Original Communications.

- I.—Miscellaneous Contributions to the Study of Pathology.—
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CHAPTER III.

Cases in which morbid changes in the arteries of the heart were met with upon dissection, adduced with special reference to sudden death and symptoms of so-called angina pectoris. Observations on the pathogeny of angina pectoris. X

IN the 'St. George's Hospital Reports for 1867' (vol. ii, p. 285) I detailed a recent case of aneurysm of one of the branches of the coronary arteries of the heart, citing, in connection with the subject, other cases of aneurysm and dilatation of these vessels, and took occasion to draw attention generally to certain other pathological conditions which they, as well as the coronary veins, presented. Chiefly influenced by the opinion which on all sides I find still entertained by medical men, that angina pectoris is almost certainly associated with, or caused by, diseased coronary arteries, I was led to pursue the subject and to examine into the question of other diseases of these vessels, with special reference to what is termed angina pectoris and to sudden death, as illustrated by the post-mortem records which we possess at St. George's, as also by various cases selected from the 'Transactions of the Pathological Society.' The results of this inquiry, stimulated in great part by the increased consideration which has of late in various directions been given to the pathology of angina pectoris, I propose to incorporate in the present communication.

I proceed, therefore, in the first place, to give the particulars of such cases as I find we have in our records; and in connection with them shall allude to others of a kindred nature, contributed by friends and gathered from other, chiefly recent, sources. It will be seen that among these cases (excluding the case of aneurysm of the

coronary artery above alluded to) are instances in which the coronary vessels were found plugged with masses of fibrine, or more or less occluded by thickening of their walls, either by what is termed atheromatous or calcareous matter (often conjoined), their calibre being thus encroached upon; or instances in which these vessels have been pressed upon by aneurysm of the aorta, or in which their orifices in the aorta have been obliterated by layers of fibrine overlapping them; or cases in which the elasticity of their walls have suffered by reason of their being rendered rigid owing to calcareous deposit, even when their calibre has not been much or at all diminished.¹ Of these, in some we have also, as might be expected, a calcareous and rigid condition of other vessels of the body.² I can find no cases in which mention is made of enlargement or dilatation of these vessels (a much more infrequent condition than a narrowed or constricted state of the coronary arteries³), nor of rupture of these vessels with or without aneurysm.⁴

¹ In the 'Transactions of the Pathological Society,' to which I shall allude later on, may be found cases recorded of "atheroma," of "ossification," of "fatty degeneration" of the walls of the coronary arteries, and also of "obstruction" by coagulum, as in a case by Dr. Baly (vol. iii, p. 267), and in a case of my own (vol. xv, p. 15), the vessel at the part plugged up by coagulum being *dilated*, an interesting fact in connection with the supposed production of aneurysm by embolism (see 'Med. Times and Gazette,' 1866; also 'St. George's Hospital Reports,' vol. ii, p. 285). There is also a case related of suppurative of the valves of the heart by Dr. Habershon (vol. vi, p. 151), "some of the branches of the left coronary artery extending to the softened part being filled with a yellowish-white thin purulent fluid."

² Hasse quotes from Goodisson (see page 72 of his work published by the Sydenham Society) a remarkable case, in which the aorta itself, the left iliac throughout, and the right iliac arteries for half of their course were completely blocked up, and rendered impervious, owing to calcareous degeneration of their walls.

³ Of general dilatation of these vessels, the most decided case I know of is related at page 57 of the work above mentioned by Hasse. In this case, simultaneously with dilatation of the right cavities of the heart and of the vena cava, the coronary arteries were found to be widened to the *calibre of the subclavian vein*.

⁴ I exclude, of course, as before said, the case of the aneurysm of the coronary artery above mentioned as being described in the 'St. George's Hospital Reports,' and which burst into the pericardium. The history of that case did not show that any symptoms, which might be termed those of angina, had ever existed, and the rapid death was the result of hæmorrhage into the pericardium; but in another case, which I mentioned in connection with the above one related by Bougon and quoted by Dr. Peacock at the Pathological Society (see 'Transactions,' vol. i, p. 227), the patient died in an attack of acute pain passing along the course of the spine to the back of the head. He had for four years been subject to pains in the chest, with a sense of suffocation, and inability to sleep; and these attacks (curiously enough) were somewhat relieved by WALKING RAPIDLY or SUSPENDING HIMSELF BY THE ARMS. Death was caused by the bursting of an aneurysm of the right coronary artery. Cases of rupture of branches of the coronary artery do exist, apart from aneurysm. Thus in the 'Medical Times and Gazette' for March 29th, 1862, Dr. Osborne relates a case of angina in connection with rupture of a branch of the coronary artery. The patient, a woman, aged 60, had suffered long from dyspepsia and dyspnoea, and had had much family trouble. Three weeks

CASE 1.—*Sudden death ; orifice of one coronary artery completely occluded ; aneurysmal pouch of the aorta ; aortic valves diseased.*

James B—, æt. 33, was admitted into St. George's Hospital, June 12th, 1844, with symptoms of disease of the heart, of dropsy, orthopnœa, &c. On the morning of the 15th he was much the same as usual, but in the evening he said he felt very ill, and was sitting up drinking, when he suddenly fell back and died.

Post-mortem examination.—Old pleural and pericardial adhesions existed ; there was hypertrophy and dilatation of the heart. The mitral valve was healthy ; the aortic one thickened. The root of the aorta was thickly studded with atheroma, and immediately above the aortic valve was an aneurysmal pouch of the size of a small egg, containing but little coagulum ; the interior was *smooth* and lined by a polished membrane. A distinct thick ridge existed at the part where the pouch communicated with the aorta. *The opening of the posterior coronary artery* was completely blocked up by atheroma, that of the anterior one remaining pervious. [138.]

CASE 2.—*Sudden death after angina-like symptoms ; orifice of one coronary artery obliterated by a layer of fibrine.*

Robert W—, æt. 43, was admitted into the hospital, August 25th, 1847. He said he had been suffering from palpitation of the heart and dyspnœa for some time, but otherwise had been pretty well, until dropsy came on suddenly, five days before admission, in the legs and abdomen. He had never had rheumatic fever. He was obviously suffering from hypertrophy and dilatation of the heart, with considerable disease of the aortic valve. Cough became

before she had been seen by Dr. Osborne she had "felt something give way" in the chest on going up stairs. She died suddenly, and after death the pericardium was found distended with blood. The orifice of one of the coronary arteries in the aorta was almost invisible owing to atheroma ; another coronary artery branch could be traced to a part of the wall of the left ventricle, which was fissured at the source of the hæmorrhage, which appeared partly to have taken place in the small coronary vessel, which was atheromatous and marked with blackish specks. The aorta was dilated and atheromatous.

In our Hospital Museum we have a specimen which I removed from the body, showing a cyst beneath the visceral layer of pericardium filled with blood coagulum, and which appeared to be the result of rupture of a branch of the coronary artery (see series vi, No. 41). It does not appear that any aneurysm existed, or that the case had presented any angina-like symptoms. Rupture of the coronary vessels is described by Feigneaux and Buys in Schmidt's 'Jahrb.' for 1859, vol. civ, p. 168. Here I would refer to an interesting case, terminating fatally by rupture of the right coronary artery, related by Dr. Galliard. It is quoted in the 'British and Foreign Med.-Chir. Rev.' for Jan., 1841, p. 239, from the 'Annali Univ. di Med.,' Dec., 1839. There was what was called "arteriasis" of the aorta and large vessels given off from it, but the remainder of the ruptured coronary artery was natural.

excessive and paroxysmal, and severe pain in the chest and suffocative feelings, presenting the character of angina pectoris, came on, along with lividity and cold sweats. On recovery from this attack he vomited. He was about to have another attack when, in raising himself, he suddenly fell and died.

Post-mortem examination.—Both lungs, otherwise healthy, were compressed by a large quantity of blood-tinged serum. There was a large quantity of turbid fluid in the pericardial sac. In addition to the disease of the heart and its valves before noticed, on the surface of the aorta was deposited much atheromatous and calcareous matter; and over these in several parts were placed *layers of soft fibrine*. Owing to the deposit of this fibrine, the orifice of the *left* coronary artery was entirely obliterated. On tracing the artery back to its commencement, the continuation of the artery was of natural size. Both coronary arteries were the seat of atheromatous deposits. The liver was rounded at its edges and granular. Other organs were natural. [208.]

I will dwell for a short time on the above case, for the sake of referring to the fact of the opening of the coronary artery in the aorta being obliterated by a layer of fibrine. I am inclined to think that if search were carefully made, it would at times be found that what appears to be atheromatous blocking up of the mouth of a coronary or other small vessel was, in fact, the result of the deposition of fibrine from the blood on to the lining membrane of the larger artery (whose walls may, in addition, be occupied or not by atheroma or calcareous material). I suppose it possible this may be at times the explanation of those so-called atheromatous specks so often found at the origin of small vessels, as, for example, of the intercostal arteries of even young subjects, the tendency of the blood being to be delayed at the giving off from larger vessels of subordinate branches. It is certain that fibrine will become deposited on the surface of an artery, and become, as it were, organically welded with the lining membrane, and I have frequently peeled off such a layer of fibrine from an arterial surface or the lining of a heart's cavity.¹ Such deposit would naturally tend to thicken, and this at times unequally, especially if the arterial walls were previously diseased, so as to assume a generally atheroma-like character. Moreover, such a deposit or layer would tend to assume a smooth and polished surface, and even, no doubt, become provided by epithelium, just as the

¹ The aorta, having "patches of lymph" adherent to its *inner surface*, is described at fol. 62 of our Post-mortem Book for 1846, and at fol. 105 of Post-mortem Book for 1851. In one such case, after maceration in spirit for many years, this deposit, examined microscopically, merely exhibited a quantity of semi-opaque yellowish fibroid material. (See Museum Catalogue, No. 25, Series VI.)

lining of a cyst,¹ or even pleural adhesions,² may acquire an epithelial investment. I have notes of an instance of absorption of bone in a case of fractured spine, in which a covering of synovial membrane was eventually formed (No. 304 in our Post-mortem Book, 1866). Blood-clot lining the arachnoid membrane of the brain will at times afford an instance of this tendency to become smooth and polished; and I have seen the inner surface of the clot of an aneurysm present similar appearances.³ I have also seen effused lymph on the surface of the pleura, covered by a thin but distinct membrane.⁴

The smooth white patches sometimes called "milk spots" often met with on the visceral pericardium appear often to be the result of patches of fibrine which have undergone similar change.⁵ I can direct you to a case in our post-mortem book for 1862, p. 42, where the entire heart was covered by a thin false membrane; and another, 1858, p. 114, where the auricle was lined by a false membrane. In such cases, the membrane whether exo- or endo-cardial, might easily become smooth and polished like the more limited white patches.⁶ Here it is right to allude to the description given by Bizot, and quoted by Hasse (p. 88, loc. cit.), of the false or so-called 'analogous membrane' which he has often found lining an artery and extending into an aneurysmal sac, sometimes covering contained coagula, but appearing at first sight like the internal true membrane of the aorta. The delineation of such a membrane is made by Carswell ('Fasc. Anat. Tissues,' Pl. II, fig. 8), and is mentioned by Hasse. A very curious case is also quoted by this writer from Wardrop's work on aneurysm, 1828, in which an aneurysm of the innominate artery existed, the entrance into the right carotid artery being closed by a thin membrane, apparently a continuation of the spurious one lining the sac. May we not compare such patches and opacities of blood-vessels and inner surfaces of the heart's cavities, presumably thus occasioned, to the patches and thickening of the capsules of various organs, such as the liver and spleen, resulting from peritoneal inflammatory processes (these patches being often like cartilaginous plates in appearance and toughness, and at times containing calcareous material); and to certain cases of thickening and stiffening of

¹ In the "Pathological Society Transactions," vol. vii, p. 280, the case of an ovarian cyst lined by ciliated epithelium is described.

² See Hasse's work, p. 203. (Sydenham Society.)

³ This was so in the previous case, No. I, and at page 250 of our P.M. Book for 1848 is described a case of spontaneously cured aneurysm, in which the clot is covered by a membrane exactly similar to the lining membrane of an artery.

⁴ See Fol. 189 of our Post-mortem Book for 1845.

⁵ At page 143 of our Hospital Post-mortem Book for 1857, a case is described of a "white patch" of the heart, covered by a cyst.

⁶ At fol. 205 of the Post-mortem Book for 1855, is a description of the auricle of the heart lined by a thickened patch, doubtless resulting from some deposition of fibrine from the blood.

the valve-segments of the heart, the results frequently of fibrinous deposits from the blood?

CASE 3.—*Sudden death; narrowing of coronary arteries by atheromatous material; aneurysmal pouch of aorta.*

Mary P—, æt. 32, was brought into hospital, March 7th, 1863, quite dead. It was stated that she had never shown signs of any disease of the heart. On the morning of her death she had left home to see what she could on the occasion of the Princess Alexandra entering London. At about 11 a.m., when standing among other people, she fell down, and was picked up dead.

Post-mortem examination.—The cranium and its contents were natural, also the lungs, excepting some emphysema. A thick patch of old lymph covered the anterior surface of the heart near the apex. The walls of the ventricles were very thick. The heart weighed eighteen ounces. The left ventricle was rather contracted, containing much coagulum. The flaps of the aortic valve were slightly thickened. Over the ascending part of the aorta was an extensive deposit of soft atheroma, beneath the lining membrane. The CORONARY ARTERIES WERE VERY NARROWED AT THEIR COMMENCEMENTS by the encroachment of the deposited material. ONE ARTERY WOULD HARDLY ADMIT THE SMALLEST PROBE. The first two inches of the ascending aorta were very atheromatous, and here was a hemispherical aneurysmal pouch, which would have held a marble. The lining of the uterus was covered with pus. Otherwise the various organs were natural. [57.]

CASE 4.—*Sudden death, described as from Angina pectoris; highly atheromatous state of the coronary arteries; heart hypertrophied.*

John W—, æt. 71, admitted February 18th, 1863. Had enjoyed good general health until subsequent to his return from Australia some weeks ago, when, after much mental trouble, he became subject to palpitation of the heart and a choking sensation, not accompanied by pain, but by a throbbing feeling, extending from the cardiac region to the epigastrium, and thence to the shoulder blades. These attacks occurred at variable intervals, and by night as well as by day. In less than an hour the effects passed off, and he was as well as usual. On admission he appeared to be robust; his face was, however, pale. He had the arcus senilis well marked, and he complained rather of giddiness, and pointed to the heart as the seat of his trouble. The brachial artery could be seen pulsating heavily through most of its course, and the pulse at the wrist was like the passage of shot under the fingers. The heart's sounds were distant and divided in a triple manner, a heavy rushing first sound being

followed by a feeble sound, to which succeeded the diastolic sound, prolonged and devoid of the natural click of health. A double sound was heard over the arch of the aorta. There was no dyspnoea or oedema; iron and calumba were prescribed. On the 17th he had slept little, and had much præcordial oppression, but he was cheerful and walking about. Whilst in bed in the evening he was seized with severe dyspnoea; he gasped heavily and turned pale. Some bloody mucus was expectorated, and he died in ten minutes.

Post-mortem examination.—The cerebral arteries were atheromatous, otherwise the cranial contents were natural. The lungs were natural. The left ventricle of the heart was much hypertrophied and quite uncontracted; its fibre was natural. The coronary arteries were very atheromatous, as was also the aorta throughout; and the cartilages of the larynx were ossified. The abdominal organs were natural. The brachial arteries were very rigid, but not atheromatous. [223.]

CASE 5.—*Somewhat sudden death; complete occlusion of one coronary artery by atheroma, and partial occlusion of the other.*

William S—, æt. 52, was admitted, July 17, 1866, in a moribund state, and shortly died, no history having been obtainable.

Post-mortem examination.—The fornix of the brain was rather softened, otherwise the cranial contents were natural.

There were indications of bronchitis having occurred, and the lungs were emphysematous. The pericardial sac was destroyed by adhesions at its anterior part, and the right ventricle of the heart contained a partially decolorised clot, the tricuspid valve being much thickened; the mitral valve was natural. There was great atheroma of the aorta, small transparent plates of it being detached along one edge, thus projecting into the vessel; and on their free edges an almost decolorised clot was found, extending about two inches up the vessel and commencing about one inch above the aortic valve. THE ORIFICES OF THE CORONARY ARTERY WERE GREATLY ENCROACHED UPON by the atheroma, and in this way the CORONARY ARTERY OF THE RIGHT SIDE WAS ALMOST OCCLUDED, whilst that on the LEFT WAS QUITE BLOCKED UP. The left ventricle was hypertrophied.

The liver and kidneys were very congested. [205.]

CASE 6.—*Sudden death; orifices of both coronary arteries much narrowed by atheroma.*

Henry McC—, æt. 39, was admitted August 16th, 1866, who had latterly been subject to dyspnoea, and came in with anasarca of the legs and abdomen. When admitted the heart's sounds were weak and its rhythm variable, but there was no bruit. The cardiac dulness on percussion was increased, and there was slight albumen

in the urine. Under treatment he did well for some time, and the dropsy decreased, but it was noticed that he became very purple on exertion. On the 20th of August he suddenly fell off the bed, and was found dead.

Post-mortem examination.—The lungs were congested, and contained patches of hæmorrhage. The heart, weighing $18\frac{3}{4}$ ounces, was quite contracted, and both sides were full of black coagula; its coats were thin and very friable, and, *microscopically* examined, showed much fatty matter in its fibre. The valves were healthy, and around the origin of the coronary vessels so much atheroma existed THAT THEIR ORIGIN WAS GREATLY OCCLUDED.

The liver and kidneys were very congested. [241.]

CASE 7.—*Sudden death; orifice of the coronary arteries occluded by atheroma; firm old clot in the carotid artery.*

A man, æt. about 30, a groom, had always enjoyed good health until about a week or ten days before his death. He then began to complain of a feeling of "being out of sorts," accompanied by aching pain in the loins and slight cough. He continued at his work until the day of his death; on that day he became excited in consequence of a dispute with another person, complained of faintness, and fell back suddenly, and died before assistance could be obtained. As far as is known he never suffered from angina, but as he was unmarried and lived in lodgings by himself, very little was ascertained about him. No account of his previous mode of life could be obtained.

Post-mortem examination five days after.—The body was found to be very much decomposed.

There was considerable congestion of the lungs; the anterior parts were emphysematous, the air-cells being in many cases ruptured, large vesicles containing air being found.

The heart was closely contracted and empty; the muscular substance was firm and natural in appearance; there were a few specks of atheroma on the mitral valve. The aorta was extensively affected by soft atheroma, especially near its origin; some of this atheroma had almost entirely OCCLUDED THE ORIFICES OF THE CORONARY ARTERIES, so that only a small probe would pass through them; these arteries were throughout the rest of their course natural.

The liver was slightly fatty. The kidneys were in a state of granular degeneration; they were smaller than natural, rough, and cystic on their surface; their capsules were adherent, and on section the secreting structure was seen to be diminished. The other abdominal viscera were healthy.

The brain was so soft and decomposed that very little could be made out of it. The only morbid lesion in this organ that could be

found was a firm decolorised clot in the left internal carotid artery, just at its bifurcation into the anterior and middle cerebral; this clot was not adherent to the wall of the vessel.

The details of the above case, which was not a hospital one, were kindly given me by Mr. Pick, now one of my colleagues at the hospital.

CASE 8.—*Obliteration of one coronary artery; contraction of the left carotid artery.*

W. B— was admitted into St. George's Hospital December 30th, 1840, and died January 20th, 1841. Unfortunately we have no history of his life symptoms on record.

Post-mortem examination.—General adhesions of the pleura on both sides; lungs œdematous, otherwise healthy. A small quantity of blood existed in the pericardium, and a white spot on the surface of the left ventricle. Heart flaccid and filled with blood coagula. The mitral valve was healthy, the semilunar valves slightly thickened. *The opening of the anterior coronary artery was obliterated*, that of the posterior one being also very much contracted by atheroma. The ascending aorta and the arch were very much dilated, the dilatation being general, and in its cavity were contained coagula of blood of recent formation. The opening of the *left carotid artery* was so contracted as scarcely to admit of the passage of a probe; the trunk of the artery was, however, of natural size; the brachio-cephalic branch was slightly dilated. The whole of the aorta, from the heart to the iliac arteries, was very rough internally, owing to large patches of atheromatous deposits. At one spot only was there any calcareous deposits, viz. at the opening of the left carotid artery. The internal membrane was, in many places, easily separable from the middle coat of the aorta.

Excepting thickening and condensation of the interlobular areolar tissue of the liver and of its capsule, the various abdominal organs were natural. [20.]

CASE 9.—*Sudden death; considerable occlusion of the orifice of one coronary artery; valvular disease of the heart.*

Mary H—, æt. 30, was brought into the hospital September 11th, 1866, having suddenly died; but no details of her history could be obtained.

Post-mortem examination.—The body appeared externally to be in all respects in a natural state. The lungs were very congested, and the bronchial tubes full of frothy fluid. The heart was contracted and empty. The aortic valve-flaps were much thickened and opaque, and quite insufficient. One of them was so much contracted that the end of the little finger could not be introduced. The mitral valve curtains were also thickened: the aorta, for

half an inch was much thickened, and covered with "soft atheroma." Around the orifice of the coronary artery of the left side much of this deposit existed, so that *the opening of the vessel was materially contracted, barely admitting a fine needle*: below this the coronary artery was natural. The muscular striæ of the heart were found (*microscopically*) to be very indistinct. The capsules of the kidneys were adherent, and easily split, and their secreting structure diminished. Other organs of the body natural.

I will here add a case, kindly put into my possession by Mr. Warrington Hayward, our surgical registrar at St. George's Hospital. Unfortunately the medical man who made the post-mortem examination is now dead, and the details are not given with the fulness which otherwise would have been obtained. It was as follows:

CASE 10.—The patient was a clergyman, æt. 52, of active habits, in whom, for about a year, breath had been rather short. This he attributed to his having become much stouter. Three weeks before death he first experienced an attack of angina pectoris, which was severe. He had only three or four more attacks before the fatal one. He died very suddenly; not after any particular exertion. "Fatty disease of the heart, and obstruction of the arteries of the heart," were found after death. No statement exists as to the actual cause of the obstruction; and it may be supposed that it was owing to atheromatous deposit.

CASE 11.—*Death, unexpected, following pain at the heart. Coagulum filling a portion of one coronary artery, and also other vessels.*

The patient was a woman æt. 56, who died in St. George's Hospital, and who had been the subject of so-called *hysteria*,¹ and who had complained greatly of severe pain at the region of the heart shortly before death. After death, softened fibrinous clots were found in the heart's cavities; in addition to other morbid changes, it was found that a portion of the wall of the left ventricle had become converted into a yellowish-white material, and that a branch of a coronary artery passing through this had become blocked up by a mass of fibrine. The left corpus striatum was softened, and the left internal carotid artery at one part contained a mass of firm fibrine and clotted blood.

[This case I have already reported in vol. xiv of the 'Pathological Society's Transactions,' p. 3, and therefore I have not here given it *in extenso*. The preparation showing the heart is preserved in our Hospital Museum, as No. 48 in Series VI.]

¹ The frequency with which symptoms from serious disease of the brain simulate so-called hysteria cannot be too often dwelt upon.

I will here quote two cases from our hospital records which have been brought before the notice of the Pathological Society of London (see 'Transactions,' vol. xvii, p. 54), by my colleague Dr. Dickinson, from whose reports I make my abstract. They were adduced by him, along with another interesting case, from private practice, in connection with the subject of angina pectoris.

CASE 12.—*Sudden death ; angina pectoris ; great narrowing of both coronary arteries by atheroma.*

James H—, æt. 42, had for more than a year had pain after food, about the epigastrium, and latterly had had severe attacks, chiefly also after food, which had all the acknowledged characters of angina pectoris. The general health was pretty good.

On the fifth day after he came into St. George's Hospital he had a sudden attack of the excessive pain ; he quickly became blue, and had a short but distinct epileptic attack. After this, in spite of treatment by galvanism, artificial respiration, &c., he gave no further signs of life.

Post-mortem examination.—The left ventricle of the heart was quite uncontracted, and contained fluid blood. The valves were natural. There was much soft atheroma under the lining membrane of the aorta, and some of this had encroached upon the mouths of the coronary arteries, and so narrowed them that neither could admit the head of a common probe without pressure. [It is not stated whether the coronary arteries were otherwise natural or not.] The heart weighed $13\frac{1}{2}$ oz. ; its muscular structure was apparently natural. The other organs of the body were natural.

There was no indication showing that this patient had suffered from ordinary symptoms of cardiac disease.

CASE 13.—*Sudden death ; ? angina pectoris ; complete closure of one coronary artery and slight narrowing of the other by atheroma.*

A soldier, æt. 35, was brought into the hospital dead. It was supposed from circumstances that he had had sexual intercourse shortly before date. It appeared also that he had been discharged from the army owing to heart disease ; but nothing more was known of him.

Post-mortem examination.—The heart weighed 14 oz. ; its left ventricle was quite uncontracted ; the right partly so ; and both contained fluid blood. Under the lining membrane of the arch of the aorta was much soft atheroma, which had so encroached on the opening of the right coronary artery as completely to close it, and the lining membrane of the aorta appeared to be continued over the mouth of the vessel. The opening of the left coronary artery was also much narrowed. The coronary arteries in their course were natural. The aortic valves were slightly thickened, but all the valves

were effective. The muscular fibres of the heart were somewhat dotted with oil.

To the interesting observation and comments on these cases, and the supposed relation between the symptoms and the closure of the coronary arteries, by Dr. Dickinson, I shall refer later on.¹

In all the above-mentioned cases of disease of the coronary arteries, either sudden death occurred, or symptoms akin to angina pectoris were occasioned during life.²

I will now quote two cases from our records, in which much disease of these vessels was found, but in which *no* angina pectoris or sudden death had occurred, which are sufficiently interesting, I think, to be placed on record.

CASE 14.—*Highly atheromatous state of the coronary arteries.*

William W—, æt. 54, was admitted November 8th 1854. About one month previously he had been taken ill with a “bad cold,” followed by anasarca of the legs, and pain in the limbs generally. On admission his pulse was full and quickish, and the tongue dirty, and bronchitic sounds were heard over the chest. He improved under treatment, but subsequently dyspnœa in urgent paroxysms came on. The urine was highly albuminous. Listlessness and partial coma came on, and after an attack of dyspnœa the patient died.

Post-mortem examination.—The only parts examined were the heart and kidneys. The kidneys were found cysted and otherwise far advanced in disease, containing also a great number of yellow calcareous deposits, especially near their surfaces.

The pericardium contained several ounces of yellow fluid and one or two “white patches” existed on the surface of the heart. Both ventricles were very thickened, and their cavities dilated. The left one was almost but not quite contracted. One of the

¹ The third case which Dr. Dickinson mentions, is one of a man, æt. 45, who was a patient of Dr. Dudfield, of Kensington, and who for eight years had had symptoms of heart disease, and for three years that of much marked angina. In one attack which Dr. Dudfield attended the patient was *pale*. He died rather suddenly.

Post-mortem examination.—The heart was enlarged; its ventricles both contracted, and the root of the aorta and aortic valves very atheromatous, and by the encroachment of atheroma the orifice of the left coronary artery had become completely closed. The right artery was also much narrowed. The coats of these vessels were natural. [The state of the valves is not mentioned.] The heart's substance was somewhat fatty.

² Among recently published cases of angina pectoris, in which, after-death, affections of the coronary arteries were found, I may mention one described by Dr. Morehead, in the ‘Lancet’ for July 30, 1859. The case was of fifteen years’ standing, and death occurred suddenly by syncope. The heart's valves were quite healthy, but the coronary arteries for one and a half inches from their origin were rigid tubes, owing to calcareous deposits, and the heart was very fatty.

aortic flaps had a tuft of old fibrous tissue attached to the corpus Arantii. The coronary arteries were, in places, very highly atheromatous, and in parts very rigid and brittle. [15.]

CASE 15.—*Complete obliteration of one coronary artery.*

John S—, æt. 64, a wheelwright, was admitted February 18th, 1863. He stated that he had had a "convulsive attack" one month before admission, in which he lost consciousness for ten minutes. A weakness of the left hip and knee, which only lasted a few days, was the only apparent effect of the attack; but shortly afterwards he became affected with dyspnœa, cough, and expectoration. Anasarca came on. He had evidently hydrothorax, and the heart's action was irregular and weak, and the sounds distant; no murmur was audible. Two attacks of lividity and exhaustion with dyspnœa preceded death, which occurred March 26th. There is no mention of symptoms which would be termed neuralgic, or those of angina.

Post-mortem examination.—Indications of both old and recent pericarditis existed; the heart was greatly dilated, and the right auricular appendix was occupied by a ragged coagulum of old standing. *One coronary artery only could be discovered.* This was excessively atheromatous, so that it would not admit the smallest probe. There was *certainly no orifice for the other vessel* upon the aorta, and the great accumulations of false membrane upon the heart made it difficult to detect it in its course. The heart and pericardium weighed twenty-eight ounces. The left pleural sac was full of serum, much compressing the lungs. The right lung was infiltrated with serous fluid, and the smaller branches of the pulmonary artery, in its substance, were packed with coagulum of a brownish colour. The kidneys were slightly granular and cysted.

Upon the upper surface of the right hemisphere of the brain was a small cavity, which was covered only by the arachnoid, probably the result of a superficial extravasation of a former period. This was just over the fissure of Sylvius vertically; within the white matter, above the left ventricle, was a similar but smaller cavity. *The white matter generally was full of pores or little round depressions.*¹ [82.]

Were it desirable I might of course multiply from our hospital records cases of simple atheroma or calcification of the cardiac coronary arteries, in which no symptoms severe enough to be denominated those of angina pectoris, existed, although in some cases there had been a certain degree of pain in the heart; and also I could refer to several specimens which our Pathological Museum contains, showing the same

¹ This pitted or porous condition of the brain I have seen in two or three other cases. My colleague, Dr. Dickinson, associates it with diabetes, I believe; but it is certainly found where no diabetes was known to have existed.

condition. The readers of Dr. Bright's 'Reports' may remember a case which he describes of apoplexy, in whom after death the coronary arteries of the heart were converted into bone-like canals, and in whom no angina and no cardiac symptoms of any kind had existed. Dr. Tweedie, in vol. iv of his 'System of Practical Medicine,' quotes a case described by Mr. Adams in the 'Dublin Hospital Reports,' in which both the coronary arteries were *obliterated* for nearly an inch at their origin. In this case there had been no pulse at all during life *in any part*, and even at the heart no indication of motion beyond a very feeble undulating sound. These symptoms are attributed to the condition of the coronary vessels, together with ossification of the aortic valve which was found.

I will subjoin a brief notice of a case, in which a branch of the coronary artery was blocked up by a mass of fibrine, but in which no symptoms referrible to angina were produced.

CASE 16.—*Atheromatous state of the coronary arteries. Obstruction of one by coagulum.*

The symptoms were those of weak heart; a peculiar nervous condition, and frequent transitory attacks of partial loss of consciousness and muscular power also showed themselves. Anasarca and ascites came on, and the patient lingered long before death. A fatty state of the heart's muscle was found on post-mortem examination. The coronary arteries were converted into rigid tubes of atheroma, and one was quite occluded at its orifice by an old standing yellow and partially softened coagulum.

The specimen showing the condition of the heart was presented to our Pathological museum by Dr. A. W. Bell, and is described in the catalogue as No. 239 in the appendix to series 6.

The following case is an instance of more or less occlusion of the coronary arteries, without, however, any positive symptoms of true angina pectoris occurring.

CASE 17.—*Sudden death; somewhat fatty heart; atheroma contracting the orifices of the coronary arteries.*

Samuel W—, æt. 64, had been subject to paroxysmal attacks of dyspnœa, and was known to have heart disease, was stated to have been in Hyde Park when he had one of his attacks, attended by painful sensation of tightness about the throat; staggered and fell. He was brought into the hospital dead.

Post-mortem examination.—The veins and sinuses within the cranium were much congested, as also the brain substance. The lungs were somewhat congested. The heart was large, weighing 15 ounces, and was covered by much fat. Both ventricles were in a state

of semi-contraction, and contained a little fluid; its muscular substance was rather soft and fatty, and paler in colour than natural. The valves of the heart were blood stained. The arch of the aorta was covered over by patches of softening atheroma, and one of these patches was immediately above the left coronary artery, the orifice of which it overlapped, and had contracted so much that it was impossible to introduce a fine probe. The orifice of the right coronary artery was also much narrowed, though to a less extent, from the same cause.

The coronary arteries themselves were natural, except one or two slight patches of atheroma. The muscular substance of the heart contained an increased amount of fat globules, but when examined *microscopically* the "striæ" were well seen.¹ [?]

In contrast and in addition to the above-mentioned cases of positive and well-marked or even extensive disease of the coronary heart-vessels, in some of which sudden death or angina-like symptoms had occurred, in others of which they had been absent, it is interesting to notice the following case, in which the symptoms were described in our books as being most likely those of angina, but in which no affection of the coronary vessels is noted.

CASE 18.—? *Angina Pectoris*.

John S—, æt. 29, was brought into the hospital dead, August 6th, 1862. He had come to London from Newcastle-on-Tyne, to visit the great Exhibition, and during his stay in London had paid little attention to diet, getting his meals very irregularly. On the day of his death he went to the International Exhibition at 10 a.m., and complained of some pain in the region of the heart. He moved about the building until half-past 11, when he again complained of the pain at the heart. He put his hand to his side, and the next moment fell forward dead.

Post-mortem examination.—The body was well nourished, and the rigor mortis decided.

Cranium.—The large intra-cranial veins were full of blood.

Thorax.—The pericardium contained a small quantity of blood-stained fluid. Both ventricles of the heart were uncontracted, the left especially, and contained quite fluid blood, the lining membrane being blood-stained. The muscular substance was generally flabby, the cut surface mottled with yellow. The muscle was found, under the microscope, to be more or less fatty.

The lungs and bronchial membranes were congested.

Abdomen.—The stomach was distended with gas. The various organs were natural. [213.]

¹ This case has been reported in the 'Lancet' for October 24th, 1868.

As I before observed, it by no means follows that symptoms of angina pectoris should have existed, or sudden death should have occurred in cases where the coronary vessels of the heart have been found very extensively diseased. Very frequently, indeed, whilst curator of the Pathological Museum, I found extensive atheromatous rigidity and brittleness of the coronary arteries in cases where no heart symptoms of any kind had previously existed.

For the following case of sudden death with angina-like symptoms, in which, nevertheless (as in the preceding case), no affection of the coronary vessels was noted, I have to thank the late Sir John Davy. The heading to the case and the "Remarks" which follow it are his own.

CASE 19.—*Spasmus Cordis?*

W. S.—, 51st Royal Artillery, æt. 28, was admitted into Corfu Hospital, 12th May, 1825, died 13th May. He was a man of dissipated habits, given to vice, and had been several times in hospital on account of pain in right hypochondrium; robust, healthy in appearance; on previous day he came over from Vido, where he worked at the limekiln, and spent two or three hours with a woman of the town. In the afternoon he was admitted into the hospital of 36th, complaining of pain in the region of the heart and in the right side, along the margin of the ribs. An aperient was given: at 7 P.M. he felt relieved. He then felt some pain in walking, but was free from it when in the recumbent posture. He talked cheerfully with the men in the adjoining beds till between 10 and 11 P.M. About 1 A.M. the man in the next bed heard him moan twice or thrice. He rose and went to him: he was lying on his back; he turned on his side and expired. It is worthy of notice that when Mr. Bouchan examined his pulse in the evening, at the *left* wrist it was *small, intermitting*, and only 40; at the right 70, and *regular and natural*.

Dissection eleven hours after death.—Limbs slightly rigid; neck and shoulders livid, apparently from gravitation of blood.

The vessels of the brain generally very turgid; slight serous effusion between the membranes and in the convolutions, and pretty much fluid in all the ventricles.

About two ounces serum in the pericardium. The heart rather large; the cavities of the heart merely moistened with blood; the valves sound; the aorta, including the A. innominata, and the arch, rather larger than usual: inner surface rough, becoming opaque in patches, and in a few points ossified.

The lungs sound, without adhesions and without tubercles; a little frothy mucus in the trachea. The tongue small and retracted so as to cover apparently the rima glottidis.

The liver weighed 4 lbs.: rather firmer than natural: so the spleen. Some adhesions of the gall bladder to the omentum.

No marked disease of the abdominal viscera; bladder empty; prostate and vesiculæ seminales large, the latter distended with an opaque milky fluid; the lining membrane of stomach and duodenum rather red.

“*Remarks.*—What was the cause of death in this instance? Was it connected with empty state of heart and turgescence of brain? As the head was low after death the unusual turgescence might have been partly owing to the posture. Was it owing to spasm of the heart? This organ being empty is favorable to such an idea. Was it owing to suffocation from retraction of the tongue over the epiglottis?

“The irregular state of pulse, the pain in the region of the heart support the idea, that spasm of this viscus was the principal cause.

“It is curious that the vesiculæ seminales were distended, as there is reason to suppose he had sexual intercourse the preceding afternoon. Perhaps this was owing to large size of the prostate.”

I must observe, in passing, upon the remarkable phenomenon in the above case of the pulse differing so much at the two wrists, as well in frequency as in rhythm. In illustration of this, though not quite analogous, I would refer the reader to the description of a case of poisoning from the effects of chloral, related by Dr. Reynolds in the ‘Practitioner’ for March last, in which it was noticed that whilst the heart was acting with increased power but regularly, the action of the distal arteries was rapid, weak, *irregular*, and intermittent.

Thinking it would be useful to ascertain what we could learn from the ‘Transactions of the Pathological Society’ regarding the supposed connection of angina pectoris and disease of the coronary vessels, I find that in them are recorded several supposed cases of this affection, in which the condition of the heart and its nutrient vessels was very variable. [In some cases, however, the coronary arteries are unfortunately not mentioned.] And again, numbers of cases of disease of these vessels without any history of angina having existed. I observe *nineteen* cases in which angina pectoris, or anginal-like symptoms occurred. They are as follows:—in the first case, dyspnœa and other heart symptoms having existed (vol. i, p. 238), related by Dr. Crisp, we have extreme calcification of the coronary arteries, a very large flabby heart and dilated left ventricle, and atheromatous and calcareous state of the aorta, the valves of the heart being natural. In the second case (vol. ii, p. 48), related by Dr. Peacock, and attended by dyspnœa and other heart symptoms, was found bone-like deposit in the right sinus of Valsalva, surrounding and contracting the orifice of the right coronary artery, the left one being converted into a cylinder of bone and quite *occluded* by a

plug of *old decolorised fibrin*: the heart being fatty and the aorta dilated, and slight thickening only of the aortic and mitral valve flaps existing. In case third, related by Dr. Quain (vol. ii, p. 188), there was fatty degeneration of the heart, the aorta being calcified and the left coronary artery much diseased and obstructed, and the left ventricle dilated. In the fourth case (vol. ii, p. 190), also related by Dr. Quain, was fatty degeneration of the heart, the coronary artery leading to a part where blood had been extravasated into the heart's substance, being narrowed and ossified. It does not seem that any heart symptoms had existed.¹ In the fifth case, related by Dr. Beith (vol. iii, p. 69), was rupture of the right ventricle and septum of the ventricles, ossification of the arch of the aorta and of part of the anterior branch of the coronary artery (with obstruction) leading to the seat of rupture, which was very fatty; the heart being very large. Dyspnœa and fainting fits had been experienced. In the sixth case, related by Dr. Quain (vol. iii, p. 262), was fatty degeneration and rupture of the heart in connection with a branch of a coronary artery, which was nearly occluded by calcareous degeneration. It does not appear that any cardiac symptoms had existed during life. In the seventh case (vol. iii, p. 276), related by Dr. J. Bird, was a fibrous degeneration of the heart, in connection with acute rheumatism (no mention made of the coronary vessels). In this case the physical signs during life, and state of the pulse, &c., pointed to cardiac disease, but there had been no extreme cardiac symptoms. In the eighth case (vol. iii, p. 314), related by Mr. Obrè, there was dilatation of most of the arch of the aorta, producing pressure on and diminishing the calibre of the left bronchus, and also thinning of the heart's walls. Symptoms of heart disease had long been suffered (no mention made of coronary arteries). In the ninth case (vol. iv, p. 99), also related by Mr. Obrè, one in which very slight symptoms had ever existed, there was a broken down state of the aortic valve-flaps, with hypertrophied heart (no mention of coronary vessels). In the tenth case (vol. v, p. 73) related by Dr. Brinton, and one in which considerable heart symptoms had existed, was atheroma and dilatation of the aorta, with a pouched state of one aortic valve-flap, the coronary arteries being very cartilaginous, though scarcely calcified. In the eleventh case (vol. vi, p. 133), related by Dr. Wilks, was fatty degeneration of the heart, the whole course of the coronary arteries being converted into bone-like channels, and only one existing to supply the entire heart; the left ventricle was dilated. No cardiac symptoms appear to have existed beyond the angina. In the twelfth case (vol. vii, p. 102), related by Mr. Hutchinson, there was aneurysm of the aorta, compressing the pulmonary artery, the coro-

¹ When I speak of ordinary "heart" or "cardiac" symptoms, I of course mean palpitation, dyspnœa, anasarca, &c., as distinguished from breast-pain.

nary arteries being found to be healthy. In the thirteenth case (vol. viii, p. 164), related by Dr. Markham, and one in which much dyspnœa had been suffered, there was ulceration and other disease of the aortic valve-flaps (no mention of coronary arteries). In case fourteen (vol. ix, p. 180), described by Dr. Hare, there was dilatation of the arch of the aorta, and there had been well-marked symptoms of heart disease. In case fifteen (vol. xi, p. 67), related by Dr. F. W. Davis, and one in which dropsy and orthopnœa in addition to angina had existed (and there had also existed in this case a visible pulsation, besides a double bruit under the third costal cartilage, and one inch to the right of the sternum, so that aneurysm was at one time suspected), was fatty degeneration and rupture of the right ventricle, extensive atheroma of the aorta and calcification of the coronary arteries, which were patent, the right one being converted into a hard bone-like tube, and the right auricle dilated and thinned, being in one part "almost perfectly transparent;" the aortic valves were incompetent, the others being natural. In case sixteen (vol. xii, p. 72), related by Dr. Quain, was fatty degeneration and rupture of the left ventricle, the coronary arteries being atheromatous. In this case the only symptoms referable to the heart had been "short breath" on going up a hill. His death followed attacks of "gastrodynia" and "dyspepsia," and was quite sudden and attended by great pain at the heart. In case seventeen (vol. xiii, p. 54), related by Dr. Crisp for Dr. Williams, a supposed case of aortitis, there was fatty degeneration of the heart, very great narrowing and atheroma of the aorta, which was of a dark livid colour, and extreme smallness of the orifices of the coronary arteries. In this case the pain at the heart had been so great as often to render the patient almost maniacal. No symptom of heart disease had existed beyond this acute pain, and previous uneasiness at the breast for eight or ten minutes.¹ In case eighteen (vol. xiv, p. 133) there was obstructive mitral disease (no mention of coronary vessels); and in case nineteen, described by Mr. S. Watson, and one in which during life heart disease had been recognised by irregularity of its action and by physical signs (vol. xix, p. 170) there was, in addition to atheroma and extensive ulceration of the aorta, complete occlusion of the left subclavian and left coronary arteries at their origin, and almost complete closure of the other coronary artery at its origin. The coronary arteries were otherwise natural.²

¹ Some authors speak of aortitis as if it existed much more commonly than is generally thought. My own experience of it is very scanty. I may note here that Dr. Corrigan describes, as among the symptoms of "acute aortitis," tearing or constrictory pains at the præcordia, with a disposition to faint, and an impression of impending death; in fact, the symptoms of angina pectoris. (See 'Guy's Hospital Rep.,' Vol. 6, 1841, p. 324.)

² It is specially mentioned in this case that the muscular structure of the heart was natural, being "of good colour and firm consistence."

Such are the examples I find in the records of the Pathological Society of symptoms of angina pectoris, in which obvious changes in the nutrient vessels of the heart, or in the substance of this organ were met with after death.

On the other hand, I find in these volumes descriptions of thirteen cases of atheroma of the coronary arteries, in only one of which were angina-like symptoms said to have occurred. In several of these there was fatty degeneration, and in one or two rupture of the heart. In one case the coronary artery was closed by coagulum, and in one the artery, which was atheromatous, was *ulcerated*. I also find one case in which fatty degeneration of the coronary arteries existed, four in which obstruction is said to have existed, and eight in which calcification is described as having been found, in all of which save one (and in that there was fibrous and fatty degeneration of the heart's muscle), no mention of angina-like symptoms existed. In three of the cases of obstruction of the coronary artery, rupture of the heart, and fatty degeneration existed. In one of these cases (vol. v, p. 336) we have the remarkable history of a man living in good health to the age of ninety-three, in whom after death the heart was found to be natural, but the right coronary artery was thickened though not bone-like, the left one bone-like almost throughout its entire length. The aortic and mitral valves, &c., were also much diseased. After a dangerous attack of syncope this patient had been kept two years in bed before death. In several of the above cases of ossification and obstruction of the coronary vessels sudden death had however occurred.

To anticipate somewhat, perhaps, I would here quote the remarks of Dr. Crisp, who observes that many morbid changes about the valves and aortic orifice may occasion the same symptoms as an ossified state of the coronary arteries, and it is impossible to discriminate between them. To this opinion I shall have to allude later on. He says, and truly, that the coronary arteries are seldom ossified without the same deposits taking place in the aorta or its valves, and that he has only met with two cases in which these vessels were *alone* implicated. In both cases angina pectoris existed.