REPORT

ON

A CASE OF ANOMALOUS CARDIAC MURMUR*.

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AND

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REPORT ON MURMUR BY DR. GAIRDNER.

THE considerations which seemed to render expedient the very careful and thorough investigation by Dr. Knox of the preparation now reported on were partly anatomical and partly clinical. It will be remembered, that the cardiac symptoms in the case presented last session were by no means prominent, and, indeed, except from the point of view of physical diagnosis, they were not a very important part of the record then presented. The really fatal symptoms were shown by the *post mortem* examination to have had their origin in a widely diffused melanotic cancer of the abdominal, and also of the thoracic, organs, chiefly, however, in the peritoneum; and the whole duration which could be definitely assigned, after most careful inquiry, to the fatal illness, was not more than four weeks. (See BRITISH MEDICAL JOURNAL, April 10th, 1875.) In the course of the investigation of the antecedents, a rheumatic history was plainly enough elicited, a severe attack of rheumatic fever four years before having confined the patient to bed for five months, and two less severe attacks subsequently having occurred, all of them, however, ending in apparent recovery, and without any such positive injury to the cardiac functions as could be verified through the statements of the patient, unless it were in respect of a degree of palpitation felt on exertion. It was ascertained that the dropsical symptoms present on admission had originated in the abdominal cavity, and the amount of altered structure which could be physically determined as existing there made it at least unnecessary to look to the heart as the cause of the dropsy; while, in other respects, the aspect of the patient was by no means that of severe cardiac disease, and there was, in particular, an entire absence of cyanosis. Under these circumstances, a murmur of peculiar intensity and harshness, extremely superficial in character, and associated with a distinct fremitus appreciable by the finger over a limited area, corresponding almost exactly with the position of the *conus arteriosus* of the right ventricle, at once attracted attention. The murmur was much more widely diffused than the fremitus, but appeared to have almost exactly the same origin or centre of diffusion, and a slight but quite unequivocal forward pulsation, both visible and tangible, in the same situation, appeared to emphasise, so to speak, the other physical signs; the whole of these phenomena coinciding with the ventricular systole, while the second sound was exaggerated, and only questionably attended by murmur. There was little doubt entertained during life that the murmur was endocardial, and its detailed description, as given below, was the result of several concurring and most deliberate observations, the facts being recorded with the utmost exactness possible, owing to their very unusual character; and all the more carefully on account of the absence of distinct signs of hypertrophy of either the right or the left ventricle, and of all the more marked symptoms to be expected in a case of mechanically obstructed circulation. The absence of cyanosis was specially noted in a brief summary of the symptoms during life, from the strong presumption arising that the murmur had its origin in the right side of the heart, if not in the pulmonary artery. The very remarkable *post mortem* appearances tend to give importance to the whole details of the clinical investigation; and these are accordingly submitted *verbatim*, without any other commentary in the meantime, than that which has been attached to them by Dr. Knox.

Mrs. S., aged 40. History of fatal disease, recorded in transactions of the Pathological and Clinical Societies, in BRITISH MEDICAL JOURNAL, April 10th, 1875.

Details of Physical Signs, as regards the Heart.—The cardiac percussion was by no means very much altered, in so far as it could be distinctly made out; the left margin, however, being obscure, and

there being perhaps a slight extension of dull percussion towards the base. The apparent apex-beat was in the fifth intercostal space, rather outside the vertical line of the nipple, and a little over four inches to the left of the mesial line. The sounds in the apex-region, and over the aorta, as well as over the vessels in the neck, appeared to be only altered through the conduction of the murmur presently to be described. Over the lower and outer part of the third left costal cartilage, at a point less than two inches from the middle line, and about one inch or more from the sternal border, a very loud superficial murmur (coinciding with a fremitus, and perhaps a certain degree of forward pulsation) was heard, occupying the whole of the ventricular-systolic rhythm, and followed by a sharp, well-defined, and somewhat exaggerated second sound, with slight roughness, perhaps amounting to murmur. The ventricular-systolic murmur was so harsh and superficial as to be quite *sui generis*, all the more that it had a kind of occasional, but only occasional, quality at the beginning almost amounting to a *crepitus*; but, in the main, it appeared to Dr. Gairdner more blowing than anything else. The murmur, obviously originating in the situation above described, and just at the upper edge of the cardiac dull percussion, was communicated in all directions, though with distinct loss of intensity. The fremitus was distinct in the third left intercostal space, and at the lower margin of the third cartilage, but was almost lost over the fourth cartilage; and its whole area of greatest intensity was comprised in a circle not more than one-and-a-half inches in diameter, and corresponding accurately with the third intercostal space, at the distance from the middle line above noticed. The point was also the seat of a distinct visible pulsation or undulation, which was appreciable also by touch, and was apparently synchronous with the apex-beat, although from the comparative feebleness of the latter, and its want of visibility, the minutest synchronism could not be ascertained. [My ultimate opinion was, that the pulsation over the *conus arteriosus* was, perhaps, momentarily postponed to the apex-beat; but, being afraid of being influenced by theoretical considerations, I declined reporting it.] The cardiac sounds were communicated to the back of the thorax, but the murmur is comparatively indistinct.

Dr. Gairdner, in the course of some verbal remarks, further alluded to two cases which had at long intervals been under his observation, which might probably have points for comparison with the present case, but where, from both the subjects of them being alive and likely to live, he felt precluded from entering on minute details. In one of these cases a loud murmur, commencing in early youth, had somewhat changed its character and position so as, instead of a pulmonic, to be rather suggestive at its later stage of an aortic murmur. In the other case, traces of cyanosis and other phenomena in addition to the murmur, suggested disease of the right orifices of the heart. In this case, also, the disease began early in life; but, although the murmur persisted without any important modification, the subject of it has grown up into an apparently hale and fairly robust young man, who is quite able for all the usual exercises of his age and position in life. The murmur in both cases is with the first sound only, but singularly loud, superficial, and prolonged. There being no obvious rheumatic or other cause, the question of a congenital origin might be entertained, but an exact determination of the point seems impossible.

REPORT ON HEART BY DR. KNOX.

The heart weighed $7\frac{3}{4}$ ounces. The walls of the various cavities seemed normal. The *mitral* and *tricuspid* valves were also nearly normal, the septal segment of the latter valve being, however, very large and loose, so as to give almost the appearance of two segments fused into one. The *pulmonic* valves were slightly larger than usual; their lunated margins were very large and loose, and the sinuses very deep. The valve-segments were not of equal size, the anterior being rather smaller than the other two. Immediately opposite this segment, and in the interval between the other two, there was a small sacculæ which might hold a barleycorn. This looked like a rudimentary valve-segment. It was adherent partly to the right segment, and measured 0.15 inch across, and 0.2 inch in depth. The pulmonary artery was considerably dilated, but the valve was quite competent. In order to determine exactly the shape of the segments as well as the amount of dilatation of the artery, casts in plaster of Paris were made of the interior of the artery and of the upper surface of the valves, and again of the interior *conus arteriosus* with the lower surface of the valves. The circumference of each cast was taken at the level of the upper and lower borders of the valve-segments. These measurements were found to be exactly equal, viz., 3.75 inches. The aortic valve was competent and symmetrical, the sinuses deep, the segments large, and their lunated borders projected upwards, as in the pulmonic valve, more than usual. The aorta itself was much dilated, and its inner surface was rough from patches of atheroma. The opening leading

* Read before the Glasgow Pathological and Clinical Society.

into it from the base of the ventricle was very small; it measured in circumference (the measurement being taken immediately below the valves) only 2.3 inches, while the aorta, measured on a level with the free border of the valves, had a circumference of 3.4 inches, the upper part of the tube exceeding the lower by 0.9 inch.

The abnormality in the valves of the pulmonary artery appears to be so slight as hardly, by itself at least, sufficient to account for the physical signs observed during life. On the other hand, the state of the parts at the root of the aorta was very unusual and peculiar, and suggested the possibility of an aneurismal condition. The observations upon other hearts which I have since made, and which I here detail, seem to me to confirm this view.

I obtained a number of hearts from the dissecting-room, and made casts of the orifices of the great vessels both above and below the valves. On examination of these casts, I found that, in the majority, the most constricted portion was immediately above the valves and sinuses of Valsalva; the artery, e.g., the aorta, widening out above that line into the great sinus, and widening also below the line into the sinuses of Valsalva. Immediately below these latter sinuses again, and on a level with the base of the ventricle, is the next most constricted part of the vessel. Particulars of these measurements, together with other particulars of the sex, age, and cause of death of the patient, and of the weight of heart in each case, are given in the accompanying table.

Measurements of the Pulmonic and Aortic Orifices of various Hearts made immediately above and below the semilunar valves. Taken from Casts in Plaster of Paris of the interiors of the Arteries and Ventricles.

No.	Sex.	Age.	Weight of Heart.	Cause of Death.	Circumference of Pulmonary Artery.			Circumference of Aorta.		
					Upper.	Lower.	Difference.	Upper.	Lower.	Difference.
25	F.	46	10¾ oz.	Bronchitis	3.05	3.4	+0.35	2.95	2.95	0.
30	M.	59	10	Ditto	3.7	3.8	+0.1	3.16	3.36	+0.2
33	M.	60	12½ "	Ditto	3.4	3.8	+0.4	3.2	2.86	-0.34
34	M.	42	6	Phthisis pulmonalis	2.60	3.30	+0.7	2.5	2.6	+0.1
35	M.	36	7¾ "	Renal disease	2.95	3.4	+0.45	2.8	3.1	+0.3
36	F.	30	11¾ "	Phthisis pulmonalis	3.0	3.6	+0.6	3.2	3.2	0.
37	M.	60	11¾ "	Bronchitis	3.3	3.9	+0.6	—	—	—
39	M.	51	11¾ "	Ditto	3.35	3.9	+0.55	2.8	2.95	+0.15
42	M.	27	9¾ "	Phthisis pulmonalis	2.75	3.2	+0.45	2.95	3.2	+0.25
43	M.	57	14½ "	Bronchitis	—	—	—	3.0	3.3	+0.3
44	M.	57	—	—	—	—	—	3.25	3.55	0.

It will be seen that, in all the pulmonary arteries, the lower measurements are the larger, the difference varying from 0.1 inch to 0.7 inch, the mean difference being 0.42 inch. In the case of the aorta, the lower measurement is the larger in six specimens, the difference ranging from 0.1 inch to 0.3 inch. In three specimens, both measurements are equal, and, in one specimen, there is, so to speak, a minus difference; that is, the lower opening is smaller than the upper by 0.34 inch, the conditions being similar to that seen in the heart of Dr. Gairdner's patient. Excluding this last case, the average measurement of the upper opening is 2.96 inches, and of the lower 3.11 inches; while the mean difference or excess of the lower measurement over the upper is 0.115 inches.

I was not myself disposed at first to lay much stress upon these measurements, seeing that they were all obtained from subjects who had died of diseases in which the heart and its great vessels were implicated to a very considerable extent, and in which reflected pressure from the pulmonic or systemic capillaries, or other causes, might have distorted, and even altogether reversed, the normal relations and proportions. But in a paper by Dr. Chevers, in *Guy's Hospital Reports for 1842*, in which the results of my investigations have been so far anticipated, the accuracy of the general result stated above is confirmed by measurements of healthy hearts specially selected for the purpose. Dr. Chevers describes the orifices of the aorta and pulmonary artery as short tubes beginning at the bases of the ventricles, and ending at the constrictions above the sinuses of Valsalva. The circumference of the upper part or outlet of this tube, taking the mean of eight specimens, was found to be 34 lines, while the lower orifice or inlet measured 36½ lines; thus giving a mean difference of 2½ lines, or 0.2 inch in favour of the lower orifice. Dr. Chevers does not give any measurements of the pulmonary orifice, and therefore other observation on the healthy heart must be made before it can be seen how near to or how far from the normal average are the measurements given in my table.

When now we compare these measurements and proportions with the corresponding measurements in Dr. Gairdner's specimen, the abnormalities stand out in a remarkable manner. In the first place, in the pulmonary artery, the outlet and inlet of the tubal orifice are of the same circumference, 3.75 inches. This is much larger than the standard measurements of Drs. Reid and Peacock; but, in order to compare it with those measurements, we must remember that they

are the measurements of the outlet only. Dr. Peacock gives the average measurement of the outlet of the pulmonary artery in the female as 3.493 inches, and Dr. Reid as 3.5 inches. Judging by my table of measurements of the relation between outlet and inlet, I am inclined to think that in this specimen the pulmonary artery is somewhat dilated, while the conus arteriosus remains nearly normal. In the second place, in the case of the aorta, we find an entire reversal of the normal conditions. Instead of a somewhat conical tube gradually contracting towards the outlet, we have one suddenly contracted at the inlet, and as suddenly again expanding till it considerably exceeds its normal size.

The question of what is the actual amount of contraction or dilatation of the several parts of this orifice is an exceedingly nice one. I may at once say that I believe the inlet to be contracted and the outlet dilated, so that both being abnormal, it will not do to judge exactly of the one by the other; still it is instructive to do so to a certain extent. Thus, if we were to consider the outlet of normal size, then the inlet, according to Dr. Chevers' rule, should be 3.6 inches instead of 2.5 inches in circumference; or, conversely, taking the inlet as normal, the outlet should be 2.3 inches in circumference instead of 3.4 inches.

We may, however, freely compare this aorta with the standard average measurements of Drs. Reid and Peacock. According to the former, the average circumference outlet of the aorta in the female is

3.0 inches, according to the latter it is 3.019 inches; while my own case give 3.07 inches. In Dr. Gairdner's case, in other respects a small heart, it is 3.4 inches.

Again, we may view this orifice in its relations to the other orifices of the heart, especially the pulmonic. Dr. Herbert Davies (in the *Proceedings of the Royal Society*, 1870, p. 265) has shown that the four orifices of the heart stand in a very simple relation to each other. His "law of the orifices" is this; 1st, that the area of the tricuspid stands in the same ratio to the area of the mitral as the area of the pulmonary artery to the area of the aorta; and 2nd, that this ratio between the areas is a constant one, its coefficient being 1.3 to 1.4. Stated in mathematical form this ratio becomes

$$\frac{T}{M} = \frac{P}{A} = 1.3$$

Calculating the areas from the formula for the area of a circle, area = $\pi \left(\frac{\text{circ}}{2\pi} \right)^2$ we find the area of the pulmonary artery is 1.119

square inches, and the area of the aortic orifice is, outlet 0.919 square inch, and inlet 0.497 square inch. According to Dr. Davies's formula, the ratio of the outlet of the pulmonary artery and aorta is $\frac{1.119}{0.919} = 1.22$; and of the inlets, $\frac{1.119}{0.497} = 2.25$.

The first of these ratios is rather less than normal (1.3), while the second is considerably greater than normal. Supposing the area of the pulmonary artery to be normal, then, according to Dr. Davies's rule, the area of the aortic outlet would be 0.86 square inch, while the inlet would have very nearly twice its present area.

I hope I have now made it sufficiently evident, 1st, by a comparison with normal measurements; 2nd, from the point of view of Dr. Chevers's rule; and, 3rd, according to the law of the orifices of Dr. Herbert Davies, that, in this case, we have a dilated pulmonary artery, and an aneurismal condition of the root of the aorta.

[Dr. Knox exhibited to the Society numerous plaster-casts which he had taken, and made some suggestions, founded on the anatomical facts, as to the possible cause of the murmur heard during life. The dilated aorta, no doubt, pressed into the posterior wall of the conus arteriosus dexter and the root of the pulmonary artery, so that it was possible that the exaggerated pulsation in the aorta produced an indent-

ation of these parts sufficient, by obstructing the flow of the blood from the right ventricle, to cause the blowing murmur heard during life. Or, the murmur might be due to the discharge of the blood from the contracted orifice of the left ventricle into the suddenly dilated aorta.]

REMARKS

ON

GLAUCOMA AS A NEUROSIS: WITH AN ILLUSTRATIVE CASE.

By JONATHAN HUTCHINSON, F.R.C.S.,

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I HAVE often and long ago indulged in the expression of a conjectural opinion that glaucoma is a neurosis, and that the immediate cause of the tension of the eyeball is tonic contraction of the sclerotic, and not any increase in the fluid contents of the organ. I have also sometimes remarked that its closest pathological analogue is the curious contraction of the palmar fascia, not unfrequently met with in middle-aged and elderly persons. Such opinions may to some seem rather fanciful; but, in spite of that defect, I feel convinced that they are worth thinking about. The contraction of the palmar fascia to which I refer, is usually seen in front of the ring finger, and often involves the little finger also. It gradually and surely puckers up the skin and deeper parts a little below the finger cleft, and pulls the first phalanx down towards the palm. The skin and fascia become adherent together, but there is never any pain or inflammation. It occurs as frequently to those who do not do any work as to those who use tools, and probably has no connection with local irritation. Excepting that it sometimes happens to gouty persons, we can offer no conjecture as to any state of health which predisposes to it. It never occurs to young persons, is rare before middle age, and most frequent in early senile periods. It usually begins in one hand, and, after a while, attacks the other also. It is irremediable. In most of these features it much resembles chronic glaucoma. I admit that we have no rapid cases which might correspond with acute glaucoma; but then probably the sclerotic coat of the eye contains elements far more closely resembling non-striated muscular fibres than does the fascia of the palm. To this latter fact I would also refer, in explanation of the circumstance, that, whilst in the palmar disease there are manifest thickening and adhesion of tissues, none such have as yet been proved in glaucoma. The operative measures, iridectomy, sclerotomy, and the like, are such as would be not unlikely to be useful if the theory suggested were true, while it is somewhat difficult to explain their action under other hypotheses.

Whether we accept or not, as plausible, the sclerotic-contraction theory of glaucoma, we can, I think, feel little hesitation in admitting that both glaucoma and contraction of the palmar fascia are neurotic lesions. They are neither of them merely local, and neither has probably much to do with the blood. It is rare, in the highest degree, to find either of them synchronously symmetrical, whilst both are usually bilateral in the end. This fact fits well with what we know of some other ailments, the result of nerve-degeneration. Both occur at periods of life when such degenerations are not uncommon.

When I began this paper, I scarcely intended to say so much on this supposed parallel; my object was rather to narrate a case in which glaucoma, with unusual features, and contraction of the palmar fascia are present together, and in which there is evidence of progressive disorder of the nerve-centres. The case is one of considerable interest in many directions, though, I must admit, of much intricacy. Certain lessons may, however, I think, by those who can give attention to detail, be learned with tolerable clearness from it.

Mr. K. is an intelligent farmer, now aged 48, of a family in which nervous disorder has repeatedly shown itself. One brother has been several years in an asylum, having become insane (a harmless quiet form) after some business anxieties. Another brother was liable to attacks of inordinate sopor, and used to sleep for several days and nights consecutively. He had several attacks of this liability, on each occasion after a very severe cold, and the last ended in death. His case has formed the subject of an able narrative by Dr. Ward Cousins of Portsmouth, in the *Lancet* some years ago. My patient considers that he was, when at school, a delicate lad; but, in later life, his state of nervous health was such as to enable him to be quite successful in his business. He never married; was always continent, and suffered from boyhood onwards from nocturnal emissions. He has lived

a very steady life in all respects, having never either drank or smoked to the least excess. It may be noted, in passing, that three other brothers have remained unmarried, two of them being those whose cases are referred to above. The third celibate is a florid healthy man. Mr. K. himself is pale, and rather thin; but there is but little in his manner which would lead to a suspicion of sexual debility. He utterly denies masturbation. The ailments from which he has suffered may be mentioned in the following order, which is nearly that of their development.

Dyspepsia, with constipation and flatulence;
Difficulty in sleeping;
Lassitude and want of strength;
Slow development of cataract in the right eye, followed after several years by glaucoma;
Absolute blindness, and great increase of tension, with an *abnormally deep anterior chamber, and an iris which still acts vigorously when the sound eye is stimulated*;
Distressing liability to giddiness;
Contraction of the palmar fascia in the right hand;
Pain in the occiput and neck;
Feeling of stiffness and numbness in the right arm and right side of the chest;
Inability to attend to his business or exert his mind, although his mental faculties remain perfect.

Mr. K. has been under my observation, with long intervals, for the last twelve years. At first, he was out of tone, dyspeptic, and "hypochondriacal"; but, by degrees, more special conditions were developed. In July of 1874, he came to me after an interval of several years, and I found that cataract had formed in the right eye. Of this I had known nothing before. He thought the eye had been ailing for five or six years. During the last three months he had experienced much pain in the eye, the severity varying much at different times. The tension was slightly increased, the cornea looked a little dull, and the iris wanted lustre. Although the pupil acted fairly to light, it dilated but very little when atropine was used. The anterior chamber was deep. The iris was thought to be a little tremulous. As the eye was blind and the failure had been slow, I did not advise an operation.

In January of 1875, I saw him again. The eye was now quite blind, but without pain. He considered that it had been blind for several years, and before the attacks of glaucomatous pain described in the previous note. The cataract was of a dirty brown colour. The increase in tension was very decided. He complained that his head symptoms had greatly increased of late. He had become more and more sleepless, and asserted that he never "could get more than half-asleep". It appeared that his want of good rest was probably a main cause of his debility. He was frequently giddy, especially soon after rising.

I now sent him to Margate; but, whilst there, he said he felt far worse, and was so languid that he could only just get out. About this time, he insisted on leaving his farm, and going to live with a brother, alleging that he felt so weak and giddy that he was unable to attend to anything. Often in the fields he would feel as if he must fall, and be glad to lean against a gate. His dyspepsia and flatulence had never been much benefited by attention to diet. He had left off first one thing and then another, and then resumed them again, and never found that it made much difference.

In May 1876, he again called on me. He did not look any worse, but made still greater complaint of his inability to attend to business. I now examined his eye carefully, and found its condition very peculiar. The cornea, although not actually steamy, was not bright, but looked dull, like that of a fish. Possibly, owing to the state of the cornea, the iris looked muddy. The pupil was of medium size, perhaps rather small; it was motionless when the eye was exposed to light, but acted very fairly when the other eye was exposed. The anterior chamber was much deeper than natural, the ciliary attachment of the iris being retracted. The emergent veins were rather larger, and more numerous than natural. The tension of the globe was much increased. He could barely tell light from dark. The eyeball was still at times rather painful. He had suffered for nine months from pain and stiffness in the right side of his neck, and from stiffness and numbness in the right arm and hand, and right side of chest. He could use the hand for anything, but said that he often had "to rub it to take the numbness away." The palmar fascia at the base of the ring finger was contracted and hard, and the finger was a little drawn down. In the other hand similar conditions existed, but in much slighter degree. The left eye enjoyed perfect vision, and appeared normal in all respects.

Mr. K. has never suffered much from cold feet, a symptom frequently noticed when the nervous system fails in consequence of sexual abuses. He has been liable to colds in the head, to an extreme degree, often being for months together scarcely ever without. Although very fre-