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Contributors

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CARDIAC DISPLACEMENT.

AN ADDRESS

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By BUCKMINSTER BROWN, M.D.

Reprinted from the Boston Medical and Surgical Journal.

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Mr. President and Gentlemen,—Every man, I suspect, who enters the ranks of our profession, if he has in truth and earnestness his heart in the work, will be found to have more or less partiality for some one of the various fertile and tempting fields which the numerous range of subjects. opened to him by his medical acquirements, spread before his view. This individual tendency, this petting of some one tendril, of the various branches into which the great trunk of medicine and surgery divides; be it denominated microscopy or chemistry, morbid anatomy or physiology, obstetrics or surgery, auscultation or ophthalmology, possesses for him a greater attraction than all the rest. This interest may be openly avowed, or scarcely acknowledged even to himself. Yet there it is, and its existence it were vain to gainsay. Our minds were originally constituted with this very end in view, and it is by such means alone that perfection can ever be attained. It is innate, and cannot be removed or rooted up, except by a new mandate from the Great Creator. This is a tendency, the action of which may be so regulated by the well-balanced mind, that it shall not produce an unhealthy state of things. Other equally important and valuable departments of the art, will not sink into insignificance in his eyes; and a thorough appreciation of each, will not be inconsistent with partiality for a subject for which he thinks his education, his habits of thought, or his temperament, may have peculiarly fitted him. Neither to such a mind need it be inconsistent with a profound knowledge and love of the various other fields of scientific research, which his professional studies present, each rich in material of practical interest, for thoughtful study, and for industrious investigation. If, however, on the one side indulging this propensity, he were to enlarge on *that* topic before the numerous audience which so constantly come up to our Saturday evening meetings, he would run the risk of wearying their patience and of failing to engage their attention; while, on the other hand, he would himself feel that any less than an extended and analytic view, would be doing injustice alike to his own labors, and the true merits of the subject.

It follows, therefore, that it is wisest, as a general rule, to leave these more minute investigations for the monograph or the brochure. At this time it is my intention to relate, somewhat in detail, a re-

markable and rare case of considerable interest, which has come under my observation.

Instances of non-congenital cardiac displacement, ectopia cordis, independent of thoracic disease, are very rare. Arising from such disease within the chest, as pleuritic effusion, hydro-pneumothorax, aneurism of the aorta, emphysema, diaphragmatic hernia, tumors, and possibly hypertrophy of the heart with dilatation, they have been not unfrequently met with.

As a form of congenital malformation, it has been described by various foreign writers, French and English, and the precise position of the organ in every case recorded, has been accurately defined. Displacement of the heart to the right has been found in nearly every such instance to be coincident with a similar transposition of the other organs. Two interesting and remarkable cases, highly illustrative of this general transposition of the viscera, have been minutely recorded ; one by Dr. Bryan, in the "Transactions of the College of Physicians of Dublin," and the other by Dr. J. M. Warren, in "the Philadelphia Journal of Medicine and Surgery." These instances are rare ; but cases in which this displacement occurs without such a reversed condition, are still more uncommon. Breschet, however, is stated to have dissected four cases in the Foundling Hospital at Paris, in which the heart was found on the right side, and all the other thoracic and abdominal viscera in their normal position. Similar cases, amounting to three or four more, have been described by Continental pathologists. It would appear, however, that they were stillborn, or died in early infancy. Dr. Stokes, in the Edinburgh Medical and Surgical Journal, No. 108, relates a remarkable and interesting case of dislocation of the heart from external violence. In this case there were two ribs on the left side fractured, and three on the right side, with the right clavicle and humerus. There was emphysema of the right side of the face and chest, and paralysis of the right arm, and upon examination it was discovered that the heart was pulsating at the right side of the sternum. There were no symptoms of pleuritic inflammation of the left side. The permanent symptoms were a short, dry cough, very frequent pulse, hurried respiration, inability to lie on the left side, and from time to time inflammatory attacks, accompanied by violent pain in the right side, with great increase of palpitation and dyspnœa. The pulsations of the heart could be seen and felt in the right mammary region, between the sixth and seventh ribs, within an inch of the sternum.

The precise classification of the following case, it will not, perhaps, be easy to determine. I find no case precisely similar on record. It is interesting from this circumstance, and likewise as it bears on some important points in pathology ; and it may be, that from a careful observation of the phenomena presented, some new physiological truths may be deduced, or some old disputed question clearly settled. If it belongs to the class of congenital displacement, it is, so far as I have ascertained, with one exception, the only instance where the subject of the malformation has survived the first few years. If it should be decided to have taken place

after birth, then in a pathological point of view it contains matter of deep interest.

J. S., a lad 10 years of age, was brought to me by his mother, to obtain advice for malformation of the chest. He is of slender form, light hair, fair complexion, intelligent expression.

On examination, I found the right chest projected an inch beyond the edge of sternum, forming an abrupt ridge, and there was also a depression, or, so to speak, an excavation of a portion of two or three of the ribs on the left. Pursuing my inquiries, I was informed that the patient had never suffered pleurisy, either acute or latent, or acute rheumatism, or any affection of the thoracic viscera. He had scarlet fever when 4 years of age, and that was the only severe attack of illness his mother could remember. On auscultation of the chest, I was surprised to find the maximum of the cardiac sounds on the right side; whereas, on placing my ear to the left of the sternum, over the normal position of the heart, its sounds were scarcely audible. On more minute examination, I discovered a complete displacement of the heart to the right side —that it was, in fact, more completely to the right of the sternum than it naturally is to the left. On percussion, the base of the heart could be defined nearly on a line with the second right rib, extending towards and slightly under the sternum, while its apex was at the intercostal space between the fifth and sixth right ribs. It appeared to extend down and to rest upon the liver. The outline of this latter organ, at the point indicated, could not be clearly ascertained, dulness being continuous from the one to the other. The liver was about two inches below its average normal position.

The size and position of the heart could be well defined anteriorly. Posteriorly, dulness extended somewhat beyond the normal dimensions. The respiratory murmur was nearly puerile on the left side, and feeble on the right.

On applying the stethoscope, the following phenomena presented themselves in succession. There was a strong aortic bellows murmur, commencing between the second and third rib on the right side, three quarters of an inch from the sternum. Following this, in the median line, the murmur gradually increased in intensity, and at the sternum amounted to a most remarkably loud blowing sound or roaring, which was heard at the upper part of the sternum and its immediate neighborhood. At the junction of the second right rib with the sternum, there was a distinct musical murmur, a cooing sound, resembling a suppressed whistle. This could be readily distinguished from the murmur before referred to, and apparently arose from a distinct cause. Both the cardiac sounds were audible from the apex to a point near the junction of the cartilage of the second right rib with the sternum, where the first sound was completely lost. The gradual diminution of this sound could be traced from a spot corresponding with about the centre of the heart to the point indicated. A slight movement of the stethoscope in a retrograde direction, and the primary sound again became audible. The second sound was best pronounced between the third and fourth right ribs.

At a subsequent examination, a rough or sawing sound was heard at one spot during both the systole and diastole, taking the place of the bellows murmur. This point was probably directly over the aortic valves. Upon moving the ear upon the chest towards the left, the bellows murmur was again heard, and in place of the diastolic *bruit de scie* was heard the roucoulement or musical whistle, affording another proof that under certain circumstances there was regurgitation. The bellows sound was not at all times equally well-marked, and the occasion of this variation could not be clearly ascertained. It could not be traced to active exercise previous to examination producing an undue acceleration of the stream through the cardiac orifices, for there had been no unusual exertion. It probably occurs whenever the heart, becoming more embarrassed, more crowded, is forced, in order to relieve itself, into unwonted action, or perhaps from some disturbance of the circulation consequent on mental excitement. The abnormal sounds were most distinct during expiration, when the parietes of the thorax were depressed.

The state of things above described was confirmed by several examinations under different circumstances, and at various times, extending through the months of December, January and February, 1847 and '48. Drs. J. C. and J. M. Warren, J. B. Brown, Gray, Morland, and Oliver, examined the case with me, and verified the above particulars.

The constitutional symptoms at this time were, severe and constantly recurring headache, accompanied by throbbing in the temporal arteries, dyspnœa, palpitation, pain in the joints and limbs, particularly in the arms, running from the shoulder down to the wrists, dyspepsia attended by pain in the stomach after eating, cough at times accompanied by copious expectoration. There was general debility. His sleep was unnatural, broken by sudden starts, dreams, great general uneasiness, together with noisy respiration; and constantly accompanied by a suffused face and copious perspiration, so profuse as to keep his clothing wet through during the night. There was extreme nervous excitability. Pulse irregular and intermitting, eminently a jerking pulse.* He had frequent attacks of dizziness, which would come on suddenly and deprive him of power to command his limbs and cause him to fall. On one occasion he fell down stairs from this cause. He was not exempt from these attacks even when perfectly at rest. Frequently, when sitting still, he would suddenly exclaim that the room was whirling round. He had at times pain in the left side. Blueness about the sides of the neck, throat and face, was also a prominent symptom, and a marked feebleness of the left arm.

The etiology, diagnosis and prognosis in such a case as this, are all matters of extreme interest. We would endeavor to ascertain, in the first place, when and how the displacement originated. Second, what is the situation of the various organs within the chest,

* Which has been said to be characteristic of regurgitation.—*Watson's Pract. Physic*, p. 603. Hope makes the same statement, on Diseases of the Heart, p. 579.

which has given rise to the phenomena we have noticed? and third, what will be the probable result?

Of the early history of the case I was able to learn but little that was of importance. The mother, however, felt convinced that the deformity of the ribs had always existed to a certain extent, but within a year it had been rapidly increasing.

Among the causes to which we may ascribe displacement of the heart, effusion into the cavity of the pleura is undoubtedly the most constant. This displacement is well known to be a frequent attendant on emphysema and hydro-pneumothorax; so frequent, that it has been stated to be pathognomonic of these diseases. It may take place either to the right of the sternum, when there is effusion into the left pleura; or when the disease affects the right side, the heart may be displaced far to the left, and has been found pulsating in the left axilla. But in these cases the ectopia was always dependent upon the disease, and upon its removal the heart has again gradually or suddenly resumed its natural position.

To account, then, for the permanent displacement, we might in the first place have concluded that severe inflammation in the left chest had produced extensive thoracic adhesions, followed in course of time by the depression of the ribs which was here observed occupying the precise situation of that part of the heart which should have been to the left of the sternum. Upon this theory we might presume that during the process of absorption of the fluid the contiguous surfaces of the mediastinum, pleura-costalis and pleura-pulmonalis, were united by adhesive lymph, and thus the return of the parts to their normal position effectually prevented. Or we might suppose it to have arisen from acute pleuritis on the right side, which had terminated in consolidation of the lung with atrophy, together with a consequent hypertrophy of the left lung, or from tuberculous disease having produced nearly the same condition, by which the heart was *drawn* instead of pushed towards the right.* In the case before us, however, neither the physical signs, nor the general preceding or present symptoms, were such as to warrant such an etiology. The respiratory murmur was nearly puerile on the left side, and comparatively feeble on the right, but it was in no part absent, or so feeble as to indicate the state of things referred to. There was a greater extent of dulness on percussion at middle and lower back, than the simple position of the heart could well account for, allowing that it was of normal size. The compression to which the lungs were here subjected would for this afford a satisfactory explanation.

Was it, then, one of those curious instances before referred to, in which the position of all the organs was congenitally reversed: the liver, the ascending colon, &c., on the left; the heart, the stomach, the spleen, &c., on the right? This evidently was not the case. Percussion proved that these organs, with the exception of the heart, were in very nearly their natural situation.

Did the displacement, which was now for the first time discover-

* See two cases in Walshe on the Heart and Lungs, American edition, p. 153.

ed, occur previous or subsequent to birth? This is an interesting question, and somewhat more difficult to settle. If the position of the heart had been *simply* congenitally changed from the left to the right side of the chest, its apex would have pointed towards the right, and it would have taken its natural oblique direction upward. Whereas the apex still pointed towards the left.

Again, was it not a consequence of pressure exerted upon the organ after birth, by the parietes of the chest? This conjecture suggests what is perhaps the true history of the case.

But before we are in a condition to make this point so far clear as to fully account for the abnormal sounds, it is important for us to examine a question of more general application, and ascertain what light, if any, the case before us will throw upon the physiology of the heart's action and the evidence it offers in regard to the cause of the cardiac sounds. The phenomena observed, if carefully followed out, are perhaps capable of affording assistance in discovering their true origin, or of furnishing additional evidence in favor of some one of the existing theories. The cause of the second cardiac sound has, I apprehend, been sufficiently ascertained to render all further proof in respect to it unnecessary. But what especial action of the heart it is, which gives rise to the first sound, has not as yet been so satisfactorily settled. When we are told of a large number of remedies which are stated to be applicable to a particular disease, and when we learn that every new remedy discovered is employed for the cure of said disease, and for a short time is considered reliable, we feel well assured that the disease in question is for the most part, notwithstanding all these specifics, still incurable. So in regard to the primary cardiac sound, the numerous diverse and sometimes conflicting theories which have been given to account for its production, afford of themselves a sufficient guarantee that the true origin has yet to be discovered, or that new and reliable evidence is still requisite before the question can be definitely settled.* In order thoroughly to examine this question, it would be indispensable to enter into a discussion of the various theories of Hope, Walshe, Watson, Latham and others, which our time on the present occasion will not permit. We will now, therefore, simply inquire into the probable origin of the most prominent symptoms.

The cause of the displacement and of the accompanying physical and constitutional symptoms, was in all probability as follows. By the gradual incurvation, perhaps rachitic, of the ribs on the left, the heart had been gradually displaced behind the sternum, and finally, through the medium of the pulmonary tissue, still pressed upon by the increasing alteration in the form of the costal arch, it had been pushed far over towards the right. We may sup-

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* "About the efficient cause of the first normal and natural sound of the heart, there is, I am afraid, a great deal still in debate. After many direct experiments, still physiologists do not agree."—*Latham's Clinical Lectures on Diseases of the Heart, Vol. I., p. 7.*

"The difficulty of unravelling the mechanism of the healthy sounds of the heart, is emphatically proved by the fact, that from the time of Laennec to the present day, at least twenty-nine theories have been proposed in its explanation."—*Walshe on the Heart and Lungs, American edition, p. 187.*

pose that this change had occurred in the latter stages of fœtal existence, or during early childhood. During the process there must unavoidably take place a considerable degree of distortion and irregularity in the course of the great vessels taking their origin in the translated organ, by which their relative size would be diminished, thus presenting a certain amount of obstruction to the current of the blood to, and from, the heart. We know that if any obstacle occurs at the commencement, or during the course of the stream by which its flow is interrupted, or its relative size is changed, the bellows murmur will be produced in tones greatly varying according to the extent and amount of impediment. Walshe, in reference to this subject, says—"Mere alteration in the direction of the current, of a kind to throw the blood obliquely against an orifice, instead of carrying it directly through, will theoretically generate murmur. Probably this plays a part in many direct valvular murmurs."* Watson, also, very clearly illustrates the well-known law in physics by which this fact is explained. He says—"The blowing sound may be occasioned by any change which alters the due proportions between the chambers of the heart and their orifices of communication with each other and with the bloodvessels that respectively enter or leave them; it may also be occasioned by a preternatural velocity in the passage of the blood through a healthy and well-adjusted heart." Dr. Elliotson, I think it is, who has offered this apposite illustration of the phenomenon. If the arches of a bridge have a certain relation to the quantity of water in the river, and to the force of the current, the water passes through them quietly and without any noise. Diminish the size of the arches, and the water begins to go through them with an audible rushing or roaring sound. The very same thing will happen if the arches remained unchanged in size, but the quantity of water in the river, and therefore its velocity and force, be augmented by heavy rains. So it is in the heart. If one of its orifices—say the aortic orifice—be narrowed by disease or in any other way, the blood will not as before glide through it smoothly and without noise, but will yield that sound which we call a bellows sound; so also if the orifice retain its natural dimensions, but the capacity of the cavity from which the blood is driven be augmented."†

The unnatural change of position which the heart had undergone in the case under consideration, furnished all the requisite conditions for the production of the bruit de soufflet, and we have it in its most intense degree. The musical cooing and whistling notes to which we have referred, would require an additional cause, and were perhaps attributable to some abnormal development or action of the valves.

In connection with this case, and in conclusion, we may briefly refer to other curious and extraordinary instances of cardiac displacement, in which the heart has occupied situations in various parts of the thoracic and abdominal cavities, that have been narrated by European observers. A case closely resembling that which

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* Walshe on the Heart and Lungs, American edition, p. 206.
† Watson's Practice of Physic, pages 591 and 592.

has been above described, is related by Dr. Kennedy, of Dublin. "A respectable middle-aged woman presented herself at the Dublin General Dispensary, complaining of dyspnœa and distressing palpitations. On examination with the stethoscope, it was discovered that the heart was pulsating at the right side, and no disease could be detected in any of the thoracic viscera to account for the displacement, in addition to which the woman positively avowed that she had felt her heart beating in the same place as long as she could remember! The physician to whom we are indebted for these particulars, seemed to entertain but little doubt that the displacement in this case was congenital." A displacement has been described by Parmel in which the heart was situated in the abdomen, occupying the place of the stomach. The patient was a girl, 10 years of age. Another is related still more extraordinary, in which it was found in the place of the left kidney in a man who lived to mature years, and at last died of renal disease. Three cases are likewise detailed in which the heart was situated in the neck. In most of these cases the arrangement has been such as to afford the vessels fair play. But in those where the displacement is non-congenital, there is necessarily more or less disturbance of the heart's action before it can accommodate itself to its new position. Add to this the increased obstruction from pressure, and we find perhaps a sufficient explanation of the phenomena observed, without diagnosticating severe valvular disease. Where the displacement is considerable, the consequences, independent of disease, must be most serious and detrimental; but even to these, the powers of nature are undoubtedly in time capable of adapting themselves.

Treatment.—The treatment recommended in this case was simply hygienic, and the use of gentle gymnastic exercises. In other words, very accurate attention to the state of the general health, to diet, atmospheric influence, and avoidance of mental labor; combined with active exertion of those muscles whose function it is to expand the chest, and thus by a gradual increase of the thoracic cavity relieve the enclosed viscera, and permit, if possible, the return of the displaced organ to its normal position.

Before concluding this paper, I should be doing injustice to my own feelings, as well as to yours, if I did not allude to the great loss which we have experienced since last we met together. One who has often at our meetings enlightened us by his practical knowledge and scientific research, whom we all highly respected as a valued professional brother, and to whom some among us were bound by the closer tie of personal intimacy and esteem, has passed away. This is not the time to speak his eulogy. That has been done by others, and a series of resolutions bearing testimony to our regard for Dr. Parkman, have been placed upon record. But a passing tribute to his memory is appropriate both to the time and the occasion.