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The Diagnosis of Mediastinal Lymphoma by Thoracotomy*

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The differential diagnosis of isolated lymphadenopathy presenting as single or multiple tumors of the mediastinum found on x-ray examination of the chest may present considerable difficulty. The history, physical examination, skin sensitivity studies, bone marrow aspiration, peripheral blood examinations, and peripheral lymph node biopsies occasionally fail to establish a correct diagnosis. It has been an acceptable practice to treat such lesions empirically as lymphomas and to subject the patient to a trial of x-ray therapy. With subsequent decrease in size of the tumor over a period of one to two months, it was assumed that the diagnosis of lymphoma was correct and no additional studies were performed to determine the accurate histologic diagnosis. Since nonspecific lymphadenopathy, tuberculosis, histoplasmosis, and Boeck's granulomas undergo spontaneous regression, or initially respond to radiation, such diagnostic radiation should be condemned. A series of cases considered to be lymphomas was studied at the Ohio State University Health Center in an attempt to point out the fallacy of trial radiation in patients with mediastinal lesions.

Materials and Results

In a 10-year period, from January 1950 to December 1959, there were 1652 admission to the University Hospital of patients with lymphomas. In the vast majority of these patients, the diagnosis of lymphomas presented no particular difficulty and specific therapy was instituted without delay. In 20 patients following the accepted diagnostic procedures the diagnosis of lymphoma remained uncertain, and rather than expose these patients to diagnostic x-ray therapy, a small anterior or posterolateral thoracotomy was utilized to obtain a representative lymph node for microscopic examination. Treatment was deferred until an accurate diagnosis based on the permanent microscopic section had been established.

The 20 patients fell into the younger age group in which lymphomas usually are prevalent. Ten patients were men, with an average age of 41 years and ten were women with an average age of 34 years. In only three was peripheral lymphadenopathy noted. Lymph node biopsies in

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TABLE 1—FINAL DIAGNOSIS OF 20 MEDIASTINAL TUMORS PRESUMED TO BE LYMPHOMAS

<table>
<thead>
<tr>
<th>Tumor</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign: (total 13)</td>
<td></td>
</tr>
<tr>
<td>Boeck's sarcoid</td>
<td>6</td>
</tr>
<tr>
<td>Granuloma</td>
<td>4</td>
</tr>
<tr>
<td>Teratoma</td>
<td>1</td>
</tr>
<tr>
<td>Lymphadenitis</td>
<td>1</td>
</tr>
<tr>
<td>Mesothelioma</td>
<td>1</td>
</tr>
<tr>
<td>Lymphoma: (total 7)</td>
<td></td>
</tr>
<tr>
<td>Reticulum cell sarcoma</td>
<td>2</td>
</tr>
<tr>
<td>Hodgkin's disease</td>
<td>2</td>
</tr>
<tr>
<td>Lymphoblastoma</td>
<td>1</td>
</tr>
<tr>
<td>Lymphosarcoma</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

these patients were not diagnostic nor were the peripheral blood count and bone marrow studies. Skin sensitivity tests to tuberculin and histoplasmin antigens were negative in most instances.

Radiologic findings varied from generalized mediastinal and hilar lymphadenopathy to single densities projecting from the mediastinum. Peribronchial lymph node calcification was present in some patients but was found to be of no diagnostic value. None of the patients had peripheral pulmonary involvement.

Following the various appropriate diagnostic procedures a preoperative diagnosis of lymphoma was entertained in all these patients. With a limited thoracotomy and removal of a representative lymph node the preoperative diagnosis proved incorrect in 13 of the 20 cases while the diagnosis of lymphoma was correct in only seven patients (Table 1).

Of the seven lymphomas, two were reticulum cell sarcomas, two were cases of Hodgkin’s disease, two were lymphosarcomas, and one was a lymphoblastoma. The 13 benign lesions included four granulomas, six
cases of Boeck’s sarcoid, one teratoma, one mesothelioma, and one chronic nonspecific lymphadenitis.

There were 21 operations performed on these 20 patients. An anterior thoracotomy was utilized in 12 patients and limited posterolateral thoracotomy in nine. One required a posterolateral approach after an anterior thoracotomy failed to yield an adequate specimen for diagnosis.

Three brief case reports are presented to illustrate the value of a tissue diagnosis in patients with mediastinal lymphadenopathy.

Case 1. E.B. #539811A, a 49-year-old white woman was referred to the Ohio State University Health Center in November, 1953, with the complaint of pain in her left chest and easy fatigability. Roentgenograms of the chest in 1951 had shown a right inferior mediastinal mass interpreted as a lymphoma and treated with x-rays. Her symptoms had temporarily improved. The positive findings on admission to the hospital included generalized shotty lymphadenopathy and a liver edge 3 cm. below the right costal margin. The laboratory findings were a white blood count of 3,200 with 68 per cent neutrophils, 8 per cent lymphocytes, and 24 per cent monocytes. The hemoglobin was 12.7 gram per cent. Bone marrow aspiration showed an increased number of monoblasts and young monocytes, and this was interpreted hematologically as bone marrow invasion by reticulum cell sarcoma. Roentgenograms of the chest showed a right inferior mediastinal mass (Fig. 1a and b). Subsequently she was given a full course of nitrogen mustard as well as additional x-ray therapy.

She was relatively asymptomatic until November, 1956, when she was readmitted to the University Hospital with pain in both sides of her chest. X-ray film examination at this time showed an increase in the size of the mediastinal mass. Physical examination and laboratory data were unchanged from her previous admission. At exploratory thoracotomy the mediastinal mass was found to be a mesothelioma of the pleura. She was well and asymptomatic when last seen in June, 1959.

FIGURE 2: Roentgenogram of Case 2 showing right superior mediastinal mass with bilateral lymphadenopathy.
**Case 2:** H.S., #867256, a 44-year-old white man, entered the hospital on June 16, 1959 with the complaint of spots in front of his left eye. The only positive findings on examination were scotomata in the left visual field. Peripheral lymphadenopathy was absent and neurological examination including lumbar puncture and EEG was normal. The tuberculin and histoplasmin skin tests were negative. The peripheral blood count and bone marrow were normal. Routine x-ray films of the chest showed a mass in the right superior mediastinum, with increased hilar densities (Fig. 2).

He was believed to have a lymphoma and x-ray therapy was advised. A right anterior thoracotomy was performed and a large lymph node removed from the superior mediastinum. Examination of the specimen showed this to be a nonspecific mediastinal granuloma. He has remained asymptomatic and x-ray examination of the chest shows no abnormality.

**Case 3:** T.H., #641023, a 29-year-old white man, was admitted on May 4, 1958 with the complaint of a cold of two months duration characterized by fever, weakness, and a 25 pound weight loss. A routine mobile x-ray film examination was reported as showing spots in the perihilar region. Physical examination was within normal limits. Peripheral lymphadenopathy was absent. The peripheral blood and bone marrow examinations were noncontributory. A chest x-ray film showed bilateral symmetrical hilar lymphadenopathy (Fig. 4). Through an anterior thoracotomy a large lymph node was obtained. Permanent section showed this to be Boeck's sarcoid.

**Discussion**

Mediastinal lymphadenopathy, presenting minimal symptoms of short duration or found on x-ray film survey of population groups, requires accurate histologic diagnosis prior to the institution of any form of therapy. The history of the presenting complaints or other factors in the patient's background may be of help in suggesting a definite diagnosis. Association with open tuberculosis cases in young individuals may lead to tuberculous lymphadenopathy, while residence in heavily infected areas of histoplasmosis may give rise to similar mediastinal lymph node enlargement. Calcification is absent in early stages of these granulomas.

**FIGURE 3:** Roentgenogram of Case 3 showing bilateral hilar adenopathy which proved to be Boeck's sarcoid after biopsy.
Physical examination in the majority of patients with lymphomas will reveal the presence of peripheral lymph node enlargement and biopsy of these nodes usually leads to a fairly large number of patients with mediastinal lymphadenopathy, cervical lymph node biopsy is not diagnostic, for in lymphomas as well as in benign lesions such as Boeck’s sarcoïd, tuberculosis, and histoplasmosis, enlarged peripheral lymph nodes on biopsy may show nonspecific hyperplasia and lead to an erroneous diagnosis. Elevation of the venous pressure in the upper extremity is usually assumed to be secondary to complete occlusion of the superior vena cava by an invading mediastinal neoplasm. The superior vena caval syndrome is frequently encountered in patients with advanced lymphosarcoma and Hodgkin’s disease of the mediastinum. Complete obstruction of the superior vena cava may occur in young individuals with chronic mediastinitis secondary to involvement of the mediastinal lymph nodes by histoplasmosis and tuberculosis, as well as on rare occasions by intrathoracic goiters. The presence of a superior vena cava syndrome does not always indicate the presence of malignancy in the mediastinum. The most frequent cause of such occlusion in the older age group is secondary to mediastinal involvement by a bronchogenic carcinoma.

Skin sensitivity tests for histoplasmosis and tuberculosis have been of some help in the differential diagnosis of mediastinal lymphadenopathy. It is generally agreed that negative skin tests to histoplasmosis and tuberculosis in a patient with diffuse involvement of the lung or mediastinal lymphadenopathy is strong suggestive evidence for the presence of Boeck’s sarcoïd. However, with decreased incidence of tuberculosis and the absence of evidence of histoplasmosis in large areas of this country, negative tuberculin and histoplasm skin reactions under these conditions do not necessarily indicate the diagnosis of Boeck’s sarcoïd in the presence of mediastinal lymphadenopathy.

Laboratory examination of the peripheral blood and bone marrow by standard and supervilal tests will in most cases and Hodgkin’s disease reveal changes diagnostic of these conditions. However, in early cases of lymphosarcoma, frequently limited to the mediastinum, such peripheral blood and bone marrow studies are frequently negative. In Boeck’s sarcoïd the peripheral blood picture is normal, however, bone marrow studies may show the presence of atypical monocytes. These cells have on occasion been confused with abnormal cells of lymphomas.

Special x-ray studies in addition to the routine anteroposterior chest projection may occasionally be of help in differentiating the various malignancies of the mediastinum. Lymphadenopathy of malignant and benign origin as such cannot be differentiated by this method, and very little is added by such studies as laminography, bronchography, an fluoroscopy except to pinpoint definitely the intrathoracic density to hilar and mediastinal lymph nodes as against bronchial, esophageal, or pulmonary locations. Contrast studies of the esophagus and bronchus are quite helpful in that intraluminal obstruction by neoplasms can be differentiated from the deformity produced by enlarged periluminal lymph nodes. The presence or absence of calcification in itself is of little value since malignant lymphosarcomas may occur in or adjacent to tuberculous and histoplasm nodes. Bacterial studies in the absence of pulmonary lesions are nonproductive in patients with mediastinal lymphadenopathy. Supravilicular lymph node biopsy, although quite rewarding in patients with Boeck’s sarcoïd and bronchogenic carcinoma, will frequently be negative. An accurate diagnosis of mediastinal malignancy occasionally requires thoraectomy and removal of a representative lymph node from the peribronchial or mediastinal area.

Review of our series of 20 patients indicates that a diagnosis of malignant mediastinal lymphoma must be based on the microscopic section of a representative intrathoracic lymph node prior to institution of any type of therapy. A thoraectomy and direct biopsy makes a diagnosis simple and accurate without delay in time and should be a part of the diagnostic armamentarium of everyone dealing with this particular problem. A standard large thoraectomy incision is not necessary since the exposure is made only for the removal of a specific lymph node, these nodes being removed without difficulty in most instances. A large posterior thoraectomy is associated in itself with a blood loss of some 500 cc. and for this reason we have used a limited small posterolateral or posterior thoraectomy without removal of ribs.

In the anterior thoraectomy approach, a small “hockey stick” shaped incision is made parallel with the clavicula and sternum margin, the pectoralis major muscle is split, and the second or third intercostal space exposed. The intercostal muscles are cut and one or two costochondral junctions are divided if necessary for adequate exposure. The mediastinum is entered and either an entire or piece of lymph node is obtained. The advantages of this approach requiring no intubation, operating time averaging 30 minutes, little blood loss, reduced postoperative pain and discomfort, and brief convalescence. The disadvantages of this incision are poor cosmetic results in women, poor exposure in the event of technical difficulties, and inability to expose adequately the posterior mediastinum. The posterolateral incision can be confined to an 8 to 10 centimeter length, can easily be extended in case resection of the tumor is possible, and offers better exposure of the mediastinum. The disadvantages of the posterolateral incision are greater postoperative pain, longer operating time, lateral position on the operating table, and necessity for intubating the patient.
There was no operative death in our 20 patients. A correct diagnosis was established in all cases, and proper therapy was begun before these patients were discharged from the hospital.

SUMMARY

Twenty patients with a presumptive diagnosis of malignant lymphoma of the mediastinum were observed in a 10 year period. In the absence of cytologic proof of malignant lymphoma, a limited thoracotomy for the removal of a representative mediastinal lymph node was performed.

In only seven patients was the diagnosis of malignant lymphoma proved to be correct, while 13 were found to have benign lesions.

RESUMEN

Se observaron siete enfermos con el diagnóstico de presunción de linfoma maligno del mediastino durante 10 años. A falta de prueba citológica del linfoma maligno, se hizo una toracotomía para quitar un ganglio mediastínico representativo de la enfermedad.

Sólo en siete enfermos el diagnóstico de linfoma maligno fué correcto, en tanto que en los 13 restantes se trataba de formaciones benignas.

RESUMÉ

20 malades atteints, selon le diagnostic présumé, de lymphome malin du médiastin, furent observés pendant une période de 10 ans. En l’absence de preuve cytologique de lymphome malin, une thoracotomie limitée pour l’exérèse d’un ganglion médiastinal caractéristique fut pratiquée.

Ches 7 malades seulement, le diagnostic de lymphome malin fut mit en évidence, tandis que 13 furent trouvés porteurs de lésions bénignes.

ZUSAMMENFASSUNG


Nur bei sieben Patienten erwies sich die Diagnose eines malignen Lymphoms als korrekt, wohingegen sich bei 13 Patienten gutartige Veränderungen fanden.

REFERENCES

7 Personal Communication, B. K. Wiseman.