminished, and the amount may sink to five or six ounces in the day. Digitalis and strophanthus, when efficient, usually increase the flow. A brisk purge may be followed by augmented secretion. The combination in pill form of digitalis, squill, and the black oxide of mercury, will sometimes prove effective when the infusion or tincture of digitalis alone has failed. Calomel acts well in some cases, given in grs. iij every six hours for three or four days.

The *diet* in chronic valve diseases is often very difficult to regulate. With the dilatation and venous engorgement come nausea and often a great distaste for food. The amount of liquid should be restricted, and milk, beef-juice, or egg albumen given every three hours. When the serious symptoms have passed, eggs, scraped meat, fish, and fowl may be allowed. Starchy foods, and all articles likely to cause flatulency, should be forbidden. Stimulants are usually necessary, either whisky or brandy.

III. HYPERTROPHY AND DILATATION.

Hypertrophy is an enlargement of the heart due to an increased thickness, total or partial, in the muscular walls. Dilatation is an increase in size of one or more of the chambers with or without thickening of the walls. The conditions usually coexist, and could be more correctly described together under the term enlargement of the heart. Simple hypertrophy, in which the cavities remain of a normal size and the walls are increased, occurs, but simple dilatation, in which the cavities are increased and the walls remain of a normal diameter, probably does not, as it is always associated with thinning or with thickening of the coats. Commonly we have the forms of simple hypertrophy, hypertrophy with dilatation, and dilatation with thinning of the coats.

HYPERTROPHY OF THE HEART.

There are two forms—the simple hypertrophy, in which the cavity or cavities are of normal size; and hypertrophy with dilatation (eccentric hypertrophy), in which the cavities are enlarged and the walls increased in thickness. The condition formerly spoken of as concentric hypertrophy, in which there is diminution in the size of the cavity with thickening of the walls, is, as a rule, a post-mortem change.

The enlargement may affect the entire organ, one side, or only one chamber. Naturally, as the left ventricle does the chief work in forcing the blood through the systemic arteries, the change is most frequently found in it.

Etiology.—Hypertrophy of the heart follows the law governing muscles, that within certain limits, if the nutrition is kept up, increased work is followed by increased size—i. e., hypertrophy. Hypertrophy of the left ventricle alone, or with general enlargement of the heart, is brought about by—

Conditions affecting the heart itself: (1) Disease of the aortic valve; (2) mitral insufficiency; (3) general pericardial adhesions; (4) sclerotic myocarditis; (5) disturbed innervation, with overaction, as in exophthalmic goitre, in long-continued nervous palpitation, and as a result of the action of certain articles, such as tea, alcohol, and tobacco. In all of these conditions the work of the heart is increased. In the case of the valve lesions the increase is due to the increased intraventricular pressure; in the case of the adherent pericardium and myocarditis, to direct interference with the symmetrical and orderly contraction of the chambers.

Conditions acting upon the blood-vessels: (1) General arterio-sclerosis, with or without renal disease; (2) all states of increased arterial tension induced by the contraction of the smaller arteries under the influence of certain toxic substances, which act, as Bright suggested, by affecting “the minute capillary circulation, render greater action necessary to send the blood through the distant subdivisions of the vascular system”; (3) prolonged muscular exertion, which enormously increases the blood-pressure in the arteries; (4) narrowing of the aorta, as in the congenital stenosis.

Hypertrophy of the right ventricle is met with under the following conditions—

(1) Lesions of the mitral valve, either incompetence or stenosis, which act by increasing the resistance in the pulmonary vessels. (2) Pulmonary lesions, obliteration of any number of blood-vessels within the lungs, such as occurs in emphysema or cirrhosis, is followed by hypertrophy of the right ventricle. (3) Valvular lesions on the right side occasionally cause hypertrophy in the adult, not infrequently in the foetus. (4) Chronic valvular disease of the left heart and pericardial adhesions are sooner or later associated with hypertrophy of the right ventricle.

In the auricles simple hypertrophy is never seen; it is always dilatation with hypertrophy. In the left auricle the condition develops in lesions at the mitral orifice, particularly stenosis. The right auricle hypertrophies when there is greatly increased blood-pressure in the lesser circulation, whether due to mitral stenosis or pulmonary lesions. Narrowing of the tricuspid orifice is a less frequent cause.

Morbid Anatomy.—The heart of an average-sized man weighs about nine ounces (280 grammes); that of a woman, about eight ounces (250 grammes). In cases of general hypertrophy the heart may weigh