ON
ANEURISMS,
AND ESPECIALLY
SPONTANEOUS VARICOSE ANEURISMS
OF THE ASCENDING AORTA,
AND
SINUSES OF VALSALVA.

WITH CASES.

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THE pathological conditions of the ascending or pericardial portion of the aorta, constituting the primary trunk of the arterial system, and preeminently liable to all those forms of disease, which predispose to aneurism, are generally admitted to be particularly worthy of study. This claim to our attention, however, becomes much increased when we consider the effects, which aneurisms of this portion of the aorta, produce on adjacent organs. For, not only may aneurisms thus situated, in common with those of other parts of the thoracic aorta, project forwards, and erode the sternum or ribs, compress

and become ruptured into the lungs, trachea, bronchi, or œsophagus, or into the cavities of the pleuræ or pericardium, but they may also compress, obliterate, and even form communications with the large venous trunks, by which the ascending aorta is surrounded, and thus constitute spontaneous varicose aneurisms of an extraordinary character. Further, as I have stated in a previous paper, "Aneurisms in this situation often burrow and become ruptured into the substance and cavities of the heart itself."* It is, then, to the pathology and diagnosis of some of the last-named and less common forms of aneurisms of the pericardial portion of the aorta, which have hitherto been barely noticed by authors, that this paper will be chiefly devoted.

In consequence of witnessing a remarkable case of aneurism of the right aortic sinus of Valsalva, which opened into the right ventricle, (see case 7,) my attention became directed to the probable effects of aneurisms of each of the three aortic sinuses, especially in relation to the particular cavity, whether of the heart, of a blood vessel, or of the pericardium, with which, in case of their becoming ruptured, they would probably communicate. I have endeavoured to determine this question, by two modes of investigation : 1stly, by anatomical examination and experiment, and 2ndly, by comparing the results of cases of aneurism thus limited, whe-

* "On Aneurisms of the heart." (Medico-Chirurgical Trans., vol. xxi. p. 243.)

ther recorded in the annals of medicine, preserved in museums that I have visited,* or occurring under my own observation.

Anatomy.—The ascending aorta has a somewhat curved form, with its convexity directed to the right. At its commencement, it is covered anteriorly and to the left by the pulmonary artery ; on the right by the right auricular appendage, the tip of which overlaps it in front ; and behind, it rests on the sinuses of the two auricles, the septum of which corresponds nearly to its median line. As it ascends, it lies, first, in front of the right pulmonary artery, as that vessel crosses behind it in its course to the right lung ; and then it gets in front of the right bronchus and the bifurcation of the trachea : it is bounded on the right side by the superior vena cava, and on the left by the pulmonary artery ; anteriorly, it is separated from the sternum only by the approximating margins of the two lungs. This portion of the aorta is included within the bag of the pericardium, the serous layer of which invests it in every part, except where it is in contact with the pulmonary artery.

The ascending aorta is often described as wanting the external cellular tunic common to arteries ; but it is more accurate to say, that the cellular tunic, in this situation, is slighter, and consequently less

* The various preparations which are referred to in this paper, as existing in the museums of London and Dublin, have been particularly examined by me. I mention this, as I sometimes refer to morbid conditions which exist in the specimens, but which are not described in the published notices of the cases.

extensible, than in any other part of the arterial system. At the very origin of the aorta, there exist three roundish dilatations corresponding to the three semilunar valves, which were first described by Valsalva, and are known by the name of the smaller sinuses of the aorta.* These sinuses have, hitherto, not been generally indicated by names ; for the sake, however, of convenience in this paper, I shall speak of them as the right, left, and posterior aortic sinuses. By the right and left, I mean the two sinuses which are seated anteriorly, and from which, respectively, the right and left coronary arteries arise ; and by the posterior, I intend that which does not give origin to any coronary vessel. The term posterior, which is sanctioned by the authority of Valsalva himself, appears to me to indicate the position of the sinus last alluded to, better than that of "intercoronary," which has been applied to it by M. Bizot. All the sinuses are imbedded in the soft fat, generally found at the base of the heart ; but the right is seated more superficially than either of the other two.

By passing needles through the coats of the aorta, in the situation of the sinuses, I have ascertained, that when affected by aneurismal or other disease, any one of them might become ruptured into the pericardium ; but that the right is more liable to do so than either of the others. By the same means, I have found, firstly, that the right

* See Cyclop. of Anatomy and Physiology, article Aorta. Vol. i. p. 188.

sinus might form a communication with the top of the right ventricle, with the pulmonary artery, or with the right auricle at the mouth of the appendage; secondly, that the left aortic sinus might become ruptured into the left auricle, the left ventricle, or the pulmonary artery; and thirdly, that the posterior aortic sinus might open into either the right or left, though more readily into the right auricle. I have likewise found that the ascending aorta, for some distance above the valves, has very similar relations to the adjacent parts as the sinuses themselves; but that, as indeed is obvious from simple inspection, the relations of aneurisms of the higher part of the ascending aorta, are with the superior vena cava on the right; the pulmonary artery on the left; the pericardial cavity in front; and with the right pulmonary artery and veins, and with the right, and in a less degree, the left bronchus behind.

LIABILITY OF THE RESPECTIVE SINUSES TO ANEURISM, AND THEIR RELATION TO ADJACENT PARTS.

Reference will be made in this paper, to eighteen cases of aneurism, which were more or less accurately limited to the aortic sinuses. In two of these cases, (15, 19,) there were aneurisms so limited in two of the sinuses; and, in another instance (6), the three sinuses were all affected. Of these twenty-two aneurisms, twelve were seated in the right, four in the left, and six in the posterior aortic sinus.

Though we cannot draw any certain inferences from so limited a number of data, yet I think they are sufficient to justify somewhat more than a conjecture, that the right sinus is more liable to aneurism than either of the others. Of the twelve aneurisms seated in the right sinus, two were of an incipient form, and, doubtless, projected into the pericardium ; * two had ruptured into that cavity ; † six projected into, and one (7) had actually formed a communication with the highest part of the right ventricle. Of the four aneurisms seated in the left sinus, one (19) had become adherent to the left auricle ; and another (14) had formed a large tumour in the upper part of the left ventricle. Of the six aneurisms seated in the posterior sinus, two

* *Cases of Aneurism of the aortic sinuses, projecting, but not ruptured into the pericardium.*—CASE 15. Hodgson on Diseases of Arteries, 1815. Case 10, Plate 2, p. 49. Aneurism both of the right and left sinus.

CASE 16.—Hodgkin, Medical Gazette, 1829, vol. iii. p. 488. Mus. Guy's Hospital, No. 1427 D. In this case, there was an aneurismal dilatation of the right aortic valve, as well as of its corresponding sinus.

CASE 17.—Mus. St. Thomas's Hospital, No. 608 C.

CASE 18.————— No. 618. This case presents a second aneurism (above that of the sinus) which has ruptured into the pericardium.

CASE 19.—Mus. St. Bartholomew's Hospital, No. 42.

† *Cases of Aneurism of the aortic sinuses, ruptured into the pericardium.*—CASE 20. Mus. St. Bartholomew's Hospital, No. 2. From a male patient, at forty, who died suddenly, in apparent health, after a hearty supper.

CASE 21.—Mus. Fort Pitt, Chatham, No. 13.

were incipient, and probably projected into the pericardium ; one (26) projected, as a round tumour into both the auricles, but principally into the right ; and one (6) probably had become ruptured into the sinus of the right, and another (13) into that of the left auricle.

That portion of the ascending aorta which is immediately above the valves, is probably even more liable to circumscribed true aneurism than are the sinuses of Valsalva themselves. I might refer to many cases of aneurism thus situated, in the writings of Morgagni, Scarpa, Burns, Sir A. Cooper and others, but as the precise position of the aneurismal sacs is not indicated, these cases do not require further notice here. I am, however, inclined to believe that those portions of the ascending aorta which are directly above the attachment of the semilunar valves, and which consequently are seated above and between the aortic sinuses, are more liable to the formation of aneurism than are the intermediate portions. I can refer to at least ten cases thus seated. Of the eight aneurisms seated above the attachment of the right and left aortic valves, three (22, 23, 24,) had become ruptured into the pericardium ; one (38) projected, and threatened to burst into the right, and another (27) into both the right and left ventricles of the heart : whilst, in four cases, the aneurismal sac was ruptured into the pulmonary artery. In one case (5), seated above the insertion of the right and posterior valves, the sac had become ruptured into the right auricle ; and in another (25),

above that of the posterior and left, the sac appears to have projected into the sinus of the left auricle, and had become ruptured into the pericardium.*

Varicose Aneurism, with its modification aneurismal varix, has, until very lately been regarded as uniformly produced by a wound of an artery and its accompanying vein. M. Breschet, even, in his valuable memoir on these forms of aneurism,† does not allude to the possibility of this lesion being spontaneous in its origin.

Previously, however, to the publication of the memoir of M. Breschet, Mr. Syme had narrated an interesting case of spontaneous varicose aneurism in the abdominal aorta and cava. Two important cases likewise, the one by Mr. Porter, and the other by Mr. J. G. Perry, in which spontaneous varicose aneurisms existed in the popliteal and femoral arteries and their accompanying veins, have also been published; for the precise nature of the latter case having been established by dissection, that of the former appears to me no longer conjectural.‡

* *Cases of Aneurism above and between the aortic sinuses, ruptured into the pericardium.*—CASE 22. Mus. St. Bartholomew's Hospital, No. 51.

CASE 23.—Mus. Guy's Hospital, No. 1478.

CASE 24.—Author's Collection. F. 16. History not known.

CASE 25.—Morgagni. Ep. 26, S. 13. From a female, aged twenty-eight, who died in actu coitus.

† Mem. de l'Acad. de Méd., tom. iii. 1833.

‡ W. H. Porter, Cycl. Anat. and Phys. 1835, vol. i. p. 242.—J. G. Perry, Med. Chir. Trans. 1837, vol. xx. p. 31. This last very important case has been alluded to by Dr. Hope, "Diseases of

When we consider, in the first place, the liability of the ascending aorta to aneurism in general ; in the second, the close manner in which this vessel is surrounded by the superior cava, the right auricle, the right ventricle, and the pulmonary artery,—all portions of the venous system ; we should, I think, *a priori*, be justified in concluding that it is a part of the arterial system particularly exposed to such a spontaneous intervascular communication as constitutes varicose aneurism.

It may perhaps be necessary in this place to meet the objection that very possibly will be made, that to call an aneurismal sac which has ruptured into one of the right cavities of the heart or into the pulmonary artery, a spontaneous varicose aneurism, is a “ pathological transcendentalism,” “ founded on a far-fetched, though ingenious, analogy.” I have, therefore, been gratified to find since a great part of this paper was written, that Mr. Smith, of the Richmond Hospital, Dublin, has taken a similar view of the subject ; and has anticipated the probable occurrence of such a lesion as spontaneous varicose aneurism, in the very centre of the circulating system. In remarking on a case to which I shall have to allude (27), and the preparation of which I have had the advantage of inspecting in his company, Mr. Smith observes, “ had the sac yielded where it projected into the right ventricle, there would have

Heart,” 3rd ed. p. 605 ; and his description of the physical signs is very valuable, though some inaccuracy appears to have crept into his history of the other details of the case.

been formed a varicose aneurism of a new and extraordinary description, and I should think not of necessity at once fatal."

But it is not merely on speculative grounds that I would contend for this view of the subject ; for, as I hope to show, there is somewhat more than a general analogy between the phenomena presented by the ordinary varicose aneurism of the extremities and those observed in the cases under consideration.

I may now proceed to detail, as concisely as I am able, the cases before me, in which a spontaneous varicose aneurism of the ascending aorta existed ; and, following the course of the circulation, I shall relate various cases in which the superior vena cava, the right auricle, the right ventricle, and the pulmonary artery, were, respectively, the seat of the varicose communication. I shall first, however, describe three cases in which the descending aorta and inferior cava were the vessels affected.

CASE I.

Spontaneous varicose aneurism of the abdominal aorta and vena cava.

Robert Scott, aged twenty-two, early in October 1830, began to complain of pain in the back and limbs ; with throbbing in the epigastric region, and an incessant whizzing noise proceeding from the same part. At the end of three or four weeks, his sufferings had become so severe as to confine him to bed, and at this period he was first seen by

Mr. Syme. He then complained of great pain in the back, and of coldness of the feet; but the symptom which occasioned himself and his friends the greatest uneasiness, was the constant noise. Upon examining the abdomen, a large pulsating tumour was readily felt: the pulsation however was not so strong, nor the tumour so incompressible, as in an ordinary aneurism; and, in the erect posture, it might readily have escaped detection. Notwithstanding the employment of various means, with the view of moderating the force of the circulation, the symptoms became aggravated, and œdema of the inferior extremities, and of the organs of generation appeared. This gradually increased to a great extent; and the swollen condition of the legs was remarkably contrasted with the emaciated arms. He died rather suddenly, at the latter end of January 1831, immediately after complaining of a pain at the heart.

Dissection.—The œdema had diffused itself all over the body; and the subcutaneous tissue of the trunk was distended with serum, to the thickness of three inches. There was an aneurism of the aorta at its bifurcation, which adhered intimately to the vena cava and to the vertebræ. It was of a flattened oval figure, the size of a large orange; and had produced absorption of the bodies of the three lowest lumbar vertebræ. The vena cava was much flattened and thickened, and communicated with the sac by a round aperture, somewhat larger than

a sixpence, immediately above the common iliac veins.*

I am indebted to the kindness of Mr. R. R. Robinson, of Camberwell, for the particulars of the following very interesting case.†

CASE II.

Spontaneous varicose Aneurism of the Abdominal Aorta and Vena Cava.

A man, aged forty, received a hurt on the back, which he felt for a few days, and then got rid of; but from which he continued to suffer occasionally. At the end of two and a half years, soon after getting wet through, and sitting in wet clothes, his legs began to swell. Five weeks after this, he came under the care of Mr. Robinson: his face had become very pale, the inferior extremities and scrotum unusually swollen, the skin being very tense, pale, and cold; the veins about the abdominal parietes numerous and varicose; fulness and indistinct fluctuation in the abdomen; pulse quick, vibratory, and slightly hæmorrhagic; urine bloody, and had been so for a fortnight. He never complained of any

* Edin. Med. and Surg. Journal, vol. xxxvi. 1831. The preparation is preserved in Mr. Syme's Museum.

† See also Med. Gazette, vol. xiv. p. 462, 1834, and Proceedings of Hunterian Society, 1834, in London Med. Journal, by Dr. Ryan, vol. vii. 1835, p. 594.

beating in the abdomen. By stethoscopic examination of the chest, nothing unusual was detected, except a rather diminished impulse of the heart.

The case was regarded as one of inflammatory dropsy, and was treated by calomel, elaterium, &c. After cupping on the loins, he felt "as if a load was removed from the kidneys;" in the course of two days the urine had lost all appearance of blood; and when examined three weeks afterwards, it did not coagulate by heat. He was freely purged by the medicine, and the swelling of the legs and scrotum was decidedly diminished. At the end of three weeks, however, the dropsical condition, both of the legs and abdomen, increased; the veins about the latter became very large, tortuous, and purple; the face was puffy and slightly œdematous; there were cough, dyspnœa, and difficult decubitus. The swelling went on increasing, so that the skin of the legs began to inflame, and actually to burst; and in this way, and by acupuncture a large quantity of serum was discharged. The remedies and the acupuncture, combined with bandaging, were repeated; and two months after coming under Mr. Robinson's care, the legs had diminished greatly in size, and the cough and dyspnœa were much relieved. A sloughy sore had, however, formed on each shin; and the urine was very high-coloured, and deposited a red sediment. For six weeks after this he continued to improve; the swelling was much diminished, and he appeared almost convalescent, when he died sud-

denly, five months after the first appearance of the dropsy.

Dissection two days after death.—The œdema had entirely disappeared. *Thorax.*—The lungs were mottled and congested; the pleuræ were unadherent, and contained a pint of serum. The heart was large, and all its cavities, but especially the right, were loaded with partly fluid, partly coagulated, black blood. The aortic valves were thickened, and the coats of the aorta presented some steatomatous deposit. The *abdomen* contained very little fluid; the liver was of usual size, soft, and nutmeg-like in appearance. The stomach and intestines were healthy. The descending aorta was considerably dilated, and formed a white tumour, having the lumbar glands, some of which were enlarged, imbedded in its substance. The dilatation was of the diffused kind, and extended from a little below the renal arteries, nearly to the bifurcation. The tumour was strongly adherent to the bodies of the lumbar vertebræ, which were scabrous, and formed the posterior wall of the aneurismal sac. The sac contained some fluid blood, and several recent clots, but none in layers: its interior was rough, from osseous deposit under the inner coat; and it communicated by two distinct but small and round openings with the inferior cava. The edges of these openings were smooth and rounded, as if they had undergone reparation, and they were only separated from each other by a small bridle. The inferior cava presented no other abnormal appearance.

CASE III.

Spontaneous varicose Aneurism of the abdominal Aorta and Vena Cava. Death in a few hours after the probable period of formation of the opening.

A butler, aged fifty-two, who had suffered for two years from severe pain of the back, stretching across the loins, was suddenly seized, whilst performing his usual duties after dinner, with violent vomiting, accompanied by general depression. When seen soon afterwards by Mr. Woodhead, violent throbbing of the abdominal aorta was felt in the umbilical region. He died at two o'clock the next morning.

Dissection.—The heart and other thoracic organs were healthy. The lower part of the abdominal aorta, just above its bifurcation, was dilated into an aneurism the size of a small orange. Near the centre of the right wall of the aneurism, there was an opening of an irregular form, the size of the point of the little finger, which communicated directly with the inferior cava. The whole calibre of this vessel was slightly dilated at the part where the communication existed. The posterior wall of the aneurismal sac had been entirely absorbed, and there were several firm fibrinous concretions occupying its place in front of the lower part of the third and the fourth lumbar vertebræ, the bodies of which were deeply excavated from absorption, whilst

the inter-vertebral substance had apparently undergone no change.*

CASE IV.

Spontaneous varicose Aneurism of the ascending Aorta and Superior Vena Cava.

A coachman, aged forty-one, of intemperate habits, and much exposed to wet and cold, had been subject to cough, dyspnœa, and palpitation, as long as he could remember. In the spring of 1833, he felt less vigorous. In the middle of June he suffered from pain in the neck and shoulders, which after a few days ceased: upon which, his face became purple and swollen; and, in a few days, the right arm, and the integuments of the trunk, as far as the base of the chest, especially on the right side, also became cedematous: his legs wasted, and he became feeble. Clusters of veins, almost varicose, appeared over the chest and back; the dyspnœa, palpitation, and cough, with viscid expectoration, increased; he suffered from a sense of weight and stiffness about the shoulders; and, towards night, felt dizzy and confused; the pulse was 100, and rather hard.

Auscultation.—There was dullness, on percussion, beneath the right, and clearness under the left clavicle; a distinct impulse under the right clavicle,

* Dr. J. Reid, Edin. Med. and Surg. Journal, vol. liv. 1840, p. 115.

and on the right side of the top of the sternum, with a loud "bruissement, like the vibration of a string," in the same situation; this sound was also heard, though not so loudly, over the right carotid and over the origin of the aorta: there was some crepitating wheeze over the back of the chest, especially towards the upper part.

He was cupped beneath the shoulder; had leeches applied repeatedly under the right clavicle; and took elaterium, squill, and other diuretics. The difficulty of breathing became more and more severe, especially towards night, but was always temporarily relieved by the leeching; the sputa became tinged with blood, the expectoration difficult, and the cough more troublesome. Towards the end of July, he suffered from slight delirium with stupor, tightness round the throat, and wheezing respiration. Six days before death, the œdema extended to the left arm, and the ankles and scrotum were slightly swollen: the countenance and eyelids had become intensely tumified, and the breathing was more oppressed. During the last three days of his life, the delirium was almost constant; on the 4th of August he had a severe fit of dyspnoea, followed by profuse perspiration, and marked subsidence of the œdema over the temples, and in the eyelids. He gradually sunk, and died in the evening of the same day, a month after admission into St. Bartholomew's Hospital; where I had an opportunity of witnessing the

Dissection, twelve hours after death.—Thorax. The

lungs were crepitant throughout ; but there were adhesions of the pleura on both sides ; and on the right side, the lower half of this membrane was thickened, to the extent of a quarter of an inch, by the presence of white layers of false membrane. The heart was large, from dilatation of the ventricles, without increase in the thickness of its walls : the valves were in their healthy state. There was a diffused true aneurism of the ascending aorta, which extended for an inch and a half above the valves, to the origin of the arteria innominata, and principally affected the right side of the vessel. It formed a tumour as large as the fist, which corresponded to the three upper right ribs, and was in front of the superior vena cava. The aneurismal sac contained some grumous coagula ; its coats were very thin, and its lining membrane friable, posteriorly and to the right : in this part there was a round opening, with smooth edges, and about a quarter of an inch across, which communicated with the superior vena cava, about half an inch above the opening of the vena azygos. The vena cava contained a coagulum of blood.

Abdomen.—The liver was firm, and rather small ; the kidneys and other viscera were healthy.*

I am not aware that any case, similar to the foregoing, has before been recorded ; and it must be re-

* See an anonymous Report in the *Lancet*, vol. ii. 1832-3, p. 666. The preparation is in the Museum of St. Bartholomew's Hospital. Arteries. No. 84.

garded as a most important one ; especially in connexion with the physical signs, which had a most striking relation to the point of communication between the vessels.

Reference has been made, by Otto, to a case in which an aortic aneurism had opened into the right auricle, but which I have not succeeded in finding.* An interesting case of the same description, has however been recently published, by Mr. T. B. Curling ; who has favoured me with an opportunity of examining the preparation. The following is an abstract of the case.

CASE V.

Spontaneous varicose Aneurism of the ascending Aorta and appendage of the right Auricle.

A man, aged thirty-five, whose history is defective, had laboured, for at least four months, under *general anasarca, cough, and great dyspnœa.*

The pulse was weak and resilient ; and there was a distinct pulsation, with bellows murmur, to the right of the sternum. Under bleeding, and the use of elaterium and digitalis, the anasarca was removed ; but the difficulty of breathing continued to increase, and amounted to orthopnœa ; his face became livid and anxious.

* Med.-Chir. Journal, vol. vi. p. 617.

About twenty-four hours before death, (November 27th, 1834,) the dyspnœa became dreadfully urgent; he could not bear the clothes near his chest, but kept throwing his arms about, calling out for fresh air; and so struggled, in the greatest possible distress, until he expired.

Dissection.—The superficial and deep-seated veins, especially of the head and neck, were extremely turgid.

Thorax.—There were some old adhesions of the right, and about sixteen ounces of serum in the cavity of the left pleura. The lungs were sound, but congested. There were four ounces of serum in the pericardium. The left ventricle was considerably hypertrophied and dilated: but, excepting a small ossific deposit in one of the valves of the aorta, the valvular apparatus of the heart was healthy. There was an aneurism of the ascending aorta, the size of a hen's egg, which had a rather contracted mouth, directly above the attachment of the right and posterior aortic valves. This aneurism was adherent to the appendage of the right auricle, on which cavity it encroached considerably.

The lower part of the aneurismal sac communicated with the cavity of the auricle, just behind the appendage, by a round opening, that would admit a crow-quill.

Abdomen.—There were about twenty ounces of serum in the peritoneal cavity. There was extreme

sanguineous congestion of the liver, with an injected state of the portal system.*

The particulars of the following important case were published, whilst I was engaged in the revision of this paper.

CASE VI.

Spontaneous Varicose Aneurism of the three Sinuses of Valsalva, right Auricle and Termination of the Superior Cava.

A tin-smith, aged thirty-five, addicted to the use of spirits, had long been subject to fits of palpitation, when he felt an uneasy sensation in the chest, like something giving way, whilst raising a heavy weight. He, shortly afterwards, became affected by œdema, and lividity of the upper part of the body, with confusion of the intellectual faculties. Three weeks after the accident, he was admitted into the Royal Infirmary, Edinburgh, under the charge of Dr. Peebles. The arms and chest, but more especially the face and neck, were of a livid colour, and highly œdematous; and the vessels of the conjunctiva were congested. He had much dyspnoea, with some cough, and difficulty of deglutition. The pulse ranged from 90 to 100, and there was a distinct interval between the beat of the heart and of the artery at the wrist. The urine was scanty and turbid, but not coagulable. There was strong impulse

* Medical Gazette, N. S., vol. i. 1838, p. 895; also London Medical and Surgical Journal, vol. vii. p. 594.

of the heart, the apex of which was felt lower down than usual ; a double bellows-sound was very audible over the cardiac and sternal regions, particularly the upper part of the latter. The murmur, accompanying the systole of the heart, was more prolonged ; that with the diastole, was sharper and shorter. Satisfactory percussion of the chest could not be obtained, on account of the great œdema ; but there was obviously extended dulness in the region of the heart, and upper part of the sternum. The respiratory murmur was very loud at the upper angle of the scapula. The diagnosis was “ hypertrophy of the left side of the heart, with aneurism of the aorta ;” and he was treated with drastic purgatives and digitalis. He had been previously bled and cupped. The dyspnœa became more urgent, so that he was unable to assume the horizontal position, for any length of time ; the œdema and lividity of the upper half of the body continued, but, excepting slight swelling of the scrotum, did not extend to the lower half. Some dark, circumscribed, livid spots appeared on the chest ; he was delirious at night, and his eyes were blood-shot. He died suddenly, a week after admission.

Dissection, the third day after death.—Thorax. There was about a quart of serum in each cavity of the pleura. The lungs were small and compressed, and contained a considerable quantity of blood and frothy serum. The pericardium was universally, and firmly, adherent ; and the heart was decidedly larger than usual. All the cavities of the heart were considerably hy-

pertrophied; and the left ventricle was likewise dilated. The walls of the heart were paler and more flabby than usual: the valves were healthy: the aorta, at its origin, was suddenly dilated, and formed an aneurismal cavity, the size of the fist. This large cavity appeared to be limited to the three sinuses of Valsalva; it was bound, superiorly, by three large segments of a circle, formed by the fibres of the artery which limit the sinuses, in a thickened and elongated condition. The aortic orifice was not enlarged. The ascending aorta, above the aneurism, was somewhat thickened and roughened on its internal surface, but was not dilated. The dilated arterial tunics, forming the aneurismal sac, were thin and very soft, and in some points, which were closed by the adherent pericardium, or the walls of the auricles, were deficient. The aneurism projected into the anterior and left part of the right auricle, where it had the termination of the superior cava stretched over its outer surface. There was a free communication of this portion of the right auricle, and the termination of the superior cava, with the aneurism, by two oval openings, with defined and rounded edges, which were barely capable of receiving the point of the little finger. The vena cava itself was pervious, but must have been compressed by the aneurism. Where the aneurismal sac projected against the anterior wall of the left auricle, there was a thin, dark, and projecting portion, which appeared ready to become ruptured. The blood was fluid, and there were no fibrinous con-

cretions in the aneurism. The abdominal organs were healthy. The brain was not permitted to be examined.*

The foregoing are the only cases, with which I am acquainted, where an actual communication had been formed between an aneurism of the ascending aorta and the right auricle. I have, however, dissected the heart of a man, in whom such a communication appeared to be on the point of taking place.†

The following most interesting case occurred in the practice of Dr. Roe, in the Westminster Hospital, where I had an opportunity of carefully observing it. As Dr. Roe intends, I believe, to make this case the subject of a distinct paper, I shall only introduce a brief abstract of it in this place.

* Dr. J. Reid, in *Edin. Med. and Sur. Journal*, vol. liii. 1840. p. 96.

† *True aneurism of the posterior aortic sinus, threatening to burst into the right auricle.*—CASE 26. Edward Wilson, aged forty-two, died in the Westminster Hospital, April 1836, after having laboured, during eight months, under symptoms of diseased heart, accompanied by an irregular pulse, and a bellows murmur, of variable intensity, over the arch of the aorta.

In this case, I found a true aneurism of the posterior aortic sinus, which would have contained about two ounces of fluid. The aneurism projected into both auricles, especially the right, into which, in consequence of thinning of its coats, it was ready to become ruptured. The heart was hypertrophied and dilated, especially on the right side, and weighed $17\frac{1}{2}$ oz. avoirdupois.

CASE VII.

Spontaneous Varicose Aneurism of the right aortic Sinus and summit of the right Ventricle of the Heart.

In a baker (John Mitchell,) aged 33, thirteen years after severe rheumatism, during violent exertion, in apparent health, sudden sense of "cracking" in region of the heart, with faintness, palpitation and dyspnœa, followed by rapidly advancing anasarca, sanguinolent and viscid sputa, great sense of cold, &c. ; extremely jerking pulse, extraordinarily superficial, and continuous sawing sound, with purring tremor, supplanting normal sounds of heart, and remarkably intense in second left intercostal space, two inches from sternum.* Death in eleven weeks.

Dissection.—True aneurism of right anterior aortic sinus, projecting into, and communicating by two small rounded apertures, with right ventricle : recent endocarditis ; more or less insufficiency of pulmonic, mitral, and aortic valves ; hypertrophy, and dilatation of heart ; hydropericardium ; hydro-

* Dr. Hope, who has given a sketch of this case, which he saw at my request, "Diseases of Heart," Ed. 3rd, p. 466, states that the sound and tremor did not extend above the third rib. From repeated observations, however, I have no hesitation in stating, that the sound and tremor were most distinct in the second intercostal space ; and in this I am confirmed by the written notes of Dr. C. I. B. Williams, who also witnessed the case.

thorax of right side; pulmonary, bronchial, and hepatic-venous congestion.

Since the preceding case occurred, I have made considerable research, but have met with no similar one; and I believe it to stand perfectly alone. But although it is the first case recorded, in which an aneurism of the aorta had become ruptured into the right ventricle, yet the lesion is one which it is not unlikely may again occur. That I am justified in this conclusion will, I think, appear, upon reference to the seven cases, described in the note.* In all

* *Cases of aneurism of the ascending aorta projecting and threatening to become ruptured into the right ventricle.*—CASE 27. Mr. Smith, Dublin Medical Journal, vol. x. p. 423. Mus. Richmond Hospital, B. c. 2 n. 15. A biloculate aneurism, an inch above the right and left aortic valves; the larger sac projecting into the summit of the right, and the smaller one into the left ventricle.

CASE 28.—Dr. Harrison, Dublin Medical Journal, vol. xv. 1839, p. 298. Mus. Trinity College. An aneurism of the right aortic sinus, the size of two walnuts, projecting into the top of the right ventricle. The aneurism likewise implicates the greater part of the right aortic valve: there is adhesion of the pericardium, extensive fibrous degeneration of the heart, and a real aneurism of the base of the left ventricle.

CASE 29.—Mus. King's College, of London. H. 28 a. A very beautiful specimen.

CASE 30.—Same collection. H. 41 a. A similar specimen, but mutilated. Aneurism in both cases, confined to the right aortic sinus.

CASE 31.—Mus. Royal College of Surgeons, London, No. 3510, from Mr. Langstaff's collection. This is a splendid specimen of an aneurism of the right aortic sinus, the size of an orange,

of these an aneurism of the very commencement of the aorta, had encroached, more or less considerably, upon the right ventricle, below the pulmonic valves ; and was merely separated from its cavity by the thin and almost transparent aneurismal sac, which, in some cases, appeared to be on the point of rupturing.

The last and most common variety of spontaneous varicose aneurism of the ascending aorta, is that which results from an aneurism forming a communication with the pulmonary artery.

CASE VIII.

Spontaneous varicose Aneurism of the ascending Aorta and Pulmonary Artery. Death nine hours after the probable period of formation of the opening.

A merchant, of temperate habits, when thirty-five years of age, suffered from symptoms supposed

with very thin walls, and lined with coagula. The sac forms a large tumour in the top of the right ventricle ; but it also projects, in a less degree, into the pulmonary artery, and into the pericardium, to the right of that vessel.

CASE 32.—Mus. Guy's Hospital, No. 1478 (25). A specimen very similar, in every respect, to the last described ; one of the pulmonic valves has become obliterated, from adhesion to the sac. See case described by Dr. Hughes, *Med. Gazette*, N.S. vol. iii. p. 206, Case 2nd.

CASE 33.—Mus. St. Thomas's Hospital, No. 1444 A. An aneurism of the right sinus, the size of a walnut.

In all the cases, except the last, the aneurism also encroached more or less on the pulmonary artery.

to be premonitory of pulmonary consumption, but which soon disappeared. Nine years afterwards, he had a slight attack of hemiplegia, which left behind it some sense of coldness in the foot which had been paralytic. In his fiftieth year, he began to complain of a noise in his ears and of flatulency, with pains, and sometimes slight swellings in his hands and feet. These symptoms continued, more or less, for more than three years. At the end of this time, he one day fatigued himself with walking; after which he ate a hearty meal, and, having refreshed himself by some sleep, began to play about with his children. Whilst so engaged, he was suddenly seized, between eight and nine in the evening, with great oppression in the chest; and he soon afterwards vomited. He went to bed, but, though the weather was warm, and he was covered with bed clothes, his skin felt cold to the attendants. At midnight, he laboured under a constant cough, and expectorated mucus tinged with blood. His body was moistened with a cold sweat, and his pulse was extremely feeble; sometimes it was scarcely perceptible. About five in the morning, when seen by Dr. Baillie, the pulse was full and irregular, the breathing difficult, the skin pale and covered with a clammy sweat. He frequently tossed and writhed his body, as though suffering great pain and uneasiness: the mental faculties, however, were unimpaired. He shortly afterwards expired; having, just before, complained much of heat in his chest, and thrown off the bed-clothes to cool himself.

Dissection.—The lungs were congested: each pleura contained about ten ounces of bloody serum. There were some adhesions of the right pleura. The pericardium contained about **two ounces** of fluid, like that in the pleura. **The** cavities of the heart and great **vessels** were very much distended with blood. **The** ascending aorta had a circumscribed aneurism, the size of an orange, growing from above the right and left aortic sinuses. The aneurismal tumour adhered to the pulmonary artery, just below its bifurcation. Within the circumference of this adhesion, there was a narrow hole, with jagged borders, half an inch long, by means of which a communication was formed between the two arteries.*

CASE IX.

Spontaneous varicose Aneurism of the ascending Aorta and Pulmonary Artery.

A porter, aged 24, much accustomed to the lifting of heavy weights, who, ten years previously, had suffered from a severe attack of acute rheumatism, was attacked with pneumonia, which yielded to copious depletion. He, however, soon began to suffer from palpitation and dyspnœa, and, at the end of six months, from dropsical swelling of the lower

* Dr. Wells, Trans. Soc. for Med. and Chirurg. Knowledge, 1812, vol. iii. p. 85. See the preparation, Mus. St. Thomas's Hospital, 618 A, marked "Dr. Wells' case," from which I have obtained some of the post mortem appearances.

extremities and abdomen. These symptoms all rapidly increased, and, ten months after the attack of pneumonia, he was admitted into the Edinburgh infirmary. His countenance, was tumid and somewhat livid ; there was great general uneasiness, orthopnoea, cough with expectoration, ascites and anasarca. The pulse 112, was large, hard and *thrilling*. There was much dulness on percussion, in the præcordial region ; the action of the heart was tumultuous, diffused, over a large space, not strong ; the first sound was accompanied by a loud blowing murmur, most distinct at the middle of the sternum, but audible over the whole fore part of the chest, and on the back, on both sides of the spine. The second sound was short, and much obscured by the first. ("Hence," observes Dr. Hope, "it appears a continuous murmur, extended from the first over the second sound.") The treatment consisted of a small bleeding and diuretics. The bleeding had the effect of temporarily relieving his general uneasiness, and the pulse was reduced, and the quantity of urine increased, under the use of the other remedies. The general symptoms, however, remained unrelieved ; the anasarca increased, the pulse became intermittent, and he died a fortnight after admission into the infirmary.

Dissection.—There were several pounds of serum in each pleura. The heart was more than twice its usual size, and encroached on the left lung. It was pale, flabby, blunt towards the apex, and had its several cavities and orifices much dilated. The

walls of the ventricles retained their usual thickness. Except a thickened condition of the aortic valves, there was no disease of the valves of the heart. The ascending aorta was reddened, and it was rugous on its internal surface from the presence of numerous cartilaginous patches, which had advanced, in some parts, to ossification. The whole of the ascending aorta was dilated into a large, irregular sac, which adhered firmly to the pulmonary artery, and communicated with it, by two openings, situated an inch and a half from its valves. The large opening was capable of receiving the point of the little finger; the smaller of transmitting a crow-quill. The edges of both were regular, round, and cartilaginous. Nearer the arch, a third, small opening was discovered, with thin, ragged edges.*

CASE X.

*Spontaneous varicose Aneurism of the Aorta and Pulmonary Artery.
Death in about twelve hours after the probable period of formation
of the opening.*

A man aged 36, of intemperate habits, was attacked, six months before death, with dyspnoea and palpitation. These symptoms had continued for more than four months, when œdema of the feet appeared; and he was soon afterwards admitted into the Royal Infirmary, Edinburgh, under the

* Dr. David Munro, by Dr. Hope, "Diseases of Heart," 3rd ed. p. 469: also, as given by Dr. Henderson, Edin. Med. and Surg. Journal, vol. xlv. p. 322.

care of Professor Alison. He then suffered from confirmed symptoms, general and physical, of disease of the heart; the pulse was small and weak, and there was a double murmur which was prolonged with the diastole of the heart. A fortnight after admission, he felt occasionally as if he were going to faint, had a sense of uneasiness in the epigastrium, and from this time the symptoms all increased in severity, except that, under the free use of drastic purgatives, a considerable diminution of the œdema of the legs and scrotum took place. Soon after noon, one day, five weeks from admission into the infirmary, and after the operation of elaterine and camboge, the dyspnœa suddenly became much increased, the lips, which had previously been pale, became livid, and the pulse feeble, and he died during the night.

Dissection.—There were about three pints of serum in the cavities of the pleuræ, and eight ounces in the cavity of the pericardium. The heart was very large, the right cavities were dilated, and full of blood, chiefly fluid, the ventricle being also hypertrophied: the left ventricle was dilated. Two of the aortic valves were relaxed and elongated, so as to be inadequate to the closure of the mouth of the artery. The mitral valve was healthy; there was an aneurismal sac, the size of an orange, of the ascending aorta, directly above the valves, and pressing upon the left auricle: this sac communicated with the pulmonary artery, by a ragged transverse fissure, more than an inch in length, and situ-

ated an inch and a half above the pulmonary valves. The coats of the aorta were thickened and irregular on the inner surface.

The cavity of the abdomen contained about a pint of serum. The liver was large, granulated and highly mottled. The stomach was much congested in the splenic extremity. The kidneys were mottled, by yellow deposit, in the cortical portion.

The brain was healthy.*

CASE XI.

Spontaneous varicose Aneurism of the Arch of the Aorta and the left Pulmonary artery, corresponding to the situation of the Arterial Duct.

Under the above head, I shall briefly allude to a case, interesting from its anatomical details, which has been published by Dr. J. Reid.† It is that of a man, aged 60, of whose symptoms nothing is recorded, but that he had laboured under considerable dyspnœa, with symptoms of hypertrophy of the left side of the heart. He died shortly after admission into the Royal Infirmary; and on

Dissection, the ascending aorta was found much dilated, the transverse portion of the arch, nearly of its usual size, and the descending aorta,

* Dr. J. Reid, Edin. Med. and Surg. Journal, vol. liii. p. 99. The preparation is preserved in the museum of the Edinburgh University. The physical signs which are noticed as having existed in this case, are obviously referrible to the diseased state of the aortic valves, &c., and not to the varicose communication.

† Ed. Med. and Surg. Journal, vol. liii. p. 101.

from the origin of the left subclavian to about an inch above the diaphragm, about three times its usual calibre. From the right side of the summit of this dilated descending aorta, a small infundibuliform aneurismal sac, rather more than an inch in length, projected forwards, and to the right side, and opened into the left pulmonary artery, about a quarter of an inch beyond the bifurcation. The orifice of this sac, in the left pulmonary artery, was somewhat rounded, but at the same time irregular and fringed at the edges. Dr. Reid observes, that it may be difficult to decide whether the communication was or was not formed by the arterial duct opened up, and somewhat altered by an aneurismal dilatation on the aorta; but there can be no doubt that it lay exactly in the situation of the impervious cord, left by the obliteration of that vessel.

There were dilatation, hypertrophy, and valvular disease of the heart. The lungs were the seat of some masses of pulmonary apoplexy.

CASE XII.

Spontaneous varicose Aneurism of the ascending Aorta and Pulmonary Artery. Sudden death at the time of the probable formation of the opening.

A gentleman aged fifty-three, who had for some months complained of slight bronchitic symptoms, and of some præcordial uneasiness, was suddenly seized with violent dyspnœa, which was rapidly followed by insensibility, and in about four minutes from the commencement of the attack, by death.

Dissection, forty-eight hours after death.—The lungs contained a very considerable quantity of blood and some serum. The heart and all its valves were healthy: that portion of the ascending aorta between the upper part of the sinuses of Val-salva, and the origin of the brachio-cephalic artery, was dilated into an aneurism capable of containing the fist. The aneurism contained a few small clots of fibrine, and projected chiefly to the left side, and there the coats of the vessel were irregularly thickened, and contained numerous yellow patches. The left side of the aneurism adhered firmly to the trunk of the pulmonary artery, and communicated freely with that vessel, by a ragged irregular fissure, nearly an inch and a half in length.*

There is a case, reported by M. Sue, and presented to the faculty of medicine of Paris, by MM. Payen and Zink, † which has been cited by Otto, and after him, by Dr. Copland and other authors, as one of aortic aneurism, which had ruptured into the pulmonary artery. Upon referring to the case, I was strongly inclined to believe that the aneurism had *not* formed such a communication, though it had projected into, and almost entirely closed the cavity of that vessel. Some difficulty, however, existed in forming a just conclusion, from the occurrence of the word “s’ouvrant,” in the

* Dr. J. Reid, Edin. Med. and Surg. Journal, vol. liv. 1840. p. 114.

† Bulletin de la Fac. de Méd. de Paris, vol. ii. 1809, No. 8, p. 128.

heading of the case, and I am indebted to the kindness of my friend, Mr. J. Kitching, for making, during his stay in Paris, a minute examination of the preparation, from which it is evident that no rupture of the aneurismal sac had taken place during life.

I shall refer in a note to five preparations, contained in the London Museums, and to one, in that of the faculty of medicine, at Paris, in which, a varicose communication had likewise formed, between an aneurism of the ascending aorta, and the pulmonary artery.*

** Six additional cases of spontaneous varicose aneurism of the ascending aorta and pulmonary artery.*—CASE 34. Museum St. Bartholomew's Hospital, No. 14. A circumscribed true aneurism, the size of an orange, above the attachment of the right and left aortic valves, and having a linear opening into the pulmonary artery, a little below its bifurcation. The ascending aorta is likewise generally dilated. This preparation is marked "Case described by Dr. Wells;" but this, I think, must be a mistake, see note to case 8. p. 351.

CASE 35.—Mus. St. Bartholomew's Hospital, No. 15. A large, diffused true aneurism, of the ascending aorta; with a roundish, lacerated opening into the pulmonary artery, a little below the bifurcation.

CASE 36.—Mus. St. Bartholomew's Hospital, No. 87. Very similar to the last specimen; but with a smaller and more linear, ruptured opening.

CASE 37.—Mus. St. Bartholomew's Hospital, No. 102. An aneurism, the size of a large walnut, above the right and left aortic valves, projecting into the pulmonary artery just below the bifurcation, and communicating with it by a round hole, the size of a common quill. The aorta is also dilated, and its valves thickened.

HISTORY.—I have now related twelve cases, and, in a note described the preparations from six others, in which spontaneous varicose aneurisms had existed. Of these, three were seated in the descending aorta and inferior vena cava. The others, excepting one in the arch, were all seated in the ascending aorta or its sinuses ; and communicated, one with the superior vena cava, two with the right auricle, one with the right ventricle, and eleven with the pulmonary artery.

The history of the disease, which I shall offer, will be founded upon an analysis and comparison of these cases.

The twelve patients were all of the male sex. Two were from twenty to thirty, four from thirty to forty, two from forty to fifty, three from fifty to

CASE 38.—Hunterian Museum, No. 366. A large multiloculate aneurism, above the right and left aortic valves, projecting, partly into the pericardium, to the right of the pulmonary artery, and partly into that vessel, and into the right ventricle. The opening into the pulmonary artery is about a quarter of an inch across, round, and quite smooth. It is seated directly above the pulmonic valves. This preparation has been particularly described by Mr. Guthrie, "Diseases of Arteries," p. 60. This and the last are the only preparations I have examined, in which the appearances warrant the supposition, that the patients long survived the formation of the openings between these two large blood-vessels.

CASE 39.—Musée de la Fac. de Méd. de Paris. "Aneurisme à l'origine de l'aorte ; perforation et communication dans l'artère pulmonaire."

I am not aware that the histories of any of the above six cases are preserved.

sixty, and one sixty years of age. One was by profession a merchant, one a coachman, much exposed to wet and cold, one a butler, one a baker, one a tinsmith, and another a porter: the three latter were all accustomed to lift heavy weights. The profession of the six other patients is not stated; excepting that one of them was a gentleman.

The habits of the merchant and baker were temperate; of the coachman, tinsmith, and another, (10), decidedly intemperate; whilst those of the other seven are not stated. One had sustained an injury on the back two years and a half before; another had complained, for two years, of severe pain stretching across the loins; and two had suffered from acute rheumatism, the one ten, and the other thirteen years before the appearance of symptoms of aneurism. One had had an attack of hemiplegia nine years previously, and had complained of pain and swellings in the hands and feet, for two years before the attack; one had suffered from dyspnoea and palpitation, during the greater part of his life; one from slight bronchitic symptoms and præcordial uneasiness for some months; and another from marked symptoms of disease of the heart, during six months. The foregoing features, however, in the history of the cases doubtless bear, principally, on the etiology of aneurism generally, and not on that of spontaneous varicose aneurism in particular.

It is only, of course, when aneurismal sacs, in the neighbourhood of venous trunks, have attained a certain size, and their walls a certain degree of tenuity, that they are liable to form varicose com-

munications. These communications would appear to be formed according to one of two principal modes. In six of the cases, the opening into the venous system seems to have been formed very suddenly ; in consequence, in four of them, of some more or less unusual exertion or effort, previously to which the patient had been in ordinary health. In two of these cases (6, 7), the effort consisted in raising heavy weights ; in one (8), in playing with children, after a fatiguing walk, which had been followed by a hearty meal ; and probably in the other (10), it was the result of the action of drastic purgatives.

In these cases, there can be little or no doubt, that the aneurismal sacs were *ruptured* during the efforts alluded to ; for in each of them, a set of symptoms, somewhat resembling those of a rupture of the heart, appeared suddenly, at the period of the more or less unusual exertion. In the first of the four cases, these symptoms consisted of a sensation of something giving way in the chest ; in the next of faintness, dyspnœa, and palpitation, with pain, and a sense of something cracking about the heart ; in the next of vomiting, oppression in the chest, and a constant desire to cough, with bloody expectoration ; and in the last, of a sudden increase of dyspnœa and feebleness of pulse. In two cases likewise (3, 12), where the patient does not seem to have been exposed to any particular exertion, the preternatural communication was evidently formed in an equally sudden manner ; and was indicated, in the one, by great

depression and violent vomiting ; and in the other, by severe dyspnoea and insensibility.

In three of the cases, the mode of attack is not particularly specified ; in another, however, (4,) we find that there was no sudden seizure, but that the patient suffered for some time, from pains in the neck and shoulders, which ceased more or less completely, as the symptoms of the varicose communication appeared. In the three cases (1, 2, 3,) in which the aneurisms were seated in the descending aorta, the symptoms were preceded by pains in the region of the back ; and, in the two former of these also, there appears to have been no sudden seizure. In most of these cases, then, we may suppose that the openings resulted from a *gradual softening or ulceration* of the walls of the sack, without any decided rupture. This, I conceive, would likewise have been the mode in which the communication would have taken place in the other instances, had not the patients been exposed to such efforts as have been alluded to.

SYMPTOMS.—The symptoms of a varicose aneurism of the aorta and vena cava, will, probably, be best understood by a division into those connected,—1stly, with the external surface and system generally ; 2ndly, with the respiration ; and, 3rdly, with the state of the heart and great vessels.

1. Excepting two or three cases in which the patients died almost immediately, the external surface in all presented very decided signs of an ob-

structed circulation. In four (1, 2, 7, 8), the animal heat appeared to be more or less remarkably deficient. In six the surface, especially that of the face, was livid or bloated ; and in one of these (7) the livor extended to the mucous membrane of the fauces and soft palate, the colour in the face being of a peculiarly pallid character. In one of the cases (2), in which the descending aorta and inferior cava were the seat of the lesion, the veins of the abdominal parietes were large, tortuous and distended. In the two cases in which the opening was in the superior cava, many of the superficial veins of the upper half of the body, particularly those of the face, neck, front of the chest, and back, were permanently distended, and almost varicose. A similar but more general condition of the superficial and other veins, also existed in two other cases (5, 7).

Dropsical infiltration of the surface was the most uniform symptom noticed, and was present in all the cases, eleven in number, in which the symptoms are detailed, excepting three, (3, 8, 12,) in which death very speedily occurred after the formation of the varicose opening. The anasarca in all was very decided, and advanced very rapidly : in one case (7), it made its appearance on the twentieth day from the date of the intervacular communication. It involved all those parts of the body, the veins of which were distal to the opening in the venous system. Thus in the case (4) in which the aneurism opened into the superior cava, and in that in which it opened into the top of the right auricle (6), the anasarca of

the face and arms was remarkably contrasted with the uninfiltated state of the lower half of the body. In two cases (1, 2), in which the abdominal aorta and inferior cava were the seat of the varicose aneurism, the anasarca of the legs and lower half of the body was equally strongly contrasted with the free, and in one case, emaciated state of the arms.

In three other cases, in which the aneurism opened into the appendix of the right auricle, the right ventricle, and the pulmonary artery respectively, the venous system of the whole body being distal to the varicose orifice, we find that the dropsical infiltration was little short of being universal; though, as in all cases of general dropsy, the lower extremities were most decidedly affected. There was, likewise, more or less ascites in these three cases. The extreme debility, also, with emaciation, which was noticed in two of the cases, (4, 7,) ought, probably, to be regarded as a symptom proper to the lesion under consideration. In one instance (2), sloughy sores formed on the shins; and in another sloughing of the scrotum supervened on the operation of acupuncture.

2. Excepting two cases (1, 3,) in which this symptom is not mentioned, there was more or less dyspnœa in all; but in four (2, 4, 7, 11,) the oppression and difficulty of breathing were not very severe, excepting, in most of them, towards the fatal termination, and were chiefly noticed after exertion. In the other six cases (5, 6, 8, 9, 10, 12,) the dyspnœa was extreme, and amounted to ortho-

pnœa, in the two former, of a most aggravated character, the patient dying from a slowly developed apnœa (asphyxia). There appears to be reason for believing that the urgency of the symptoms generally, and especially of the dyspnœa, is in proportion to the size of the opening into the vein, and to its proximity to the lungs; and, consequently, that this symptom, *cæteris paribus*, is more severe when the aneurism communicates with the pulmonary artery, than when it opens into the inferior or superior cava. Cough is stated to have been present in every case but five, (1, 3, 10, 11, 12); and in several instances it was particularly distressing. It was almost uniformly attended by expectoration; and in two cases only, where there was cough, (5, 6,) is this symptom not mentioned. The sputa were more or less mixed with blood in three of the cases, (4, 7, 8).

In order to estimate how far the symptoms referrible to respiration, were connected with the varicose aneurism, it will be well to consider the state of the lungs and pleuræ, as observed after death. In one case (4), the pleuræ were uniformly adherent, and in seven hydro-thorax, to a greater or less extent, was present; though, perhaps, in four cases only (6, 7, 9, 10), was the fluid in such quantity as to have materially affected the respiration. It is most probable, that this effusion into the pleural cavities is to be regarded as a consequence of the varicose communication. In one case (11), there was pulmonary apoplexy; but, excepting for the

most part, slight congestion and œdema of the tissue of the lungs, in five or six instances, these organs appear to have presented no other lesion. It may then be observed, that the severity of the dyspnœa, &c., in very few of the cases, bore any proportion to the degree of pulmonary complication ; consequently we must, in the main, attribute these symptoms to the varicose aneurism.

3. In five of the cases (4, 6, 7, 9, 10), there were palpitations of the heart, and, in one, (7,) præcordial pain. As, however, these were precisely the cases in which the heart itself presented the most decided traces of disease, in the shape of hydro-pericardium, dilatation and valvular lesion, it is doubtful how far we can look upon the symptoms alluded to, as directly belonging to the varicose communication. The pulse presented distinctive characters in all the cases, eight in number, in which it is noticed ; if we except one (4), in which it is briefly stated to have been "hard," a character which it is difficult to reconcile with a communication between the ascending aorta and vena cava. In four of the cases (2, 5, 7, 9), the pulse was decidedly "jerking ;"—the terms, "vibratory," "hæmorrhagic," "resilient," and "thrilling," applied by three of the observers, evidently referring to one and the same character. In another case (6), it is stated that there was a distinct interval between the impulse of the heart, and the pulse, as felt at the wrist. In the other two cases, the pulse

was chiefly distinguished by being extremely feeble ; and this was likewise the case in two of the instances in which it was jerking. In one (7), the pulse was much weaker in the left than in the right wrist ; and in three cases (7, 8, 9), it became either intermittent or irregular in the process of the disease.

PHYSICAL SIGNS.—In the first only of the two cases of varicose aneurism of the descending aorta and inferior cava (1), were the physical signs noted ; and in this they consisted of a pulsating tumour of the abdomen, with an incessant whizzing sound proceeding from the same part, and audible both to the patient himself, and to those around. In the case in which the aneurism opened into the superior cava (4), there was a distinct impulse detected under the right clavicle, and on the right border of the first piece of the sternum ; and a loud murmur was also heard in the same situation. In the case in which the aneurism communicated with the appendage of the right auricle (5), a distinct pulsation and a bellows murmur were also perceived on the right of the sternum.

In the instance in which the varicose communication existed between the ascending aorta and the upper part of the right auricle (6), there was a loud double bellows' sound, which was particularly heard over the upper part of the sternum ; the systolic portion of the sound was more prolonged, the diastolic sharper and shorter.

The physical signs, as observed by myself, in the case in which the aneurism opened into the sum-

mit of the right ventricle (7), differed remarkably from the preceding, as to the situation in which they were heard. There was dullness on percussion in the præcordial region, which extended to the level of the second rib. The healthy sounds of the heart were scarcely audible, and that only in the arteries of the neck. Throughout the præcordial region, and indeed over nearly the whole thorax, a continuous sawing sound was heard. This sound was loudest during the systole, less loud during the diastole, and still less so during the interval: it was most distinct in the second intercostal space, about an inch and a half from the sternum; where, in a spot that might be covered by a shilling, it was intensely loud and superficial; and in the same spot there was a most distinct and superficial purring tremor. In this case it is to be recollected that the heart was displaced somewhat to the left, by dropsy of the right pleura. Dissection proved that the spot where the murmur was heard and the tremor felt most distinctly, corresponded precisely to the situation of the varicose orifices.

The physical signs in the first of the cases of varicose aneurism, connected with the pulmonary artery (8), were not at all noticed, but it is to be observed that this occurred prior to the great discovery of Laennec. In the next case (9), in addition to increased though not forcible impulse, and dullness on percussion, in the region of the heart, there was a loud blowing sound heard over the front and back of the chest, but most distinctly at the middle of

the sternum. In this case also the murmur would appear to have had a continuous character. In the remaining cases the physical signs do not appear to have been noticed, at least not after the formation of the varicose opening.

There are a few other symptoms mentioned in the details of the cases, which are not referrible to any of the three heads under which I have arranged them. With one or two exceptions, however, to which I shall allude, these were evidently either the effects of the aneurismal tumour on surrounding parts, or were dependent upon complication with other diseases, and, consequently, need not detain us. In two cases (4, 6), there was gradually increasing dizziness, and confusion of the intellectual faculties, which ended in delirium and stupor; and which, though the brain was not examined, can scarcely be doubted to have depended upon a congested state of the cerebral veins, the result of the impediment to the return of the blood of the superior cava. To the same train of symptoms are likewise to be referred the congested and even blood-shot state of the eyes, and the ultimately impaired condition of the speech, which were also observed in one of these cases (6). In one case (2), there was considerable hæmorrhage from the urinary system; and in another (4), from the bowels.

PATHOLOGY.—When a communication exists between the ascending aorta and an adjoining part of the venous system, the arterial blood, in conse-

quence of the greater power of the left ventricle, is propelled through the opening, becomes mixed with the venous blood, and is carried forward with it to the lungs. The pathological effects consequently resulting, are hence obviously referrible to one of three circumstances.

In the first place ; a portion of arterial blood is abstracted and regurgitated from the arterial system ; and the arteries, consequently, are imperfectly filled. As a consequence, the pulse is feeble, and peculiarly jerking ; the surface, and especially the countenance, loses the ruddy hue of health ; the animal heat is diminished ; and, the various organs being imperfectly nourished and stimulated, there arise emaciation, debility, loss of muscular power, with a disposition to syncope, to gangrene, and even to softening of the heart and internal viscera.

Secondly ; the stream of arterial blood, which is constantly passing into the venous system, acts as a direct and powerful impediment to the return of the venous blood from the veins distal to the varicose orifice ; and this is an effect which, in some cases, is assisted by the pressure of the aneurismal tumour. Hence arise, in the parts so situated, livor of the skin and mucous membranes ; venous congestion of the glandular system, especially the liver ; engorgement and dilatation of the right cavities of the heart ; distention, and a varicose condition of the sub-cutaneous and deep-seated veins ; passive

hæmorrhages ; dropsical effusions, especially in the shape of anasarca ; and venous congestion of the brain, with comatose and apoplectic symptoms.

Thirdly ; the circulation through the lungs of a portion of already arterialized, in a state of mixture with the impure venous, blood, and in vessels not intended for its reception, acts, in all probability, as an abnormal stimulus or irritant to the pulmonary organs. We consequently have dyspnœa, cough, and the secretion, from the air cells and bronchial tubes, of a more or less viscid mucus, often tinged, or even mixed, with blood ; and the lungs, after death, are frequently more or less congested, and may even be the seat of apoplectic effusions.

This is the proper place to consider the rationale of the physical signs of varicose aneurism of the aorta ; but as the mechanism of abnormal murmurs of the heart and arteries is, to a certain extent, still *sub judice*, I shall content myself with a very few observations on this subject. I may remark, however, in passing, that some of the cases before us, and especially the seventh, offer many important features in relation to the mode of production, both of the normal and abnormal sounds of the heart and arteries.

As a consequence of the superior force of the left ventricle, the arterial blood is doubtless propelled through the varicose orifice, and so produces the murmur. During the systole of the heart, the current through the orifice is the strongest, and the sound consequently is then the loudest. During

the diastole, in consequence of the elastic reaction of the arterial system on its contained blood, a less powerful current is propelled through the opening, and at that time, a somewhat weaker murmur is heard. This reaction of the arteries, however, is in operation, not only during the diastole, but also during the interval, and, in fact, until it is overcome by the succeeding ventricular systole; consequently, though the current is stronger at the commencement of this reaction, and synchronously with the diastole, yet is it also continued during the interval. Hence, the murmur is a continuous one; it being present, though much weaker, during the interval between the diastole and the succeeding systole. The same circumstances which produce the murmur, of course occasion the purring tremor. I think there can be no doubt but that the extremely loud and distinct character of the murmur and tremor, are due to the generally small varicose apertures, through which the blood is propelled into the vein or right cavity of the heart; and that their intensity will be found to be in a direct ratio to the smallness of the aperture, and to the proximity of this to the walls of the chest. Like all other organic murmurs, the sound will be heard the loudest over the orifice in which it occurs; and, like them, will be propagated in the direction of the circulation beyond. Consequently, when the aneurism opens into the vena cava superior, or the right auricle, it is on the right border of the upper half of the sternum, that the sound will be chiefly heard,

and the tremor felt ; but, when the communication is with the summit of the right ventricle or pulmonary artery, it is on the left border of the upper third or half of the sternum, that the sound and tremor will be the loudest and most distinct.

DIAGNOSIS.—After the preceding analysis of the symptoms and view of the pathology, I think we shall be justified in regarding the following, as the diagnostic signs of spontaneous varicose aneurism of the aorta.

General signs.—1. Severe and rapidly advancing anasarca, of such portions of the body as are below, or the venous system of which is distal to, the varicose orifice. When the varicose aneurism is between the descending aorta and inferior cava, the legs, scrotum, and lower half of the body ; when between the ascending aorta and the superior cava, the arms, face, and upper half of the body ; and when between the ascending aorta and one of the right or left cavities of the heart, or the pulmonary artery, the whole of the body is the seat of the dropsical effusion.

2. Livor of the face particularly, but likewise, in a less degree, of all such portions of the body as are below the varicose orifice.

3. A distended, and even varicose, condition of the subcutaneous and other veins, distal to the orifice.

4. Dyspnœa ; often amounting to orthopnœa and terminating in apnœa.

5. Cough, with expectoration ; especially if the sputa be bloody.

6. A remarkably jerking, and in some cases, very feeble pulse.

7. Emaciation, debility, loss of muscular power, deficient animal heat and sensorial disturbance, may be looked upon as somewhat less frequent and certain signs.

Physical signs.—8. A superficial, harsh, and peculiarly intense sawing or blowing sound, accompanied by an equally marked purring tremor, heard over the varicose orifice, and in the current of the circulation beyond it ; this sound is continuous, but is loudest during the systole, less loud during the diastole, and still less so during the interval. The characters of the sound, as regards intensity and continuousness, will probably altogether distinguish it from any that is heard in ordinary cases of aneurism, or valvular disease of the heart. In the case of a varicose communication between the aorta and superior cava or right auricle, when there is no displacement of the heart, the sound will be heard and the tremor felt, along the right border of the sternum ; and will, generally, be the loudest about the second right intercostal space. When, however, the aneurism opens into the pulmonary artery or summit of the right ventricle, the corresponding points on the left side will be the seat of the murmur ; though this may, probably, sometimes be heard more distinctly nearer to, though still to the left of, the centre of the sternum.

When the history shows that the foregoing signs have been developed soon after some unusual effort, especially if that were attended by pain in the præcordial region and a disposition to syncope, the evidence of a varicose aneurism of the ascending aorta is rendered nearly indisputable.*

PROGNOSIS.—We have no grounds for believing, that when a varicose orifice has been once formed between an artery and a vein, in any part of the vascular system, it is susceptible of a spontaneous cure; and it is probable that when seated in the aorta, the lesion must necessarily sooner or later, and as the following details will show, in no long time, prove fatal. The duration of the disease, dated from the formation of the varicose opening, appears only to be indicated with precision in four of the cases. In four of them (3, 8, 10, 12), the cases had a general aspect, very much resembling that of rupture of the heart; and the patients survived, in one case only four minutes, and in the other three from nine to twelve hours each. In one of the other cases (6), the patient lived a month; and in the other (7), eleven weeks and two days. The prob-

* For some interesting and valuable observations on the signs and differential diagnosis of some of the above cases, see Dr. Hope, *Diseases of Heart*, edit. third, p. 471. Although the bulk of this paper was written more than a year before the publication of Dr. Hope's remarks, I must, nevertheless, express my obligation, to a certain extent, to the views of that justly esteemed author.

able duration of the disease in the five remaining cases, was in one (4), about two months ; in two (1, 5), about four ; in one (2), five ; and, in another (9), ten months.

As illustrative of the subject now under consideration, I may here allude to the anatomical characters of the varicose orifices. In eight cases (3, 8, 10, 11, 12, 33, 34, 35), all of which, excepting the first, were seated in the pulmonary artery, the openings were, for the most part, linear and irregular, and had jagged borders, indicating that the patient must have died speedily after their formation. In one case (38), the character of the orifice is not stated ; but in the remaining nine the openings were round, and had more or less smooth and polished borders ; so that the patient must be supposed to have survived a somewhat considerable period, to have allowed of such an extent of reparative change. The cases in which death occurred more or less suddenly, were, including the four above mentioned, seven in number (1, 2, 3, 6, 8, 10, 12) ; in the remaining five it took place in a much more gradual manner, and in one it very much resembled that from ordinary diseases of the heart.

TREATMENT.—The disease being, so far as we know, necessarily fatal, the indication of treatment will necessarily be confined to the relief of particular symptoms, such as the dropsy and dyspnoea. These objects are to be obtained, doubtless, by the same means as are resorted to in cases of valvular

disease of the heart ; and, as in those lesions, all powerful and violent measures ought to be avoided. In the cases before us, we have no record of the result of treatment in five of the number (3, 8, 10, 11, 12). Out of the remaining seven, general bleeding was resorted to in three instances, but with little or no advantage, and perhaps even with injury. Dyspnœa and hæmaturia were materially relieved in two instances, after local bleeding by cupping and leeches. In five of the cases, powerful diuretics and drastic purgatives, such as squill, digitalis, elaterium, camboë, and calomel, were employed ; but the dropsical symptoms were, for the most part, but little, and as might be expected, only temporarily relieved by these remedies. Acupuncture was resorted to in two cases (2, 7), and in both with considerable relief to the anasarca of the legs ; but in one (7), it was followed by sloughing of the scrotum, which probably somewhat hastened the fatal termination.

The plan of treatment which the experience of one case, and the above considerations seem to me to point out, as likely to relieve the symptoms and to prolong life, is as follows. To relieve dyspnœa and the other results of congestions in important organs, by the cautious use of local bleeding ; to attempt the removal of dropsical effusion by the employment of the milder diuretics and hydrogogue purgatives, such as the compound powder of jalap, squill, and blue pill ; lastly, to increase the activity of the capillary circulation, by means of combina-

tions of diffusible stimuli, such as carbonate of ammonia, and the nitric or sulphuric ether, with the essential oils of the labiate plants, and camphor.

ANALOGY WITH THE ORDINARY FORMS OF VARICOSE ANEURISM, &c.—If we now compare the symptoms and pathology of spontaneous varicose aneurism of the aorta, as above given, with those of traumatic varicose aneurism of the extremities, I think it will be admitted that there is a very decided analogy between the two lesions.

According to M. Breschet, the latest and most accurate writer, at length, on this subject, the rational signs of varicose aneurism of the extremities, consist of numbness, loss of power, diminished heat, a blueish or slightly violet tinge of the skin, and a small and feeble pulse (which Scarpa states to be likewise vibrating), in that portion of the limb which is beneath the aneurismal tumour. Now the only signs of spontaneous varicose aneurism of the aorta, that we should at all look for in cases seated in the extremities, and which are not mentioned, are the distended and varicose state of the veins, the œdema, and the symptoms referrible to the respiration. But when we recollect the free inosculations which exist between all the principal veins of the extremities, and the absence of such in the vena cava, right cavities of the heart and pulmonary artery, it is easy to perceive why œdema, and a distended or varicose state of the veins below the opening, should be absent in varicose aneurisms of the extremities ; and why they should be present in the same lesion,

when situate in the ascending or descending aorta. Again, the comparatively very small quantity of arterial blood which, in the former cases, circulates through the lungs, and the greater distance from these organs at which it enters the venous system, afford a sufficient explanation of the absence of dyspnœa, cough, and the other symptoms of pulmonary disturbance.

With respect to the physical signs of varicose aneurism of the extremities, it may be observed that by all authors who have treated of them, from Dr. William Hunter downwards, they are stated to consist of pulsation and purring tremor, in the situation of the tumour, accompanied by a decided, and, in most cases, *very loud* murmur, which is said, by some, to be propagated up the vein. The murmur, which has been variously described as a humming, whizzing, hissing, or roaring sound, is in some cases not merely audible when the ear is applied over the tumour, either with or without the stethoscope; but is also, as in that of Mr. Syme (1), and in the fifth reported by M. Breschet, audible to the patient himself, and even to those at some distance around him. In many of the cases also the sound is described as being alternately louder and more feeble, synchronously with the motions of the heart, so that a *continuous* sound would appear to have been present. Thus Dr. Cleghorn,* in describing the mur-

* Med. Observations and Inquiries, vol. iii. 1767, p. 115.

mur as heard in his case of aneurismal varix of the brachial artery, says "this thrilling noise is alternately higher and lower by regular jerks, corresponding to the pulsation of the artery." In the case, however, of spontaneous varicose aneurism of the femoral artery, already quoted from Mr. Perry, the continuous character of the murmur and purring tremor, is attested by the observation both of Mr. Perry and of Dr. Hope. Thus, Dr. Hope says, "There was a strong thrill and a remarkably loud murmur, *which continued without intermission*, though louder during the arterial pulsations;" and Mr. Perry observes, "this purring was quite distinguishable from the pulsation of the artery; for while the latter was lost in the intervals corresponding to the diastole of the heart, the former continued to be felt without intermission, deriving only renewed intensity from the repetition of the heart's action." It would thus then appear, that in the distinguishing, and perhaps pathognomonic characters of intensity and continuousness of the abnormal murmurs, we have, as we should have presumed *a priori*, a precise correspondence between the varicose aneurisms of the aorta and those of the arteries of the extremities. The enlarged state and increased pulsation of the artery above the tumour, in cases having their seat in the extremities, obviously correspond to the increased impulse and palpitations of the heart, which are generally, and perhaps always, present in cases seated in the ascending aorta.

I shall only just allude to the analogy which may

likewise be traced between the effects of the accidental and indirect communication between the left and right sides of the heart, in cases of spontaneous varicose aneurism of the ascending aorta, and those of the congenital and more direct communications, which are the result of original malformation of the heart.

ON ANEURISMS OF THE ASCENDING AORTA, RUPTURED INTO THE LEFT CAVITIES OF THE HEART.—We have seen, from anatomical examination and experiment, that aneurismal sacs, when situated in certain of the sinuses of Valsalva, or in certain portions of the ascending aorta, would be likely to form communications, not with the right, but with the left cavities of the heart. That this is a circumstance that may actually occur, the following cases will prove. In such cases, the lesion cannot, of course, be denominated a varicose aneurism, though both the general and the physical signs would, probably, have much analogy to those belonging to such cases.

CASE XIII.

Aneurism of the posterior Aortic Sinus, communicating with the left Auricle.

Dissection, of a man, aged forty, whose history, unfortunately, is not related. There were three or four ounces of serum in the pericardium. The heart was much enlarged. There was an aneurism,

the size of a large walnut, which opened into the aorta, immediately above the posterior aortic valve. The aneurismal sac projected, very slightly, into the pericardium. It was lodged, almost entirely, in the thickness of the inter-auricular septum, and projected into the cavities of both the auricles, though more into the left. It here presented four small elevations, of not more than half an inch in diameter. These proved to be secondary aneurismal sacs, and one of them presented an aperture of two or three lines in diameter.

The preparation is in the museum of the Faculty of Medicine, at Paris; and was presented by M. Beauchêne.*

CASE XIV.

Aneurism of the left Aortic Sinus, projecting and threatening to become ruptured, into the left Ventricle.

Under this head, I shall merely allude to a very interesting case, published by Dr. Hanna. The aneurism appears to have been caused by a fall from a horse, six months before death. The general and physical signs are well described, but, as they do not immediately refer to the subject now under consideration, I need not introduce them here.

The preparation is preserved in the museum of the Park Street School of Medicine, Dublin, where I have had an opportunity of examining it. The

* Bulletin de la Fac. de Méd. tom. ii. 1810, No. 3. p. 38.

aneurism is the size of a small orange, and communicates with the left aortic sinus, below the coronary artery, by a mouth not more than two or three lines in diameter. It forms a prominent tumour, in the upper and anterior part of the cavity of the left ventricle, from which, indeed, it is only separated by the extensively opaque and thickened endocardium. From the very small size of the mouth, in relation to that of the aneurismal sac itself, as well as from the history, I incline to think, that the case is one of false aneurism, which has dissected the muscular walls of the heart.*

The pathological effects, resulting from the rupture of an aneurism into either of the left cavities of the heart, would only partially correspond with those of a similar rupture into the right. They would, I think, be resolvable into those produced by, 1st, the abstraction of a certain quantity of blood from the arterial system, and the circulation of such current through the left cavities of the heart ; which would act, 2ndly, as a powerful impediment to the return of the blood from the lungs. The effects thus produced, need not here be particularly pointed out. They would consist of great dyspnoea, hæmoptysis, &c. ; and they would have considerable analogy with those occasioned by an extremely patescent condition of the mitral valve. The dropsical symptoms would appear later in the course of the disease, and then only as a conse-

* Dublin Journal of Medical Science, vol. vii. p. 80.

quence of the retarded pulmonary circulation. The essential characters of the pulse, and of the physical signs, would not vary from those of spontaneous varicose aneurism. The situation of the murmur, however, would doubtless be different. The sounds would be heard, most distinctly, lower down in the præcordial region, and probably in the neighbourhood of the left nipple.*

Retreat, near York,
December 1839.

* Whilst this paper was passing through the press, two additional cases of spontaneous varicose aneurism were published. The one was seated in the ascending aorta and pulmonary artery, and the other in the common iliac artery and vein: they were communicated, the former by Mr. Smith, the latter by Mr. Adams, to the Pathological Society of Dublin, in April last. (Dublin Med. Journal, Sept. 1840, vol. xviii. pp. 164 and 166.)

It is interesting to observe, that these cases afford additional confirmation of many of the views which have been laid down in this paper respecting the pathology and diagnosis of this remarkable form of aneurism. It may be also remarked, that from the publication of no fewer than eight cases, in as many months, we are perhaps warranted in concluding that this lesion is not a mere pathological curiosity, but, on the contrary, one with which the practitioner should be prepared occasionally to meet.