Perforation.—Four cases of perforation came under my observation, with one other probable case; two of these patients died. No operations were performed. The treatment was almost identical with that for hemorrhage, with the exception that no epinephrin or calcium chlorid was used, and that feeding was not begun until the end of the third day, except for small amounts of beef juice at the end of twenty-four to thirty-six hours. The results were very satisfactory in two cases, though in one case it was very difficult later to bring about a bowel action and to reduce the immense distension of the abdomen. This was finally accomplished by hot turpentine stupes to the abdomen, turpentine by mouth and per rectum, and small doses of calomel. In one fatal case death was due to a second perforation into the free peritoneal cavity high up in the small bowel the third day after the first perforation in the iliac region. The autopsy showed that the first perforation under the above treatment had become completely walled off from the peritoneal cavity, and, although the perforation in the cecum was as large as a 25-cent piece, recovery would probably have followed except for the severity of the infection and the second perforation. My observation in these cases leads me to doubt the advisability of surgical treatment, except in perforation during convalescence. To submit a patient in such a profound state of infection and collapse to an abdominal operation, and the manipulation and sewing of a thoroughly diseased bowel, seems to me questionable treatment, unless done immediately and under the most favorable circumstances. If peristalsis can be promptly controlled, the hope of recovery is fairly good without operation, and the risks of an operation, particularly where the condition is doubtful, are very great.

Pneumonia, as a severe complication, was met five times, and no patients were lost, although one had a temperature of from 104.5° to 106° F., a pulse 140 to uncountable, and respiration 50 to 80, for several days. The treatment was one of stimulation, oiled silk jacket to chest and oxygen inhalations. Particularly valuable in controlling the cyanotic attacks was the inhalation of turpentine fumes, from turpentine placed on hot water. The ether and camphor was used freely hypodermically when needed, and the most desperate cases recovered finally, having taken over ℥ii each of 10% camphorated oil and ether and oil aa within a week's time. The oxygen was found very valuable when intermittently administered. No expectorants were used because of the need of all possible nourishment by the patient and the fear of digestive disturbance, although oil of eucalyptus, tincture of benzoin compound and oil of white pine, āā, were vaporized in the room constantly.

In conclusion, I would say that the great thing in the treatment of a typhoid case is a careful study of the patient and his surroundings, of all the evidences that we can discover of the reaction of each organ to the toxins damaging it, and of a most detailed and painstaking attempt to help his system in every way; but above all to see that he digests and eliminates properly.

MYOCARDITIS, WITH SPECIAL REFERENCE TO DISORDERED METABOLISM.

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(*Continued from page* 343.)

A recollection of the physiological effects of these baths will always guide us in the selection of suitable cases as well as in determining the line of treatment adapted to each individual. As the temperature of the bath is from 3° F. to 10° F. below that of the body, the first influence is a contraction of the peripheral vessels, followed by reaction and then dilatation, a change that generally takes place during immersion, but which may be delayed until the period of rest, when the patient has been removed from the bath. This is associated with stronger but slower heart action, so that, as a result of the combined effects, we should have an improved circulation through general, pulmonary, and portal systems. According to Schott, this is accomplished by the influence of the carbonic acid and salts upon the skin, and also by their absorption into the corium, so that they have a prolonged effect upon the peripheral nerves and reflexly influence the vaso-motor system.

Cases of arterio-sclerosis so advanced that the vessels may not react, and patients suffering from myocarditis of such a degree that it is doubtful whether the heart muscle will endure the strain, must always be treated with the greatest care, the period of immersion should be short and the amount of mineral salts and gas in the bath very small; should the patient improve, the bath may be made stronger and the immersion longer, but if he should fail to react, then the bathing should be abandoned entirely or temporarily until the resistance movements have rehabilitated the cardiac muscle.

The treatment is also of diagnostic value, because the readiness with which the heart responds to it enables us to form some opinion regarding the reserve power of the myocardium. Patients who are too weak to use the baths, or are so situated that they cannot obtain them, are frequently benefited by the resistance movements; but these must also be conducted with caution in regard to degree of resistance, variety of movement and duration of treatment, any increase in dyspnea or the onset of precordial distress being an indication for rest and diminution in amount of resistance. What has been said is not to be taken as in any way approaching a full description of the Nauheim treatment; it is only an attempt to indicate in the few words that are possible in this lecture the points that should influence the adoption of the method, and also it is intended to emphasize the fact that dosage in regard to temperature of bath, amount of minerals and gas present, and period of immersion is as important in this as it is in the medicinal treatment. The pamphlets issued with the artificial salts give instructions regarding the amount of salt to be used in fifty gallons of water, but my experience has been that a comparatively large number of nurses, and physicians also, have very hazy ideas regarding the volume occupied by fifty gallons of water, and therefore, as has been already said, the treatment is haphazard, and failures are attributed to the method which in many cases are due to the ignorance or carelessness of the physician. If the attendant measures the cubic space occupied by the water in a bathtub, and remembers that every cubic foot of water corresponds to practically 6.25 gallons, he will then know how much of the salt should be added to bring it to the desired percentage. This a bath 5 feet long, 20 inches wide, and in which the water is 9 inches deep before the immersion of the patient, would contain (60 in. × 20 in. × 9 in.) 6.3 cubic feet of water, and therefore 6.3×6.25 gallons=39.375.

While the baths can be given at home, the treatment is generally conducted with better results at a sanitarium, for various reasons: the bathtubs are longer than those generally found in private dwellings, so that the patient can lie in a more nearly horizontal position, and be more comfortable; the attendants are better trained to this individual class of work, and the immediate effects of each bath can be noted by the resident physician; futhermore, at a sanitarium the treatment becomes the main feature in the patient's daily life, while at home it is very difficult to keep him free from disturbing influences.

A full account of this method and its results will be found in the writings of Schott, Bezly-Thorne, Leith and others who have given the subject special attention, and I would only add that the experience of succeeding years only more thoroughly establishes

its value as a therapeutic agent in this treatment of myocardial disorders.

Medicinal Treatment.—The remedies that in my hands have given the best results when treating this class of cases are mercurials, cholchium, iodides, arsenic and strychnia. If there is much loss of compensation it may be necessary to use digitalis or strophanthus as an aid to its restoration; but these will prove ineffectual unless the disorders of alimentation receive particular attention.

The effect of mercury in myocardial troubles is not sufficiently appreciated; the benefit is not simply a result of purgation which could be accomplished equally well by a saline or any other form of cathartic, not merely the removal of dropsy and edema so that respiration is less embarrassed, but clinical experience from the days of our grandfathers until the present time testifies to the value of mercurials where none of these conditions exist, records the relief from angina pain and precordial distress that has followed its use in such cases as we have just reported, and although the laboratory has exploded many of the theories which sought to explain these results, the clinical fact still remains, and we can only hope that some day the laboratory will be able to furnish us with an explanation. No doubt much of the improvement is due to an increased activity of the lymphatics and glandular system generally, so that exudates and toxins are rapidly absorbed and excreted, the blood purified and the quality of the glandular secretions thus improved. When simply the alterative effects are desired it is my custom to use the proto-iodid of mercury in doses of one-quarter of a grain three times daily for two days, and in addition to this a saline aperient every other day, as this mercurial salt in such doses very often causes constipation; but when there is edema or dropsy then the squill digitalis and bluemass pill three times daily, or one grain of calomel or five grains of grey powder given with the same frequency, for several days, has been found to be more satisfactory. The selection of any one of the three first mentioned preparations depends upon the tendency of one or the other to produce gastric disturbance in the patient.

Where there is a distinct gouty tendency on the part of the patient the mercurial treatment should be followed by the administration of colchicum in moderate doses for three or four weeks, but when cardiac distress is associated with a gouty attack, I have not hesitated to give the colchicum in full doses from the start, and at the same time use a mercurial purge for three or four days in succession.

It is not to be expected that all cases of cardiac disturbance due to faulty metabolism will be cured so soon as the diet has been corrected and the toxins removed; unfortunately in the majority of cases the trouble has continued so long that extensive structural changes have taken place, and all we can hope to do is to arrest or delay their further progress. It is on this account that in an earlier part of the lecture a careful scrutiny was urged of all cases of so-called functional disturbances of the heart when there was any enlargement of the liver or disturbed digestion.

At this stage, where the object is to improve nutrition and give tone to degenerating myocardial fibres, the simultaneous use of strychnia and arsenic is strongly indicated. The mere fact that there is intolerance to the average dose of arsenic is no reason for discontinuing the drug; it should, under such circumstances, be given in infinitesimal doses, and continued for a considerable length of time.

I hope that what has been said about the relationship between the foregoing cases and metabolism will not leave the impression on your minds that I attribute all myocardial changes to disordered portal circulation; it is only my intention to emphasize the fact that this is the case very frequently, and that in all cases of myocarditis, irrespective of the cause, very strict attention must be paid to the patient's dietary. When we reflect that the blood from the stomach, intestines, pancreas and spleen combines to form the portal circulation, and that the liver stands as a protecting barrier between these and the general circulation, we need not wonder if very often the solution of the problem, Is life worth living? will be found in the liver.

Closely related to the cardiac lesions which may be attributed to disorders of the alimentary tract are those consequent upon disease of glands not directly associated with alimentation, but which are occupied with the distruction or excretion of poisons formed within the body, and consequently failure of their activity may lend to accumulation of toxins which either directly or indirectly affect injuriously the myocardium. Reference is particularly made to the thyroid and supra-renal glands, and also to the kidney. The cardiac symptoms so frequently found in cases of exophthalmic goitre are so familiar to everyone that description is not necessary, and the relationship between the diseased thyroid and the cardiac condition is still such a matter of uncertainty that it is not possible to say much in regard to treatment; but we do know that the administration of cardiac tonics never amounts to more than a treatment of symptoms which, in the majority of cases, is a complete failure, and consequently our hope must be for a treatment based upon the pathology of the disease, meagre though it may be. The tendency of experimental work is to indicate that the disease originates in the nervous system, and that, as a result of pernicious nerve influence, the thyroid function is prevented so that there is an excessive, or possibly an abnormal secretion which is responsible for the production of the characteristic symptoms. Upon this supposition much attention has been given to the production of a serum from animals whose thyroids have been removed; the results obtained from the injection of this preparation, while not sufficiently numerous to establish its value as a therapeutic measure, are at least so encouraging as to warrant further investigation.

Disease of the supra-renal glands is associated with a very marked myocardial asthenism against which all the usual cardiac tonics are of no avail, and even the injection of epinephrin solution has not yielded any beneficial results, although its action as a cardiac and vaso-motor stimulant under other conditions is well established. It is therefore possible that toxins exist in the blood which are normally attracted to the supra-renal bodies and there destroyed; also that epinephrin is not an antitoxin, as was at one time supposed, but a secretion whose purpose it is to modify the blood pressure in the gland according to the demands made upon its activity.

We are more familiar with the cardio-vascular changes in nephritis, but to what extent these are dependent upon disturbed renal function, and how far they are due to other disturbance in the human economy is an open question. I feel myself to be at a disadvantage in making any reference to this subject at such a time as the present, as it can only be fairly discussed by considering the whole subject of uremia; but on the other hand, there are so many reasons for the belief that the cardio-vascular changes are not entirely secondary to nephritis, but also due to an accompanying vitiated metabolism, that it seems hardly right to pass the matter by without mention, although it must suffice for the present simply to state some of the reasons for such a belief, and leave their discussion to some future occasion.

The temptation is very great to ascribe the cardio-vascular changes to the effect of prolonged high blood pressure rendered necessary by an endeavor to produce an increased functional activity of the healthy portions of the diseased kidney so that a normal amount of urinary excreta may be eliminated through a diminished excreting area. This, therefore, attributes the disturbance in the circulatory system

to diminution of kidney substance. Experiments upon animals are, as a rule, opposed to such a conclusion; but probably the best comparison can be made with human beings who have been the subjects of nephrectomy, and, so far as can be ascertained, it is generally admitted that if the other kidney be healthy at the time of operation, there is not any reason to apprehend the development of a subsequent nephritis, nor any of its accompaniments, from the additional work thrown upon the remaining gland. I have the opportunity of observing frequently a lady from whom one kidney was removed nearly eight years ago; since that time she has lived an active domestic life, has not followed any special diet, yet she enjoys perfect health, and does not present any evidences of deterioration either in the heart or blood vessels. Clearly, therefore, it is very doubtful whether we are entitled to regard the cardio-vascular changes as the result of an endeavor to eliminate normal urinary excreta.

The difference between the clinical symptoms of obstructive and non-obstructive urinary suppression indicates that in nephritis there is either a failure to destroy some toxin normally present in the urine (possibly from absence of an internal renal secretion), or that some new poison is present in the circulation. All investigations relating to the existence of an internal renal secretion which has the power of destroying toxins have up to the present time been far from conclusive. On the other hand, the progressive character of nephritis, the tendency to relapses even under the most favorable conditions, the multiplicity of exciting causes, such as scarlet fever, alcoholism, gout, etc., all of which frequently produce changes in other tissues without any evidence of the kidneys being affected, suggest the possibility that many of the vascular changes found in Bright's disease, and usually described as being secondary to that lesion, are in reality co-existing diseases produced by the same toxins. We know that gouty patients tend to develop cardio-vascular changes, and that a very large proportion of them are free from nephritis; we know that glandular structures may not only have impaired functional activity leading to altered metabolism, but that their function is sometimes very gravely perverted, as when the gastric mucous membrane has been found to excrete urea, and therefore among all the perplexity and failure that has attended our efforts to account for many of the symptoms and changes associated with nephritis on the ground of retained normal excretion, we should consider whether we may not have begun at the wrong end, and that while some symptoms may be due to defective renal excretion, it is perfectly possible that others, including the nephritis itself, have a common origin in the metabolic processes of the body.

Croptan's experiments (*Med. Jour. Med. Sc.* Vol. CXX) upon rabbits led him to his conclusions which point to this direction, because he found that frequent injections both of xanthin and hypo-xanthin produced nephritis, and also a high blood pressure; and in one case where the injections were continued twice daily for six months the heart underwent considerable hypertrophy, while the blood vessels showed thickening of the intima, together with small cell infiltration of the intima and adventitia. As these substances are derivatives of proteid metabolism they indicate the possibility that many of the clinical symptoms in nephritis at present attributed to disturbed renal function, and which it has been impossible to explain upon that basis, are in reality conditions due to a common cause. Such a pathology would put the treatment of this variety of myocarditis on the same plane with that due to lithemia, and really that is where the clinician empirically has placed it for many years; but the faint glimmer now seen of a scientific solution of the problem entitles us to hope that in the near future workers in chemical physiology and pathology may furnish us with knowledge that will enable us to cope more successfully with a disease against which our present efforts are of little avail.

The third group of heart cases we decided to consider was that in which the myocardial disturbance seemed to be associated with the existence of a neoplasm in some other part of the body. While there are several conditions that might be discussed under this head, attention will be directed to one only, *i. e.*, fibroid tumors of the uterus. The relationship between these two conditions is not understood, although many theories have been advanced by way of explanation; but what is even more unfortunate is the fact that the relationship is not generally recognized, and cases go on to a fatal termination, when early operation might have restored the patient to perfect health. I should like to read the abstracts of two cases in illustration of the conditions to which reference is made.

Case A—Patient at the age of 25 years, unmarried, began to feel weak, and had attacks of syncope. The pulse cardiac sounds were weak, but otherwise the heart appeared to be normal, it being impossible to detect any change in the area of dullness or in the valvular apparatus. These attacks of weakness would sometimes last for several days, so that the patient was unable to follow her usual vocation, but had to spend her time in bed. Generally a course of arsenic and strychnin built her up so that she could resume her duties, but it would be long before she was again incapacitated. About the same time she began to suffer from painful menstruation, and this became so severe that ultimately an examination was made, which revealed the presence of a small fibroid about the size of a walnut; but as she never suffered from excessive menstruation nor hemorrhage between the periods, no importance was attached to it as bearing upon her extreme cardiac asthenia. After two years the tumor began to grow very rapidly, and caused such pain that the patient decided to have the uterus removed. When I saw her about two months later, and was congratulating her upon her recovery, she said, "Do you know, doctor, my heart has not troubled me since the operation." It is now nearly three years since the fibroids were removed, and the patient enjoys good health. I met her a few days ago, and in response to my question, she replied, "I never know I have a heart."

There are several other cases that we could mention, but the histories are too imperfect to be of value as statistics, and the above will serve for purposes of illustrating, so it is not necessary to rehearse them.

The first question that suggests itself is whether the cardiac symptoms of such cases are reflex-nervous in character, or are due to changes in the myocardium. No one disputes the fact that myomata produce many reflex symptoms, but it is equally true that they are also associated with tissue changes in the myocardium. Looking at the cases from a clinical point of view, the dilatation and persistent weakness during many months are suggestive of myocarditis, but still these might be due to lack of tonicity. Sufficient autopsies, however, have been recorded to establish the nature of the morbid anatomical changes, and the following abstract of a case published by Kessler is an excellent illustration of the point in question. The patient suffered from a large uterine fibroid which was not accompanied by hemorrhage, but on account of its size gave rise to considerable distress. Everything went well until the seventh day after the operation, when the patient, while sitting up in bed, suddenly fell back and died. Post-mortem examination showed that the entire heart was enlarged, the right ventricle was dilated, the left showed hypertrophy in excess of dilatation, and the coronary arteries were healthy. Microscopic examination revealed a myo-fibrosis involving both ventricles and auricles, but most marked in the right ventricle, and consisting of an over-growth of connective tissue between the muscular fibres rather than degenerative changes in the fibres themselves. It differed from senile atrophy in the fact that the coronary arteries and their branches were perfectly free from sclerosis.

Strassmann examined a very large number of patients suffering from fibroids, and in 45% of them he was able to demonstrate changes in the myocardium. It would therefore appear that we are perfectly warranted in accepting as proven the frequent coexistence of uterine fibroids and myocarditis.

(To be concluded.)