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LUMLEIAN LECTURES

ON THE

NATURAL HISTORY AND DIAGNOSIS OF INTRATHORACIC CANCER.

Delivered before the Royal College of Physicians, 1870.

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IV.

THE differential diagnosis between aneurism and malignant tumours is sometimes beset with difficulties. My predecessor, Dr. Sibson, has ably illustrated the principles of diagnosis in the several varieties of intrathoracic aneurism, especially pointing out the definite direction which different aneurismal tumours take in the course of their development. But we have no such aids to guide us in the case of mediastinal tumours; on the contrary, there is the utmost diversity, not only in the original situation of the growths as regards their anatomical relations, but also in the direction which they take in the course of their development. A distended state of the superficial veins is, no doubt, a more frequent attendant on the interrupted circulation through the internal veins, occasioned by cancerous disease. But this is not always present, as several of my cases show; and, when present, it is usually in the later stages, and associated with growths of considerable magnitude. The main difficulties in diagnosis are, however, in the early stages of aneurism, and in cases of small limited cancerous tumours, before they have involved to any important extent surrounding textures. And it is in the early periods that an accurate diagnosis is of most importance as regards treatment; for it is then that we may hope—in the case of aneurism at least—that therapeutic efforts may be of use.

Pain is a very common symptom of intrathoracic cancer in some stage or other of its progress; but it is not usually severe, nor is it of any special character. In at least half of my cases it was an early symptom, and generally had been of a pleuritic, sometimes more of a neuralgic or rheumatic, character. In many of these it had been of very temporary duration. In more than one instance it was sudden, sharp, and transitory, and attendant on physical exertion. Most frequently it was referred to the side, in other instances to the shoulder or the sternum. In two instances it was severe, long continued, and associated with acute sensitiveness of the thoracic parietes. When severe, it is, I believe, the result of extensive pressure and implication of the nervous trunks. But I have seen extensive tumours involving the nervous trunks and large vessels unattended by pain throughout the course of the disease. Speaking generally, I believe that pain is a more prominent and severe symptom in connection with aneurism than with intrathoracic cancer. Pain in parts distant from the thorax is rarely observed; and symptomatic vomiting has been chiefly noticed in cases where the cardiac nerves have been implicated.

Aneurism, however, is not the only disease with which cancer may be confounded. Scrofulous enlargement of the bronchial glands, hydatid disease, disease of the thyroid and thymus glands, and certain rare varieties of limited empyema, have all been mistaken for intrathoracic cancer. And although I have never met with such a case, I believe phthisis has been mistaken for cancer; and it is easy to conceive how this may be. In some instances tubercular disease, in its earlier stages, and when as yet limited, is attended by paroxysmal attacks of dyspnoea of an asthmatic character, and even by tracheal or laryngeal symptoms, which may simulate very closely some of the varieties of intrathoracic tumours.

I recently met with a case which, from its great interest and extreme

rarity, if it be not quite unique, I shall be excused from detailing, as it bears closely on the question of the diagnosis of cancer.

Bronchocele: Acute Hypertrophy of the Thyroid Gland: Tracheal Occlusion: Tracheotomy: Death.—A young gentleman, 19 years of age, who had enjoyed good previous health, but who had latterly grown very rapidly and attained a height of six feet one inch, went up to the University of Oxford in the October term apparently well. Being likely to gain high honours, he worked hard, but took a good deal of active exercise. He soon became subject to paroxysmal attacks of dyspnoea, coming on only during exertion, and having the character of asthmatic paroxysms. His general health, however, remained good, and he had a hearty appetite; he had no cough, nor any affection of his voice. On returning to town at Christmas, he consulted a physician, who examined the larynx by the laryngoscope, but discovered nothing beyond some apparent lividity of the mucous surfaces. Subsequently, the end of the uvula was removed, with, as the patient thought, some benefit. For a few days he appeared better, but the friends noticed some wheezing and whistling in his breathing, when seated at table and when quiet; he, however, remained free from cough or expectoration, and had no dysphagia. The paroxysms of dyspnoea continued to return; and one morning, on going out for his walk, he was seized with an unusually sudden fit of extreme difficulty of breathing, obliging him to seek rest in the first house that he could reach. This was three days before his death, and from this time his paroxysms became more frequent, and in the intervals his breathing was difficult. There was still, however, neither cough, nor dysphagia, nor pain, nor any lividity of countenance. His appetite continued good, so that he ate a couple of chops for dinner the day but one previous to his death; but on the Saturday and Sunday (the day of his death), he became very weak and exhausted, and fainted on getting out of bed after prolonged difficulty of breathing. Antispasmodics and other remedies used gave no relief; but on one occasion, after being sick, he was for a time a good deal relieved.

About eleven o'clock on the Sunday evening I was sent for, and saw him for the first time with his medical attendant, Mr. Jackson. I found him sitting up in bed breathing with extreme effort and difficulty; his face was pale; he was sweating profusely, and his pulse was rapid and full and of good strength. The tongue was somewhat furred and coated. He swallowed without difficulty; was able to speak a little, and had no local pain. There was no laryngeal stridor, nor had his voice any laryngeal character. The heart was beating forcibly and rapidly, and no bruit was detectable. His neck was thick and dilated at the base, apparently from diffused enlargement of the thyroid; but there was no distinct tumour or definite swelling either of the isthmus or lateral lobes of the gland. The enlargement was a general diffused expansion of the base of the neck. This had only been noticed a few days previously; but when questioned with reference to it, it appeared that he had complained of his shirt-collars being too tight, and had had them let out. I made a careful examination of the chest, but could detect nothing beyond evidence that scarcely any air was entering the lungs; and the like negative results had attended previous examinations by Mr. Jackson and others. The breathing all this time was forced and heaving to an extreme degree, beyond anything I had ever before witnessed. The lower end of the sternum and the epigastrium were drawn in so as to create a deep hollow at each inspiration, and every auxiliary muscle was called into the utmost forced action. The jugulars were distended; but there was not the least lividity of countenance, nor any great distress depicted beyond what indicated exhaustion. Although the heart was beating forcibly, and the pulse was of good strength, it was evident that complete exhaustion must soon ensue on such long-continued violent and fruitless efforts to fill the lungs, and that on the cessation of such efforts, asphyxia would rapidly follow. It was therefore determined to send for a surgeon with the view of entertaining the question of opening the larynx, although everything indicated that the cause of obstruction, whatever it might be, was situated low down, and it did not seem probable that tracheotomy could be of much avail. Mr. Bryant was sent for about midnight, and arrived a little before one o'clock. In the interval, the patient's strength failed him; the frightful efforts to breathe grew fainter, and asphyxia rapidly

set in. He could no longer swallow, and became livid and unconscious. Mr. Bryant, on his arrival, concurred in the opinion that the obstructing cause was probably so low down as to render it very unlikely that tracheotomy could be of any use. But all hope of life having fled, and the friends consenting, the trachea was immediately opened, on the chance of prolonging life by gaining such further insight of the nature of the obstruction as might thus be obtained.

An incision was made in the median line, through the centre of the thyroid, which proved to be much thicker than was anticipated, and the trachea much deeper than natural. The second and third rings of the trachea were divided, and the tube passed in without difficulty or loss of time. No air, however, passed through the tube, and a female catheter was passed down the trachea. This, however, struck against what was imagined to be the bifurcation of the trachea, and no air passed through the catheter either. The aorta could be felt pulsating violently when the finger was passed into the opening of the trachea. No relief was obtained from the operation, and he sank very shortly afterwards.

Post Mortem Examination Thirty-six Hours after Death.—The thyroid gland was found greatly enlarged (when removed it was as big as the two fists), but the enlargement was mainly below the sternum and along the sides of the trachea. Immediately below the orifice made by the surgeon, the trachea became so compressed, as to be completely flattened laterally from that point, to within half an inch of the bifurcation; it was also twisted to the left, and was surrounded by the greatly enlarged and firm lateral lobes of the thyroid. There were no enlarged bronchial glands, nor any pulmonary or cardiac disease. The aorta and large vessels were healthy; the larynx was healthy; the mucous membrane of the trachea was congested; the lungs were pale and collapsed; the upper lobes were a little emphysematous. The structure of the thyroid gland appeared healthy, but very firm, and the enlargement was due solely to hypertrophy, and not to cystic or other disease.

The *osseous parietes* of the thorax are not very frequently invaded by intrathoracic cancer; but occasionally we find, after death, both the ribs and spinal column affected. I have myself met with but two cases where evidence existed, during life, of such complication. In one instance the disease of the spinal column had extended to the theca of the cord, but not through it, and, pressing on the cord itself, induced symptoms of progressive paralysis. In the other, the cord itself showed evidence of inflammatory changes. The true nature of the disease was diagnosed from an early period in the former case, although in certain important respects the symptoms deviated from those which are most characteristic of extensive cancerous disease of the chest, especially in the absence of dyspnoea; and although the earliest symptoms were such as would naturally lead to the suspicion of phthisis; viz., hæmoptysis to the extent of several ounces, cough, and expectoration, with emaciation and night-sweats, the subsequent progress was not that of phthisis. The temperature, also, which was, in this instance, noted from time to time, being below the normal standard, seemed conclusive against progressive tuberculation. A low temperature would usually be considered in favour of cancer; but, from a case which has recently occurred in the London Hospital, it would appear that increase of temperature may attend the rapid growth of cancer diffused through the system. A man with cancerous disease of the testis became the subject of acute symptoms, referable to the lungs, there having been loss of flesh and spitting of blood for three weeks previously. The physical signs showed that mischief was going on, diffused through both lungs. After death, deposits of carcinoma were found in various parts of the brain, liver, lungs, and testis. There was, however, no evidence of acute inflammatory changes in any part of the body; no pneumonia, nephritis, or serous inflammation, and the brain-substance was healthy; but the cancerous deposits were exceedingly vascular, and had the character of having rapidly grown. The high temperature in this case ranging from 100 to 101.4 deg., led to the inference that the changes going on in the lungs were of the class known as tubercle, or broncho-pneumonic phthisis. The body was very carefully examined by Dr. Sutton, who is satisfied that if any inflammatory mischief had been going on it was inappreciable: we therefore can only infer that the high temperature was due to the rapid growth of cancer; i.e., rapid cell-formation.

In the following case, the absence of constitutional disturbance was remarkable, and the disease, though extensive, was of comparatively slow growth.

Intrathoracic Cancer, involving the Bronchial Glands, Spinal Column, etc., occluding the Left Bronchus, and converting the Left Lung into a series of Abscesses.—A. K., aged 23, single, a servant girl, was admitted into the Victoria Park Hospital, under the care of Dr. Risdon Bennett, on the 29th of October, 1867. She was a well-grown girl, rather spare, with brown hair and eyes; and, except that she was rather pale, of a healthy aspect, that did not indicate any very serious disease. She did

not give a very distinct or satisfactory account of any previous illness; but stated that, whilst away for her holiday at Whitsuntide, she had felt very unwell and out of sorts. Previously to that time, her health had been very good. After a month's absence, she returned to town, feeling much better, and went to service. In about a fortnight, however, she broke down; the catamenia became suppressed; she had hæmoptysis to the extent of three or four ounces, with some cough and expectoration; the latter, however, was but scanty. She lost flesh and strength, and had night-sweats.

On her admission, the following were the physical signs that presented themselves on examination. The thorax was well formed. There was absolute dulness over the left anterior region of the chest; absence of respiration, and no increased vocal resonance; nor much, if any, diminution of motion. The heart-sounds were a little ringing in character, and audible throughout the whole of the left side. The pulse was feeble, and under 100; the tongue was clean; the breathing was calm and perfectly easy, and continued so; there was a little occasional cough, with slight, simple, mucous expectoration. She was feeble, and somewhat put out of breath in walking. Her appetite was good, and there was no febrile disturbance.

On the 15th November, she complained, for the first time, of pain between the shoulders, which was relieved by a small blister. On the 22nd November, the following record was made of a very careful physical examination. "Heart-sounds heard more distinctly to the right than to the left of the sternum; very little impulse to be felt or seen; but this is most appreciable by the touch, immediately to the left of the sternum, an inch above the nipple; sounds audible throughout the chest; dulness absolute throughout the left side; respiration altogether inaudible, except it be at the extreme base posteriorly, where faint, questionable, and probably transmitted, breath-sounds may be detected. In the same situation, the dulness is also somewhat less marked; diminished motion; no vocal thrill. On the posterior aspect, the left side appears less prominent than the right; and it is found by measurement to be half an inch less from the sternum to the spinous processes. Anteriorly, the dulness terminates abruptly at the mesian line of the sternum." On the 6th December, the following note was made. "Within the last fortnight, she has gradually lost power in the lower extremities; this is most marked in the left leg, where it was first noticed. She also complains of numbness, which has gradually extended upwards as far as the epigastrium. There is some difficulty in passing urine, but no incontinence, nor any paralysis of the sphincter ani. There is still some pain, though less than at one time, over the dorsal vertebrae, with tenderness on percussion. Her countenance is placid, and even cheerful in expression; scarcely any cough or expectoration, and the most remarkable absence of dyspnoea, except when moved. The tongue is clean; the appetite fairly good; pulse feeble, usually under 100; temperature in the axilla, 98.5 deg." On the 18th December, the paralytic symptoms were more pronounced, and the belly tympanitic; profuse sweating; some epigastric uneasiness, and diminished appetite; urine 1.022, acid, scanty, and slightly albuminous; temperature, 97 deg.; breathing still quite placid; heart's action more superficial, and attended by a questionable friction-sound. On the 20th, some twitching and starting of the lower limbs; sphincters still good; respiration, 24 per minute; temperature, 97 deg. On the 27th, paralysis had involved the upper extremities, and the urine was passed involuntarily. A large slough had formed on the back. The tongue had become glazed and dry. The heart was displaced upwards, and there was a slight systolic murmur at the apex. On the 3rd January, there was observed, for the first time, a projection of the third lumbar vertebra. Breathing rather short and quick, and pulse rapid and scarcely to be felt. On the 5th, for the first time, there was much dyspnoea, with mucous rhonchi and dusky countenance, and she appeared to be sinking. She, however, rallied; the breathing became comparatively tranquil; and she did not finally sink till the 12th of January, when she died apparently from asthenia.

Post Mortem Examination.—The body was much wasted, well proportioned, and the chest well developed; the lower extremities were oedematous. The heart was displaced, being drawn upwards. On opening the pericardium, the posterior wall was seen to be thrust forward by a greyish-white mass near its base. The left pleura was greatly thickened, and adherent throughout. The right pleura had here and there a few scattered adhesions. The left lung was somewhat, but not greatly, reduced in volume, and converted into a number of small abscesses or cavities, for the most part about the size of a Spanish nut and filled with thick greenish-yellow pus. These cavities showed no lining membrane, their walls being formed by ragged lung-tissue. There was nowhere any healthy lung-tissue detectable. What looked like the remains of lung-tissue was of a greyish colour, dotted with pigment, resembling grey hepatisation, and of that consistence throughout. On

passing the finger down the trachea to the bifurcation, the right bronchus was found to be patent and normal. The left bronchus was completely occluded by the surrounding mass of malignant structure in which the bronchial glands were involved. On laying open the bronchus at the occluded spot, it was found to be pressed on by the malignant growth all round; and below this point the growth had so invaded the walls of the bronchus, that its channel could no farther be traced. The main portion of the growth lay in front of the descending aorta and œsophagus, but did not invade their coats. Below the bifurcation of the trachea it formed a large mass, which completely surrounded the left bronchus, but passed across the right bronchus without either involving or surrounding it, and terminated just before reaching the root of the right lung. It thus lay below the arch of the aorta. Backwards it extended between the left arches of the fourth and fifth dorsal vertebrae and between the roots of the corresponding ribs on both sides. It extended also in some places four or five inches from the bodies of the vertebrae and involved the dorsal muscles. In the vicinity of the fourth and fifth vertebrae it invaded the spinal canal, compressing the cord and its sheath, both of which, however, were healthy. On each side of the body of the third lumbar vertebra, the disease had also invaded the spinal canal. It could be traced likewise along the upper border of the pelvis, a little outside the left iliac vein. The iliac vessels, however, were not involved, nor were the glands on the right side of the chest, except just at the bifurcation of the trachea. The right lung weighed twenty ounces, was somewhat œdematous, and at the base showed a little red hepatisation. The mucous membrane of the bronchial tubes was much congested, but they contained no pus. The heart was healthy, weighing nine ounces and a half. The liver weighed five pounds three ounces, and presented a marked example of the common "nutmeg liver," quite as marked as is seen in connexion with contracted mitral orifice. The gall-bladder was healthy, and also the spleen, which weighed eight ounces. The kidneys weighed seven ounces, and were much congested, being throughout of a dark red colour. The intestines were congested, but otherwise healthy, as were also the mesenteric and lumbar glands; nor was there any malignant deposit in any of the internal organs. The growth everywhere presented the same character, being soft and of a greyish-white or white colour, and yielding, on pressure, an abundance of milky juice. This in many parts was so abundant as to pour out immediately on section of the growth.

The condition of the lung of the affected side is the main point of interest in this case, not only pathologically, but also with reference to diagnosis. The first effect of pressure on the left bronchus was doubtless a certain degree of collapse of the lung, and, as this proceeded, corresponding falling in of the parietes, subsequently increased by the general adhesions of the pleural surfaces. The diminished motion was only marked in the latter stages of the disease, when the adhesions had become firm and general. In proportion as the bronchus became occluded and the tubes became choked, we had absence of respiration and of vocal resonance, and complete dulness from consolidation of the lung. It is, therefore, obvious that we may have all these important physical signs, independent either of fluid effusion or a solid growth filling the chest; for the mediastinal growth in this instance extended but little beyond the sides of the spinal column. Doubtless, the anterior dulness depended on the solid growth; but that of the lateral and more distant parts of the chest must be referred to the collapsed and consolidated lung. The only remaining question would be, might not the consolidation of the lung be the result of pneumonia? It seems very improbable that such an error would be committed, if only the least attention were paid to the history and other features of a similar case. But how, it may be asked, was this consolidation and extensive disintegration of the lung induced? Simple impediment to the entrance of air would not produce it. Dr. Stokes appears to think that, both in aneurism and in the case of cancerous tumours, gangrene of a portion of the lung may ensue from pressure on a main bronchus, owing to the anatomical disposition of the nutritive arteries of the lung, as pointed out by Dr. McDonnell. This seems highly probable, and, *primâ facie*, a sufficient explanation. But I am disposed to think that, where such disintegration as existed in this case occurs, the true explanation is that which has been given by Dr. Gull, who refers the lung-changes to pressure, not so much on the principal arteries or even nerve-trunks, as on the sympathetic plexus at the root of the lung. Certain it is that physiological experiments, especially those of Reid and Pavy, show that division of one pneumogastric nerve does not lead to any morbid structural change in the corresponding lung; and there are numerous cases on record, both of aneurism and of cancerous tumours, where the pneumogastric has been involved to the extent of destroying its continuity, without any such structural changes resulting as were seen in the case last detailed. The ordinary result of mere occlusion of a bronchus is

simply collapse of the corresponding lung. If, however, before their occlusion, the bronchi and capillaries become paralysed, owing to such pressure and disease at the root of the lung as deprives it of nervous supply from all branches of the pulmonary plexus, whether of the direct or interlacing branches, then we have such paralysis of the tubes as incapacitates them for emptying themselves of their contents; and the exudation from the congested capillaries accumulates, and hepatisation and purulent infiltration follow. And this is precisely what seems to have resulted in the case in question, where the whole lung became converted into an airless solid mass, riddled by cavities. Where a similar condition exists to only a limited degree, involvins gone lobe or portion of a lobe, we have sometimes complete gangrene. These conditions, Dr. Gull has rightly said, are of considerable importance as aids to diagnosis when the physical signs, apart from the interpretation thus afforded, would be quite insufficient. It is exceedingly difficult to trace with sufficient minuteness the course of the nerves through a cancerous mass and the compact surrounding tissues, so as to ascertain their precise condition; and in any case this requires more time and care than can generally be afforded, so that the *post mortem* records are seldom given with the minuteness and accuracy that are necessary to give us the data requisite for determining the real nature of the changes which the lung has undergone. It is, however, certain that, with complete occlusion of the main bronchus, we find after death very various conditions of the corresponding lung.

There are three very distinct conditions of lung met with in connexion with mediastinal growths.

1. A collapsed state, in which the lung is airless, and diminished greatly in volume by pleuritic effusion, having apparently undergone no other change than that which is frequently seen in ordinary cases of pleurisy with effusion; and a closely analogous condition, where it is spread over and condensed on the surface of the morbid growth.

2. The condition described in the case last related, where the lung retains its volume to a considerable extent, but has become consolidated by inflammation, and then has undergone disintegrating changes, ending in the formation of abscesses or numerous pockets of pus—all communication with the main bronchus being destroyed.

3. An augmentation of volume, with more or less consolidation, either from inflammatory condensation, or from the extension of the cancerous growth into the substance of the lung.

These latter cases are generally associated with enlargement of the affected side, and often with increased vocal fremitus, tubular breathing, etc., according as the main bronchus is or is not occluded.

Although, as I have stated, the destruction of continuity of one pneumogastric nerve does not involve any structural change in the corresponding lung as a necessary consequence, it is certainly somewhat remarkable that we should not more frequently meet with symptomatic vomiting or other disturbance of the stomach. But, except where the cardiac plexus is involved, as in certain cases it is, where the heart becomes implicated, we do not meet with any such symptoms.

An interesting case, however, is recorded by Dr. Quain, in which the function of the stomach was completely suspended, owing to the impossibility of swallowing any food—the patient dying of inanition; and where, after death, both vagi nerves presented a remarkable morbid condition, referred by the narrator to the results of "reflex irritation". In this case, the œsophagus was imbedded in a cancerous growth for nearly four inches of its course; the leading symptoms during life having been a complete inability to swallow, scarcely any food appearing to pass into the stomach, and the patient complaining much of hunger and intense thirst. The right vagus entered the upper part of the tumour, and soon became completely imbedded in it, and throughout its whole course presented a remarkable fusiform enlargement. The left vagus presented a similar condition; its entrance into the tumour, and coincident enlargement, beginning a little below, where the recurrent was given off. Under the microscope, the bulbous enlargement was found to consist of a basis of coarse granular matter, with irregularly scattered fine fibres of fibrous tissue. That this bulbous enlargement of the vagi was not due to pressure, seemed to be shown by the state of other nerves, more deeply pressed on by the tumour, which showed no such enlargement.

LONGEVITY.—The obituary of the *Times* has lately contained some rare illustrations of prolonged existence; especially on Saturday and Tuesday last, when the deaths of ten persons were recorded, whose united ages amounted to 908 years, giving an average of nearly 91 years to each; of these the oldest was a gentleman who had reached the age of 104, the youngest of the same sex being 81. The oldest lady also reached 100 years, and the youngest 83. The ages respectively were 81, 83, 84, two at 89, 90, 91, 97, 100, and 104 years.