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ORIGINAL ARTICLES.

ON THE DIAGNOSIS OF TUMORS OF THE ANTERIOR MEDIASTINUM.

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It would be difficult to find in the adult human body a region of less intrinsic interest than that space between spaces known to the anatomists as the Anterior Mediastinum. It is narrow and of little depth; at its superior part a small interval is left between the two layers of pleura which bound it; behind the second piece of the sternum, the pleuræ of opposite sides come into contact and it amounts merely to a thin septum; while lower down it is inclined to the left, and widened out into an angular space of some breadth by the recedence of the margin of the left pleura from the sternum (Quain). It is bounded in front by the triangularis sterni muscle, behind by the pericardium, laterally by the reflected borders of the costal pleuræ, and constitutes a sort of physiological no-man's-land, for it is occupied simply by connective tissue save in its upper part where lies, when it still persists, the shrivelled remnant of the thymus gland.

Six or seven small lymphatic glands lie along the course of the internal mammary vessels. They are for the most part beyond the borders of the mediastinal space, but have nevertheless received the name of anterior mediastinal glands. Nor does this space possess, under ordinary circumstances, the clinical importance that has been ascribed to it "as indicating the position of the anterior margins of the lungs relatively to the heart," [1]for it is only upon the fullest inspiration that the pulmonary and parietal pleuræ can come into contact at the mediastinal borders, and the relations of the margins of the lungs to the heart must be determined in the living subject by the methods of physical diagnosis rather than by fixed anatomical lines.

But when we consider the Anterior Mediastinum in connection with the pathological processes to which it is liable and in connection with the new growths which occasionally invade it from surrounding structures, it assumes a clinical importance which is not likely to be over-estimated. On the contrary, systematic writers upon diseases of the chest have too often failed to recognize alike the variety and frequency of the diseases of this region and their importance from a clinical point of view. The students' manuals of Physical Diagnosis, with few exceptions (Gee, Bruen, West,) strangely do not mention them at all. The more pretentious treatises upon Diagnosis and Practice in common use in this country and abroad, for the most part, make the same omission. Important articles have appeared in recent years in the great systems of medicine [1] but much that is valuable is scattered in the journals and reports of societies, and is inaccessible to the majority.

Even those who have most freely contributed to our knowledge of the subject make no formal distinction between the diseases of the anterior and those of the posterior mediastinum. Such a distinction is, I hold, called for by the anatomy of the chest, by the great difference in the contents and relations of these spaces in front of and behind the heart and separated by the middle mediastinum containing the pericardium and its contents, by the different pathological processes to which their contents are respectively liable, by the requirements of accurate diagnosis and finally, by the measures of relief which in certain rare cases become available when, and only when, a differential diagnosis is established.

The morbid conditions to which the anterior mediastinum is liable arrange themselves into two groups; (A) inflammation of the tissues in the cavity, and (B) new growths involving the space and its borders, and are in brief:

A. Purulent Inflammation; *B*. 1. Cysts; 2. Lipoma; 3. Fibroma; 4. Osteoma; 5. Tubercle; 6. Gumma; 7. Lymphoma; 8. Sarcoma; 9. Carcinoma.

Simple acute inflammation of this region terminating in resolution is practically unrecognizable and unknown.

Of inflammation resulting in the formation of solid exudation, a single case is reported, that of Wildemann. The affection resulted from long continued pressure in the sternal region. The anterior mediastinal space was distended with layers of solid exudation.

On the other hand, abscesses are not uncommon. They may be (a) the result of primary inflammation in consequence of injury and sudden exposure to cold, or (b) secondary purulent collections in con-

[1]Quain's Anatomy, Seventh English Edition, p. 229.

[1]See Hertz in Ziemann's Encyclopædia, Vol. V.—R. Douglass Powell in Reynold's System of Medicine, Vol. V.—J. Risdon Bennett, in Quain's Dictionary of Medicine.

nection with operations upon the neck, as tracheotomy, or they may be (c) the result of pyæmia.

Cysts in this region are rare. They are mostly of embryonic origin (dermoid) and contain epithelial structures, such as hair, sebaceous and sweat glands, teeth, and occasionally bone, cartilage and other tissues, together with much sebaceous matter. These cysts occasionally develop rapidly and may attain great size.

Lipomata occur as the result of an undue increase of the mediastinal fat, and are associated with excessive accumulation of fat in the pericardium and elsewhere. Such fatty tumors are rare and of very gradual development.

Fibromata and osteomata occur so infrequently that they may be regarded rather as pathological curiosities than as matters of clinical importance. Exostoses springing from the internal surface of the sternum have been met with. They do not attain such size as would permit their recognition during life.

Tubercular deposits in the anterior mediastinal glands are of much less common occurrence than in the bronchial glands. Occasionally observed after death, they do not during the patient's life-time give rise to changes that render a diagnosis of their true nature possible.

Gummata seated upon the anterior and posterior surfaces of the sternum are mentioned by systematic writers upon syphilis.

Lymphoma, sarcoma, and carcinoma constitute by far the greater number of new growths found in the anterior mediastinum. Conclusions as to the relative frequency of these three forms of morbid growth must be based upon the observations of recent years; many of the older cases regarded as forms of cancer being doubtless lymphomata and sarcomata.

Carcinoma probably never occurs as a primary disease of this region. It is met with here even as a secondary growth very seldom, except when it occurs as a secondary deposit from a cancerous breast.

Primary sarcoma is also relatively uncommon. It may originate from a persistent thymus, from the fibrous pericardium, from the periosteum of the sternum, or from the mediastinal connective tissue. Much more commonly sarcomata of this region are secondary to some similar or associated new-growth elsewhere. In a case of my own the primary disease had its seat in the thyroid body.

Lymphoma or lymphadenoma is by far the most frequent form of growth having its origin in the anterior mediastinum.[1] It arises either in the mediastinal glands or in the thymus, and rapidly invades the surrounding tissues, the neighboring glands, the lungs, the heart, and the walls of the vessels which it may even penetrate.

So rapidly and so completely do the malignant growths of this region implicate the surrounding structures that it is, as a rule, quite impossible to determine even after death the starting point of the disease.

[1] R. D. Powell, M.D., F.R.C.P. Loc. cit., p. 5.

The foregoing morbid conditions differ among themselves as to causation, rapidity of development, associated lesions and other important clinical characters; they possess the common traits that they constitute sub-sternal tumors, and that they cannot be recognized as such until they attain sufficient volume to exert pressure upon surrounding organs and modify the physical signs in the region of the chest. It follows that in their incipiency diagnosis is impossible. Even when they have attained a considerable size and occasion serious symptoms and coarse modification of the physical signs, their differential diagnosis from analogous conditions of the posterior mediastinal space constitutes one of the most difficult problems of clinical medicine, whilst under certain circumstances their diagnosis from aortic aneurism and pericardial effusion calls for the exercise of the utmost care. Finally, the recognition of the special form of disease with which we have to d[illegible] is possible only in a small proportion of the cases, and the diagnosis must, in most instances, be of necessity a probable rather than a positive one.

Prominent among the symptoms of mediastinal tumor are, pain, pleuritic in character, commonly superficial, and differing in this respect from the deep-seated, boring pains of aneurism; dyspnœa, increasing day by day and always aggravated by exertion; cough, unproductive or attended by scanty, often frothy expectoration; dysphagia, and a sense of constriction and of oppression in the sternal region. These symptoms, which also occur in other conditions, are characterized by a tendency to paroxysmal intensification altogether peculiar and of itself of diagnostic moment.

Fever is absent, save when it occurs in consequence of some inflammatory complication.

The nutrition is often good, emaciation being present chiefly in those cases in which the œsophagus is pressed upon or implicated. Patients are often well nourished to the last.

When to such symptoms are added certain of the following physical signs, the probability of the existence of mediastinal tumor is correspondingly increased.

Upon Inspection.—Repletion of the veins of the face and neck, lividity of the lips, prominence of the eyeballs, inequality of the pupils, and tumefaction of the tissues of the face, neck, or upper extremities, from serous infiltration; distension of the superficial venous twigs of the upper part of the chest; this often amounts to a mere reddish-blue arborescence, terminating abruptly at or near the sternal borders, but occasionally the superficial veins are enormously enlarged, and form varicose patches of considerable size and prominence; protrusion of the upper sternal region and enlargement of the chest, particularly above the level of the fourth rib, usually asymmetrical; in certain cases an irregular mammilated appearance of the surface, from the protrusion of the tumor through the tissues forming the chest wall; enlargement of the thyroid body, or of the glands at the root of the neck, or in the axillæ, or deformity due to the extension of the tumor upward beyond the sternal notch or the sterno-clavicular articulations;

diminished respiratory movements, often asymmetrical.

On Palpation.—The signs of displacement of the apex of the heart, or great enfeeblement of the cardiac impulse, which often is fluttering and irregular; absence of abnormal impulse or thrill.

On Percussion.—Modification of the sternal resonance, with an area of dullness of greater or less extent, involving the upper sternal region, and continuous with the cardiac dullness; dullness in the interscapular region. If there be extensive secondary implication of one or both lungs, the pulmonary resonance will be modified at points distant from the sternum, and collapse of a lung from occlusion of a bronchus, or pleural effusion will yield their known signs.

On Auscultation.—The modifications of the signs relating both to the heart and lungs are of the most varied and diverse character. The sounds of the heart are usually enfeebled, and their rhythm disturbed. In some instances the heart-sounds have been intensified over regions of extra-præcardial dullness. Murmurs may or may not be present, but they never occupy the position, nor do they manifest either the intensity or the rasping character of those of aneurismal origin.

The respiratory murmur is greatly diminished in intensity over the tumor. Stridor is less common than in aneurism, partly because the pressure is apt to be less directly exerted upon the trachea or bronchi, and partly because the common forms of mediastinal growth tend rather to invade than to merely compress at a single point the tubular strictures with which they come into relation. Great enfeeblement of the respiratory murmur over one side may, in the absence of other cause, be of diagnostic value as indicating obstruction of a primary bronchus.

The general diagnosis of mediastinal tumor having been made, the following considerations would favor the probability of its being in the anterior mediastinal space:

(a) Enlargement of the superficial veins of the chest, especially of those below the level of the upper segment of the sternum.

(b) Bulging of the middle portion of the sternum, especially if resonance in the interscapular region remains unimpaired.

(c) Great obscurity of heart-sounds and impulse.

(d) An amount of dysphagia, slight in proportion to the other symptoms of pressure, or the absence of dysphagia altogether.

The differential diagnosis from aneurism of the aorta would be rendered probable if, in addition to the above data, there be

(a) The history or presence of tumors of a malignant nature elsewhere.

(b) An extensive area of dullness without characteristic pulsation, thrill or bruit.

(c) No evidence of disease of the blood-vessels.

(d) No history of excessive or long continued strain, nor of syphilis.

(e) Pain of a stitch-like character, with sense of constriction, rather than the dull, deep-seated, often radiating pains of aneurism.

(f) And the tumor be developed at a relatively early period of life (before the thirtieth year.)

Blood spitting may occur in consequence of the disturbing presence of any form of tumor, or it may be due to the invasion of a bronchus by a malignant growth. It cannot therefore be regarded as of peculiar diagnostic importance.

Tumors of the anterior mediastinum may be distinguished from pericardial effusion by

(a) The irregular outline of the dullness, the greater transverse diameter of which is at a higher level than that of effusion.

(b) Absence of febrile movement.

(c) Absence of the history of the acute or chronic diseases to which pericarditis is commonly secondary (nephritis, rheumatism, etc.)

(d) The progress of the case.

(e) The absence of diverse and irregularly grouped pressure-signs.

The diagnosis of particular forms of tumor of the anterior mediastinum has hitherto led to practical results, only in so far as regards the presence or absence of a sub-sternal abscess or of a cyst amenable to operative measures. Nevertheless Heyfelder[1] had collected in 1863, no less than nineteen cases of resection of the whole or part of the sternum for cancer, abscess and other cause, of which number a single case only succumbed to the operation. In recent years the successful total excision of the sternum for sarcoma, by Koenig,[2] and successful partial resections of this bone for mediastinal growths[3] lend fresh importance to the subject of the diagnosis of these morbid conditions at the earliest possible period of their development.

Mediastinal abscess occupying the anterior space, yields, before its contents have found vent, the following points of difference from other forms of tumor in this locality:

(a) Etiologically, the history of a blow, knock or prolonged pressure upon the sternum; of a wound or stab; of caries or fracture; of an operation in the neighborhood or in the throat or neck; of suppurative disease elsewhere in the thorax, as abscess of the lung or empyema; of severe constitutional disease, or finally, of exposure to intense cold.

(b) Deep-seated, steady, gradually increasing, rather than paroxysmal pain.

(c) The intermittent signs and active movement of irritative fever.

(d) A tendency to "point" and the appearances of a fluctuating, circumscribed, superficial tumor at the sternal border or at some distant position.

In favor of a cyst the following:

(a) Absence of the etiological data of abscess.

(b) Absence of fever.

(c) Evenness of contour.

(d) Absence of positive signs of new-growth, or associated morbid conditions.

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[1] O. Heyfelder, Traite des Résections, Traduit de L'Allemand avec additions et notes par Le Dr. Boekel, Strasburg et Paris, 1863.

[2] *Centralblatt f. Chir.*, No. 42, 1882.

[3] Küster, *Berliner Klinische Wochenschrift*, No. 20, 1883. pp. 127, 136, 274.

(e) Want of the diversity in the pressure-symptoms met with in the malignant growths.

(f) An obscure sense of fluctuation.

The recognition of a mediastinal fatty tumor would be attended with difficulty, enhanced by the fact that sarcoma of this region may attain considerable size and lead to a fatal issue, without grave impairment of the general nutrition of the body. A woman, aged 60 years, short of stature and enormously fat, died in my ward at the Jefferson Hospital, of sarcoma of the anterior mediastinum, the symptoms of which had lasted almost eighteen months. Kronlein[1] described a congenital lipoma of the anterior mediastinum, in a child aged one year, which found its way through an intercostal space to the surface of the chest, and then rapidly increased in size.

When we come to consider the differentiation of the malignant new-growths which constitute the more common tumors of this region, we find that a probable diagnosis of lymphoma is warranted

(a) When the tumor is primary.

(b) When there are evidences of widespread disease of the lymphatic glands, with or without enlargement of the spleen.

(c) The younger the subject, the greater the probability that the tumor is lymphomatous.

Carcinoma is rendered probable by

(a) The previous or coincident occurrence of cancerous disease in the mammæ or elsewhere:

(b) The presence of hard, nodular, immovable masses in the neck:

(c) Relatively slow development of the tumor:

(d) A tendency to rapid emaciation in the absence of evidences of direct pressure upon the œsophagus.

(e) The occurrence of cachexia.

(f) The intensity and knife-like character of the pain:

(g) A relatively advanced period of life.

(h) A hereditary predisposition to carcinomatous disease.

If the evidence in favor of the other forms be wanting, the diagnosis of sarcoma may be reached by exclusion. This view would be rendered more probable by

(a) Rapidity of growth;

(b) The history of the amputation of a limb, resection of a joint, or extirpation of any organ for sarcomatous disease.

All these forms of malignant growth are alike liable to be followed by secondary invasion of the lung.

I have purposely omitted, in the foregoing paper, the consideration of many of the multifarious phenomena of pressure and invasion met with in mediastinal tumors. The necessity to be brief has obliged me to simplify the subject by serious omissions. I find a further excuse, also, in the fact that each case must be worked out not so much by fixed rules of procedure, as by careful and painstaking analysis of its symptoms.

[1] Langenbeck, Klinic, p. 157.

LIMITATIONS OF PATHOGNOMONIC SIGNS AND SYMPTOMS.

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It has been the writer's intention to bring into this short paper, the results of observations extending over some time concerning certain limitations which must be placed upon signs which are considered, when present in certain states, more or less pathognomonic of a definite morbid condition. The word pathognomonic is not used in a strict sense, but somewhat as the word diagnostic. The writer has so frequently witnessed erroneous opinions as to the nature of disease, arising from the reception of some one sign as absolutely determining, that he has been impelled to write this article to impress more forcibly the necessity of studying all the phenomena present in cases of disease. Those diagnoses which are rightly denominated snap, may at times be brilliant, but he who indulges in them frequently, no matter how well informed, will be sure to make mistakes. Diseases do not follow an absolute rule in their manifestations, and he who would have them always square with the written description will obtain but a partial insight into their nature. As the time allotted is brief, I shall only allude to some of the facts of the nature indicated by the title, and not attempt to cover the whole field of medicine. Moreover, I shall restrict it to this consideration as regards signs.

The nervous system allows of fewer claims of pathognomonic signs or symptoms than do most of the other organs. Yet we find that there is a tendency to accept certain states as proving the existence of a given disease. It was not so long since that many were willing to accept the presence of optic neuritis or choped disc conjoined with headache as characteristic of a cerebral tumor; and the change in intelligent medical opinion on this subject shows how the ground shifts with an increasing attention paid to a subject. At present we would accept the optic neuritis as indication of increased intracranial pressure only, not necessarily that this pressure was due to a tumor; moreover we should place the limitation to this consideration by excluding the possibility of Bright's disease, or of this as capable of explaining all the phenomena of a given case. The writer has on a number of occasions found that those who were thoroughly conversant with the examination of the eye, would alter the opinion expressed as to the cause of an optic neuritis as between disease of the kidney, and intra-cranial pressure with the course of the case and the development of symptoms.

Such a symptom or sign can only be accepted with considerable limitation as pathognomonic.

There seems to be a wide discrepancy in this matter, also, as regards the examination of the fundus of the eye, in cases of so-called congestion of the brain. Some have relied upon a certain state of the retinal vessels as proving that the brain was also congested. Yet here, surely, the margin must be very large, for