

**On a case of death from hæmorrhage into the pericardium, as a result of rupture of one of three true and circumscribed aneurysms of the coronary artery of the heart : with observations on aneurysm or aneurysmal dilatation as a result of embolism or thrombosis.**

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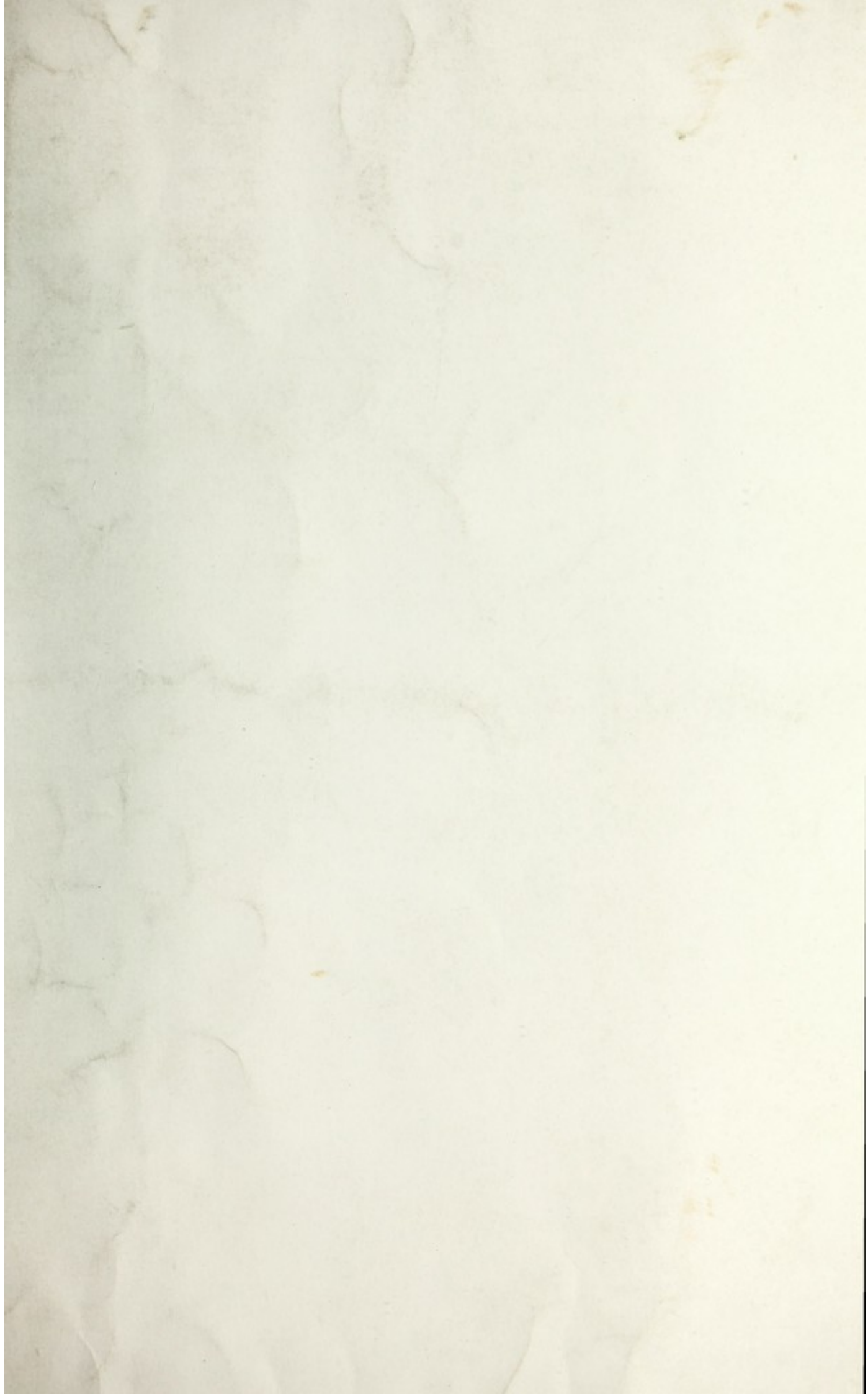
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ON A CASE OF DEATH FROM HÆMORRHAGE INTO THE PERICARDIUM,

As a result of Rupture of one of three true and circumscribed Aneurysms of the Coronary Artery of the Heart; with Observations on Aneurysm or Aneurysmal Dilatation as a result of Embolism or Thrombosis.

I VENTURE to think that the following case will be considered worthy of record, as being an instance of aneurysm in a very unusual locality, and as probably illustrating a not unimportant point in pathology.

In the session of 1856-7, at a meeting of the London Pathological Society,\* I suggested the probability of the formation of aneurysm in certain instances (especially in the case of the smaller arteries of the body) as a result of embolism or thrombosis of a vessel; and to this subject I drew attention more at length in the *Medical Times and Gazette*† in the course of last year. I had also previously related to the Pathological Society the case of a boy‡ in whom was found after death plugging of one of the coronary arteries

\* See vol. viii. of the Society's *Transactions*, p. 168, where a case of aneurysm of the superior mesenteric artery is related, from a patient with a softened heart, and having soft recent fibrinous granulations on the heart's valves.

† See vol. i. p. 196.

‡ See vol. xv. of the *Transactions*, p. 15. This patient, aged sixteen, was admitted into the hospital in a state not unlike fever, and died comatose. After death, in addition to the state of the coronary artery above described, extravasation of blood into the cerebellum, and also plugging by fibrin of the corresponding cerebellar artery were met with. In this case masses of fibrin were found attached to the edges and surfaces of the mitral valve-flaps, and to the lining membrane of the left auricle of the heart. A "false membrane" of fibrin also lined the dura mater, which was described in Beale's *Archives*, No. vi. p. 88.

of the heart, which at the part affected was *greatly dilated*. Until the present time I have not met with a single case bearing upon the question until the one which I am about to describe, which came under my own care at St. George's Hospital a few months ago, and which appears to be most probably an illustration of the proposition alluded to. At the time I made the communication to the *Medical Times and Gazette* to which I have referred, I was unaware of the fact that Mr. Joliffe Tuffnell had already contributed to the *Dublin Medical Journal*\* some observations on arterial dilatation and aneurysmal development as resulting from the detachment of so-called "cauliflower excrescences" on the valves of the heart, and their presence in the circulating blood. These observations of Mr. Tuffnell were based upon a most important and interesting case, given by him in detail, of an anæmic patient, aged 25, with hypertrophy and dilatation of the heart, and patency of the aortic valves, in whom a large pulsating tumour suddenly formed in the popliteal space of the right leg, the limb becoming of a much lower temperature, and of a dirty livid colour,—the result, as it proved, of plugging of the artery by the impaction of fibrinous deposit carried thither from the heart. Eventually (death occurring from other causes) collateral circulation was established, and the tumour disappeared.

I was glad to find that I could quote so high an authority as that of Mr. Tuffnell as an independent support of my suggestion. He has recently informed me that he has not met with another illustration of this subject since the one which I have just cited.

I will now proceed to give the particulars of the case which I before spoke of as having recently occurred under my care in St. George's Hospital.

CASE.—William S., aged 26, a blacksmith, was admitted into York ward January 2, 1867. He had had rheumatic fever 12 years previously, and another illness  $2\frac{1}{2}$  years before admission, attended by pain in the back part of the head, followed, in about two weeks, by sudden numbness in the thumb and two first fingers of the right hand, also with pains in the back, arms, and belly. One month before

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\* See the number for May 1853.

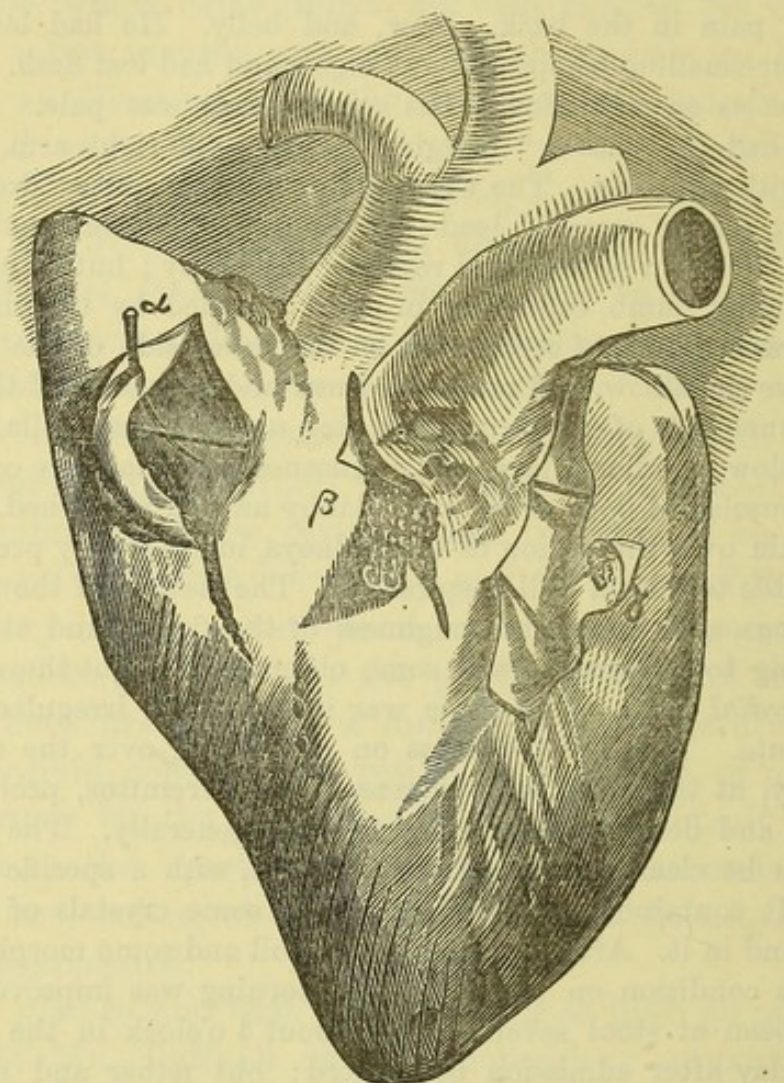
admission he suffered from another attack, accompanied by pain in the back of the head, followed (six days before admission) by intense pain in the right arm, lasting about an hour. When this pain ceased, he states that he found himself unable to move the arm and hand. He had also pain in the back, elbow, and belly. He had, latterly had much sour-smelling perspiration at night, and had lost flesh.

*Symptoms on admission.*—His countenance was pale. He stated that he had at times a "dragging" pain in the right arm, which he moved with difficulty. The wrist of this arm was quite "dropped" (as we often see in cases of lead-poisoning), and he was unable to extend it. The skin of the hand retained sensibility; but he complained of its feeling numb, especially in parts supplied by the ulnar nerve. There was a patch of ecchymosis on the inner side of the right arm just above the elbow, and much hardness and tenseness of the muscles of the inner side of this arm, extending up into the axilla. He had had no blow or other injury. This tenseness was the more conspicuous as the muscles of both arms were flabby and ill-nourished. He had much pain over the region of the kidneys, increased by pressure, and was unable to take a full inspiration. The action of the heart was tumultuous, and there was roughness of the first sound at the apex, amounting to a murmur; and some observers thought there was also *an exocardial bruit*. The pulse was intermitting, irregular, and 104 per minute. There was dulness on percussion, over the right lung especially, at the apex, with increased vocal fremitus, prolonged expiration, and deficient respiratory murmur generally. The urine was found to be clear, and free from albumen, with a specific gravity of 1014. It contained no blood-casts, but some crystals of hæmatine were found in it. After a dose of castor-oil and some morphia at bedtime, his condition on the following morning was improved. After having been at stool several times, about 4 o'clock in the afternoon on the day after admission he fainted; but æther and sal-volatile having been given to him he rallied. He then complained of pain in the bowels, and wished to go to stool once more; but as it was seen that he was faint, he was put back into bed. He subsequently said he felt better, but immediately began to breathe stertorously. His eyes became fixed and staring, and he died without convulsions shortly afterwards.

*Post-mortem examination.*—Cranium. The cranial bones were natural. The brain-substance and its membranes were natural; but the larger arteries at the base of the brain were atheromatous, and several of the small veins on the surface of the posterior lobes of the cerebrum and cerebellum were *plugged with partially decolorised blood-clots*. The larger vessels were, however, free from such obstruction.

Thorax. Firm adhesion of the pleura existed on the right side. The left lung was much congested, especially posteriorly. The pericardium was *full* of firmly coagulated blood-clots. The heart was uncontracted, and the aortic valves greatly thickened by fibrinous deposit, evidently not of very old standing. On examining the surface of the

heart, three branches of the coronary arteries were found to be affected by aneurysm. Thus, holding the heart as it is situated in the body, and looking at its anterior surface (see Woodcut), on the extreme right



Woodcut showing the anterior surface of the heart on which the three aneurysms  $\alpha$ ,  $\beta$ , and  $\gamma$  are seen. The aperture in aneurysm  $\alpha$ , through which hæmorrhage occurred, is indicated by the bristle passed through it into the cavity of the sac which has been laid open.

hand (*i. e.* the left side of the heart), and about one inch from the base of the heart, was a pouch of the size of a pea projecting from the surface ( $\gamma$ ). This possessed tolerably thick and quite entire walls, and was full of laminated clot. It was in connection with a branch descending from the left coronary artery (passing down the anterior interventricular sulcus), which at its upper part (as indicated in the woodcut) was atheromatous, but not at all obstructed. About the middle line of the front of the heart, and near the root of the pulmonary artery was a second pouch ( $\beta$ ), somewhat larger than a pea, feeling solid to the finger and entirely occupied by firm consolidated fibrin. This was connected with a descending branch of the right coronary artery, which branch throughout its entire length was *wholly obstructed*, being occupied by a contracted fibrinous coagulum, and so shrunk as to be with difficulty

distinguishable from neighbouring parts. Again, to the left of the others (towards the right edge of the heart), and on a higher level than the first pouch described, was a third pouch, of about the size of a small cob-nut, almost quite empty, and with thin walls, which at one spot were perforated by a hole scarcely admitting the passage of a pig's bristle. Through this aperture the blood, which was found to fill and distend the pericardium, had found its way. This aneurysmal sac freely communicated with a descending branch of the right coronary artery, which was quite unobstructed, and in all respects healthy.

Abdomen. The liver was hard and congested; the spleen healthy. The right kidney was coarse and congested, and its capsule infiltrated with blood. At its base a large mass of recently extravasated blood was met with in its substance; and on examining it at one extremity, this mass was found to contain a cavity lined by a distinct and firm membrane, of about the size of a small pea, and containing a quantity of coagulated blood of the same character as the general mass surrounding it. This could be picked out of the cavity entire, leaving the membrane tolerably smooth. On trying by dissection to find a communication between this small sac or cavity and some arterial branch, it appeared as if such an one had existed, but it could not be altogether very satisfactorily made out. In the same kidney were also two old-standing "blocks" or masses of fibrinous deposit. The left kidney was quite natural; the large arteries of both kidneys were natural.

The right arm was very swollen on its inner side and towards the elbow, and the surface was red and darkish in colour at this part. On dividing the integuments and muscles in this region, much blood was found to have been extravasated into the muscular structure and intermuscular tissue. It proved impossible to find out exactly the source of the hæmorrhage; but two of the minute muscular branches from the brachial artery, low down in the arm, were found to have aneurysmal pouches connected with them, quite full of firmish coagulum. These sacs were perfectly entire, and one of them *was in close proximity with the median nerve*. It appeared most likely that some other aneurysm had existed, which, having given way, had allowed of the hæmorrhage amidst the tissues, &c. The small branches having the aneurysms connected with them, as also the main brachial artery, were quite free from any disease.

*Comments.*—Before proceeding to the pathology of the above case, I will make a few remarks upon certain points of clinical interest which it contains. On reviewing the circumstances of this case there can be no doubt, I think, that death eventually resulted from the giving way of the aneurysm of the coronary artery into the pericardium, which was otherwise healthy. The walls of the aneurysm had for some time been yielding and getting thinner, and at last the small aperture before described was produced. The oozing of blood



was, no doubt, gradual, as may be inferred from the small size of the perforation in the aneurysm, and from the fact that some time before death it was found that a slight exo-cardiac murmur, in addition to the interference with the first cardiac sound (the latter no doubt being due to the altered condition of the aortic valve), was audible.\* Again, the irregular, intermitting pulse may have indicated this. However that may have been, the straining at stool which appears to have preceded death most probably accelerated the outflow of blood from the aneurysm. This hæmorrhage into the pericardium, in addition to the syncopal effect of the loss of blood,† must mechanically have had the result of embarrassing materially the heart, and thus of interfering considerably with the pulmonary circulation (as indicated by the congested lungs) and with that of the central nervous organs;‡ and these results would be more prejudicial as the patient was previously in weak health, and in a state to be soon overpowered by such untoward conditions. Here I would take occasion, in passing, to refer to the condition of the lungs as ascertained by auscultation. When the patient first came to the hospital, in addition to other symptoms, we found, on examining his various organs, that prolonged expiration, deficient respiratory murmur, increased vocal resonance, and some amount of dulness on percussion over the right lung and especially at the apex existed. From this, we could not help suspecting that the lung-substance was occupied at this part. On post-mortem examination, however, it proved that the lung itself was quite clear,

\* In a case of rupture of the heart which occurred at St. George's Hospital last year, a "rough double crumpling sound was heard all over the heart" before death. See No. 185 in *Post-mortem Book*. The ruptured heart was catalogued as Series vi. b. 14.

† The loss of blood alone, in this case, would not have been sufficient to have occasioned death. Of course the pericardium under long distension, as in old-standing hydrops or pericarditis, will hold very much more than in the natural state; but under ordinary circumstances this sac (with the heart unremoved) will hold from 18 to 20 oz. This was ascertained for me by Mr. Pick, our pathological curator, who examined a great many healthy pericardial sacs for me. I was unable to find any mention of the capacity of this sac in any of our anatomical works.

‡ I think there can be no doubt that disease of the organs of the chest and their investing membranes may (through the agency of the sympathetic nerve, most likely) affect the vessels or structures of the central nervous organs.

and that the deviation from its ordinary physical condition was probably the result of the extensive pleural adhesions which existed. Another apparent discrepancy between physical conditions observed during life and post-mortem results, may be noticed in the case of the kidneys; for whereas the right kidney was coarse and congested, and contained in its substance an extravasation of blood and two old-standing discoloured "blocks" of fibrinous deposit, yet the urine, on examination, was found to contain no albumen or blood-casts when the patient was admitted, though some crystals of hæmatine were found in it.\* Directly I saw the patient, his history, and the fact of the occurrence of the sudden pain in the arm, followed, as it was, by equally sudden and unexpected loss of power in the limb (the wrist and hand being "dropped"), along with the existence of the swelling in the lower part of the arm, made me suspect that it was a case of sudden plugging of an artery and pressure upon neighbouring nerves, though of course I could have had no idea of the presence of aneurysm of the coronary arteries. That pressure on the nerves of the arm had existed was indeed proved to be the case, though it is impossible to say whether the affection of the nerves of the arm was owing to the pressure of an aneurysm or to that of blood effused into the neighbouring textures,† or to both combined. The establishment of this pressure was no doubt contemporary with the sudden pain and the loss of power in the limb which occurred six weeks before admission; but possibly in his previous illness (two years before admission) there may have been a slight amount of this pressure (pro-

\* We are quite conversant with cases in which urine contains no appreciable amount of albumen, but in which blood-discs may be discovered nevertheless by the microscope.

† That blood extravasated into textures around nerves may by pressure affect those nerves, was illustrated by a case which occurred in St. George's Hospital in January 1866, and was related by my colleague Dr. Dickinson to the Pathological Society. The patient—an intemperate man—suffered from purpura. A tumour formed suddenly in the thigh, and another in the lower part of one arm on the inner side, at a part corresponding to that affected in my patient: and in connection with this latter, numbness of the little finger and outer side of the third finger was experienced; after death (which was from meningitis) the tumour of the arm was found to consist of altered blood so embedded in the biceps muscle as to press decidedly on the ulnar nerve.

bably from plugging of the vessel), as there was then sudden numbness in the thumb and two first fingers, although this symptom might have been quite independent, as it might have resulted from some cerebral disturbance, or from some condition of the nerves independent of any peculiar state of artery. What the date of the commencement of the aneurysms of the coronary arteries might have been, is quite problematical; but I am strongly impressed with the idea that they had the same origin as the condition of the arterial branches of the arm,\* and that all arose from plugging up of the vessels by fibrin carried thither from a distance (from the valves of the aorta or its inner surface, or from some part of the lining of the left auricle or ventricle).† The antecedents of the case point to a condition of blood in which such a state of things would be likely to be favoured (I allude to the generally weak ill-nourished and cachectic state, the rheumatic tendencies, &c.), and this appears to receive confirmation from the existence of the fibrinous "blocks" in the kidney and the state of the orifices of the heart, and the plugging of the cerebral vessels (thrombosis), which was found to have existed. As regards this latter state, the thrombosis,

\* A very interesting case is related by Dr. Crisp (at p. 46 of his work on the *Diseases and Injuries of Blood-vessels*) of a man, aged 21, who had an attack of rheumatic fever, after which "the bellows-sound was always heard over the cardiac region, the heart's impulse being greater than natural." Five years after the attack he became suddenly affected with a pain in the middle of the upper arm, after complaining of pain in the chest. Pulsation ceased in the arm below the axilla. Throbbing in the arm and tingling and numbness of the fingers followed. The artery of the arm became painful on pressure, and a touch produced tingling in the middle and index fingers, and there was a feeling of deadness along the outside of the forearm. The patient died; and in addition to pericardial adhesions, hypertrophy of the heart, and disease of the valves of the left side of the heart; the sigmoid valves were beset at their margin with so-termed "vegetations." Immediately below the origin of the two profunda arteries the brachial artery was found to be enlarged to the extent of three-quarters of an inch; after which it became contracted, and the enlarged part was found to contain a hard fibrinous coagulum of the circumference of a goose-quill, quite adherent to the sides of the artery; the contracted part was quite impervious. This case is quoted by Dr. Crisp as one of arteritis; *but I believe it to have been one of embolism with tendency to aneurysm at the part of the artery where the plug was situated.*

† Absence of recent granulations affords no argument against the supposition of their having at some previous time existed.

it is interesting to note that the only important symptom referable thereto appears to have been the pain in the head which previously had existed; possibly also (as before said) the numbness of the hand, &c. may have been attributable to it.\* It may be a question also, as before hinted, whether the extravasation of the blood in the arm was due to a rupture of an aneurysm which escaped observation, or was the result of congestion owing to interference with the local circulation by the aneurysmal enlargement? This question may also be asked regarding the extravasation of blood into the substance of the kidney.†

As regards the general subject of tendency to aneurysm of the cardiac coronary arteries (from whatever cause it may have arisen), it will be allowed that this occurrence is a most rare event. Dr. Crisp, in his work quoted in the foot-note, when citing no less than 551 cases of spontaneous aneurysms, does not enumerate a single one of these vessels. He, however, at page 21, refers to a case (see No. 93) of a woman in whom he found "the origins of the coronary arteries so much dilated as to resemble small aneurysms; one would admit a common-sized pea. The arteries were large, but not ossified." He informs me that he does not remember having seen any other cases. On looking over the sixteen yearly volumes of the *Transactions* of the London Pathological Society, I find but three cases bearing upon the subject. One was the case related by Dr. Bristowe (vol. vii. p. 98) of a sailor, æt. 22, who died in St. Thomas's Hospital, having been admitted for what was thought to be fever, fol-

\* It may be remarked that we often have single nerves or sets of nerves affected by central brain or spinal disease.

† Dr. Crisp, in his work quoted on the opposite page, relates one case (but only one) of aneurysm of a renal artery (see Case 320 in his Table, p. 254). This is the case of fatal hæmorrhage which was supposed to have been owing to rupture of aneurysm of the renal artery, and was related at the London Medical Society (see the *Lancet*, 1829-30, vol. i. p. 388). Subsequently doubts were thrown upon the pathology of the case, and it was objected that it was really one of rupture of the artery without aneurysm. There was discharge of blood from the bladder for nine days. I find also an instance of aneurysm of the vessel mentioned in the "Observations on Aneurysm" published in 1844 by the Sydenham Society, as quoted from the cases of Dr. Donald Monro, physician to St. George's Hospital (see p. 132), the left emulgent artery being described as "dilated at its beginning to the size of a filbert-nut."

lowed by paraplegia and exhaustion (no symptoms referable to the heart having existed). After death, in the course of the vessels on the surface of the heart were found "a number of nodules, isolated and in strings, and individually, from the size of a pea downwards, the nature of which, at first sight, was not very apparent. Dissection, however, showed that they were due to aneurysmal dilatations occurring in the course of the trunks and branches of the coronary arteries." The walls of these aneurysms consisted "for the most part of dense fibroid tissue." "All those parts of the walls of the coronary arteries and their branches which were undilated appeared to be perfectly healthy, and free from atheromatous deposit." The muscular walls of the heart and its valves were quite healthy. Patches of extravasation of blood existed in the lungs, and the cortical parts of the kidneys were thickly studded with buff-coloured patches, and with dark-red coloured masses, owing to hæmorrhage. *The pericardium was healthy.*

The second case which I find in the Pathological Society's *Transactions* was brought forward by Dr. Peacock, and was that of an intemperate butcher, æt. 51, who died in the Royal Free Hospital in 1847 (see vol. i. of the *Transactions*, p. 227), having suffered from symptoms of bronchitis, and having been in a half-comatose state. Though carefully examined, the heart presented no indications of disease until the day before death, when he had pain in the præcordia, and when a "peculiar flapping sound accompanying the action of the heart, but distinct from the ordinary cardiac sounds, was loudly audible along the course of the sternum and towards its left side." After death, the pericardium was found distended with pale yellow-coloured sero-purulent fluid and lymph of soft consistence, and an almost spherical aneurysmal dilatation of the anterior branch of the left coronary artery existed. The artery between the sinus of Valsalva and the aneurysm was rather dilated, and converted into a complete cylinder of bone, but was quite pervious; the aneurysmal sac was also ossified, but to a less extent; the right coronary artery was dilated, and in places ossified. The heart's walls on the right side were thickened, those on the left side thinned. This case of Dr. Peacock's was also republished by

him in the *Monthly Journal of Medical Science*, March 1849, in a communication wherein he gives short notices of the cases of aneurysm of the heart's coronary arteries which he had found placed on record. He had found *only two*, which were fully reported; and imperfect notices of only two others. Of the fully-noticed cases the first one was published by Bougon, in the *Bibliothèque Médicale*, 1812, t. 37; the second was published by Peste, in the *Archives Générales de Médecine*, 1843. The remaining two, the imperfectly reported cases, were published one by Hedland, and referred to by Otto in his *Compendium of Pathological Anatomy*; the other by Merat, in the *Dictionnaire des Sciences Médicales*, tome v. p. 484. For all details I must refer the reader to these cases as given by Dr. Peacock, merely noticing one or two salient points which they present. For example, in the case by Bougon, the patient for four years before death had suffered severely from pains in the chest, with a sense of suffocation and inability to sleep, the attacks commencing about eleven or twelve o'clock at night, and continuing till the morning. During the attacks some ease was obtained by walking rapidly, or suspending himself by the arms. Not long before death the cardiac symptoms disappeared during an attack of fever, but recurred as usual. The patient used also to have pain in the middle of the left arm, but never cough or expectoration. The cardiac and radial pulsations were isochronous, sometimes feeble, at others strong and intermittent. He died suddenly, in an attack of pain, passing rapidly along the course of the spine to the back of the head. After death, the pericardium was found to contain two pints of blood, partly coagulated, which had proceeded from an opening in an aneurysm of the right coronary artery, which was also very dilated. The opening through the walls of the aneurysm into the pericardium was unequal, soft, reddened, and very lacerable, as if gangrenous.

In the case of Peste's, the patient, *æt.* 77, had enjoyed good health until two years before death, when he was seized with apoplexy, followed by hemiplegia on the left side. He had no cardiac symptoms of any kind until four days before death, when he vomited his food, and afterwards felt some indisposition, with dyspnœa, and præcordial pain at times very severe. He died quite suddenly. After death, the

pericardium contained coagulated blood, and was distended with serum. The anterior wall of the left ventricle was found lacerated through its substance in a somewhat transverse direction; at a short distance from the origin of the left coronary artery there was a patch of extravasated blood, which was traced to a rupture in the walls of a small aneurysm of that vessel—a probe introduced into the lacerated opening on the surface of the ventricle penetrated into its cavity between two of the fleshy columns, and could also be passed into the sac of the aneurysm. The aneurysm was of the size of a large nut, and was situated on the left coronary artery, at the point where it divides into its branches. It contained laminated coagula, and presented an aperture inferiorly by which the blood had escaped; its coats around this point were very thin. The vessel was dilated to the size of the brachial artery, and its coats were studded with bony plates. The right coronary artery was free from disease, and the heart's substance and its valves natural, but the coats of the aorta were readily lacerable, and contained osseous scales.

The third case, viz. that by Hedland, occurred in a man *æt.* 40, and death arose from hæmorrhage into the pericardium, owing to the giving way of the sac. In the remaining case, that related by Merat, the aneurysmal pouch, of the size of a small nut, arose from an "erosion of the coronary artery," and was formed in the thickness of the parietes of the left auricle. There had been no symptoms of heart-disease during life.

On reviewing all the six above-mentioned cases, including my own, it is worthy of remark how little interference with health this grave affection of aneurysm of the coronary artery had, on the whole, produced; and it is also worthy of observation that, in four out of the six cases, the aneurysmal sac had given way into the pericardium.

When Dr. Peacock made the above-mentioned communication, in 1849, he remarked that he had examined most of our London Pathological Museums, but had not found a specimen of aneurysm of the coronary artery in any of them. A specimen existed in the Museum of St. Bartholomew's

Hospital, which was formerly described as one of such an aneurysm; but Dr. Thurnam had shown that it was in reality an aneurysm of the sinus of Valsalva. Since that time up to the present, Dr. Peacock tells me he has not seen references to any other cases.

Dr. Duckworth informs me of a specimen, now in the St. Bartholomew's Hospital Museum, of dilatation of a cardiac coronary artery, "blocked up with clot in parts, in a specimen of fatty heart, which ruptured its left ventricle in three places." He says it could not be called an "aneurysm, I believe, and the sinuses of Valsalva are not affected." This specimen was described in the Pathological Society's *Transactions*, by the late Dr. Baly (see vol. iii. p. 264), who speaks of one branch of the left coronary artery (running from the base of the left ventricle towards the centre of the degenerated muscular wall of the heart) as being enlarged to the extent of three-quarters of an inch from its origin, being prominent on the surface of the heart. All its coats were thickened and opaque, yellow and rigid, and its cavity filled with firm dark coagulum. "This dilated portion of the arterial branch ended abruptly, and its canal could be traced no further; it seemed to be obliterated at the very margin of the degenerated part of the ventricle." The aortic valves in this case were thickened; but there is no description of any fibrinous masses being attached thereto, and Dr. Duckworth says that in the preparation no appearance of anything of the kind at the present time exists.

I will now refer to instances, sufficiently rare,\* which I have met with in our literature, of aneurysm or dilatation of the coronary arteries of the heart. These are almost all from foreign sources; and although it is possible that many cases of so-called spontaneous hæmorrhage into the walls of the heart's cavities may have had origin in the yielding and laceration of dilated arterial branches, otherwise diseased or not; and though possibly so-termed aneurysm in the muscu-

\* Harrison, in his work on the *Surgical Anatomy of Arteries*, when speaking of the coronary arteries, quotes the words of Bertin, who remarks: "The coronary arteries are frequently diseased, but aneurysm of them is rare. They are subject to inflammation and calcareous deposits. In hypertrophy of the heart they have been found much dilated."



lar walls themselves (I don't, of course, allude to mere sacculations of the walls, or pouches) may in certain cases be attributable in the first instance to dilatation of arteries,—yet I shall, in my quotations of cases, lay stress upon such as are patently and undoubtedly examples of aneurysmal sacculations of these vessels, though in one or two instances I shall allude incidentally to the more doubtful kind of cases.

To proceed with mention of cases from foreign authorities, which include, however, one or two cited from our own English periodicals, I would first refer to a case of Professor Heuse of Lüttich (related in the *Presse Méd.* 1856, 34),\* as it presents interesting points of resemblance to the one which I have related. The patient, aged 21, having had 3 attacks of tertian fever, had been ailing 3 months. There was swelling of the face, pallor of the mucous membranes, œdema of the legs, dyspnœa, and hydrothorax. The urine was not albuminous, nor were the heart's sounds remarkable. After death about a pint of coagulated blood was found in the pericardial cavity. The tissue of the heart was pale and softened, and under the visceral layer of the pericardium were fine small "thrombi," one of which was ruptured. The heart's cavities, valves, and vessels were natural. Of these thrombi,—"blutherde," "noyaux ou foyers sanguins,"—3 were on the left and 2 on the right ventricle, and one had spontaneously burst and given rise to the hæmorrhage. They were found to be aneurysmal dilatations of branches of the coronary arteries; and one of them was surrounded by fibroid substance in the walls of the ventricle, apparently the result of former extravasated blood, owing to the giving way of an arterial branch. The aneurysmal sac which had burst was the largest of all, measuring from 0.012 to 0.015 mm. in diameter. Excepting the branches on which the aneurysmal sacs were situated, the vessels of the heart were natural.

In the *Archives Générales de Médecine* (tome xiv. 1847, p. 195), Dr. Aran has brought together the particulars of several cases of rupture of coronary vessels of the heart in a communication entitled "Observation sur la dilatation et la rupture des vaisseaux coronaires du cœur, pour servir à

\* See Schmidt's *Jahrbücher*, p. 165. 1857

l'histoire des ruptures de cet organe." He commences his paper by alluding to the peculiar position of these vessels, their relation to the organ which impels the blood, and their consequent exposure to all the vicissitudes and troubles of the central organ of the circulation; he afterwards refers to the observations of Norman Chevers on the remarkable anatomical structure and functions of the coronary vessels,\* by which they are enabled to resist and sustain the efforts of the blood, to reinstate themselves, or regain their proper length after their elongation, and to be distended laterally at the same time. He states that a great number of the cases of lesion of the coronary vessels are consecutive to a graver and more profound lesion of different parts of the central organ; but that dilatation and rupture of these vessels of themselves menace the individual with sudden and rapid death. He looks upon this lesion as probably being more common than is supposed, and thinks that it is often overlooked owing to the small size of the dilatation and the incompleteness of investigation. He then recounts the cases which he has been able to collect of this affection. I do not propose to reproduce the particulars of these cases. I will only give the very briefest summary of them.

The *first* case was one described by Kramer in the *Commercium Litterarium*, h. 41, p. 324, 1732; the patient was a woman aged 78. She had been in the habit of being bled twice a year. On discontinuing this custom, she became subject to agitation at night and obtuse pains between the shoulders. She died suddenly, and after death rupture of one of the heart's coronary vessels was found.

The *second* case, related by Fischer in the *Acta Physic.*

\* See the *Guy's Hospital Reports for 1843*, p. 103. The principal object of Dr. Norman Chevers' paper is "to show that, in the structure of their tunics the coronaries really differ in a very remarkable degree from all other vessels of their size; and to attempt to assign the causes upon which the peculiarities of their construction depend;" the coronary arteries deriving their peculiarity from the remarkable development of a strong laminated fibrous structure, which, at the expense of another tunic of the vessel, exists between the internal and middle coats; as in the case of the aorta and some of its branches. He points out how the coronary arteries resemble the large superficial veins of the heart in the arrangement of their subserous and middle coats.

I will here, by the way, allude to the fact that Brücke made some inter-

*Med. Acad. C. Leopold*, 1740, tome v. p. 142, was that of a soldier who died suddenly, owing to hæmorrhage resulting from rupture of one of the branches of a coronary artery.

The *third* case, given in greater detail, was related by Bougon in the *Bibliothèque Méd.*, and was the same as that mentioned before as being quoted by Dr. Peacock.\* He died suddenly with hæmorrhage into the pericardium, owing to giving way of the right inferior coronary artery, which was veritably "aneurismatique dans la longueur d'environ 1 pouce."

The *fourth* case was the one related by Peste, and quoted also by Peacock.† Aran proceeds to observe that in certain

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esting physiological observations and experiments upon the coronary arteries of the heart, as described in the *Sitz. Ber. d. k. Akad. z. Wien. Math-naturw. Kl.* xiv. 1854, and quoted in Schmidt's *Jahrbücher*, p. 299, 1855; by which it appears that, owing to the particular arrangement and disposition of the coronary arteries and veins, and their relation to the aorta, &c. the persistent filling of the arteries has the effect, during the diastole, of opening out the cavities of the heart, by which the blood is sucked in, and also probably of elongating the papillary muscles and giving them that proper direction, which they must have in order, when the systole of the auricle is passing into that of the diastole, precisely and certainly to close the auriculo-ventricular valve-flaps. It also appeared to Brücke that, owing to the origin of the coronary arteries from the sinuses of Valsalva, the blood could not enter into them during the systole, as, if it could, an obstacle to the contraction of the heart would be produced. Since then Hyrtl and Bojanowski have found, on examining the hearts of the calf, pig, &c. that in very many cases the orifices of the coronary arteries are not reached at all by the edges of the valve-flaps. Out of eleven human hearts, in four cases the orifices of these vessels could not be covered by the valve. These observations are quoted in Schmidt's *Jahrbücher* for 1864, p. 95; but it is observed by the reporter that even where the coronary artery orifices are covered, the blood still gains admission when the valve-flaps are in apposition with the walls of the aorta, inasmuch as between them a quantity of blood exists in the sinuses of Valsalva which finds its way into the open coronary arteries, as it is not only under pressure of the heart, but also under that produced by the elasticity of the aortic walls. And even if the entrance of the capillaries into the walls of the ventricles during their contraction is prevented, as Brücke thinks, by the pressure of the contracting muscle (which is denied), yet the capillaries of the *auricles* which are not contracting would receive blood during the systole. In the same place notice is made of the observations of Brücke, of Von Wittich, of Donders, and Kleefeld, who take opposite views to each other upon the functions of the coronary arteries.

\* See p. 295, ante.

† Aran also alludes to the case described by Merat and quoted by Peacock.

cases of rupture of the heart wherein changes in the structure of the heart's walls have not been recognised as leading to the lesion, it may be that this lesion has followed upon interstitial hæmorrhage, which has weakened the resistance of the muscle.\* He considers that we are deficient in our knowledge of the etiology, prognostics, and diagnostics of these aneurysmal dilatations, and that as to symptoms the only one which appears in a manner to have been almost constant is a singular pain along the vertebral column in the præcordial region. He laments that auscultation was not practised in those cases which he details.

He concludes his paper by relating five cases of dilatation and rupture of the cardiac *veins*, which he cites from divers authorities: cases even of course much rarer than those of similar disease of the coronary arteries. These cases I quote, as bearing indirectly upon the subject of this communication.

Of these the first case was that of a man aged 48, subject to dyspnœa and a dry cough, who died suddenly, owing to the giving way of a dilated coronary vein. All the coronary veins were found to be dilated, the heart being thin and fatty.

The second case was that of an old woman who had effusion into the pleural and pericardial cavities. A varicose dilatation of the cardiac veins, which had attained the size of the little finger, was found. The veins were very thin and fatty. These two cases are recorded by Albers of Bonn in the *Corresp. Blatt. Rhein. u. Westfäll Aerzte*, 1844, No. I. Aran suggests that the dilated condition of these veins might have resulted from interference with the pulmonary circula-

\* Norman Chevers (*op. cit.*), after speaking of calcareous deposits in the walls of coronary arteries (p. 109) closing more or less their calibre, and causing dilatation of the less rigid parts which may even rupture, speaks of permanent dilatation of the vessels as being produced by undue distension and of their becoming generally widened or assuming a varicose state. The occurrence of ruptures he thinks mostly dependent either upon inflammatory softening or ulceration of the inner tissues of the vessels. One of the most frequent causes of dilatation of coronary arteries he considers to be a deposition of fat within the interstices of the muscular tissues of the heart, which produces a diminution of the capacity of the minuter capillaries and consequent dilatation of the larger branches, the heart's tissues becoming pale, softened, and atrophied; hence one of the most frequent causes of rupture of the heart.

tion and consequent stasis of blood in the heart's cavities. In connection with this point I would call to the reader's mind the fact, that all the cardiac or coronary *veins* terminate in the *right* auricle.

The third case, reported by Dr. David Maclagan, is quoted from the *Lond. and Edin. Monthly Journal of Medical Science*, June 1845, p. 421, and given at considerable length. A lady, aged 75, always having enjoyed good health, became suddenly pale and collapsed, but experienced no pain, only some distress at the chest. She died in an hour's time, and it was found that two small ruptures of the heart had occurred in the anterior surface of the left ventricle. One of these lesions was found by Dr. Goodsir to be connected with one of the coronary veins, and it appeared probable that the hæmorrhage into the pericardium which was found, *was owing to rupture of this vein, and perhaps to that of some small arteries.* The heart was above the normal disease, but not hypertrophied as to any of its parts.\* This case is quoted in Braithwaite's *Retrospect of Practical Medicine and Surgery*, vol. xii. p. 61; and the editor in commenting upon it, after speaking of the rarity of such cases, observes that "those which bear the greatest analogy to it are described by Cruveilhier under the head of apoplexy of the heart, and that Dr. Cormack also alludes to similar cases."†

The fourth case, quoted by Aran, was described by Dr. Carson in the *Lond. Med. Gazette*, vol. xiv. 1834, p. 472. It was that of a robust man, aged 52, subject to dyspepsia, who was suddenly taken with extreme weakness and præcordial pain, followed by pain at the chest and vomiting. No stethoscopic signs could be discovered. He died on the day after, suffocated. The pericardium was found distended

\* In his description of this case, I find that Dr. Maclagan observes that he was "strongly impressed with its probable affinity to that of the lamented Dr. Abercrombie." But he remarks, "the chief differences between this case and that of the late Dr. Abercrombie seem to have been the less rapid escape of blood into the pericardium, and the rupture being on the anterior surface of the heart."

† Aran suggests the probability of rupture of the veins, and perhaps of the coronary veins, in the two cases of "hémopéricarde" which Lieutaud quoted from Baader and Frambesarius (*Biblioth. Anat. Med. obs.* 660 and 668); and in the cases cited by Baillie in his *Pathological Anatomy*.

with blood; but the surfaces of the heart and pericardium showed no trace of rupture of any of the vessels, a small ecchymosis only being found at a level with the origin of the pulmonary artery. Dr. Carson, I find, quotes other cases from Baillie, Alston, &c. in which the pericardium has been met with distended with blood, supposed to have been poured out *without rupture* of any vessel. He considers that the exudation must have arisen from exudation, owing to a peculiar state of the blood and relaxation of the fibres.

The fifth case, related by Dr. Fitzpatrick in the *Lond. Med. Gazette*, vol. xviii. p. 295, was that of a soldier, aged 40, who was subject to difficulty of breathing; he suddenly fell down, and died. After death the pericardium was found to contain a pint of serous fluid, and the heart to be covered with a very thick fibrinous layer, weighing altogether a pound and a half. No solution of continuity was observed on the surface of the heart, and no trace of inflammation in any part.

This and the former case are considered by Aran as being probably due to rupture of veins, and perhaps small arteries. He concludes his paper by dwelling forcibly on the supposition that ruptures of the heart may be, in some cases, referable to alterations in the coronary vessels of the heart.\* And whilst referring to Aran's suggestions on this point, I will take occasion to quote here one or two cases of rupture of the substance of the heart associated with positive and undoubted rupture of branches of the cardiac arteries. Their relation may, at any rate, help the mind of the reader to dwell upon this suggestion and to realise its probability.

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\* I have just been informed by Dr. Crisp that in his opinion "atheromatous deposit has not so much to do with the production of aneurism as many pathologists suppose; the deposit often takes place, to a great extent, after the enlargement of the arterial tunics." Two cases of rupture of the heart, in which thrombus of a coronary arterial branch was met with, are quoted in Schmidt's *Jahrbücher* for 1864, Bd. 123, No. 3, p. 297. In one case (related by Soulier in the *Gaz. d. Hôp.* p. 27, 1863) the rupture is of the posterior surface of the left ventricle, but the thrombus is in the right coronary vessel, not completely filling its calibre. In the other (related by Malmsten in the *Hygien*, xxvi. 1861, p. 629) the rupture is also of the left ventricle; but it is the anterior branch of the left coronary vessel, which was, near the softened part, occupied by an old thrombus that in one place presented a puriform appearance.

Thus, in the *Journal de Bruxelles*, Jan. 1859,\* a case is related by Feigneaux of spontaneous laceration of the upper part of the heart and of the coronary artery, which was dilated. The case was that of a man, aged 57, who, otherwise in good health, experienced headache, weakness of the limbs, and thirst, a few days before death. After vomiting he had unpleasant feelings at the region of the heart, and unconsciousness, followed by dyspnœa and cough. On examination after death, in addition to the lesion above described, about three pints of coagulated blood were found in the left pleural cavity.

Again, I find that, in a report on the Klinik of the civil and military hospital at Geneva, Dr. Lombard, in the year 1857,† among other cases, describes one of sudden death from rupture of the left coronary artery, occasioning extensive extravasation of blood into the tissues around the aorta and other large vessels at the base of the heart. The patient was a woman, aged 44, who had been subject to palpitation of the heart and difficulty of breathing. After exertion, shortly before death, she was affected by pain in the chest, attempts at vomiting, and distress at the præcordial region.

He also describes a case of aneurysmal sac *in the walls of the heart* communicating with the left ventricle; and also a similar one in the substance of the left ventricle associated with abnormal communication betwixt the left ventricle and the left auricle. No mention is made of the state of the coronary arterial vessels; but it is possible, I would suggest, that these sacs in the substance of the heart's walls may have been the result of distension or aneurysmal dilatation and rupture of branches of these vessels.

Returning from the digression which I have made in quoting cases of dilatation of the coronary veins and rupture of the heart, apart from aneurysm of the coronary arteries, I would remark that I have found little or nothing on the latter subject amongst the writings of English authors beyond the cases already alluded to. From inquiry amongst those whom I know personally, I have only heard of two cases

\* See the *Prag. Vierteljahrschrift f. d. Prak. Heilk.* 1860; *Analekten*, p. 31.

† See Schmidt's *Jahrbücher*, p. 83, 1837.

of the kind, and they were mentioned to me by my friend Dr. Chadwick of Leeds, who informs me that he "distinctly remembers hearing of two cases of aneurysm of the coronary artery of the heart,—one in the practice of one of his colleagues, and the other in or about the hospital;" but he only spoke "from hearsay and memory."

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P.S. Since writing the above, I have met with the following notice of aneurysm of the coronary artery. It is quoted from the *New-York Journal of Medicine* in the *Dublin Medical Press* (see July 4th, 1860, p. 4).

(Abstract.)

Dr. Clark.—A young man, aged 30, a free drinker, died suddenly, soon after midnight, in the street. Had never complained of shortness of breath, could run up-stairs without difficulty, and never had rheumatism. The pericardium contained blood. There was no rupture of the heart, nor was there any aneurysm of the aorta. On "tracing the left coronary artery from its origin outward into the first fibres of the heart, running a distance of perhaps half an inch, the pair of forceps closed, was allowed to come into the pericardium, and examining the point where it had made its exit, there was a pretty extensive opening, a laceration of that coronary artery, perhaps three-fourths of an inch from its origin. *There was no evidence upon the specimen that there had been aneurysm of this coronary artery.* The pericardial sac contained possibly about 12 or 14 ounces of blood." There was a small amount of atheromatous deposit in the aorta.

Dr. Markoe remarked that it did not seem to him that the coronary artery could be in a normal condition, and such a result be brought about. He thought it would be interesting to dissect it out very carefully and ascertain accordingly. He referred in connection to a beautiful specimen of aneurysm of the coronary artery in the Museum of the New-York Hospital. It was removed from a lady who died suddenly while engaged at her dressing-table. The aneurysmal sac was about as large as the end of the little finger, with a rupture at one point, thus allowing blood to escape into the pericardium.

Dr. Wood did not remember to have heard of a case of rupture of that artery without disease. Some years ago he met with an aneurysm of the coronary artery, about the size of a marble, which ruptured into the pericardium, while the man was in congress with a prostitute of this city. In this case atheroma existed, both in the aorta and in the artery itself.



Dr. Clark did not think it probable that in his case the artery was free from disease; but its coats were so stained with the colouring matter of the blood, that it would be impossible to determine the fact until after maceration.

For copying out the above quotation from the Dublin journal I am indebted to Dr. W. D. Moore, who had access to the work, which, owing to our London Libraries being shut, I did not possess.



