CASE
OF
CYANOSIS;
WITH
A DESCRIPTION OF THE APPEARANCES PRESENTED
ON DISSECTION;
ILLUSTRATED BY THE PREPARATION, AND A DRAWING,
OF THE HEART.

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THE subject of this case came under my notice, a few weeks back, in the dissecting room of St. Thomas's Hospital. I have since gleaned the particulars which have enabled me to draw up the following history; and for them I am indebted to Drs. Bevan, G. O. Rees, Cohen, and Leeson, under whose care the boy was, successively, until the time of his death.

William Baker, ætat. 19, shoemaker, was admitted into Clinical Ward, St. Thomas's Hospital, July 28th, 1846. He stated that he had been ill, with the attack under which he then laboured, two months; but that he considered his illness to have been occasioned by a strain which occurred in August 1845, a week after which he experienced pain in the region of the heart, and suffered from extreme dyspnœa. For this he became a patient at the Islington Dispensary, and afterwards went into Guy's Hospital, where he remained eight or nine months. Two months before his admission into St. Thomas's Hospital, he had hæmoptysis on two or three occasions. He also stated that he had rheumatism four years ago; but, on being questioned respecting this attack, the symptoms

resolved themselves into severe dyspnœa with pain in the chest, but unaccompanied by swelling of the joints, shifting pains, or any peculiarity in the appearance of the urine.

Dr. Bevan, under whose care the boy was prior to his admission into Guy's Hospital, perfectly remembers the case, and confirms the accuracy of the diagnostic signs which I shall presently enumerate. This gentleman also believes the lad's mother distinctly affirmed, that he had always suffered from lividity of countenance and other evidences of disturbed circulation; but the boy denied that such was the case, when questioned by Dr. Cohen at a later period, although he admitted that his constitution had been ailing from early childhood; pain in the cardiac region and palpitations having prevented him from being able at any time to take much exercise, or to do any hard work. Unfortunately the friendless condition of the boy has rendered abortive all attempts I have made to prosecute this inquiry.

When in Guy's Hospital, Dr. Rees informs me that Baker "suffered occasional attacks of dyspnœa, and on exertion became livid. His extremities and nose were often cold, the former nearly always so when his attacks of dyspnœa occurred. There was a loud bruit heard below the left nipple, and also upwards from that spot and to the right, reaching over the sternum. This bruit accompanied the systole of the ventricle, and was of a loud *swishing* character." He continued in Guy's Hospital nine months, and then quitted it, without having experienced any marked benefit.

On admission into St. Thomas's Hospital, five weeks after his dismissal from Guy's, the following entries were made in their books by Drs. Leeson and Cohen, who have kindly supplied me with their notes.

"Habits apparently regular. Disposition placid. Complexion remarkably livid. Skin cold and dry. Bowels habitually torpid. Urine natural. Lips swollen and very livid: and the alæ nasi distended. Urgent cough, with extreme dyspnœa, render the recumbent posture very distressing. The superficial veins of the chest are extremely dilated; and

at times there is a jugular pulsation. Pulse quick and labouring. Does not complain of any pain.

"On percussion, the chest yields over its whole extent a dull sound, excepting over the anterior mediastinum, where the sound is clear; so that it is impossible to ascertain the size of the heart. With the stethoscope a very feeble respiratory murmur is detected, but unaccompanied by any morbid sounds.

"The impulse of the heart is natural. Its sounds are superseded by a very loud prolonged systolic bruit, heard over the whole region of the heart, but most especially over the aortic valves. The sound, however, does not extend beyond its arch in the direction of the aorta, but spreads out laterally from the point where it is heard in its greatest intensity, with an equal degree of force, along the course of the left branch of the pulmonary artery, and may be heard on that side to the very periphery of the chest. The sound on the right side is also heard in the course of the right branch; but here it has, although distinct, a more distant character, and does not reach to the same extent. There is also a systolic bruit over the apex of the heart."

The preceding account was principally furnished me by Dr. Cohen, who first saw the patient. When examined by Dr. Leeson, nearly a month subsequently, some of the symptoms seem to have undergone a modification, for he then complained of pain of a lancinating character in the chest, reaching through to beneath the scapulæ; the respiratory murmur had become sonorous and wheezing in the larger bronchi, and the pulse feeble, slow, and irregular.

A lowering plan of treatment was first adopted, but was subsequently changed to one of a "gently stimulant and tonic" nature, from which he seemed to derive most relief; and his suffering was always mitigated by fine and dry weather. Bleeding appeared to afford very little relief.

During the last two days of his life, the lividity of his face, the dyspnoea and suffering, were greatly increased, and he was quite unable to lie down; he died on the 3rd of January 1847.

Autopsy.—The body generally was wasted, and the feet and lower part of the legs were œdematous. The right lower extremity was shortened and inverted; and, on dissection, the head of the corresponding femur was found partly absorbed and resting on the *dorsum ili*, the capsular ligament being much thickened. The left hip-joint was also partially affected in a similar way.

Of the abdominal viscera, the liver was large and dense: the spleen was thrice its ordinary bulk, but apparently unaltered in texture. The kidneys and membranous chylipoietic viscera presented nothing abnormal.

The adjacent surfaces of the pleura on either side of the chest were adherent throughout the greater part of their extent. The lungs were a good deal loaded with blood, and in many parts dense and uncrepitating. There were a few small circumscribed cavities in one lung, containing softened tubercular matter.

On laying open the pericardium, it was found to contain a small quantity of limpid serum; but it was not adherent at any part to the surface of the heart, nor did it present any other evidence of morbid change.

The bulk of the heart was decidedly great in proportion to the development of the frame generally; but it was at once apparent that this increase in size was especially due to the abnormal capacity of the right auricle. The auricle and ventricle of either side were laid open by a perpendicular incision, extending from the base to near the apex of the heart. Some wax injection, which had been thrown upwards from the abdominal aorta, was found in the cavities; yet, with the exception of a little thickening in the general texture of the tricuspid valve, both the auriculo-ventricular and arterial valves seemed to be healthy. The left auricle and ventricle presented nothing to attract attention, except, perhaps, a trifling attenuation of the walls of the latter.

The right side of the heart presented the following appearances:—The auricle, more particularly its appendix, was largely dilated, and the intervals between the fleshy fibres were thin and transparent. There was an oblique communi-

cation between the two auricles at the fossa ovalis ; but this I have found so commonly the case that it can scarcely be regarded as abnormal. The auriculo-ventricular communication was free and unobstructed, and the termination of the venæ cavæ presented nothing unusual. On comparing the walls of the two ventricles, it was apparent that the usual relation of development was reversed, the parietes of the right cavity being nearly twice as thick as those of the left : this disproportion, however, resulted almost exclusively from hypertrophy of the former, the diameter of which was ascertained to be nine lines. The cavity of the ventricle itself was perhaps slightly encroached upon, but not in a very marked manner, the hypertrophy being rather eccentric than concentric. The fleshy columns were fully, but not abnormally, developed.

On passing my finger into the usual position of the orifice of the pulmonary artery, I was much puzzled at being unable to discover the aperture, and was equally foiled on endeavouring to carry the finger through from the artery into the ventricle. I then carefully cleansed the heart, and discovered the following peculiar and unexpected condition :—The long axis of the ventricle was shortened in the direction of the arterial opening, and, instead of communicating directly with the pulmonary artery, the anterior part of the base of this cavity presented two small circular apertures, neither of which would admit, without distention, the passage of a small-sized goose-quill ; their circumference was dense and white, similar in appearance to the auriculo-ventricular zone. One of these outlets from the ventricle opened into a small but thick muscular sac of oval form, which measured about an inch in its longest diameter, and gave origin to the pulmonary artery. The calibre of this vessel, and the manner of its connection to the small ventricular chamber just described, were normal : it possessed only two semilunar valves, but they were healthy.

Above and slightly to the left of this orifice, and about seven lines distant from it, was the second outlet from the right ventricle, precisely similar to the other in form, charac-

ter and size. This opened into the aorta, or rather into the angular interval between two of its semilunar valves, so that the aperture was partly bounded by the crescentic borders of the proper arterial coat, and in part by the muscular fibres of the ventricle. On examining the *canalis arteriosus*, this duct was found to be unusually short; and a diaphanous membrane, which had the appearance of a patch of organised lymph with a defined margin in the pulmonary artery, alone obstructed the passage of a probe into this vessel from the aorta.

The systemic arteries (which were injected and dissected throughout the body) were generally of rather small calibre, and presented an unusual number of the more common varieties; such, for instance, as a high division of the brachials, abnormal origin of the obturator and circumflex arteries in the lower extremity, double renal artery on one side, &c. The bronchial arteries were unusually large and tortuous; and the branch from the internal mammary artery which accompanies the phrenic nerve was nearly equal in size to the parent trunk, and expended itself principally in the adjacent adherent lung. The systemic veins presented no peculiarity either in size or distribution. The course and distribution, as well as the calibre, of the pulmonary arteries and veins seemed to be natural, as far as could be ascertained without injection.

A quantity of colourless fibrin occupied a considerable portion of the distended right auricular appendix: it adhered firmly to the walls of this cavity by having insinuated itself between the fleshy columns, which suggested the idea that, *possibly*, it had accumulated gradually during life. It certainly presented more consistence, and was more adherent to the walls of the auricle, than such fibrinous deposits, which are frequently met with as a *post-mortem* appearance, usually are.

In the foregoing case the more prominent symptoms are satisfactorily accounted for by the *post-mortem* appearances; as it is evident that the currents of venous and arterial blood must have been mixed in the aorta, and that the lungs must

have been deprived of a large share of their supply from the right ventricle.

But the sum of the calibre of both the arterial outlets from this cavity was not equivalent to that of the normal aperture of the pulmonary artery; and thence the hypertrophy of the ventricle. To the same cause also may be traced the dilatation of the auricle; for that obstruction which tends to engender increased power in the propelling cavity, from its struggles to overcome the obstacle, must, at the same time, tend to produce distention of the receiving cavity, which is constantly overloaded in consequence of its inability to part with its contents as fast as it is replenished.

The morbid condition of the liver and spleen was doubtless associated with the obstructed venous circulation; but I cannot help regarding it also as indicative of a function performed by one or both of these organs vicariously of the lungs.

It is impossible to overlook the connection between the large size of the bronchial and branches of the internal mammary arteries, and the obstructed pulmonary circulation;—a coincidence which seems to justify the supposition that, naturally, the lungs are not exclusively dependent for their nutrition on the bronchial arteries.

Lastly, as regards the primary cause of all the mischief, it would seem to be a congenital vice of conformation, referrible to that category of cases in which obstruction of the discharging orifice of the ventricle is accompanied by an abnormal aperture for the exit of the blood. I find, however, on reference to authorities on this subject, that in the instances most closely allied to the present, either the ductus arteriosus was open, or the communication was more direct between the ventricles, by perforation of their septum. It is true, in the case I have just narrated, that the abnormal opening was on the ventricular side of the semilunar valves of the aorta, occupying the angular interval between the attachments of two of them; so that, in strict anatomical

language, the communication was really between the two ventricles, as the extent of its middle coat constitutes the limit of the artery. Yet, physiologically considered, the effect both upon the heart and circulation must have been the same as if the blood had been poured into the aorta higher up, or the *canalis arteriosus* had been pervious: for the left ventricle could have had no additional burden thrown upon it by the communication in question, and the currents of venous and arterial blood must have been effectually mixed.

I find, on consulting Otto's Pathological Anatomy, that he refers to instances of malformation belonging to the same class as the present, in which the lungs were supplied by branches from the thoracic aorta, from the phrenic, and from the pericardial arteries. The enlargement of the bronchial arteries in the present case was probably due to the exigencies of the lungs, and illustrative of a general principle where there is an interrupted circulation, rather than belonging to and forming part of the original vice of conformation.

A suggestion was thrown out by some gentlemen who have examined the heart, that the superadded abnormal opening from the right ventricle might have been the consequence of disease. I cannot say I entertain this belief myself, though the *apparently* recent closure of the *canalis arteriosus*, and the doubt thrown over the early history of the case, might seem to lend some colour to the supposition.

EXPLANATION OF PLATE III.

This plate, illustrative of Mr. Le Gros Clark's case of cyanosis, exhibits the right side of the heart laid open.

The upper aperture, into which a rod is passed, communicates with the aorta; the lower one opens into the small ventricular chamber which gives origin to the pulmonary artery.