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## REPORT ON A CASE OF MALIGNANT THYMOMA WITH NECROPSY \*

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One does not often encounter malignant tumors of the mediastinum and it is seldom that they are to be procured in as fresh a state of preservation as that which I shall report:

### REPORT OF CASE

**CASE.**—The patient, G. S., aged 9 years, was sent in to the service of Dr. James S. Stone, in the Children's Hospital, from a suburban hospital April 30, 1919, with the diagnosis of mediastinal tumor.

**Previous History.**—He was a normally delivered, full-term child, with a negative family history. Ever since his fourth year he had had frequent attacks of tonsillitis, which led to the removal of his tonsils and adenoids when he was 6 years old. During the winter months he had frequent colds and coughing which usually lasted two to three weeks at a time; these would occur as often as every month.

**Present Illness.**—His present illness began with a gradual onset of coryza and inspiratory dyspnea, one month prior to admission. He could not lie flat in bed, having well marked orthopnea. Two weeks after onset, his mother noticed swollen veins at the base of his neck, just above the clavicle. She stated that roentgen-ray examination at the local hospital was negative. The patient was better at the time of his admission to the Children's Hospital, able to lie flat and sleep on one pillow; he had occasional fits of gagging and coughing, which would awaken him at night, but was otherwise pretty comfortable. He did not raise much, if any, mucus when he coughed, there was no cyanosis, no convulsions, no bleeding from the nose or the mouth. He had no pain in his chest, no night sweats or night cries.

**Physical Examination.**—There was dullness on both sides of the sternum from the first to the fifth rib, breath sounds and voice sounds were increased; there was bronchovesicular breathing. Breath sounds were more nearly normal on the left than on the right side. There was a dorsal scoliosis of the spine to the right. The patient was round-shouldered. The heart sounds were clear and normal; precordial dullness measured 2.5 by 8.5 cm. The aortic second sound was louder than the pulmonic second. The abdomen was negative. The extremities were of equal size with veins showing prominently in places. Blood pressure, left: 130 mm.; right: 120 mm.

**Roentgen-Ray Examination.**—This showed (Fig. 1) a large mediastinal tumor, occupying the upper central portion of the chest; stereoscopic roentgenograms showed that it was anterior to the great vessels. The veins in the anterior and lower part of the neck were prominent, and there was slight enlargement of the veins of the upper part of the chest anteriorly.

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*Laboratory Findings.*—The urine was normal. Leukocytes, 12,000; erythrocytes, 4,460,000. Differential count: Polymorphonuclears, 69 per cent.; mononuclears, 31 per cent. The blood smear showed nothing abnormal. Hemoglobin, 90 per cent. The von Pirquet test was negative. Except for two rises in temperature to 99 on the days he was roentgenographed, the temperature curve was comparatively flat.

*Diagnosis.*—A tentative diagnosis of mediastinal abscess or enlarged mediastinal nodes was made on admission.

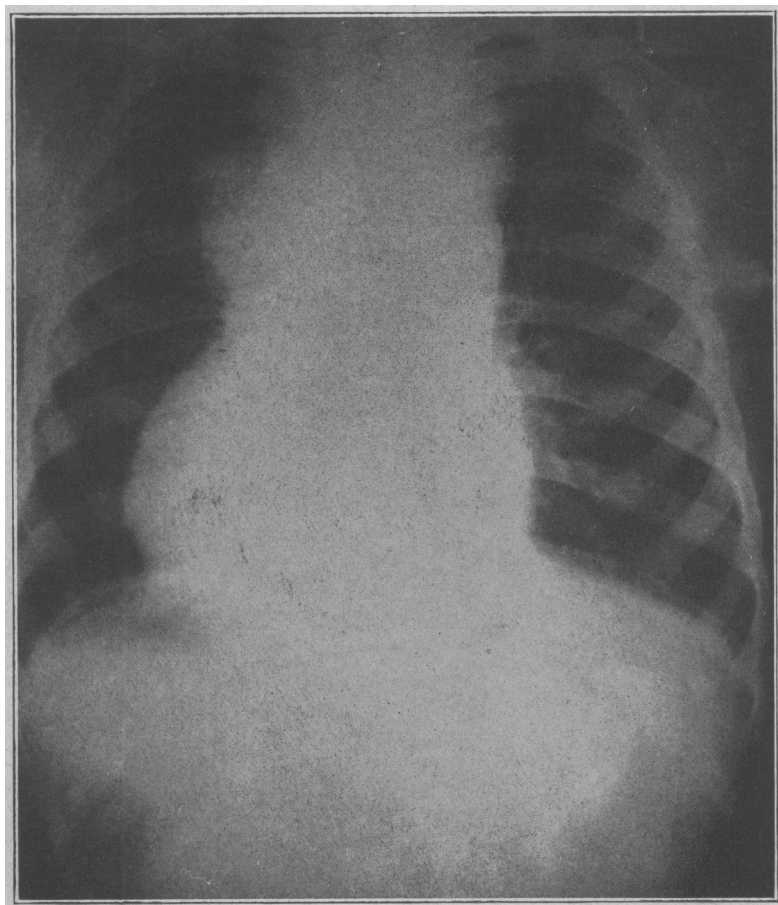


Fig. 1.—Roentgenogram of tumor, taken during life by Dr. Percy Brown.

*Operation.*—The patient was taken to the operating room one week after admission, for the purpose of making an exploration. He took his ether well, holding the cone himself, until partially anesthetized. As the anesthesia became complete he grew markedly cyanotic and the ether was immediately stopped, the usual restoratives, including oxygen being used. The boy's color improved steadily and became almost normal. His heart seemed to be in good condition. He never regained consciousness, however, and one-half hour after starting anesthesia he suddenly became very pale, and his heart and respiration stopped abruptly. Tracheotomy was not performed, as there was no hope of relieving the obstruction by this means. A necropsy was performed four hours later.

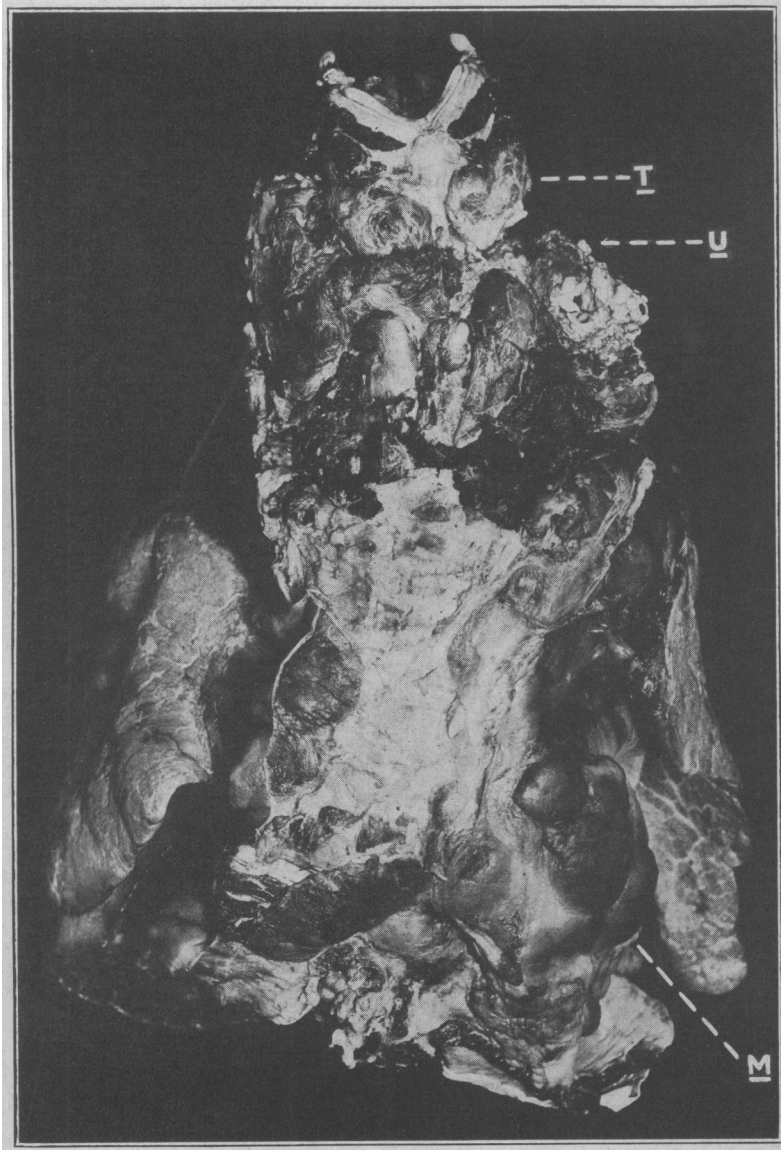


Fig. 2.—The tumor viewed from in front. T=thyroid gland; U=upper limit of tumor; M=metastases into pericardium, which is unopened. Lungs on either side.

*Necropsy Report.*—The body is that of a well nourished, well developed, white male child, 139 cm. in length. There is no rigor mortis, except in the lower jaw; postmortem lividity is present in dependant portions. There is nothing remarkable about the head. A bulging mass is palpable above the suprasternal notch, extending as high as the thyroid and firm and lobulated. The left side of the thorax is noticeably arched and protruding; otherwise not externally abnormal. Primary incision, extending from suprasternal notch to mons pubis. The abdominal contents are in situ, but there are adhesions between the gallbladder and pylorus and the transverse colon and liver. The intestines as a whole, are congested. There is a small accessory spleen, 1.2 cm. in diameter, situated just off the lower pole of the spleen proper and about 1.5 cm. distant therefrom. The liver projects 1.5 cm. below the free margin of the ribs. The mesenteric lymphnodes are all enlarged, some of them to 2 cm. in diameter. They show coarse, whitish follicles through their capsules and the largest of them is almost completely caseous. The diaphragm is at the first rib on the right, at the fifth interspace on the left. On opening the thorax one notes that the costal cartilages cut easily and that the muscles covering the thorax are of good color. On removing the sternum, a tumor of very extensive growth is encountered.

This tumor lies in the anterior mediastinum, is adherent to, but does not infiltrate the sternum and extends from the thyroid gland above to the diaphragm below. The organs of the neck and thorax were removed in toto, in order that they might be studied more intelligently. The pericardium contains 200 c.c. of clear, straw colored fluid; its inner surface is studded with small, granular tumor masses; its outer aspect shows several large infiltrating masses of tumor tissue, about 2 cm. in diameter and 0.75 cm. in thickness, as shown in Figure 2. The heart is firmly contracted and shows small masses of a similar nature on its epicardium, varying from 1 mm. to 1.3 cm. in diameter and penetrating the myocardium to a slight extent.<sup>1</sup> The lungs show no internal abnormalities on section, although there are metastatic foci in the pleura. For the sake of coherence, the tumor will be described later, its gross and microscopic peculiarities being combined.

**Abdomen:** The spleen is very firm, purplish red and weighs 101 gm. On section, it drips bloods, its pulp is firm and does not strip readily on the knife blade. The splenic corpuscles are coarse and prominent, whitish in color; the trabeculae are normal in size and number. The organ contains one small metastatic nodule, spherical in shape and cartilaginous in consistence. It is yellowish white and measures 0.5 cm. in diameter.

**Liver:** Weight, 830 gm. It is dark reddish brown in color, mottled with a definite nutmeg pattern. Its capsule is everywhere smooth and glistening, except where there are adhesions with neighboring viscera. At the apex of its convex surface, near the middle of the falciform ligament and to the right of it, is a spherical mass, yellowish white and 1.2 cm. in diameter. It is very firm in consistence. On the under surface of the left lobe is another such mass, stellate in outline and 1.5 cm. in diameter, which is completely calcified. The cut surface of the liver drips blood, is finely patterned in a nutmeg design of reddish brown and seems not unduly fibrous or greasy. The gallbladder contains viscous, olive green bile which is readily expressed through the papilla of Vater.

**Stomach:** This organ is of normal size, its mucosa velvety and of the usual appearance; there is marked congestion and a large hemorrhagic erosion in the duodenum, just below the pylorus. It is 2.5 cm. in diameter; the mucosa is ulcerated and there is evidence of fresh hemorrhage here. Some bloody mucus lies in the lumen of the gut. The intestines show similar areas of hemorrhage here and there and they are congested, as a whole, the congestion being apparently passive in type. **Pancreas:** This is of normal size and consistence. **Kidneys:** They weigh together 218 gm. Their capsules strip readily, exposing

1. Grawitz: Deutsch. med. Wchnschr. 37:2357, 1911.



a smooth surface, with injected stellate venules. The organs show congestion on cutting them open, are of a dark red color, drip blood and the congestion is apparently of a passive type, similar to that in the other organs. The ratio of medullary to cortical diameter is normal, there is nothing abnormal about the pelves, ureters, nor urinary bladder.



Fig. 3.—The tumor viewed from behind, the lungs on either side.

Restrictions by the parents prevented examination of the cerebrum.

*Microscopic Examination.*—The spleen shows congestion of its pulp, with increase in the pulp cells; the malpighian corpuscles are well formed; the trabeculae are normal. There are many eosinophil leukocytes in the sinuses, both of the myelocytic and polymorphonuclear type. The liver shows passive con-

gestion, with slight fatty infiltration, not in excess of physiologic limits. The metastatic (?) nodules are either completely necrotic or calcified and give little or no clue as to their original composition. The large caseous mesenteric lymph node shows typical tuberculosis, with a zone of miliary tubercles surrounding a caseous center.

*Examination of Tumor.*—Macroscopic: The tumor in the mediastinum is roughly conical in shape, its base measures 8 cm. laterally and 11 cm. anteroposteriorly, while its axis is 11 cm. in height. It is homogeneous, for the greater part, pearly yellowish white and occupies the entire mediastinum, surrounding all the large vessels, the bronchi, trachea and the peribronchial lymph nodes. It is lobulated, the lobules being of a type to suggest local overgrowth of a single organ, rather than aggregations of enlarged nodes. Cross sections made at various levels (clearly seen in the posterior view in the illustration, Fig. 3) show that it has included everything as high as the thyroid gland; it is as though molten wax had been poured into the anterior mediastinum and had flowed out laterally and posteriorly before hardening; in the thorax the

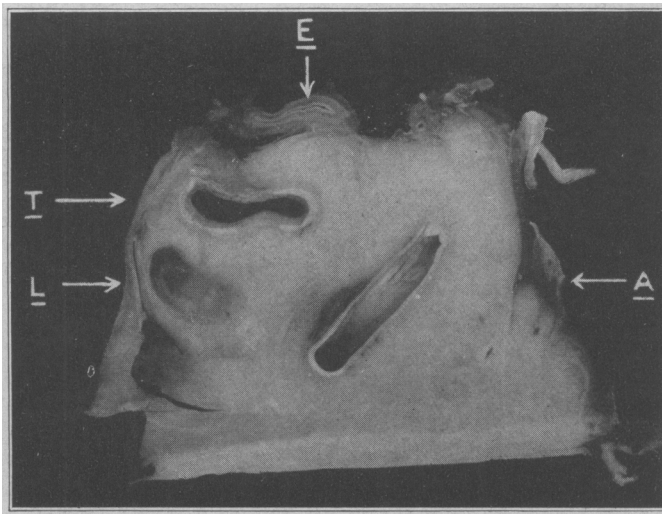


Fig. 4.—Transverse section of tumor at level of arch of the aorta. E = esophagus; T = trachea; L = an included lymphnode. An arrow, "A," points to the diagonally situated arch of the aorta.

esophagus alone has escaped inclusion. The tumor resembles cornstarch blanc mange in its yellowish white color, but is of an extremely dense and almost cartilaginous consistence. The trachea is compressed anteroposteriorly, until it is a mere slit, a millimeter or so in this diameter (Fig. 4). This compression is present practically throughout its entire length. Here and there lymph nodes are embedded in the tumor mass, but they are totally different in appearance, being of a soft consistence and more yellow tinge. The tumor shows areas of necrosis at intervals throughout its substance, but they are few and widely separated from one another. They are of irregular outline, somewhat softer in consistence than the tumor and of a canary yellow color. The growth has metastasized by way of the lymphatics into the pleura and pericardium in its immediate vicinity, where it forms several plaques as already described. It will readily be seen that the tumor, then, occupies the site of the thymus and has encroached directly on the pericardium, heart, pleura and lungs.

Microscopic: The tumor is made up of innumerable lymphocytoid cells which, at first glance, might be taken for microlymphocytes. Closer examination, in sections stained with Mallory's eosin-methylene blue, shows that they differ from these in several respects: They are somewhat larger, more polygonal in outline, have an acidophile rather than a basophile cytoplasm and their nuclei are vesicular, contain a nucleolus and are poor in chromatin when compared with those of the microlymphocytes (Fig. 5). They lie, furthermore, in a dense feltwork of collagen fibrils and fibers, which in some cases form basket-

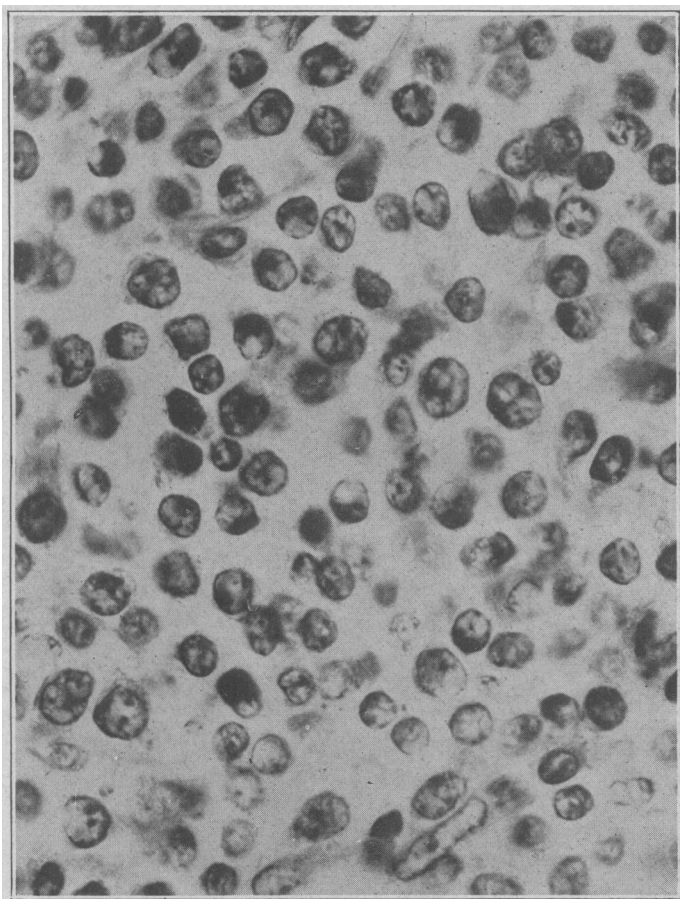


Fig. 5.—Oil-immersion photomicrograph of nonfibrous portion of the tumor. Slightly more than 1,000 diameters magnification. Phosphotungstic acid-hematoxylin.

like nests, or alveolar spaces in which the tumor cells lie more or less crowded together (Fig. 6). Often, too, one can demonstrate delicate anastomosing filaments, or processes from the cytoplasm of these cells, which connect them either with one another, or with the fibrous reticulum in their neighborhood. They do not give the oxydase reaction, when stained by Goodpasture's<sup>2</sup> method. Their

2. Goodpasture, E. W.: J. Lab. & Clin Med. 4:442, 1919.

size is fairly constant in certain localities (Fig. 5), some parts of the tumor showing larger cells than do others, but the cells of each part are usually of about the same size. They average from 4.5 to 6.0 microns, occasionally attaining a long diameter of 7.5 microns. Mitoses are very thickly distributed and usually occur in the smaller type of cells. There are a good many eosinophil leukocytes present, both types being scattered throughout the tumor and usually being more or less locally grouped. Some rather larger cells are found containing one or two large masses of eosinophil material, probably phagocytosed erythrocytes. Besides the tumor cells, there is a larger type of cell of a vesicular character; with large, pale nucleus (from 10 to 14 microns) and a well marked nucleolus. Their cytoplasm may be vacuolated; when it is thinned out and

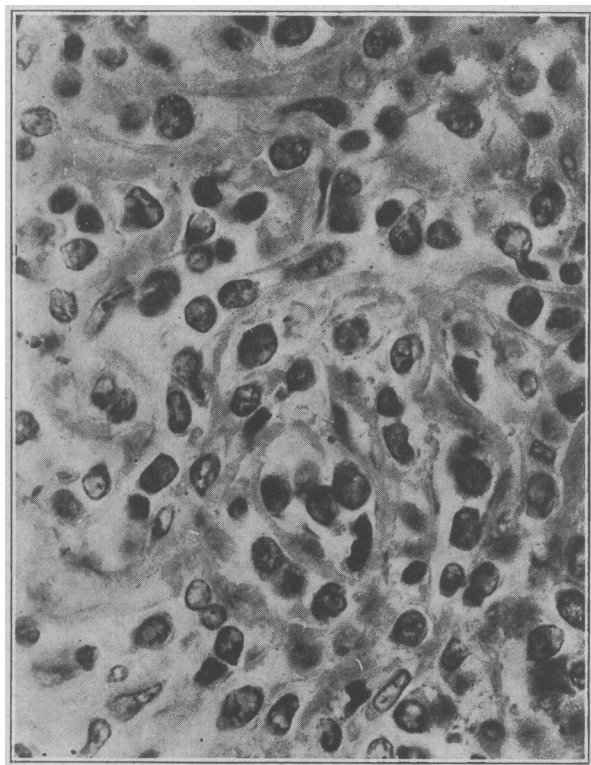


Fig. 6.—Showing the fibrous reticulum of the tumor; oil-immersion photomicrograph, 1,000 diameters. Phosphotungstic acid-hematoxylin.

stained with phosphotungstic acid hematoxylin one finds blue fibrils in its substance. These cells closely resemble swollen fibroblasts, though they may represent thymic reticulum cells. They are often piled up locally in the vicinity of blood vessels, where they might be mistaken for young Hassal's corpuscles. As vessels can usually be demonstrated as being intimately connected with their appearance, it seems more likely that they are endothelial phagocytes, or fibroblasts. There are a few giant cells at the margin of the necrotic areas in one of the ten or more blocks cut from the tumor; they are somewhat like those seen in a Hodgkin's granuloma, with large, vesicular nuclei which are

more or less lobulated. Sometimes they are multinuclear, but they never have as dense a cytoplasm as the so-called "foreign body giant cells." They are found only in the situation mentioned.

The stroma, or reticular network of collagen fibrils, stains bright red with acid fuchsin and deep red with phosphotungstic acid hematoxylin. It varies much in density, being in the form of a delicate reticular network here and a dense fibrous matrix in another situation. The two types are shown in Figures 5 and 6. It is this feltwork that gives the tumor its deceptively cartilaginous consistence.

Lymph nodes taken from near the tumor show hyperplasia, many eosinophils and a considerable number of small cells which are indistinguishable from the tumor cells and lie among typical lymphocytes, with which they contrast rather sharply. There are no giant cells in these nodes, and their reticulum appears to be normal and not fibrosed. There are one or two nodes, however, which show a very remarkable hyperplasia and proliferation of their endothelial elements, particularly those of the lymph sinuses between nodules. These are often massed into thick bands or cords, the vascular endothelium in this situation seemingly sharing in the process, although to a lesser degree. In those places where the tumor has penetrated the myocardium, this is a direct infiltration from the epicardial fatty tissue near the anterior interventricular sulcus and near the apex, to a depth of 270 microns. The structure of the growth does not differ microscopically here from that seen elsewhere.

#### SUMMARY OF FINDINGS

We have a very hard, lobulated mediastinal tumor, occupying chiefly the anterior mediastinum; lying just behind the sternum, but not infiltrating the bone. It shows metastasis by direct lymphatic extension, with three possible minor metastases at a distance. It does not penetrate the lung nor other neighboring organs much more deeply than their serous coverings or sacs. It is composed chiefly of small cells, resembling microlymphocytes, but having vesicular nuclei, acidophil cytoplasm and tending very slightly to anastomose with one another by means of slender processes. This applies only to a decided minority of their number, the majority being unconnected with each other, or discrete. The rest of the tumor is chiefly collagenous connective tissue. Neighboring lymph nodes, while they show a few discrete tumor cells in their sinuses, are usually respected by the tumor and not incorporated in its mass.

#### REVIEW OF LITERATURE

The literature on this subject is characterized by its comparative scantiness and by the wide divergence of opinion shown by the various writers as to the true status of these tumors. Such textbooks as Borst's,<sup>3</sup> Lewin's,<sup>4</sup> Ribbert's<sup>5</sup> and Wolff's<sup>6</sup> pay but passing attention to them. Schridde,<sup>7</sup> in Aschoff's "Pathologische Anatomie," gives a good description of tumors of thymic origin, which is fairly comprehensive considering its brevity. Since 1911, very little has been written

3. Borst, M.: Die Lehre von den Geschwülsten, Wiesbaden, 1902.

4. Lewin, C.: Die bösartigen Geschwülste, Leipzig, 1909.

5. Ribbert, H.: Geschwulstlehre f. Aertze u. Studierende, Bonn, 1904.

6. Wolff, J.: Lehre von der Krebskrankheit, Jena, 1911.

7. Schridde, H.: Aschoff's "Pathologische Anatomie," Jena, 1911, 177; Münch. med. Wchnschr. 58:2593, 1911.

on the subject. Of the more recent articles, one by Ewing,<sup>8</sup> and another by Vanzetti,<sup>9</sup> present extremely good reviews of the various theories that have been advanced as to the origin and character of thymic tumors, and the authors report several cases and give full bibliographies on the topic. Rubaschow's<sup>10</sup> case report and article is very helpful, while Wiesel's<sup>11</sup> much longer paper on the pathology of the thymus, which stresses the clinical features of these tumors, is valuable but rather rambling and prolix. Rubaschow has compiled a list of the tumors of the thymus described up to 1911, combining one of Hoffmann's which brought them up to 1896. It totals about seventy-five cases, of which fifty-two were described as "sarcomata" of various sorts, twelve as carcinomas and the rest variously. He gives the names of the writers concerned and the dates of publication. Since 1911 one can find but few reports, less than a dozen.<sup>12</sup>

Rubaschow reports a case more closely corresponding to the one described in this paper than any that could be found, although it occurred in a man, aged 62. The "type cells" were very small lymphocytoid affairs, and there were aggregations of larger cells, such as I have already described. Two of Ewing's cases come very close to ours in appearance. It is possible, in reviewing the literature, to find descriptions of tumors in which the type cells vary all the way from small, disconnected lymphocytoid cells, through larger, more or less anastomosing cells, to a definitely epithelial type of large cell, which may finally attain a degree of differentiation resembling that of the epidermoid carcinoma, on the one hand, and an adenoma or adenocarcinoma, on the other. Our case stands at the lowest point in the scale; Rubaschow's and Chiari's<sup>13</sup> may be slightly more advanced. Two of Ewing's come next, with larger, more polygonal cells, which have a tendency to anastomose, or to be connected with the reticulum by delicate processes (just as was found in the upper portions of our tumor). Vanzetti's<sup>9</sup> is still further differentiated, the cells in his tumor being frankly epithelial in appearance; and then come numerous examples of true carcinoma.

The presence of much connective tissue and many eosinophils have led several authors to compare this tumor with Hodgkin's granuloma, and to suspect an infectious origin. Those of us who consider the

8. Ewing, J.: *Surg., Gynec. & Obst.* **22**:401, 1916.

9. Vanzetti, F.: *Arch. per le sc. med., Torino* **40**:264, 1916.

10. Rubaschow, S.: *Virchow's Arch. f. path. Anat.* **206**:141, 1911.

11. Wiesel, J.: *Ergebn. d. allg. Path. u. path. Anat.* **15**:416, 1912.

12. Barbano, C.: *Pensiero Med.* **2**:701, 1912. Roccavilla, A.; *Gazz. d. osp.* **34**:903, 1913; *Riforma med.* **21**:337, 1915. Simmonds, M.: *Ztschr. f. Krebsforsch.* **12**:280, 1912. Speed, K.: *Surg. Clin.* **1**:643, 1917. Perrero, E.: *Riv. di clin. pediat.* **9**:241, 1913.

13. Chiari, O. M.: *Zentralbl. f. Path.* **22**:8, 1911.

latter disease a form of neoplasm can dismiss this contention by attributing the presence of increased connective tissue and the eosinophils to a sympathetic overgrowth or irritation of elements already present in the parent organ. Giant cells, of whatever type found, obviously present no stumbling block.

#### HISTOLOGY OF THYMUS

Before going any further into this discussion, it would be well to consider the general aspects of the thymus in its relation to tumors of the mediastinum. It will be seen that so long as there is uncertainty as to the histology of this organ, just so long will there be doubt and disputes as to the histogenesis of tumors arising therefrom. Of the various histologic elements of the organ, three are the subject of speculation and dispute. The small thymic cell of the cortex ranks first as a bone of contention; is it a lymphocyte, or is it a modified form of epithelial cell? Dantchakoff,<sup>14</sup> Hammar<sup>15</sup> and Maximow take the former view; while Bell, Prenant, Schridde, and more recently Pappenheimer<sup>16</sup> claim its descent from the epithelium.<sup>17</sup> A clearer understanding of the difficulties surrounding this question will be gained by reading Hammar's "Fuenfzig Jahre Thymusforschung,"<sup>15</sup> or Pappenheimer's splendid exposition.<sup>16</sup>

The occurrence of eosinophil cells in the thymus is another cause for discussion. Are they eosinophil leukocytes derived from the circulating blood, or are they cells peculiar to this organ? Hassal's corpuscles, although admittedly epithelial in character, represent another unknown quantity, insofar as their physiologic function is concerned.

#### THYMUS ORIGIN OF TUMOR

When we come to consider tumors derived from these elements, we naturally enough encounter the same questions, the same dissensions, the same difficulties. Are they epithelial and hence carcinomas, or should they be called sarcomas and lymphosarcomas? Not only do we have to deal with such problems, but the question arises as to which mediastinal tumors may be considered thymic in origin and which derived from the lymph nodes of this region.

It seems to be more or less agreed that the following facts point to the thymic origin of a tumor:

1. The situation of a large, not too lobulated, firm tumor at the site of the thymus, in the anterior mediastinum.

14. Dantchakoff, V.: J. Exper. Med. **24**:87, 1916.

15. Hammar, J. A.: Anat. Hefte **19**:1-274, 1909; 43, 201, 1911.

16. Pappenheimer, A.: J. Med. Res. **17**:1, 1910.

17. From a personal conversation with Dr. Pappenheimer, a few weeks ago, I surmise that he has changed his opinion and joined the "lymphocytic camp."

2. Extension downward behind the sternum, without infiltrating the bone.

3. Involvement of the pericardium and pleura by direct lymphatic extension.

4. A resemblance to thymic tissue on histological examination. The finding of Hassal's corpuscles is helpful, but not essential.

Ewing, Schridde, Rubaschow and Letulle<sup>18</sup> are fairly well in accord on these points, some being more specific in their statements than others. Virchow (quoted by Wiesel<sup>11</sup>) maintained that the thymic tumors involved the pericardium first, while the lymphosarcomas attack the lungs or pleura. Hoffman (quoted by Vanzetti<sup>9</sup> and Wiesel<sup>11</sup>) denied that one could make any decision in the matter, the two types of tumor being absolutely indistinguishable one from the other. He appears to be alone in his opinion, nobody seeming to accept so sweeping a view. He also denies that the presence of Hassal's corpuscles proves anything at all. Letulle<sup>18</sup> states that the parenchyma of the lung can only be invaded secondarily by thymic tumors, thus paraphrasing Virchow's statement. He imposes other conditions, such as eccentric pressure on neighboring viscera, but they seem less essential. Vanzetti feels that the small-celled type of thymic tumor so closely resembles a true lymphosarcoma, that one must be extremely careful in diagnosing one from the other; a fact that no one will dispute.

Another point on which most authorities agree is that the tumors are apt to be of the small-celled or sarcomatoid type in youth; while they are large-celled epithelial, or sarcomatous, in later years, after fifty. In this connection it is interesting to note that Rubaschow's case occurred in a man, aged 62, and yet was of a definitely small-celled type, which he considered epithelial.

When one compares the thymoma with a true lymphosarcoma, one finds many similarities; but this is, perhaps, to be expected in view of the similarity of the small thymic cell and the lymphocyte. The following points seem to be against the lymphocytoid type of thymoma being a true lymphosarcoma.

1. The type cell is almost identical with the small thymic cell.

(a) The nucleus is large, more or less ovoid and may contain a well marked nucleolus.

(b) The cytoplasm is often acidophil, never strongly basophil like that of the microlymphocyte, and may be present in sufficient quantities to give the cell a polygonal outline. Anastomosing processes may be present.

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18. Letulle: *Arch. Gen. de med.* 2:641, 1890.



2. Lymphnodes taken from near the tumor, although they may show isolated tumor cells in their sinuuses under the microscope, are not definitely incorporated in the tumor mass. They stand out clearly demarcated, even when surrounded on all sides by the tumor, both when viewed in the gross, or with the microscope. Rubaschow has stressed this point. They seem to hold themselves aloof from the tumor process, not only locally, but also in more distant parts of the body. Metastases, when they occur at a distance from the tumor, generally do so in the spleen or liver instead of in lymphnodes, as one would expect, were this a true lymphosarcoma. The mesenteric nodes in our cases are enlarged, but show either tuberculosis or simple hyperplasia, no tumor metastases being found.

3. Lymphoblasts and collections thereof are not found in the tumor to any appreciable extent, mitoses occurring in the smaller cells, or in larger cells totally dissimilar from the large lymphocyte.

4. There is a variable tendency to form alveoli, or nests of small cells, although lumina are not definite enough to warrant speaking of glandular structure.

#### SUMMARY

The information to be gleaned from a review of this subject, as well as from what little I can add to it, seems to point rather strongly to an epithelial origin of the tumor in question. One starts with a cell which is almost, but not quite identical in appearance with the micro-lymphocyte, but once it begins to differentiate the similarity is rapidly lost. It would seem to be wisest not to put too much stress on an argument based on a series of transitional stages pieced together from groups of cases occurring in individuals of different ages and reported by an equally variable number of observers with opposed points-of-view. Such a series is, nevertheless, very suggestive and not unsupported by supplementary evidence from the embryologic standpoint. On the one hand, as Ewing has said, are the small-celled, sarcomatoid tumors; on the other the carcinomatous; while between these are all the intergradations, which to him suggest an infectious process when they appear in the same tumor. There is very little reason to regard such a tumor as ours as being of infectious origin, while there is a great deal to point towards its being a true neoplasm. Although the presence of eosinophils and a few large cells are reminiscent of Hodgkin's granuloma, these could be explained by the irritation of the neoplasm on its host, so that it seems best not to consider the two conditions as being at all related to each other.

## CONCLUSION

In conclusion, there seems to be little doubt that these small-celled thymic tumors fulfill the conditions we have already reviewed and are, whether lymphosarcomas or not, still of thymic origin and different from the lymphosarcomas that originate in lymphnodes. The decision of their true status rests with the histologist, who must first determine without a doubt, the origin of the small thymic cell. Once this has been done, the question will be settled automatically, so far as the pathologist is concerned.

I am much indebted to Prof. Lewis Bremer, of the Department of Anatomy of the Harvard Medical School, for the use of his photomicrographic apparatus, and to his staff for their aid and advice as to its use. Dr. Percy Brown has kindly supplied me with the Roentgenograph which is reproduced in this article.