CLINICAL LECTURES
ON THE
PRACTICE OF PHYSIC,

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LECTURE V.

ON THE MORBID CONDITIONS OF THE HEART
AND CIRCULATING TUBES.

THE morbid conditions of the heart are almost of equal importance to those of the head. In many cases death is instantaneous; in others the rise and progress of disease is more slow and insidious, yet not the less fatal; in all, even the slightest symptoms are to be gravely considered, as ultimately they may induce consequences of a serious kind, though not a matter of certainty or necessity. Before entering upon the different forms of disease to which it is subject I shall offer you a simple sketch of the organ itself in its natural state, divested of all unnecessary detail, only with a view to bring freshly before you its healthy, compared with its morbid, condition. The heart, then, as you are aware, is a hollow muscle, containing four distinct chambers, involuntary in its movements, yet possessed of fibres similar to those of a voluntary muscle. It is of a conical shape, enclosed within its bag or pericardium, and is attached by the fibrous expansion of its pericardium, as well as by the great blood-vessels, to the thorax behind, though in a manner that permits of very free motion. Its base, where all these blood-vessels enter or emerge, lies as nearly as possible under the centre of the sternum, while its apex points towards the left, and ought to impinge in its contraction at a spot about two inches below the left nipple and one inch to the right side thereof. The size of the organ may vary a little in different individuals without the presence of any disease; but there is a general healthy proportion which it bears to the body, a rude yet useful-enough approximation to which is expressed by saying that the heart ought to be about the size of its possessor's closed fist. Of the four chambers into which it is divided inside, the two auricles are the smaller and the two ventricles much the larger, to external appearance. The auricles, however, as being more passive, are furnished with very thin loose walls, whilst those of the ventricles, and especially that of the left, are thick and solid. The chambers of the right side are devoted to the purposes of the pulmonic part of the circulation, by receiving the returning venous blood and projecting it into the lungs for aëration, whilst those of the left are devoted to the purposes of the systemic part of the circulation, by receiving the aërated blood from the lungs and distributing it through the body at large. These com-

bined portions act upon the principle of a double force-pump, as may be seen by tracing the course of the blood through them and watching their mode of operation. Thus we see, in the first place, that by means of the great systemic veins all the vitiated blood of the frame is poured into the right auricle by a continuous flow, without being shut up there by any perfect valve, the absence of which at this point conduces to safety; as in event of any stagnation in other parts of the heart there is no passing forward of the blood from this first chamber. There is a free natural passage backwards as well as forwards, though the partial closure of the Eustachian valve somewhat impedes the former motion, and the contractions of the auricles are so gentle that whilst they have no tendency to engorge with any vehemence the next chamber, neither do they produce any appreciable pulsation in the veins, which, when it exists, is owing to the regurgitation of blood during the more powerful action of the ventricle, when the auriculo-ventricular opening happens to be patent. But the auriculo-ventricular opening of the right side is naturally closed during the contraction of the ventricle, under the very act of this regurgitation; for the opening being surrounded by the three flat plates at the base of the auricle, to the edges of which are attached the tendons of the columnæ carneæ, or cross muscles of the ventricle, these, under the action of the columnæ carneæ and walls of the ventricle are so drawn up together that they constitute the complete valve called the tricuspid. Within this right ventricle, by means of its contraction and the intersection of its transverse fleshy columns, the varied returning fluids of the ordinary veins, the portal vessels, the lymphatics, and the chyle are all duly intermixed, and so propelled forwards to the lungs. For this purpose there is complete resistance to the regurgitation of blood, by the closure of the tricuspid valve, while the pulmonic semilunar valves are pushed forwards with ease, immediately clapping backwards as soon as the weight of the column above exceeds the force exerted from below. Having undergone a vivifying change in the lungs, the blood next returns to the left auricle by means of the four pulmonary veins, whose openings are even more patent than those of the systemic veins, and permit of free egress to the blood, whenever it is required. Again, however, we find the principle of the tricuspid valve repeated in that of the mitral valves, at the left auriculo-ventricular opening, and likewise the principle of the semilunar valves of the pulmonary artery repeated at the aorta. Such are the mechanical contrivances at the central organ of the circulation, which affords full means for its safety and efficiency. Strong as is the action of the heart, it ought not in a healthy person of moderate plumpness to be very apparent, except under excitement; nor if the lungs are sound ought it to give any dulness on percussion, except over two inches or so of the chest; and if emphysema exist there may be no dulness at all. Two sounds, however, ought always to be distinctly heard. The first, the more prolonged of the two, corresponding to the filling of the auricles and the emptying of the

ventricles, while the second corresponds to the flapping back of the semilunar valves. After these two sounds there is a pause of relaxation, equal in duration to that of the two sounds conjoined, the then contraction of the two auricles being apparently too gentle to elicit any appreciable noise. We talk of longer or shorter by comparison, for of course the longest is but very short in reality. Taking, for instance, a moderate pulse at 60 in the minute, and considering that 120 sounds are produced each minute, and that 240 would be produced but for the pauses, we find the longest sound of this slow pulse would be little more than a quarter of a moment. In a pulse of 120, very common under disease, it would be little more than an eighth; in one of 140, which is not uncommon, up to 160, which is rather uncommon, it would range from a ninth to a tenth of a moment. Such a view of the matter shows us very clearly to what a degree the ear must be trained and educated before it learns to discern with nicety any little alteration in their natural sounds; and points out with what assiduity a student should examine them on all possible occasions if he desire to compass their familiar acquaintance. As in most affections within the heart itself, evidence thereof will be sought for by an inquiry into the sounds elicited over the valves; it is a matter of great consequence to know their relative situation. Beginning with the first in the order of the circulation, we are to listen for the sounds of the tricuspid valve, a little to the right of the middle of the sternum, remembering, however, that we had better begin to listen at some distance from the spot, and so gradually approach nearer and nearer from different quarters in order to determine that they are loudest there; because all of them are so near each other, that if any of them happen to be very loud, it may be so propagated as to give room for mistakes. A murmur, if heard there with the first sound of the heart would prove regurgitation, and if with the second, some narrowing of the orifice. A secondary evidence of the regurgitation would be the jugular pulse, and an accompaniment of either condition would be a general tendency to venous congestion. With the like precautions we are to listen for murmurs from the next set of valves, viz., the pulmonic, over the centre of the sternum. These are very seldom diseased, and the murmurs might be confused with those from the aortic valves immediately behind; but if they be from the pulmonics, they will be very superficial, and will be propagated most towards the left-side, in the course of the pulmonary artery; yet even in that case let it be recollected that any solid body in the aorta pressing through against the pulmonary artery and there causing a bulging of its side, may give rise to a rough sound in its course, even whilst quite healthy. This was illustrated in the case of Shaw, whose aortic valves were found after death incrustated with phosphatic concretions, which, by their size, pressed through on the pulmonary artery, narrowed its calibre, and produced a murmur in its course. The murmurs of the mitral valve are to be searched for to the left of the sternum. If accompanying the first sound, they will indicate regurgitation, and if accom-

panying the second, a narrowing of the opening. Both would tend to produce an engorgement of the lungs. Those of the aortic valves are to be listened for in the same situation as the pulmonic, but they will be deeper seated, and heard most distinctly in the course of the aorta towards the right. If heard with the first sound they will prove a narrowing of the orifice, and if with the second, a regurgitation. In the former case, the pulse will be smaller than usual, and in the latter it will be jerking, or retrogressing, as it were, after the first bound. In either case the obstacle will be propagated backwards through the whole of the chambers, and will tend to induce an inclination to general congestion, and all the other consequences of an universally obstructed circulation. Such morbid murmurs may sometimes be produced by other circumstances than organic causes, as, for instance, an over liquidity of the blood, or its fibrinous condition producing clots in the heart; but these will not be so permanent and invariable as those that arise from organic changes. The tissues of the heart are a serous membrane on its inner surface, called the endocardium, the muscular substance of its walls, with the fibro-tendinous structures about its valves, and a serous pericardial lining outside. A large plexus of nerves, composed chiefly of the ganglionic system, with branches of the pneumogastric, lie at its base, and a series of ganglia are found throughout its substance. The whole organ, as a body, lies within its loose bag, reflected back, as it were, from its base. This pericardium consists of a fibrous membrane outside, lined by a serous membrane, which is reflected upon the outer surface of the heart. The inner surface of this bag may become filled with serum, pus, or blood, and cause an extensive dulness, along with faint sounds and motions of the heart; or it may become partially glued by lymph to the opposite surface of the heart, and cause a friction-sound at each motion, or impede the motion to a great degree.

In directing our attention towards the heart, which should be done in every case, but especially in rheumatism, a few seconds will suffice to prove that its action and sounds are natural. If there be any irregularity, our next inquiries must be as regards pain or occasional palpitation, or whether its motions be quicker or slower, or more or less forcible than they should be. We must also observe whether the dulness on percussion be more extensive than usual, whether the apex impinges at the wrong point, and whether the sounds be of one morbid character or another, and where heard most distinctly. These observations as to its degree of irritability, its physical magnitude, and its motions and sounds, include the whole chain of investigation. To be expert at this requires long practice, but its acquisition is worth any amount of labour. All of these symptoms must proceed, either from irregularity in the supply of nervous power, or from anæmia, or hyperæmia, or some perversion of the nutritive fluids. I shall first take notice of those ailments connected with enervation, and which need not detain us long. The irritability may be so increased under natural or accidental debility, that certain convulsive motions, called palpitation, may

arise from time to time, due to some cause of irritation, either in the stomach, bowels, uterus, or brain. In such cases the very slightest deviation from a state of ease in body or mind, will cause the supervention of a fit of palpitation, without any organic disease of the heart whatsoever. In event of the blood being very thin, which it generally is under such circumstances, there may be heard during the fit a slight blowing sound over the valves; but that will disappear again as soon as the circulation is quieted. These simple palpitations, though very annoying, are not of much consequence in themselves, but they are important as evidences of the debilitated state of the general constitution, and of the tenuity of the blood. They are most frequently connected with dyspepsia and chlorosis, but will accompany any exhausting disease, such as phthisis, or any extensive loss of blood, or long course of starvation, or anxiety of mind. In every case we have to remove any discoverable cause of irritation, and invigorate the constitutional powers by means of nutrients, tonics, and sedatives. With this view we may have to use emmenagogues in the event of a suppression of the menses, mild purgatives, stomachic bitters, and antacids in case of dyspepsia, carbonate of iron if the paleness of anæmia be present, and cod-liver oil if the patient be excessively thin. It will also be right to calm the irritability of the system by such sedatives as act more directly on the heart, as hydrocyanic acid, or a belladonna plaster; yet, combined with a tonic, which may be the muriated tincture of iron or the carbonate or Fowler's solution, or quinine, according to the conditions of other organs. Should the palpitation be chiefly traceable to mental emotions, then the tincture of castor oil will be found of much avail. But in every case the various appliances of a tonic regimen, must accompany the medicinal treatment, and open air recreation, bodily and mental employments short of fatigue and excitement, cold bathing, generous light diet, and a moderate allowance of wine or malt liquors, especially porter, should be enjoined.

As palpitation is a convulsive action of the heart, so cardialgia or purely nervous agony, is to be viewed as a spastic contraction of that organ in some of its fibres at least; so that they do not act in correct concert with one another. It may be very difficult to prove such an assertion by direct physical demonstration. Nevertheless, there is no reason to doubt that the fibres of the heart, may be affected by spasm, as well as those of the bowels; and reasoning from analogy, when we find pains of a like character in different parts of the body, we are entitled to attribute them to like causes. Much dispute arose on this subject when Lord George Bentinck died. Simply neuralgic pains may, perhaps, be distinguished from this affection; but I think there is little doubt that the very severe form of cardiac pain, called angina pectoris, is due, in its essential character of a pain, to some irregular and spasmodic action of the muscular fibre. The causes of this irregular action in that extreme case, may be the existence of a foreign body in the heart, such as a cancerous or osseous deposit, and shall be treated of under another head, but

its distinctive definition is that of a spasmodic pain, so that angina pectoris is to be viewed as a simple symptom, and not as a distinct disease, any more than the pains of rheumatism, or the headache of fever. Adopting this doctrine it will be unnecessary to allude further to this affection at present, than to say, that while it is an attendant upon different organic changes in the structure of the heart, it is also known sometimes to display itself irrespective of any physical change; yet, as in either case, it comes as a sudden pang and so departs, it must be considered in the light of a spasm. Should organic disease appear to be the cause, our attention must be directed to that source of excitement; but if it appear as a simple spasm, then antispasmodics must be chiefly relied upon.

In contradistinction to either convulsion or spasm, there may also be a paralysis of the heart. If this be partial, there may only be a simple depression of the heart's action as in typhus or other adynamic fevers, or under the influence of medicinal doses of hydrocyanic acid, digitalis and the like, or at most, we may merely have that milder form of syncope from which people may readily rally under the application of smart stimulants. This condition, as now stated, may proceed from direct impressions on the the cardiac ganglia themselves, as we know, that by the law of specific determination, several poisons of different kinds may be directed in a special manner towards those centres, or it may arise from causes primarily acting on the brain, or the peripheral expansions, as already stated in the lecture upon affections of the nervous system. Each of these causes, if sufficiently sudden or powerful, may induce a complete and permanent paralysis of the heart, under the name of fatal syncope. Mental shocks, the poisons of cholera or hydrocyanic acid, extensive burns or scalds, all act after this manner if in sufficient force. Rapid and instantaneous as death is under such circumstances, there yet occurs in most cases, a sufficient interval for the heart to make one final effort to propel whatever blood may be in it at the moment. This is proved by the almost universal, yet not necessary fact, of the organ being found empty of blood after death by syncope; for it is obvious, that if the paralytic shock were sufficiently rapid, and took effect at the precise point when the chambers were filled with blood, all further motion would be for ever arrested, and the organ would be found to remain as it then had been, namely, gorged with blood. The emptiness is only owing to the fact, that the shock is very seldom so rapid as we here suppose it might, and certainly could, be. I beg to call your special attention to this mode of reasoning upon such subjects, because it has been through the non-perception of it that so many disputes have arisen upon this and other matters of a like kind, each disputant basing his assertion upon certain facts frequently observed by himself, and furnished to him by others, as contrasted with other facts, which he has never observed himself, nor had furnished to him, except in limited number. Upon this simply numerical comparison he may either doubt the existence of the latter altogether, or else receive them as exceptions

to a general rule. In the latter case he encumbers his mind with a number of crude dogmata, each requiring to be bolstered up by a long series of such exceptions, whereas a really fundamental principle of philosophy can admit of no exception whatsoever; and we may depend upon this that, whenever we meet with such exceptions we have not yet carried our generalizations sufficiently far. Applying this rule to the question before us, it can admit of no doubt that, in almost every case of death by syncope, the heart is deprived of blood, and in but a few instances has it been found gorged. Nevertheless, these two facts are not contradictory of one another, neither is the latter less positive in its nature, because it may be the rarer of the two; nor is it an exceptional departure from any principle such as is supposed to govern the more numerous body of facts; on the contrary, they are but exemplifications of one principle, according to the degree in which it may be applied. A shock or injury of some kind penetrates to the nerves of the heart, and paralysis ensues. If not very severe, effectual re-action may supervene, and life be restored; or an ineffectual re-action may take place, so that the organ may continue a few faint, and far-between motions for some time; or it may give but three, two, or one beat more. But the injury may also be so powerful, that no re-action whatever takes place, so that without one further effort the organ may be stilled at once and for ever, under which circumstances the arrest, as a question of time, may certainly occur either during systole or diastole, and therefore the absence or presence of blood becomes a mere matter of accident, in proof of which Dr. Christison relates a case of gorged heart after a death of this kind. I am thus particular in inculcating the relative position which these facts bear to one another, because the confusion of essential with accidental occurrences, not only in this question but in most others, has too often characterized the reasonings even of very eminent men, and led them into unseemly contradiction to others quite as eminent as themselves. The evil arises from a deficiency in logical habits of thinking, whereby the clearness of abstract truth is obscured by the grossness of mere concrete forms; and separable accidents, merely because they may be very common, are mistaken for essentialities. To illustrate this unfamiliar point in a familiar manner, let me say that men are generally from five feet four to six feet high, and any departure above or below five feet eight inches, the medium, whether rare or common, is an accident. Men of five feet, or six feet and a half, may represent the very common fact accidental, while men of three or eight feet may represent the very uncommon fact accidental, yet both, as facts, are equally certain, and also equally accidental. There is no essentiality of man as connected with height, yet he who mistook the accident for the essential might proceed to deny, that a man could be either found of three feet high, or of nine, whereas both suppositions are not only possible but true. By the mode of argument, however, which I have employed, with regard to the fulness or emptiness of the heart after syncope, you will perceive that you are carried

superior to any such limited fields of experience; you become able to reconcile facts apparently at variance, and from your calmer altitude, you are placed above those petty differences and narrow views which must, of necessity, belong to the inhabitants of a lower atmosphere. I consider it not only my privilege, but my duty, thus to enforce those principles upon your minds which have relation to the conduct of the understanding in medical affairs. Matters of fact must necessarily be furnished to you in vast abundance, but they will be little better than a dead manure in your education, unless you be further vivified with a close and discriminating acumen that shall pierce into the pentalia of nature, and be able to select those essential elements of knowledge which constitute the sap of a wise judgment.

This paralysis of the heart being dependent on the diminution, the arrest, or the annihilation of its irritability, only one rule can be applied to its treatment, and that is the employment of stimulants. When the irritability is utterly exhausted, as in the cases of which I have been speaking, of course nothing whatever will prove successful. Yet there are many occasions where such an effect would seem to have been produced, and which doubtless would have continued till recovery was impossible; but in which death has been averted by the timely employment of the means of resuscitation. Thus, in syncope arising from loss of blood, we have already seen that life has been frequently preserved by the simple gravitation of blood towards the head, while the patient was laid with that part of the body very low. Likewise, under hydrocyanic acid, the action of the heart has been re-excited by a sudden dash of cold water, or the actual cauterization, or ammonia. It has already been observed that the latter agent is one of peculiar value in all cases of syncope, as from its gaseous form it may be almost instantaneously applied as a potent stimulus to the vast ramifications of those nerves of respiration, which likewise extend to the surface and tissues of the heart; whereas, any attempt to administer solid and fluid medicines during the syncope, would not merely be almost impossible under the circumstances, but highly dangerous, as tending to induce death by suffocation, even after the heart might have rallied from its torpor. The skin and the lungs therefore, must be the media through which we apply our stimulants in a case of syncope, and should the stomach contain any poison which caused the suspended animation, neutralising draughts had better be injected into that organ by means of a pipe, than poured into the mouth.