Lectures

ON

CERTAIN MUTUAL RELATIONS OF PHYSIOLOGY, PATHOLOGY, AND THE PRACTICE OF MEDICINE.

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LECTURE II. (Continued.)

Pathology in its Relations to the Practice of Medicine. On certain Pathological States as the Result of Impaired Nutrition consequent on the Imperfect Performance of Function. Diseases of Degeneration attacking the Heart, Lungs, etc. Fatty Disease of the Heart. Sudden Death in Relation to Diseases of the Heart. Emphysema of the Lungs, Phthisis, etc.

THERE are two conditions in which fatty degeneration shows itself, which have a special importance to us, and perhaps a close relation to each other; I mean fatty degeneration of the heart, and atheromatous deposit in the blood-vessels; and I think we have sufficient evidence that both these diseases are the result of impaired nutrition.

Let us take for examination the cardiac disease. We meet with it especially in old age; but we meet with it also in adult life, and that by no means infrequently.

There are two forms of fatty heart, between which we should draw a well-marked line of distinction: 1. Fatty deposit on the heart; and 2. Fatty degeneration of its muscular fibres. It is the second form which comes more especially under the pathological head to which I am now referring.

The first form has, however, undoubtedly, a tendency to run into the second. It—i.e., the first form—is associated with that condition of the body which we so frequently meet with towards the middle or close of adult life—when, from inactive habits, the function of respiration is not carried on energetically, and the carbonaceous elements of the food become deposited in the shape of fat, especially about the abdomen and on the surface of the heart.

This condition, the result of inactivity, predisposes to further inactivity, and thus tends to increase existing obesity and favour muscular degeneration; and we find a very important illustration of this, in the fatty degeneration which has been shown to take place in animals fattened for the purposes of exhibition. These animals, indeed, afford a very remarkable instance of the effects produced by simple rest, combined with abundant diet.

Now, just as we see that fatty degeneration of a voluntary muscle may take place when it no longer performs its function, so may we fairly anticipate that a like process will follow with regard to the heart, under circumstances of a similar nature; and it must be borne in mind that, although from an early period of embryonic existence to the moment of dissolution, the heart's function is never arrested, yet it may be but imperfectly performed; and that comparative inactivity, such as must result from a sedentary life, bears the same relation to an organ like the heart, which ought to be, not only con-

stantly, but, at all events, from time to time, vigorously, acting, as does absolute rest, for a long period, to a muscle, whose function it is, to be only occasionally brought into play. Thus, a heart which is underworked may be fairly supposed to be undernourished, and a degeneration of its tissue may ensue.

But in questions of this kind we must not be exclusive; and, no doubt, in these cases of degeneration, there are various concurring causes which assist in producing the result. Amongst these must be mentioned numerous circumstances which impair the nutrition of the body, as exposure, want of proper food, intemperance in alcoholic fluids, exhaustion consequent on severe mental labour, etc.; but such conditions do not exist in a large number of persons in whom we meet with these diseases of degeneration, and I do not wish now to refer to them more particularly. Again, in all classes of individuals, we must not forget the influence which moral causes may exert. The anxieties of mind consequent on the occupations in which men engage, the engrossing nature of these occupations, the sorrows and troubles of life, are amongst the causes which tend to diminish the nervous energy which should be directed to the nutrition of the body, and predispose to the various forms of degeneration.

But, setting aside these causes of impaired nutrition, I think the experience of those whom I am addressing will confirm me in the remarks I have made, on that point to which I wish more especially to refer; viz., *the effect produced on the heart by the imperfect performance of its function*. I can call to mind several cases which would tend to illustrate these views; but I prefer to direct your attention to some statistical tables which were drawn up by Dr. Quain.

Of a series of twenty-four cases of fatty heart, ascertained by *post mortem* examination, collected by Dr. Quain, in which he was able to learn the habits of the individuals during life, he found that *two only* were of active habits; the remaining twenty-two were of sedentary habits.

Facts of this kind, coupled with the observations I have referred to, seem to indicate one great cause as an important element in the production of this disease, and point in a remarkable manner to the means which should be resorted to, to prevent its origin and retard its progress; as we know that, by maintaining the physiological action of a muscle, we can prevent its being converted into fatty matter, so we may hope that, by adopting a like process with regard to the heart, a similar result will follow.

It is in the earlier stages of this disease that the use of remedial measures will be most successful; and, therefore, is it necessary to study, more carefully than has yet been done, those early manifestations of it, which assuredly exist, although they have been hitherto overlooked.

And here I would remark as to the value of a phenomenon, to which attention has been much directed as a symptom of fatty degeneration of the heart; I mean the "arcus senilis," a fatty degeneration of the cornea.

The study of a phenomenon of this kind is quite in accordance with the direction which I think our inquiries should take, and to which I have alluded in the beginning of this lecture—the endeavour to re-

cognise an early external demonstration of a deep-seated disease. With reference to the value of this particular condition as a symptom of fatty degeneration of the heart, it is by no means of certain import. Its existence does not necessarily show that the heart is fattily degenerated—for it may be consequent on some local affection of the eye; nor, on the other hand, does its absence prove that no degeneration of the heart exists. Setting aside, however, these exceptional cases, it is, perhaps, the most valuable symptom we are at present acquainted with, of a tendency to general fatty degeneration; and it is, undoubtedly, a phenomenon which we shall do well to study carefully. And I would observe that the absence of this arcus must not be hastily assumed; for many persons who, at first sight, may appear to have no signs of it, are yet found, when the cornea is fairly exposed, to have the upper portion more or less marked.

But there is another pathological point to which I would briefly refer. It has been observed that, in cases of arcus senilis, and fatty degeneration of the heart, ossification of the cartilages of the larynx, of the rings of the trachea, and of the cartilages of the ribs, is frequently found. And it appears by no means improbable that this ossific degeneration bears a close relation to the fatty disease. I have frequently noticed that the cartilages of the ribs have become hardened, and in part ossified, at a somewhat early period of life; and, contrary to the expressed opinion of some pathologists, I have pointed out elsewhere, that the rings of the trachea often have ossific deposit in them long before the approach of old age. I cannot say, from my own observation, that this degeneration of the costal and tracheal cartilages, is associated with general fatty disease; but I believe the degeneration is of an allied nature, and that the two affections bear a close relationship to each other.*

It seems to be the opinion of some, that the particular form of cardiac disease, to which I have been referring, is more prevalent than formerly, and that sudden death more frequently occurs. I am unable to decide whether this is the case; but certainly, I think I may safely say, that our diagnosis of the disease is much more accurate than it was; and, further, that in consequence of the use of the microscope in the examination of the tissue of the heart, many cases are now ascertained to be cases of fatty degeneration in its early stages, which, if we had to depend on the naked eye alone, we might pronounce free from disease.

And here I would remark, that we should receive with extreme caution all statements, as to the non-existence of fatty disease of the heart, not verified by microscopical examination; and, especially, should we insist on such investigation being made, when we have symptoms of the affection, in the cornea or elsewhere.

* Since the foregoing was written, a case has come under my notice which shows the relation between fatty degeneration of the heart, atheroma of the arteries, and osseous deposit in the cartilages of the ribs. A man was admitted under my care into the Liverpool Northern Hospital, with severe hæmoptysis, and died in the course of an hour. At the autopsy, a large quantity of blood was found in the left pleura and in the lungs. There was an aneurism of the thoracic aorta, which had burst into the left lung and pleura. The aorta was very atheromatous. The muscular fibres of the heart, although to the naked eye they appeared tolerably healthy, had undergone fatty degeneration to a considerable extent; and there was osseous deposit along the centre of most of the costal cartilages.

We occasionally hear of persons dying suddenly of this disease, in an advanced stage, as proved by *post mortem* examination, without, as it is said, any previous symptoms having occurred. One remarkable instance of this kind in a late eminent judge is fresh in our memory. I must be allowed to express a doubt whether such cases ever occur. I mean whether the disease ever advances to such a condition, as to cause sudden death, without symptoms having existed which would have been intelligible to the physician. It is no doubt true that patients will go on, in various chronic ailments, disregarding certain symptoms, and imagining themselves in a state of perfect health. Are we not often called to cases, where perhaps some sudden acute symptom has come on, and we find evidence of long-standing organic disease, which has never been suspected by the patient; but which has been gradually undermining the health? And do we not often find, on careful cross-examination, that symptoms, which would have been unequivocal to us, have occurred? And so it is, I believe, with this cardiac disease.

And in reference to the general bearings of the subject we are considering, and the way in which pathological effects are produced by the imperfect performance of function, it may not be without interest to consider what condition of the heart is most liable to terminate in sudden death. The question is one which must be decided by a direct appeal to statistics; and I think we have sufficient evidence to enable us to answer it. The practical importance of the question will be obvious to all. How often does it happen, when patients are suffering from some cardiac disease, that they wish to know from us what are their chances as regards the termination of their lives; whether the probabilities are that their life will suddenly cease, or that death will gradually come on, from the secondary results of the original malady? The question resolves itself into this: *Is sudden death more likely to ensue from a diseased condition of the muscular substance of the heart, or of its valves?*

The results of my own observations, with regard to this question, are, that fatty disease of the heart is the affection which, more frequently than any other, terminates in sudden death. And, in confirmation of this opinion, I would again refer to the statistics of Dr. Quain. Of eighty-three cases of fatty heart collected by him, sixty-eight died suddenly—an enormous percentage—a percentage which far exceeds that of valvular disease. For in the latter, we have, in almost every case, sooner or later, those symptoms of impeded circulation through the lungs, and general dropsy, with which we are all so familiar. In these cases, the transition from life to death is usually protracted. The secondary consequences of the disease incapacitate the patient for violent exertion, and ultimately cause his death. When, however, there is disease of the muscular substance of the heart, we have a gradual obliteration of its contractile elements, a gradual diminution of its contractile power, until at length some sudden movement paralyses its action, or even gives rise to rupture of its walls. And this very frequently takes place without the occurrence of any of those symptoms which mark the progress of valvular disease. Although we have indications of a feeble heart from the dyspnoea and partial syncope, which occasionally come

on, there is yet no evidence of impeded circulation such as we meet with where there are contracted orifices or incompetent valves. And it is a circumstance of no little interest that, even when fatty degeneration of the heart exists to a considerable extent, we occasionally find the pulse by no means small and sometimes even moderately full. I have known instances where this condition of the pulse has misled as to the nature of the disease. I have observed it myself, especially in patients who have been very fat, and who may perhaps be designated as full-blooded—*i. e.*, whose blood-vessels were well filled. In these persons, even a feeble contraction of the heart gives rise to the sensation of a moderately full pulse.

But there is a further point of great practical importance in reference to this subject; viz., the probabilities of sudden death in valvular disease of the heart, and the particular valvular affection which is most likely to terminate in this manner.

In the first place, I think it may be safely stated that, speaking generally of valvular disease, the proportion of cases which terminate suddenly is very small. Of a series of seventy-nine deaths collected by Dr. Barclay from the records of St. George's Hospital, where there was valvular disease of the heart, I find that only *two* are mentioned as having been sudden. In all the others there was dropsy, or some other diseased condition which produced slow death. This small percentage of sudden deaths, however, must not, I think, be taken as the usual one. In my own more limited experience, I could show a much larger percentage, but still far less than that which we find in fatty disease.

As to the particular kind of valvular disease which is most likely to terminate suddenly, our knowledge of the physiology of the heart enables us to arrive at certain theoretical conclusions which, I think, are borne out by practical experience.

Setting aside the diseases of the right side of the heart, with which we rarely meet, the question resolves itself into this: *Is sudden death more likely to occur in disease of the aortic valves or disease of the mitral valves?*

In disease of the aortic valves, these structures become sooner or later incompetent for their function, and they then allow of regurgitation of blood from the aorta into the left ventricle. This, in course of time, is followed by hypertrophy with dilatation of the ventricle, by which the cavity is enabled to hold a larger quantity of blood than in health, and at the same time to contract with greater power, so as to expel its contents. The consequence on the arterial tubes is, that they get well distended by each ventricular systole—in fact, they receive more blood than in a normal state; but, in consequence of the imperfect closure of the semilunar valves, they lose a portion of this blood; and hence the sudden collapse of the arteries after their diastole, which gives so peculiar a character to the pulse in aortic disease attended with regurgitation. Now, as the structures of the body get well supplied with blood so long as the ventricle retains its vigour, there is but little element of syncope, and less probability of sudden death than when the mitral valve is alone diseased; for, when this valve is so affected as not to close perfectly, a portion of the blood which ought to go to fill the arteries passes back into the left auricle. Hence these cases are characterised by a

small pulse—a pulse of little volume. If the amount of the regurgitation be large, the quantity of blood passing into the systemic blood-vessels must necessarily be small; and, under any circumstances of a more than ordinary character, the elements of syncope existing, sudden death may ensue.

In considering this question, I have been obliged to isolate the two forms of disease; but, practically, we often have to deal with both together.

Of the 79 cases I have already alluded to, collected by Dr. Barclay, the proportion in which the different valves were diseased was as follows:—In 36 cases, both valves were diseased, or 45 per cent.; in 26 cases, the aortic valves were diseased, or 33 per cent.; in 17 cases, the mitral valves were diseased, or 21 per cent. And the same proportion, as nearly as possible, is maintained in a larger series of nearly 200 cases. Now these statistics show that, in a very large proportion of cases where death takes place as a consequence of valvular disease, both the mitral and aortic valves are affected; but I believe it will be found that in many of such cases, whether of acute or chronic origin, the aortic valves are the first to become involved, and that the mitral disease is a secondary one.

I have looked over 31 cases of valvular disease of which I have preserved notes. In some, the state of the valves was ascertained by *post mortem* examination; but in others, it was inferred from the symptoms and physical signs during life. Of these 31 cases, there was disease of both valves in 9; of the aortic valves alone, in 16; and of the mitral valve alone, in 6. Probably in some of the cases of aortic disease, the mitral valve will sooner or later become implicated.

Now, I have remarked that I believe there is less liability to sudden death in aortic, than in mitral, disease; and I will further add, that I believe the value of life, and the chances of its being prolonged, are greater in the same affection; for there is in it a compensating action set up, which does not and cannot exist in mitral disease.

And in reference to all cases of valvular disease, although we can never hope to remove the morbid deposit, yet that, even when the disease is somewhat extensive, life may be, not only prolonged to a considerable extent, but that little suffering may be felt, must have been observed by all who have had any experience in such cases; and, although it is our duty to warn our patients of the accidents to which they are liable, and the possibility of sudden death, yet it is equally our duty not to depress them with unnecessary alarm.

And in regard to treatment, one of the main points we should have in view is to prevent muscular degeneration, in addition to attempting to check further deposit in the valves.

[To be continued.]

UNNECESSARY CAUSTICS. In a paper in the *Glasgow Medical Journal*, Mr. Morton dilates very sensibly on the abuses made of caustics. "But though the scope of this paper has," he writes, "of necessity been limited, it may serve to show that caustics, as employed by many, are frequently unnecessary; when so, they are generally injurious; and that there are cogent reasons for the belief, that in some instances they aggravate the morbid condition already in existence, and hasten, if they do not cause, a fatal termination."