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19

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ANEURISM OF THE ARCH OF THE AORTA,  
PRESSING UPON THE LEFT  
BRONCHUS, AND ANNIHILATING THE ORDINARY PHYSICAL  
INDICATIONS OF PNEUMONIA:

WITH REMARKS.

BY  
ROBERT SPITTAL, F.R.S.E.,  
FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, AND PHYSICIAN TO THE ROYAL  
INFIRMARY OF EDINBURGH.

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CASE

ANEURISM OF THE ARCH OF THE AORTA

PRESSING UPON THE LEFT  
BRONCHUS AND ANNIHILATING THE ORDINARY PULMONARY  
INDICATIONS OF PNEUMONIA:

WITH REMARKS.

BY

ROBERT SPITZ, M.D.

LECTURE ON THE DISEASE OF THE AORTA, AND ITS CONNECTION TO THE LUNGS.  
LECTURE ON PNEUMONIA.

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The subject of the following observations, a gentleman of the legal profession, aged 47, unmarried, and somewhat irregular in his habits, had for several recent winters suffered from bronchitis. During these attacks he took very little care of himself; and, in the winter of 1839-40, the disease assumed a chronic form, and continued varying in severity according to the state of the weather, or the attention he bestowed upon himself, until the period of his death, which took place early in December 1840.

Not having visited the patient, professionally, since May 3d of the same year,—the catarrhal affection having become abated as the summer progressed,—I was again requested to see him on the 18th October. From this period, the case assumed a new and complex character, full of pathological interest; while, at the same time, the risk of life was greatly increased. On examination of the thorax, a tumour or fullness was observed a little above the centre of the sternum, in the mesial line. The elevated portion measured between two and three inches in diameter, and was of a rounded form, somewhat conical in appearance, although the extreme degree of elevation did not appear to exceed half an inch. The sternum was distinctly perceptible across even the apex of the tumour, and continued to be so until the fatal termination of the case; while the integuments over the latter, at first of a normal appearance, subsequently became reddened, especially at the apex, presenting very much the aspect of the skin over a pointing abscess.



There was a considerable heaving impulse in, and around, the tumour; and the sound of percussion over the latter was dull; as was also the case to the left, to nearly two-thirds of the clavicle, from its sternal extremity; the dullness likewise extending down below the second rib of the same side. Very little impulse, however, was perceptible in the subclavicular region. The respiratory murmur was absent, where the percussion was dull; but distinctly audible over other parts of the left side of the chest; frequently however mixed with catarrhal *râles*, chiefly of a mucous character, and which had always been more or less present, in this situation, during former examinations. The sound of percussion over the chest, with the exception mentioned, was normal; and the respiratory sounds on the right side were pure, and somewhat increased in intensity. At this time, also, frequent cough, with yellowish, tenacious expectoration, especially troublesome at bedtime, and accompanied with slight acceleration of the breathing, formed a progressively increasing source of much annoyance to the patient.

These indications continued much the same until the 15th November, when the catarrh became more severe, accompanied with slight febrile action, and short and frequent breathing; and the respiratory murmur, at the same time, was observed to be feeble on the left side whenever heard; still inaudible in the region of the tumour, as before detailed,—puerile over the right side,—while the tracheal respiratory sound had slightly assumed a stridulous character, and dysphagia had begun to manifest itself.

No farther particular change took place in the symptoms until the 20th November, when, after unwarrantable exposure to cold in the open air, and exertion in his professional avocations, the right lung also became affected with bronchitis. From this period to the 26th, the pulse varied from about 90 to 100, and was of good strength. On the latter date, however, having seen the patient in his ordinary state in the early part of the day, I was sent for about 10 P.M., when I found him labouring under a very considerable aggravation of all his symptoms. The pulse had risen to 120, and of increased strength,—the skin was alternately hot and dry, or covered with a very profuse perspiration,—respirations 40 in the minute,—catarrhal *râles*, chiefly mucous, were observed to have increased in the right lung, while scarcely any respiratory sound was perceptible over the left, and then only on coughing, or on forcible respiration, catarrhal in its character, and evidently only in the large air-tubes.

Œdema of the feet and ankles, together with lividity of the face, and slight apparent protrusion of the eyes, now began to complicate the case; while the patient became unable to maintain the horizontal position, except for a very short period, and always with most ease in the morning.



After the exhibition of antimonials, and the free application of blisters, slight relief was obtained. The respirations diminished to 32, and the pulse on the 27th fell to 112, and softer; but the lividity and œdema continued as before. On the 28th there was still much mucous *râle* generally, over the right side of the thorax; with increase of cough, and much thin frothy mucous expectoration; while the left continued as before. On the 29th the respirations fell to 28,—pulse 112, rather stronger and fuller, with less lividity of the face; and for several days he had little and disturbed sleep. On the 30th the dyspnœa increased,—pulse became more rapid and feeble, in spite of stimulants,—face, and upper part of the trunk of a slightly livid aspect—increase of œdema of lower extremities, and he gradually sank, and died early on the morning of December 1, 1840, having been unable to assume the horizontal posture for several days previously. The sounds perceived in the region of the tumour were similar to those in the precordial region—which were of the normal character—except on one or two occasions during the earlier part of my attendance, when a short and sharp murmur was heard, synchronous with the first sound of the heart, a little below and to the left of the external tumour or elevation. The patient thinks he observed the commencement of the tumour about half a year before the period at which he called my attention to it. He likewise stated, that, about two years ago, he had an acute “cutting” pain, as he termed it, under the sternum, but had had little or none since.

The treatment, apart from that applicable to the acute pulmonary attacks, was directed to the alleviation of the symptoms arising from the aneurism, and especially with a view to hindering as much as possible its increase. For this purpose, the ordinary means of rest, both mental and physical, were enjoined; with, at the same time, absence from all unusual stimuli; and a very moderate diet was ordered. Some of these measures, especially the former, were not very strictly adhered to; nevertheless the tumour did not make any advance externally, but appeared rather to have diminished, as was also the opinion of the patient.

*Sectio cadaveris.*—On examination of the body, 36 hours after death, the following appearances were observed,—a large sacculated aneurism was found to arise from the anterior and a little to the left side of the ascending aorta, about an inch above the semilunar valves; involving likewise the whole of the lower and anterior portion of the arch, which was very much dilated. The tumour admitted easily the doubled hand, and projected considerably to the left side, though not to the extent indicated by the dull sound on percussion during life; but the tumour was flaccid, containing only a small portion of recently coagulated blood. The aneurism extended from the upper part of the sternum to that



portion of it nearly in a line with the cartilages of the third ribs; the sac was firmly adherent to the edge of the sternum throughout the whole length and breadth of the portion described, the latter having served as part of the anterior parietes of the tumour. At several places the bone was quite exposed internally; at some hollowed out and quite diaphanous, especially at the upper part and left side, near to the sterno-clavicular articulation, and at the lowest part of the sternum affected, where, in consequence of this, the latter broke through on raising the bone in the usual manner during the examination.

The interior of the tumour was quite irregular from rounded elevations, the normal structure of the artery becoming obscured or lost immediately at the commencement of the dilatation. At the posterior and upper portion of the arch the normal structure of the vessel was less indistinctly observed, having, though not to the same extent as in the walls of the sac, an irregular appearance. The great vessels arising from the dilated arch were all pervious; at their origin from the aorta, however, they were somewhat thickened in an irregular manner, and were of a reddish colour; and this affection was more or less present in the aorta and great vessels of the neck generally. The portion of the aorta occupied by, or involved in the tumour, terminated at the descending portion of the aorta.

The tumour contained numerous layers of fibrine of a pale ash colour, varying in hue, and not unlike some limestone depositions familiar to the mineralogist. About one-third of the sac,—that most out of the current of the blood on its way to the descending aorta,—was occupied in this manner. The coagulated mass was dense, and adhered tolerably firmly to the parietes of the sac.

The left ventricle was slightly dilated and hypertrophied, the aortic valves were a little thickened at their attachments and edges, the mitral valve was normal, with the exception of a few yellowish patches on its larger or aortic segment.

The right lung had its air-tubes loaded with mucus of a thin and frothy character, and was slightly emphysematous. The left lung again, presented the various stages of the well-marked results of pneumonia. Its upper third was in a state of sanguineous engorgement; the lower portions in a state of red hepatization, insensibly passing into purulent infiltration towards the base of lung, where also there existed several abscesses filled with a reddish-brown purulent fluid; around these the lung was hepatized. Immediately below the bifurcation of the trachea, five of the cartilaginous segments of the left bronchus were more or less completely exposed, and this great bronchial division was somewhat flattened in its appearance. No tubercles existed in either of the lungs. There was some serous effusion in both sides of the thorax.



*Remarks.*—The above case is interesting in several particulars to which the attention of the pathologist may be directed with advantage. The commencement of the aneurism may, perhaps, be dated from the period when he perceived the “cutting” pain which has been alluded to; and although no indication of its existence was observed by me until about six weeks previous to his death, it is proper to state that, on visiting him, at the commencement of this period, he at once not only informed me of his too well founded suspicions, that he laboured under aneurism of the aorta, in support of which, he laid before me the evidence contained in a paragraph under this head in a popular dictionary,—but at the same time stated, that for several months past he had suspected the presence of this disease, chiefly from the unusual “beating” he felt in the region of the tumour, an indication which was set forth as one of the chief symptoms in the article he had been perusing; he also stated that he had observed some degree of the external swelling about the period mentioned, which had continued gradually, but slowly, to increase, with scarcely any pain or uneasiness. From the first, no doubt presented itself as to the nature of the disease, an opinion which became more and more confirmed, and supported by subsequent events. The progress of the tumour internally, where alone it extended, was clearly manifested in the occurrence of pressure on the neighbouring parts; involving the œsophagus, blood-vessels, nerves, and great air-tube on the left side of the thorax and neck; as proved by the dysphagia, lividity of face and upper part of trunk, and œdema, dyspnoea, and the progressive diminution of the respiratory sounds over the left lung,—together with the stridulous character of the tracheal respiratory murmur, proving the contraction of the trachea to a certain extent,—while, in the progress of the case, the left bronchus became completely blocked up, and all but perforated by the pointed pressure of the tumour in this direction; and it seems evident, that had the patient lived, the aneurism would have burst into the left great division of the trachea. As it was, the patient sank under the combined effects of obstruction to the respiration and circulation directly from mechanical pressure,<sup>1</sup> together with the effects consequent on the morbid state of the lungs described.

Perhaps the most interesting point to the semeiologist, is the impediment which the mechanical obstruction of all respiration in the left lung placed in the way of the ordinary means of diagnosis,—*denying us altogether the aid of those indications of a respiratory and vocal character*, and limiting us to those afforded by

<sup>1</sup> The aneurism must, from its position during life, have pressed upon the vena innominata and left jugular,—also on the descending cava to some extent,—and on the left pulmonary vessels, hindering somewhat the free passage of the blood in these, and thus accounting for many of the symptoms and appearances.



percussion and the general indications; and on referring to my notes, I find that the sound on percussion posteriorly was, three days previous to death, "pretty good on both sides of thorax;" so that it is fair to conclude that hepatization had not occurred to any great extent at this time. That the pneumonia, however, had commenced at an earlier period, is highly probable, if not certain, from the indications of fever, of an inflammatory character, which took place on the 26th November, five days previous to death, together with the advanced progress of the affection observed on examination of the lung after death. The total absence also of the characteristic sputa, formed an additional bar to the diagnosis of the inflammatory condition of the left lung.

The two sounds, similar to those of the heart, perceived in the region of the tumour, as well as the all but complete absence of any morbid *bruit*, corroborate the observations of previous investigators, that aneurisms, in the situation described, with large communication with the aorta, rarely give rise to morbid murmurs, single or double, and this especially when the tumour commences in a gradual dilatation of the vessel. In such cases, the sounds, which are louder in the region of the arch of the aorta than in a normal condition of the parts, owe their increase, there is little doubt, to the altered force of the blood, and dimensions and elasticity of the containing parts. For example, according to Dr Williams, in his recent excellent work on the "Pathology and Diagnosis of Diseases of the Chest," &c.: "The aorta, thus dilated, and wanting its proper regulating elasticity, receives the contents of the ventricle with more abruptness than usual; this circumstance, with the greater size of the vessel, increases the force and loudness of the pulsations at the upper part of the sternum."<sup>1</sup> Something more, however, it appears to me, is necessary to be taken into account, in order to arrive at a satisfactory explanation of the phenomenon, than this view of the subject, that the first sound is "exaggerated," merely "by the impulse of the blood against the dilated walls of the artery."<sup>2</sup> In the conditions described, and in accordance with several experiments and observations detailed elsewhere,<sup>3</sup> I cannot but agree with the observations of my colleague, Dr Henderson, "that the stroke of the expanding sac against the sternum or ribs, or the sudden infringement of the wave of blood against these solid parts, affords a very probable explanation of the phenomenon—at all events, such actions are perfectly adequate to produce such a sound."<sup>4</sup> In the experiments alluded to, it was observed,

<sup>1</sup> 1840. P. 284.

<sup>2</sup> Ibid.

<sup>3</sup> Experiments and Observations on the Sounds of the Heart. Ed. Med. and Surg. Journ., No. 128, 1836. By the author.

<sup>4</sup> Ibid. vol. xlv., 1836. On Substernal Aneurisms.



that no impulse, even of a gentle character, could be made against any, especially a bony part of the chest, from within, as well in air as under water, without giving rise to a sound of an analogous character; and to this explanation I claim the support of Dr Williams, who, though very properly hostile to the exclusive view advocated by Magendie, that the stroke of the heart against the chest is the sole cause of the sounds of the latter, admits, nevertheless, "that in forcible pulsation, and when the lung does not too much intervene, he has no doubt that the impulse does produce sound; and if we listen to the sound of the heart when it is beating strongly, or when, by leaning forward or by breathing out, the heart is brought in contact with the walls of the chest, we hear the first sound has something like a knock in it, which we can *scarcely help referring to the impulse*."<sup>1</sup> If, then, these facts be admitted in regard to the heart, the same views cannot be denied to the explanation of the inordinate aortic or aneurismal, but pure heart sound, and in this I believe Dr W. will concur.

As to the morbid sound heard on one or two occasions early in my attendance, and which was of a "whizzing" character, short, and by no means loud, this may have arisen from the vibration caused by the current of blood from the ascending aorta, passing into the aneurism, immediately at the commencement of which, from the left side of former, there was an abrupt edge formed by the angle of junction of the sound aorta and tumour. The feebleness and subsequent absence of the murmur, may be accounted for, partly by the large size of the communication with the tumour, as above alluded to, and perhaps its progressive enlargement; although there is no doubt that the comparative rest, both mental and physical, together with the absence of many accustomed stimuli, aided perhaps by the fibrinous deposition in the tumour, may also, to a great extent, assist us in explaining this occurrence. The murmur, in this case, may be regarded as a mere vestige of an important diagnostic indication perceived in aneurisms, in which the communication with the aorta is narrow and abrupt, and in which case there is sometimes not only a murmur synchronous with the contraction of the ventricles, but also another synchronous with their dilatation, or, what is next to the same thing, with the dilatation and subsidence of the aneurism. This, however, is rare; nevertheless both Dr Hope,<sup>2</sup> (whose untimely death all must deplore,) and Dr Williams,<sup>3</sup> who has not met with a case of this nature, admit the possibility of such an occurrence; and in a case published by Dr Henderson, which I had several opportunities of

<sup>1</sup> Op. cit. p. 205.

<sup>2</sup> On Diseases of the Heart, &c., 3d ed., 1839, p. 443.

<sup>3</sup> Op. cit. p. 286.



examining along with him and Professor Fergusson, the double murmur from this cause was very distinctly marked.<sup>1</sup>

The second heart sound perceived in aneurisms about the arch of the aorta, is generally admitted to arise from mere transmission from the ordinary site of its origin in the semilunar valves, augmented, it may be, by reason of the aneurism affording a better medium of conduction of sound than the aorta in its normal state, not close to the sternum, and often covered by a portion of pulmonary tissue. And there is little reason to doubt that the first sound must also to a certain extent owe some degree of augmentation in its intensity, to transmission from the original site of the first sound of the heart, wherever this may be found to arise.

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<sup>1</sup> Ed. Med. and Surg. Journ., vol. xlv. 1836, p. 314.





