micro-organisms; but after watching a good many charts one can give a good guess as to the probable germ. For example, the streptococcus gives a high temperature; the colon bacillus a low one; the tubercle bacillus an eccentric and widely varying temperature. So with the milder germs—the white and yellow cocci—the temperature is moderate, though I have seen a temperature of 105° for days in cases from which pure cultures of the staphylococcus albus were obtained. Other and rarer organisms cannot even be suspected from the temperature. I have found, for instance, a temperature of 106° and 107° in cholecystitis, caused by the typhoid bacillus, when no typhoid had been suspected in the patient or had existed in the community; a varying temperature, but not an alarming one, from the diplococcus capsulatus.

(To be continued.)

FUNCTIONAL DISEASE OF THE HEART.¹

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I WISH this evening to bring to the attention of the Society the consideration of some of the points in the diagnosis of functional disturbances of the heart. Such disturbances are often the source of much greater worry to the patient than organic disease. To the physician the problem always presents difficulties, and in many instances no positive diagnosis can be made. The important questions for us to consider are:

- (1) What is functional disease of the heart?
- (2) What are the signs and symptoms?
- (3) How may the diagnosis be made?
- (4) How frequent is such a disturbance of the heart?

To take up the first question, or "What is functional disease of the heart," we understand by functional disease of an organ or set of organs some disturbance of the normal physiological action of that organ whereby its action is impaired or rendered impossible. Further, we limit the use of the word functional to such disturbances as are dependent upon some cause as yet unknown, without definite pathological lesion, and, therefore, so far as we know, capable of complete restoration to health.

From a strictly pathological standpoint, we should limit the use of the term functional to disturbance of the action of the heart dependent upon faulty innervation, though clinically such a theory is scarcely tenable, as thereby it would probably be necessary to exclude the very large class of cardiac disturbances arising in anemia. I will speak later of this class of cases.

In making the differential diagnosis between organic and functional disease of the heart, it is of the utmost importance to remember that the term organic disease should not be so limited as to include only organic valvular disease; we should rather include in the class of organic disease the many and really more important cases with disease of the myocardium. The importance of this statement is realized when we consider that, from a clinical and therapeutic standpoint, chronic valvular heart disease becomes of im-

portance to the individual only when and in so far as the muscle of the heart is affected; patients with valvular heart disease suffer when as the result of overwork the cavities become dilated and the muscle is weakened by the strain caused by overwork.

In the medical reports of the Boston City Hospital I published in 1894 a review of 92 cases seen in the Out-patient Department where the symptoms pointed essentially to the heart as the chief organ diseased; in 48 cases no valvular lesion was found as a factor in the production of the heart trouble, and these I classified as "parietal disease of the heart," using a term first employed by Dr. Gammett, considering that nomenclature more satisfactory than the more usual word "cardiac," in that it expressed the clinical picture without attempting to describe a pathological condition that could be accurately determined only by autopsy. In 39 cases there was evidently or apparently some valvular disease, and five I classified as functional.

That is to say, in 87 cases with organic disease of the heart 55 per cent. gave no clinical evidence of valvular disease; the truth of these data is fairly well substantiated by a subsequent examination that I made from the autopsy records of the hospital of 100 cases of diseased heart.

In the first series by clinical examination I made a diagnosis of valvular disease in 45 per cent. of the cases; in the second series I found by autopsy records that valvular disease was present in 40 per cent. of the cases.

Cases of anemia, with murmurs or other symptoms of functional disease, were of course not included in the five cases spoken of as functional in the first series of cases from the Out-patient Department.

In answer to the first question I should therefore say that functional disease of the heart included a class of cases in which patients complained of palpitation, rapid action of the heart or pain in the region of the heart, in which careful physical examination gave no fair reason to suspect the existence of organic disease. Exclude, if possible, organic heart disease; first and foremost in the exclusion of organic disease comes the determination that no enlargement exists. The size of the heart is to be determined by percussion; the force of the apex beat and the quality of the pulse determine whether an existing enlargement be dependent upon hypertrophy or upon dilatation. Unfortunately, physical examination cannot always exclude disease of the coronary arteries, a most important factor in the differential diagnosis between true and false angina pectoris.

I dwell especially upon the exclusion of organic disease in considering functional disease of the heart, as in looking over the literature of functional diseases I find long articles on the so-called "neuroses," including in this term "palpitation," "tachycardia," "bradycardia," and similar terms rarely used clinically, describing merely these signs or symptoms without regard to the etiology of the disturbances of action.

As it is certainly probable that many of the causes of functional disturbances of the heart may be found in the nervous system, in faulty innervation, I wish to review briefly the physiology of the heart. It has been demonstrated by physiological and anatomical experimentation that the muscular contraction of the heart may be induced independently of any nervous action, a wave of contraction being transmitted from

¹ Read before the Clinical Section of the Suffolk District Medical Society, April 19, 1899.

the auricles to the ventricles; in proof of this proposition the following experiments may be cited: (1) The fetal heart beats before the development of the nervous system; (2) the excised heart and even portions of the excised heart of reptiles beat independently of any possible nerve action.

To secure the proper blood supply to various organs with varying force according to the demands of the special occasion, the heart must beat with proper rhythm, and this regularity of the force and frequency of the heart is under direct control of the nervous system.

The heart receives nerve supply from three sources, the vagus, whose action is inhibitory, the sympathetic, which is an accelerator nerve, and the ganglia in the heart itself, whose action is not definitely determined.

As a striking instance of the action of the sympathetic we may cite the rapid, often painful, and sometimes tumultuous action of the heart resulting from sudden fright, alarm, or sudden awakening from a sound sleep, and requiring a man to use at once some powerful mental effort. Such symptoms are common to us all in everyday life.

Our very definition of functional disease, namely, some disturbance of action independent of pathological lesion, shows that in the specific case we cannot absolutely determine the cause of the symptoms, but it is highly probable that in most instances there is some transitory disturbance of the innervation of the heart. As many diseases of the nervous system which were formerly considered to be functional have in recent years been shown to be the direct result of some pathological lesion, so time may teach us to understand the various phases of disturbed action of the heart, and for some at least to discover a pathological lesion.

(2) What are the signs and symptoms?

As a general rule, it may be said that a patient who complains of palpitation, of pain in the heart, and of rapid action of the heart has functional rather than organic heart disease.

In Sansom's work on the heart under the head of "Schema," practically a *résumé* of all signs and symptoms connected with the heart, are to be found the following very comforting axioms:

"Symptoms referable to the heart:

"(a) Pain felt by the patient in the region of the heart is rarely an index of structural disease of the organ. Organic disease may progress without any manifestation of pain. Precordial pain is often due to affections of the stomach or of the neighboring nerves. The special pain of heart origin is angina pectoris, characterized by paroxysmal recurrence, extreme distress and sense of impending death, with coldness and arrest of respiration. Pain may occur in pericarditis and in inflammatory affections of the aorta.

"(b) Palpitation, though a frequent symptom in heart disease, is still more common in dyspepsia and in emotional conditions.

"(c) Intermission and irregularity of the action of the heart felt by the patient are indications of nervous disturbance rather than organic disease."

In health we are unaware of the action of the heart and the very fact that a patient complains of the heart's action in itself shows the presence of some disturbance. The symptoms of functional disease are palpitation, pain about the heart, rapidity of action, irregularity and occasional stopping of the heart.

The signs of functional heart disease, using the word in the technical sense of symptoms that may be observed by the physician, are rapidity of the rate of the heart, irregularity in action and not rarely intermittency, the occasional dropping of a beat recognized by the patient often with as great accuracy as it is by the physician. To these symptoms may be added flushing, often followed by coldness of the extremities, with perspiration.

Pain in the region of the heart is an important and very frequent symptom; the pain is referred either to the precordia or often to the anterior part of the chest just to the left of the region of the heart. The pain may be continuous, moderate in degree, or paroxysmal, and at times of great severity, suggesting the train of symptoms associated with angina pectoris. Sensations of distress or a suggestion that some obstacle interferes with the proper beating of the heart are often more annoying and alarming to the patient than actual pain.

In distinction from the symptoms arising in organic disease of the heart, patients suffer from functional disturbance of the heart more when they are quiet, perhaps in resting after a meal, and especially at night, when their attention is more strongly drawn towards the heart. Usually the symptoms are not aggravated by moderate exercise or exertion. The heart is not incompetent, but the nerves regulating the heart are deranged.

In certain rare cases the heart beats are reduced in number, a condition found far less often than increase in the number of the beats. Austin Flint has written at length in this form of functional disturbance, at the same time warning the practitioner that it is most essential in such cases to eliminate as a causative factor all sources of direct stimulation of the vagus from cerebral pressure. So far as I can remember, I have seen but one case of slow heart in functional disturbance. An old lady complained of distress in the region of the heart with some pain and at times a sensation as if the heart were beating in the throat; her pulse and apex beat coincided, the rate being at all times about 50 to the minute. The pulse was of good strength, the heart was not enlarged, and there was no edema or disturbance of the kidney suggestive of failure in the heart's action. She was under my care for several years, and I never found her pulse to be 60 unless she took digitalis, when her symptoms were aggravated. She died suddenly as the result of a fall, and up to the time of her death had no symptoms suggestive of cerebral disease. During the time that I saw her, her constant complaint was of heart disease and a dread that she might die suddenly from some cardiac disease that she believed existed.

In this connection I would say that I believe a slow pulse is very rare as an index of weakness of the muscles of the heart. At present I have under my care a man with valvular disease and considerable dilatation of the heart who has a pulse of 50 or less beats in the minute independently of any medication. He is perfectly comfortable and has not a symptom referable to the heart so far as his sensations go.

(3) How may the diagnosis be made?

This question may be answered by what has already been said: symptoms are complained of referable to the heart, yet a careful physical examination fails to reveal any organic disease of the valves or muscular system of the heart.

(4) How frequent is such a disturbance of the heart?

Functional disturbance of the heart is certainly far more frequent than organic disease. To this statement I think we can all agree if we stop to consider how seldom we find any evidence of organic disease in the heart, compared with the number of patients who consult us for some symptoms referable to the heart either in their minds or in ours and who yet show no evidence of any organic defect. I wish to refer briefly to various classes of cases which present such symptoms, giving in each instance the treatment that I would suggest. In children just reaching puberty it is not unusual to find an occasional intermittency of the heart; in taking the pulse we note that occasionally a beat is dropped. I have seen this in boys who were to all appearance perfectly well, who showed no symptoms of any failure of the heart, and who certainly were unaware of the symptom. Such cases should be watched in case further symptoms should develop, but in my experience this has been a transitory symptom, passing off in a few years without giving rise to any disturbance. Rapidity of the heart in children I consider as much more important; I have frequently seen a pulse of 100 in young boys who had grown fast, had played hard, and perhaps had given too little time to outdoor recreation. Such children should give up confining school work, should live out of doors as much as possible, and avoid the rougher and more exacting forms of sports. These boys are helped by enforcing regular hours for meals, and what is perhaps more important, regular hours for quiet rest without interfering with the greatest possible amount of outdoor life. I have this winter seen the son of a physician; his father said that he complained of being tired after riding his bicycle and sometimes was short of breath. I found his pulse was always over 100 when I saw him, and his father reported that except in the early morning he also found the pulse the same. The boy had grown very fast, lived in the suburbs, and went to school in Boston, so that he got home too late for dinner, and played hard all the afternoon, having only a light lunch between breakfast and a late dinner. He left school for several months, studied somewhat at home, was out of doors as much as possible, and as a result improved fast, and in February returned to school, but with the reservation that he must get home at half-past one for a suitable noon dinner. In similar cases, where the rapid action of the heart has been associated with painful sensations or with palpitation, I have found that small doses of bromide, ten grains three times a day, either alone or combined with iron, was of advantage in curing the disturbance. Perhaps in dyspepsia, usually associated with and often caused by constipation, we find the largest number of cases of palpitation and allied functional disturbances of the heart. Such cases form a very large number of the young girls and women who apply for relief in the out-patient departments of hospitals. Here attention to the underlying cause usually cures the trouble; in such cases I think a small amount of bromide is essentially useful as an aid to the proper administration of a cathartic. "Pain in the heart," "palpitation," or "pain in the side," usually meaning a place between the heart and the anterior axillary line, are very common symptoms to us, and to the patient most distressing and often alarming. In chlorosis we have a frequent cause of

palpitation and rapid action of the heart; these cases differ from other forms of functional disturbance in that there is shortness of breath on exertion. Practically these cases may be classed under the head of functional disturbance of the heart in that they present a condition essentially amenable to treatment, with absolute return to a state of perfect health. Recent observation has shown that in a certain proportion of cases there is some fatty degeneration of the muscle of the heart, a condition similar to, though less marked than, the fatty degeneration of the heart in severe anemia. In these cases vigorous treatment with iron, sometimes with the addition of arsenic, brings the greatest relief to symptoms and an absolute cure. Where the heart is very rapid, and especially if it is irregular, small doses of digitalis or strophanthus are of direct benefit. The last-mentioned heart stimulants probably are of service only when the muscle of the heart is sufficiently affected by the fatty degeneration as to give rise to a certain weakness of its contractile power.

In the use, or rather, let us hope, in the abuse, of various cardiac stimulants we find a frequent source of disturbance of the action of the heart — coffee, tea and tobacco. Tea and coffee or similar articles are used the world over; used, I believe, because they are stimulants. Some persons are so susceptible to their action that they cannot use these articles even in moderation. One of our prominent surgeons, an athlete of good physique, told me that he found that a single cup of coffee caused an occasional intermittency of his pulse and a sense of oppression in the chest. Many more are injured by tea and coffee because they are taken to excess, and furnishing a powerful stimulus they are made to take the place of food; in such cases the trouble arises from insufficient food plus the injurious effect of stimulation. In many individuals moderation is impossible, and when we find trouble has arisen from an excessive use of these stimulants our only alternative is to prohibit entirely tea and coffee. Dr. Minot used to say, "Tobacco, the greatest blessing given by God to man, is refused to women. Why deprive them of tea?" I have heard the Vienna physicians say they could not live if it were not for the various troubles arising from their patients' visits to curative bathing resorts, and I suppose we might venture the same assertion as to the pernicious and ever increasing "five o'clock tea." Tobacco undoubtedly is a frequent cause of disturbance of the heart, cigarette smoking especially, because it implies in many almost constant smoking.

Certain drugs in common use may in some individuals cause interference with the action of the heart. I have observed this with phenacetin and sulfonal; phenacetin I consider to be a depressant, and I hesitate to use it in persons suffering from organic disease of the heart. Sulfonal I have often used in cases with much weakness of the heart without any apparent ill effects, yet I know a perfectly healthy woman who has on several occasions complained of a sense of oppression in the chest after a small dose of sulfonal. She once said to me that she felt as if her heart "turned over and went glob-glob." I felt her pulse and found that it intermitted every few beats. This winter I saw a gentleman who was perfectly healthy; on this occasion for the first time I found his pulse markedly intermittent and at times irregular. He had taken several doses of a proprietary headache remedy

containing probably from its name a mixture of phenacetin and caffeine; the trouble was temporary.

No disease causes us such anxiety as the so-called false angina pectoris; the attacks are often terrific, accompanied by great pain, anxiety, sense of suffocation, and the fear of impending death. In false angina all the symptoms may be as severe as in true angina, dependent upon organic disease of the heart or the coronary arteries; the pulse may be rapid and the extremities cold in false as in true. Our main reliance in making the differential diagnosis must be on the frequency of the attacks in false angina, their recurrence over a long series of years, the long duration of the individual attacks, and the lack of any evidence of disturbance of the heart in the intervals between the attacks. The great difficulty in diagnosis lies in the fact that arterio-sclerosis of the coronary arteries may be present without giving rise to physical signs by which the diagnosis may be made. I once saw, in consultation, a lady with intense excruciating precordial pain, who had previously been well except for occasional attacks of what she called pain in the chest from dyspepsia. In this case a very weak, irregular and intermittent pulse ruled out false angina; three days later post-mortem examination showed arterio-sclerosis of the coronary arteries, necrosis of the heart muscle and two ruptures in the left ventricle. I had made a diagnosis of probable thrombosis of the coronary arteries; the rupture was not diagnosed, though it was probable from the post-mortem appearance that at least one of the tears occurred at the time of the first attack of precordial pain.

Another lady under my care has for twenty years had occasional attacks of severe pain in the region of the heart, the pain passing down into the left arm; her pulse is good, there are no murmurs, no enlargement and no albumin in the urine. My prognosis in this case is favorable, though necessarily guarded, as her superficial arteries are somewhat sclerotic and she is subject to attacks of true monarticular gout.

Attacks of angina may be alleviated by nitrite of amyl, nitroglycerin, Hoffman's anodyne, ice-bag to the heart; morphine may be necessary, though usually a few whiffs of ether are more efficient and less harmful. A Western lady that I once saw had frequently taken chloroform with much relief and no untoward symptoms, though I must confess that I should not have cared to administer it.

It seems to me highly probable that time will show us some pathological cause for the so-called false angina, as already the discovery of the connection of this trouble with disease of the coronary arteries has removed a considerable number of cases from the domain of functional diseases.

Graves's disease, exophthalmic goitre, furnishes us with a beautiful example of rapid action of the heart directly dependent upon some disturbance in the functional activity of the sympathetic nerve. Rapidity of the heart and palpitation are the two most prominent symptoms so far as the patient goes. Digitalis is well-nigh useless in this disease, belladonna, bromides and the phosphate of sodium being probably the three drugs that afford the most relief.

In this brief summary of the subject in hand I have tried to point out the important elements in the diagnosis of functional diseases of the heart and to mention some of the most common causes of such a disturbance.

THE RESPONSIBILITY OF THE ATTENDING PHYSICIAN WHEN A WILL IS MADE.¹

BY ARTHUR C. JELLY, M.D., BOSTON.

THE responsibility of the attending physician when a sick person transfers property was forced upon me about a year ago in a case where death was due to heart disease, and again recently where alcohol was the probable cause of death.

In the first instance there came, with failing compensation, periods of great mental confusion when the man failed to recognize the familiar surroundings of his home, and believed that his wife and children had taken him to a lonely farmhouse, intending to abandon him there. This condition varied in duration, and alternated irregularly with periods when he was perfectly clear. During this time a sister came to help the wife take care of him. He looked to her for protection when the confused state of mind came on, and he often exacted the promise that she would stay with him till death and would see that he was properly buried.

After his death, his wife learned that he had given the sister an order for all the money he had in the bank, and that she had drawn it out. The wife, whose devotion had been unflagging, felt that this act was done at a time when he was confused and therefore not responsible; accordingly she demanded the money. But the sister was sure that he was mentally clear, and that he intended simply to show his appreciation of her care. At this point I was asked whether in case of a suit to recover the money I could testify positively about him. But as I had not made any visit on that day, I had no record of his mental condition at the time of the gift, and I was therefore unable to be of service to them. So many questions were asked in the discussion of the matter that I felt the need of more knowledge in regard to the position of the physician in attendance upon such cases. Accordingly, I consulted text-books upon wills written by lawyers (from which I shall quote freely without giving references) as well as the more familiar writings of doctors upon testamentary capacity.

Wills are contested on one or more of the following points: (1) He did not understand that the paper he signed was a will; (2) he was not of sound mind; (3) he was the victim of fraud and undue influence.

To protect all parties, and to ensure the just and proper distribution of the estate, the statutes make certain steps necessary. The Massachusetts statute reads as follows:

"Every person of full age and sound mind may, by his last will, in writing signed by him or by some person in his presence and by his express direction, and attested and subscribed in his presence by three or more competent witnesses, dispose of his estate real and personal, etc."

An attestation clause is desirable but not essential. The following is an example of such a clause:

"Signed, sealed, published and declared by the said A. B. as and for his last will and testament, in the presence of us who at his request and in his presence and in the presence of each other have subscribed our names as witnesses hereto."

If due care is given to these precautions, it is clear that the will cannot be contested on the ground that the man did not know it was his will.

¹ Read before the Clinical Section of the Suffolk District Medical Society, April 10, 1899.