

a portion of the pulmonary structures, from pressure upon the trachea, upon a main bronchus, or upon the pneumogastric trunk or one of the recurrent nerves. An aneurism must have attained to a considerable size before it can shut off a portion of a lung sufficient to produce decided dyspnoea. Shortness of breath, therefore, will not be much complained of in the early stages, unless the tumor interfere with some of the other structures just named. Compression of the trachea commonly occurs from aneurisms of the arch, and the dyspnoea will be observed to exist both in inspiration and in expiration. It is accompanied by enfeeblement of the respiratory murmur in both lungs, and the laryngoscope shows the mechanism of the vocal cords to be normal. Under favorable conditions a skilled observer can detect the narrowed lumen of the trachea by the laryngoscopic mirror, and in some instances can even observe pulsation transmitted from the aneurism at the point of pressure. Standing beside such a patient, it is quite usual to hear a rough, raucous sound of peculiar calibre accompanying both inspiration and expiration, especially when these acts are performed somewhat forcibly. The dyspnoea here, as in the last-mentioned form, is very markedly increased by even slight exertion, the chief reason, no doubt, being that the tumor, being expansile, the increased heart's action expands it, and causes it to compress the elastic tube more firmly. In exceptional cases of tracheal compression, paroxysms of intense dyspnoea may be occasionally witnessed, and that without direct involvement of any of the important nerves. Attacks of this character are apt to come on from exertion or emotional disturbance, and are attributed by Bristowe to more or less complete obstruction of the trachea by a plug of mucus. Position will often relieve the respiratory distress considerably, and patients very frequently, of their own accord, rest or sleep, leaning the chest well forward to take off the pressure from the windpipe. If a main bronchus be compressed (and it is most often the left), the dyspnoea is not likely to be so great, and enfeebled breathing is found in the corresponding lung. It has long been recognized that pressure upon the important nerves supplying the muscles of the larynx which pass through the chest will cause dyspnoea, and that, very often, of the most intense kind. Here the striking feature is dyspnoea *in paroxysms*. There may be periods of comparative calm, during which there is only a moderate shortness of breath on making some exertion, but suddenly, with or without any exciting cause, severe suffocative dyspnoea sets in, and in some cases actually proves fatal. This result may be brought about either by the compression or involvement of a pneumogastric nerve or a recurrent laryngeal nerve. Sometimes nerves of both sides are implicated. Owing to its situation in relation to the aneurism, the nerve of the left side is more often affected than that of the right. When the latter is involved, it is generally from its being disturbed by the dragging of a tumor upon the root of the right subclavian artery. It is held by some that this form of dyspnoea may be brought about either by spasm of the muscles supplied by the recurrent nerve or by their paralysis. Pressure, it is said, will either irritate or destroy a nerve. Irritation will cause spasm, destruction, paralysis. There does not, however, seem to be any reliable evidence of the occurrence of spasm as a cause of dyspnoea; while, on the other hand, whenever decided laryngeal symptoms are observed from intra-thoracic pressure, the laryngoscope nearly always shows the existence of paralysis in a greater or less degree. Unilateral paralysis may exist for a long time without marked dyspnoea, but, if the opposite muscles become affected, the liability to paroxysmal attacks becomes developed, the flaccid cords are sucked together by the inspiratory effort, and a suffocative condition is induced. Why does this occur in paroxysms? It may be that a rapid temporary enlargement of the tumor occurs (from exertion, etc.), and that this causes increased pressure, as a result of which the paralysis may be rendered *complete*; or it may be that, from incomplete coughing efforts, mucus collects in the

glottis, and forms a complete barrier in the already partially obstructed glottic opening. A rare form of dyspnoea in aneurismal patients consists in a simulation of ordinary asthma. I have seen one such case in a young woman in which the picture presented was exactly that of a common attack of spasmodic asthma.

*Alterations of voice* are observed only when the tumor presses upon one of the recurrent nerves, or upon a pneumogastric trunk. The changes in the voice consist mainly in diminution of its power and clearness in varying degree, together with hoarseness and sometimes a squeaky or high-pitched tone. The loss of voice may come on quite suddenly, and ultimately complete aphonia may result. These laryngeal symptoms may be among the very first complained of, thus simulating catarrhal laryngitis, for which this condition has frequently been mistaken. Laryngoscopic examination almost invariably shows deficient abduction of a vocal cord (more frequently the left). If the paralysis be incomplete, the affected cord is seen, on phonation, to fail to reach the median line, and thus an open space is left between the two. If it be complete, the paralyzed band remains almost, if not quite, stationary, and the healthy cord is seen to move rapidly across the median line until it approaches its fellow of the opposite side.

*Stridor* is specially noticed when an aneurismal tumor presses upon the trachea or one of the main bronchi. It differs altogether from the stridulous respiratory sounds heard in cases of laryngeal disease, and is distinguished also from them in that the ordinary speaking voice remains unimpaired. The stridor is usually a rough, low-pitched, growling sound, accompanying both inspiration and expiration, and giving the impression of originating deep within the chest. It is markedly increased by full breathing. This is the so-called "stridor from below" of the older authors.

*Cough* very commonly occurs during the course of a thoracic aneurism. It is produced mainly by the irritation from pressure of the pulmonary and laryngeal nerves, and is often very frequent and distressing. If there be laryngeal paralysis the cough will probably be husky, and even suppressed. When tracheal pressure with stridor exists, the cough likewise becomes loud, rough, and clanging in character. The expectoration at first is very small in quantity—in fact it may be so throughout; but when there has been much pulmonary irritation, or when a tracheo-bronchial catarrh has been set up, large quantities of purulent expectoration may be got rid of. Blood sometimes appears in the sputum, and must always be looked upon as a sign of impending danger.

*Dysphagia* is a symptom more often seen in connection with other forms of intra-thoracic tumor than with aneurism. It has also been clearly proven that an aneurism may have exerted considerable pressure upon the œsophagus and yet no resulting dysphagia have been observed. Certain peculiarities in œsophageal obstruction due to aneurism (as compared with that which results from other tumors or from organic stricture) are these: that it is variable—perhaps at one time of day nothing can be swallowed, and again, later on, fluids or semi-solids pass with comparative ease; and, secondly, it is altered by position—the patient may be able, by removing the weight of the tumor on leaning well forward, to swallow fairly well, while the same thing is impossible in the recumbent position.

*Engorgement of the vena cava* and its branches, from pressure of the sac upon this great trunk or upon one of the innominate veins, occurs pretty frequently. It is indicated in the lesser degrees by undue fulness of certain of the superficial veins of the neck, shoulder, and front of the chest. In an extreme degree the appearances produced are very striking. The face is purple and congested, the eyes are suffused, the superficial veins greatly distended with blood and mostly tortuous. The tissues at the root of the neck become infiltrated and present a soft, swollen appearance, obliterating more or less the hollow above the clavicle. The congestion of the internal veins, which must simultaneously occur, causes these

patients to suffer from headache and often from great drowsiness, and death may take place in a comatose condition. Pressure on the brachial veins will cause swelling of the corresponding arm.

*Difference in the Size of the Pupils.*—The anterior roots of the spinal nerves from the sixth cervical to the sixth dorsal (according to Brown-Séquard to the ninth or tenth dorsal) supply to the cervical sympathetic filaments which pass to the iris. When an aneurism presses upon these nerves, then ocular symptoms are observed, more or less marked according to the degree of the pressure. If the pressure is slight, then irritation only is produced, and, as a consequence, there is dilatation of the corresponding pupil. If the pressure is considerable, then paralysis is produced, and we find permanent contraction of that pupil. With reference to this symptom, it must be developed to a decided degree before any reliance can be placed upon it, because the slighter differences in size between the two pupils are quite commonly observed in healthy persons. Even when this symptom is clearly made out its importance is not great from a diagnostic point of view, for there are generally then present many more reliable indications of the disease. But it can be used as one means to assist in enabling us to locate more precisely the seat of the tumor.

*Emaciation* is very often wanting, and persons with large tumors may remain quite well nourished. Considerable emaciation is, however, often seen arising from coincident weakness of the digestion, want of exercise, and continued suffering. Marked wasting of the tissues has, in rare cases, been traced to pressure upon the thoracic duct, and again, although it develops less rapidly, to pressure upon the œsophagus and to inanition.

Such are the chief symptoms of thoracic aneurism, which are the result of the intra-thoracic pressure which it must sooner or later produce, and it is to them we must generally look for aid in establishing a diagnosis. But there are others which must be mentioned. It sometimes happens that the objective signs of aneurism may be present while subjective symptoms are entirely wanting. But the contrary is more generally true. Various complaints will be made before the existence of their cause can be satisfactorily made out. Much, of course, will depend upon the situation of the tumor. Patients often first experience pains in the chest, the different characters of which have been already alluded to. As the tumor increases in size these painful sensations may be modified in various ways by the occurrence of complicating inflammations of surrounding parts, and especially of the pleura. There may also be a distinct sensation of throbbing or pulsation in the chest in the region of the aneurism. Palpitation of the heart and tightness in the chest are often associated with these. The patients themselves may also observe that alterations of position have an effect in increasing or diminishing their discomfort. Then dyspnoea of some kind is likely to occur and to be followed by dysphagia, neuralgias, pareses, or actual paralysis (perhaps only formication or numbness), some anæmia, diminution of strength, and sometimes œdema. An aneurism of the chest may thus cause death by a gradual process. Less commonly we observe continuous increase in the tumor until it finally ruptures and death ensues, either directly from hemorrhage or indirectly from the effects of the effusion of blood upon some vital organ. Rupture is generally associated with enormous hemorrhage, which is inevitably fatal in a few minutes or seconds. It does happen, however, that smaller bleedings occasionally make their appearance for some time (it may be for only a day or even for a longer time) previous to the final gush. In the case of a gentleman, under the care of the writer, who died of this disease a short time ago, small quantities (a few ounces) of bright arterial blood were brought up for more than twenty-four hours preceding the actually sudden end. In this case the aneurism broke into the substance of the lung, and evidently had leaked into a small bronchus during the time mentioned. The final rupture took place into the left main bronchus, and was accompanied by a great spirt of fluid blood, and

followed by instant death. Hæmoptyses sometimes occur at long intervals (years) in aneurisms, generally from associated pulmonary congestions.

When rupture takes place, it may be accompanied by a sense of tearing within the chest, and if the blood does not appear externally with cough or efforts of vomiting (through the trachea or through the œsophagus), then it will be recognized by the accompanying pallor and syncope, with failure or extinction of the pulse. Internal rupture takes place most frequently into the pericardium, and is almost always immediately fatal, although in a case quoted by Kelynack the patient lived for four hours. Pepper and Griffith have published a case of rupture into the superior vena cava, and they have collected twenty-seven other instances, whilst Fränkel has recently recorded two such accidents recognized during life. The symptoms are dyspnoea, followed by slight proptosis, and by œdema and cyanosis of the face, neck, upper part of the thorax and arms. There is frequently a continuous murmur, louder during systole and produced by the passage of blood from the aorta into the vena cava. Death in such cases is not necessarily immediate, and has been postponed for several weeks or months after the occurrence of the rupture. Escape into a pleural cavity is common, and is marked by severe pain and dyspnoea, and by the presence of the physical signs of effused fluid. I have seen one case of rupture into the pulmonary artery when the symptoms consisted of sudden pain, collapse, want of pulse, and tumultuous action of the heart for about two hours before death. External rupture is comparatively rare. If such a rupture is impending, the fact will be recognized by the commencing lividity and finally gangrenous appearance of the tensest portion of the projecting tumor. This accident is sometimes induced by straining or falling, or by rough handling.

*Physical Signs.*—The foregoing symptoms (which are mainly those of excentric pressure) are indicative of intra-thoracic tumor of some kind, but cannot indicate aneurism specially. On observing any combination of them, we must turn to the physical signs to determine the character of the tumor—they are, of the two, therefore, the more important; and both together will, in the majority of cases, enable the physician to arrive at a positive diagnosis. These physical signs are derived both directly from the tumor itself and indirectly from an examination of the neighboring organs which may have been pressed upon, displaced, or otherwise interfered with by the encroaching tumor. The signs, as regards the aneurism, will evidently depend mainly upon its size and its exact position, especially as regards the surface of the chest.

*Inspection* will readily demonstrate the existence of any distinct bulging of the parietes of the chest. This may be only a slight or ill-defined elevation of a circumscribed area, or it may be a tumor of some magnitude. The elevated part, moreover, is seen to pulsate (almost) synchronously with the apex of the heart. The situation of the pulsating prominence depends upon the portion of the aorta involved, and the direction in which it has been tending. Aneurisms of the ascending arch are most commonly seen in the second or third interspace of the right side. Those of the descending aorta will most commonly reach the surface on the posterior or lateral wall of the chest. The skin over the prominence is usually healthy, except when the external tumor is large, when it may be red or livid. There may be no elevation from the general surface, the eye only detecting a pulsating spot similar to that over the cardiac apex. In the absence of these more characteristic appearances, if the front of the chest be carefully examined while the patient stands sideways to the observer, a more or less distinct systolic heaving of the chest wall can be noticed, especially when the respiration is withheld. This indicates usually an aneurism of considerable size and deeply seated. If the heart be displaced, this fact can also be determined by the altered position of the apex beat.

*Palpation* of the chest is of service only when the tumor sufficiently approaches the chest walls. Local ful-

ness or bulging can be appreciated, pulsation can be located, and the force of the impulse measured. Frémissement, or thrill, systolic in rhythm, can also not infrequently be felt, perhaps over the entire area covering the tumor; and following this, sometimes a diastolic shock may be recognized. In obscure cases, in which a deep-seated aneurism may be suspected, the bimanual method of examination may prove of great service. The patient's chest is firmly grasped between the two extended hands laid flat upon the surface. By this means a diffused sense of expansion will be experienced which is extremely significant and can only be ascertained in this way. The supra-sternal notch should also be explored. The patient's head being bent forward to relax the sterno-mastoid muscles, one or two fingers are pressed deeply into the fossa and beneath the manubrium sterni, when pulsation or thrill communicated from the transverse portion of the arch can be distinctly perceived. Another physical sign of very great diagnostic importance, and one which is also to be obtained by the educated sense of touch, is what is now known under the term "tracheal tugging," or Oliver's sign. It is but quite lately that attention has been directed to this method of examination, and it is only now that its value is being realized. To examine for this sign proceed as follows: Let the patient be seated upright and with the head well thrown back, in order to put the windpipe upon the stretch. Then with the finger and thumb of the right hand grasp the cricoid cartilage or the lower border of the thyroid, and make steady pressure upward. If a deep-seated aneurism be present which impinges at all upon the trachea or one of its principal divisions, then a very distinct and unmistakable tugging downward will be felt with each systole of the heart. When the heart is acting strongly, or when aortic incompetence is present, considerable rhythmic pulsation may be communicated to the fingers from the adjacent carotids, but with a little care this cannot be mistaken for the tugging directly downward above described. I have observed a considerable number of cases of thoracic aneurism, cardiac and other thoracic diseases with reference to this sign, and I have never observed it produced by any other condition but aneurism. In one case, which I saw in consultation, there seemed clear evidence of an aneurism of the transverse arch, and the presence of stridor and paroxysmal dyspnoea showed its interference with the trachea and nerves. No tugging could be felt. The autopsy, however, showed that the tumor was completely filled with firm laminated fibrin, and its pulsatile character was lost. Except in cases of this kind (which must be of pretty long standing) tracheal tugging may always be looked for in central aneurisms of the chest. This sign was attributed by MacDonnell to pulsation transmitted downward to the left bronchus. It may, however, be present in any instance in which the aneurism is adherent to the trachea, and Fraenkel has seen it in an aneurism of the ascending aorta in which firm adhesions were present between it and the trachea. It is conceivable that a vascular pulsating tumor might give rise to this sign, but hitherto no well-authenticated case of solid tumor has been published with tracheal tugging. Care must be taken to distinguish a slight downward pulsation, often felt in healthy necks, from true tugging. Hall has recently described a diastolic shock following the systolic tracheal tug.

*Percussion* elicits a flat note over the area throughout which the aneurism is in contact with the chest wall. This area, of course, may give no idea of the actual size of the aneurism, for its principal bulk may be buried beneath healthy lung tissue. A modified dullness may sometimes be found for some distance around the flat region. It is often impossible to separate the dullness of the aneurism from that over solid organs, the heart, liver, etc. Of course, if the tumor be entirely deep-seated, the percussion may be everywhere normal. If also the lungs be emphysematous, no information can be obtained from percussion.

*Auscultation* over an aneurism of the aorta reveals of necessity only a systolic and a diastolic sound, such as we

hear over the vessel itself. The systolic sound, however, may be modified, and is sometimes accompanied by murmur. The modification consists generally in loudness, while, at the same time, a sense of impulse is conveyed, the so-called *bruit de choc*. The diastolic sound is communicated from the aortic valves, any increase in their tension intensifying the second sound over the aneurism. It is always accentuated when the diastolic shock is perceptible on palpation. Systolic murmurs are of tolerably frequent occurrence. They are probably produced in one of two ways: either by sudden alteration in the calibre of the vessel (causing fluid waves or eddies) or by the vibrations produced by contained coagula or irregularities in the course of the blood current.

The systolic murmur of an aneurism is generally blowing in character, but sometimes possesses a decided musical or "cooing" quality. Its seat of maximum intensity is likely to be the central part of the tumor, and it is not generally diffused to any very considerable distance from this. The significance of the murmur is derived from its seat of maximum intensity being away from that usually associated with valvular lesions, and from its being accompanied by a magnified second sound. Heard alone (*i. e.*, without accentuation of the second sound) a systolic murmur is rather indicative of some other condition than aneurism. Indeed, diastolic accentuation, if confined to some circumscribed dull area in the neighborhood of the aorta, is of more value than any murmur. Any murmurs generated at the aortic valves and orifice are likely to be transmitted through an aneurismal tumor as well. Often, therefore, double aortic murmurs are to be heard in this situation. Sometimes, however, similar to-and-fro sounds are generated within the sac itself, their origin being declared by their being much louder over the corresponding area than elsewhere, by being much more restricted to this region, and by not being at all necessarily associated with dilated hypertrophy of the left ventricle. A diastolic murmur alone may, exceptionally, be heard arising from an aneurism, and Gerhardt states that a diastolic murmur may sometimes be heard in the left supra-spinous area. Over the tumor the respiratory murmur is absent, but on passing just beyond the edges of this, the breathing sounds are heard, but generally of a somewhat bronchial character. In the same areas the voice will have a bronchial resonance, although decided bronchophony will not be found (or, at any rate, is rare).

The *pulse* in internal aneurism may, or may not, afford positive information. The arteries themselves are frequently in a diseased condition, fibroid or sclerotic, and may thus affect the pulse. The state of the heart will also have to be taken into account. If, however, the blood be flowing into an aneurism of considerable size, special alterations in the blood current, in the parts on the distal side of this, may be observed and delineated. The effect of the diverticulum is to act like the empty rubber ball in the ordinary syringe, *i. e.*, to make the current more even and steady and less spasmodic and jerky. When, therefore, a sphygmographic tracing is taken, the curve is found to differ from the normal one in accordance with this mechanism. The ascent of the systole is less abrupt, more gradual, and the descent also occurs without the same sharpness. The necessary result of this is to render the apex of the curve more rounded, less acute than that of the natural pulse. The larger the sac and the more distensible the walls, the better this kind of tracing is brought out, while fibrillation of the contents and stiffening of the walls tend to obscure these peculiarities and cause the tracing to resemble the normal curve. The value of these observations is greatest when we examine at the same time the corresponding artery of the opposite side, or else the same artery (or a branch of it) above the region of the suspected aneurism. It is not uncommon to find such a degree of difference between the pulses of the two sides as may be clearly recognized by the finger. The differences consist in delay of the pulse and in alteration in its volume. Delay of the pulse in the radial artery is a diagnostic sign upon

which too much stress must not be laid, and, indeed, it is very often absent. Diminution in the calibre of the radial pulse of one side is important as an additional point of evidence in a case of suspected thoracic aneurism. Its positive value is, however, detracted from by a consideration of the fact that the same thing is often seen from congenital peculiarity or from irregular distribution of the blood-vessels of that arm. The latter possibility should always be sought for, and a comparison made between the brachials of the two arms. The alteration in the volume of the pulse may be produced by twisting or distortion of the vessel, by dragging upon it by the advancing growth, or by partial or complete obliteration of the lumen by the entrance into it of detached fragments of fibrin. The only special distinguishing mark of embolism is the suddenness with which it is apt to occur.

Thoracic aneurism is very frequently associated with changes in the heart and in the circulation. Other neighboring organs also become physically altered by reason of the pressure, or other interference, to which they may have been subjected. These conditions can generally be recognized by physical examination. Under some conditions, an aneurism may be the direct cause of hypertrophy, but the heart may remain entirely unaffected, even in the case of large aneurisms of long standing, provided there be a sound condition of the aortic valves. As, however, atheroma is often the common cause of both aneurism and aortic valvular disease, the former is frequently found along with dilatation and hypertrophy of the left ventricle. This backward affection of the ventricle cannot, therefore, be used as an argument in favor of aneurism, nor can its absence be construed against it. Displacement of the heart is often seen. This is generally a downward displacement only, or with some inclination to the left. When the tumor affects the descending aorta, the heart is displaced forward. If incompetence of the aortic valves be present, as often occurs, its existence is recognized by the usual physical signs. The cause of the incompetence may be either atheroma, as above mentioned, or the altered calibre of the root of the aorta produced by the tumor, *i. e.*, relative incompetence with healthy valves near to which the expansion has begun. Tumors near the origin of the aorta are also liable to cause pericarditis. This occurrence has frequently been found post mortem, and is occasionally witnessed during life. Dr. Byrom Bramwell ("Diseases of the Heart and Thoracic Aorta," p. 714) says: "In any case of non-rheumatic pericarditis occurring after the age of forty, in which the cause of the pericarditis is obscure, I strongly suspect the presence of an aneurism." The same author suggests that aneurism in the same locality may account for certain cases in which pericarditis and angina pectoris have been observed at the same time. Pleurisy is a common complication, and must be looked for either from friction sounds or from the signs of liquid effusion. It occurs most often with aneurisms of the descending aorta. The existence of a pleurisy at the base of one lung, followed by prolonged pain in the same region, otherwise unaccounted for, will certainly sometimes lead us aright by suggesting aneurism.

If a main bronchus be compressed, the corresponding lung becomes comparatively airless, its circulation is impaired, and catarrhal conditions prevail. In consequence of this the following physical signs will be found, *viz.*: Moderate dullness on percussion and enfeebled respiration, with or without moist râles. In a few of these cases a whistling sound can be made out over the situation of the compressed tube.

Changes in the lungs are not uncommon in aneurism. Owing to the frequency with which the left bronchus is compressed these changes are much more frequent in the left than in the right lung. Fibroid changes with retraction, gangrene, and suppuration are seen and may even mask the primary disease. Constriction of the left bronchus by aneurismal pressure sometimes sets up bronchiectatic dilatation below the site of stricture. Such a condition is usually not recognized during life, but ex-

ceptionally symptoms and signs of bronchiectasis can be discovered.

We may now consider more particularly the chief symptoms and physical signs which indicate aneurism in the different parts of the thoracic aorta.

*Aneurisms of the Root of the Aorta (the Sinuses of Valsalva).*—Those aneurisms which spring from the very commencement of the aortic tube are not very uncommon. They are frequently entirely latent, but symptoms of pericarditis, or of angina pectoris, may occur. They are quite liable to cause aortic incompetence. Such tumors are very dangerous, as, before arriving at any great size, they are liable to rupture, especially into the pericardium. Dr. Bramwell figures (*op. cit.*, p. 720) a remarkable aneurism springing from this situation; it attained an enormous size, perforated the sternum, formed a large external projection, and finally ruptured through the integument.

*Aneurisms of the Ascending Portion of the Arch.*—In this region of the tube, dilatations, cylindrical or spindle-shaped, are most frequent, but saccular aneurisms also occur. The latter are then generally situated upon the right side of the aorta. In an early stage of dilatation we shall find altered pitch of the percussion note to the right of the sternal margin above the second rib, and the pulsation of the aorta becomes stronger and more perceptible above the sternum. As it increases, we get more decided dullness, extending to the right above the second rib. The first sound becomes dull and the second more forcible and clanging. A systolic murmur may then become developed in the same area, and this, from its seat of origin and want of diffusion, may be distinguished from a valvular murmur. Disease of the aortic valve frequently coexists. Aneurism in the ascending arch has a tendency to reach the surface of the chest, and can, therefore, generally be made out with ease by the physical signs. The locality where pulsation and bulging are most apt to be discovered is the neighborhood of the second costal cartilage of the right side. The edge of the sternum and one or two ribs become eroded, and the tumor, which may be of considerable size, projects. The pulse in the vessels on the right side will be small and delayed compared to that of the vessels on the left, if the innominate be involved. Compression of the superior cava or right innominate vein may happen, with resulting dilatation of the veins of the upper half of the body or right arm. The symptoms commonly complained of are pain and dyspnoea, perhaps cough. When the aneurism is of considerable size, numbness and weakness in the right arm may occur from pressure on the brachial plexus. The right bronchus may also be sometimes compressed. Rupture of an aneurism in this situation occurs most frequently into the right pleural sac, the pericardium, the lungs, or externally. In one of my own cases, already mentioned, rupture took place into the pulmonary artery.

*Aneurisms of the Transverse Portion of the Arch.*—These may be either spindle-shaped or, more commonly, saccular. As they occupy that portion of the arch of the aorta from which spring the great brachial and cephalic branches, the latter are quite frequently involved in the aneurismal growth. They are common, but somewhat less so than those of the ascending portion. Their situation is such that they, soon after attaining any size, necessarily impinge upon some of the important structures in the centre of the thorax, giving rise in consequence to decided evidences of intra-thoracic pressure. The presence of a pulsating tumor in this region will also cause easily recognized changes in the percussion of the sternum and its margins, and can further be detected by the sense of touch behind the manubrium. Aneurism in the transverse arch is therefore, as a rule, readily diagnosed except when the tumor is quite small. Sometimes, even before any other signs have developed, the aneurism may be discovered by means of the finger pressed well down behind the sternum in the jugular fossa. As the expansion of the aorta here increases it pushes aside the edges of the lungs, and dullness becomes well marked