FOLLICULAR LYMPHOBLASTOMA
A Report of Six Cases

By OVID O. MEYER, M.D.

FOLLICULAR lymphoblastoma has been a subject of considerable interest since 1925 when Brill, Baehr, and Rosenthal reported the 2 cases which made the medical profession really cognizant of this entity. They called the condition generalized giant lymph follicle hyperplasia of lymph nodes and spleen. Much earlier, in 1901, Becker had described a case which probably was this disease, and between 1912 and 1920 descriptions of a few additional cases were reported. In their original report Brill, Baehr, and Rosenthal concluded that the lymph node disease was probably benign, but in a subsequent report published two years later Baehr and Rosenthal concluded on the basis of six cases studied, that the condition was malignant. In the same year, however, Symmers described 3 cases on the basis of which he concluded that the condition was benign from the "standpoint of prognosis." In an extensive report published in 1938, Symmers, with the histologic picture, cases of giant follicle hyperplasia which later were transformed into polymorphous cell sarcoma of the lymph follicles; others which appeared to terminate as Hodgkin's disease, and still others which ended as "lymphatic" leukemia. He stated that giant follicular lymphadenopathy, with or without splenomegaly, was probably inflammatory or toxic in origin and usually amenable to mild roentgen therapy. In a communication published in 1946, he stated that he had seen 5 histologically proved cases in which roentgen therapy was followed by apparent cures for periods of 3, 4, 5, 9, and 12 years. Another patient survived nine years without any treatment. Baggenstoss and Heck, on the other hand, agree with the conclusion which Baehr, Klemperer, and Rosenthal had arrived at by 1931, namely that the disease is a form of lymphosarcoma which in its early stages presents the histologic picture of follicular hyperplasia but is later characterized by a conglomeration of the follicles and diffuse infiltration of the lymph nodes by polymorphous lymphoblasts. It was at this time that the term "follicular lymphoblastoma" was proposed. By 1940, Baggenstoss and Heck had collected 59 cases from the literature and 13 of their own, a total of 72. In 1941, Gall, Morrison, and Scott reviewed 63 cases from biopsy or necropsy material submitted to the laboratory of the Massachusetts General Hospital. Since publication of this report, more than 50 additional cases have been recorded through 1946. These include 15 cases with skin manifestations reported by Combes and Bluefarb. The present paper reports 6 additional cases.

The chief characteristics of follicular lymphoblastoma are outlined by Baehr, Klemperer, and Rosenthal. Enlargement of the lymph nodes is due to enormously enlarged lymph follicles, a single one of which may fill a low power microscopic field. The follicles resemble huge germinal centers consisting of lymphoblasts with
frequent mitotic figures. The periphery of each large follicle is surrounded by a narrow zone of small lymphocytes whose nuclei stain darker. The splenomegaly may be enormous as a result, chiefly, of enlargement of Malpighian bodies. There are no abnormal cells in the blood. Nor is anemia and cachexia present until the end stages of the disease. There is a tendency to lymphatic infiltration in the lacrimal gland, which gives rise to unilateral exophthalmus, and there is a tendency to involvement of serous membrane with pleural or peritoneal serous or even chylous effusion. The disease is remarkable for its chronicity and its extreme radiosensitivity. No neoplastic disease responds more promptly to relatively small doses of roentgen or radium therapy. Recurrences in widely separated parts of the body usually take place after varying intervals until eventually, often after many years, there is radioresistance.

The present report is of 6 cases seen at the State of Wisconsin General Hospital since 1941. Two, cases 2 and 6, were of particular interest because of bone involvement. Three of the patients were women, 3 were men. The ages were 54, 45, 44, 61, 82, and 60 respectively.

Case Reports

Case I. L.M.M., age 54, a white farm housewife, was admitted September 3, 1941. She complained that for six months she had been afflicted with shortness of breath and a cough. In the spring of 1941, she noted a painless swelling of the right side of the neck. She saw a physician on July 3 and was hospitalized. A left pleural effusion was demonstrated, and thoracentesis was performed on three occasions, each of which was followed by temporary relief of dyspnea.

Examination showed an obese white woman, able to sit up in bed. The trachea was deviated to the right. There were 2 cm. nodes in the right cervical region, several 1 cm. nodes in the left posterior cervical chain, and a healed surgical scar of biopsy on the right. The nodes were freely movable, nontender, and without induration. No other enlargement of lymph nodes was demonstrated. There were signs of a massive fluid accumulation in the left thorax. The blood pressure was 170/90. The liver extended 3 cm., the spleen 8 cm. below the costal margin.

Laboratory studies showed a hemoglobin of 14.5 Gm. (90 per cent); erythrocytes 3,950,000; leukocytes 5,500; neutrophiles 64; lymphocytes 32 per cent; monocytes 1; eosinophiles 1 per cent. Blood Wassermann was negative. A roentgenogram of the chest as read by Dr. L. W. Paul showed massive left-sided opacity, presumably due to pleural effusion. Bucky film after aspiration of fluid did not demonstrate enlargement of mediastinal nodes. The tuberculin test was negative.

Thoracentesis on three successive days resulted in the withdrawal of 1500 cc. of chylous fluid on each occasion. No organisms were found in the fluid, and it was negative for acid-fast bacilli. The specific gravity was 1.025, and albumen 1 per cent; there were many red blood cells. Biopsy of a node from the right cervical region on September 6, 1941, showed the findings of follicular lymphoblastoma.

The patient received eight treatments of 150-r to 100-r each in air (H.V.L. = 1.05 mm. distance 10 cm.) between September 8 and 13, 1941, and she went home. In October she returned to the outpatient department. Earlier in the month she had required a thoracentesis. There had been no gain in weight, but she felt better. Her cough, however, and the signs of a small fluid accumulation in the left pleural cavity persisted. There were no palpable lymph nodes; the spleen was about 6 cm. below the costal margin.

On January 8, 1942, the patient reported a ravenous appetite, an 8 pound gain in weight, and for three weeks recurrent backache in the mid-lumbar region which was severe enough to cause much loss of sleep. The cough had disappeared. Examination showed tiny cervical and axillary nodes. The spleen was 2-3 cm. below the costal margin. There was muscle spasm and tenderness in the right lumbar region. A roentgenogram of the lumbar spine was negative for bone or joint disease. Three treatments of 150-r each were given to the spine. Subsequently, after the patient had returned home, massage and diathermy were administered, since the pain persisted.
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She was readmitted to the hospital on April 27, 1942, suffering torturing pain in the back and down into the legs. She had increasing difficulty in walking and loss of control of the bladder and bowels.

Physical examination at this time revealed signs of a moderate accumulation of fluid in the left pleural cavity; the spleen was just palpable, and there was no enlargement of the lymph nodes. The patient could no longer move the lower extremities, the deep reflexes had ceased, and the vibratory sense and position sense were absent. There appeared to be deformity of the 8th thoracic vertebra.

Laboratory studies showed the hemoglobin to be 11.4 Gm. (70 per cent), leukocytes 4,500 with 76 per cent neutrophiles. A roentgenogram of the dorsal and lumbar spine showed no definite bone lesions.

It was believed that the patient had a lesion compressing the cord, and five treatments totaling 1100-r in air (H.V.L. = 1.05 mm. distance 50 cm.) were administered to the dorsal and lumbar regions. She returned to the hospital for the last time on July 9, 1942. Her condition has not improved; ten days before, her legs had become slightly flexed at the hips and knees and it was almost impossible to move them.

There was anesthesia in both legs, due to apparent sacral segment lesion, and in the right leg it extended to lumbar 4. Deep reflexes were absent. Roentgenograms of the dorsal and lumbar spine were negative. The laboratory studies were not significantly different from those made in April. Six treatments of 400-r each in air (H.V.L. = 1.4 mm. distance 60 cm.) were administered to the dorso-lumbar spine between July 1 and 7, 1942, and the patient was discharged. She died at home about two months later and autopsy was not obtained.
Comment: Involvement of the pleura with effusion was prominent in this patient. The unproved but apparent involvement of the spinal cord was unusual. The course was rapid, death occurring within 18 months of onset of the lymph node enlargement.

Case 2. C.A.J., age 45, an American housewife of Dutch descent, was admitted on May 13, 1946, complaining of pain in the left leg. Her illness had begun three years before with episodes of gaseous distension, nausea, and diarrhea. Several months later she noted enlargement of nodes in the inguinal regions, enlargement of the abdomen, and then the presence of "lumps" in the neck and axillae. Biopsy was made and x-ray therapy given. The nodes disappeared. A few months later she complained of pains in the arms, legs, and lower abdomen. These gradually decreased without specific therapy. After this she had been able to do hard work until two months before admission when she again suffered pain in the left leg and lower back.

Physical examination showed a well-developed, well-nourished, though pallid woman. The largest of a few palpable nodes, 2 cm. in diameter, was in the right axilla. The liver and spleen were not palpable.

Laboratory studies showed 4 plus glucose in the urine, hemoglobin 11 Gm. (70 per cent); erythrocytes 3,415,000; leukocytes 2,700 with neutrophiles 69; eosinophiles 0.6; small lymphocytes 7; atypical lymphocytes 2.6; intermediate and large lymphocytes 3.4; young lymphocytes 5; monocytes 1.1; metamyelocytes 0.8; neutrophilic myelocytes 0.1 per cent. Reticulocytes numbered 1.4 per cent. The volume of the individual cell was 94.2 microns. A roentgenogram of the chest showed no enlargement of mediastinal nodes. The roentgenogram of the pelvis as read by Dr. L. W. Paul showed areas of increased density in the ischial rami, particularly on the left side, with a suggestion of a little mottling in the upper ends of the femurs. These changes were thought by Dr. Paul to be consistent with early involvement of these bones by a lymphoblastoma.

Biopsy of an axillary lymph node was performed, the description of Dr. Walter Jaeschke being as follows: "This moderately enlarged node has a moist grey medullary appearance on cut section. Throughout, there are giant follicles separated by a lymphoid stroma. In the stroma, there are numerous eosinophiles. Reed-Sternberg cells are not identified. Diagnosis: giant follicle lymphoblastoma."

The patient received 600 r in air of high voltage roentgen therapy (H.V.L. cu. = 1.05 mm. distance 50 cm.) to the right and left axilla and a similar dosage to the anterior and posterior pelvis. She was discharged on May 22, 1946. Her local physician reports that the patient died in July, 1946.

Comment: This patient, who had symptoms for three years before coming under our observation, had definite anemia by this time. There is in the literature little to suggest involvement of bone with follicular lymphoblastoma, but since it is common in other types of lymphoblastoma, its occurrence in 2 of the 6 cases here described is probably not surprising.

Case 3. E.R.H., a 44-year-old white male, was first admitted to the Wisconsin General Hospital on April 18, 1942, complaining chiefly of "lumps on the head and left side of the neck." He had had an enlarged node behind the right ear as long as he could remember. About nine months before admission, he had first noted three small "lumps" on the right side of the head. These slowly increased in size, and a week before admission another "lump" appeared on the left side of the head. A biopsy of a node from the scalp showed hyperplastic follicles. He had lost 22 pounds in weight.

Physical examination showed this patient to be a well-developed, well-nourished man of good color. On the right side of the head were three firm, but movable, masses measuring 2 x 3 to 2 x 4 cm. On the left side, also in the region of the scalp was a single smaller node, and in the left submaxillary region was a firm node measuring 3 x 5 cm. In the neck were several smaller nodes and there were also small nodes in the right postauricular, the axillary, epitrochlear, and inguinal regions. Blood pressure was 120 systolic, 120 diastolic. The liver extended 3 cm., the spleen 2 cm. below the costal margin on deep inspiration.

Laboratory studies showed a hemoglobin of 15.9 Gm. (100 per cent); erythrocytes 4,180,000; leukocytes 8,600 with neutrophiles 76 per cent; lymphocytes 13 per cent; eosinophiles 1 per cent. Blood
Wassermann was negative. The basal metabolic rate was plus 37. Roentgenograms of the chest showed cardiac enlargement. X-ray of the skull was negative. Biopsy of the node in the left submandibular region was interpreted by Dr. W. D. Stovall as giant folliculoma (follicular lymphoblastoma).

The patient was discharged on May 5, 1947, to report to the outpatient department for roentgen therapy. He has been seen repeatedly in the outpatient department and has twice been readmitted to the hospital, in May, 1943, and on January 13, 1945, at which time he complained of dyspnea, orthopnea, precordial pain, and cardiac arrhythmia. For five months he had been hoarse and for a week had noted enlargement of the spleen with pain in this region. The right side of the neck was swollen.
The patient was apprehensive. There was general superficial enlargement of the lymph nodes, several small nodules scattered in the subcutaneous tissue, signs of bilateral intrapleural fluid. The liver extended 6-8 cm. below the costal margin, and the spleen was palpated 16 cm. below the costal margin. The blood pressure was 185 systolic, 110 diastolic.

Laboratory studies included a urinalysis with 5 to 10 casts per low-power field, specific gravity 1.016. The blood count was still essentially normal. A roentgenogram of the abdomen showed enlargement of the spleen and liver. An x-ray of the chest showed the presence of fluid bilaterally. There was also moderate enlargement of the mediastinal nodes.

It was thought that much of the symptomatology and the pleural effusion were attributable to the cardiac disease rather than to the lymphoblastoma. However, the patient received treatments of 150 r each in air (H.V.L. cu. = 1.0 mm. distance 50 cm.) distributed to the spleen, right cervical, and mediastinal regions. He was discharged January 25, 1945. On April 15 of that year, his physician reports the patient died of "cardiovascular renal syndrome."

**Comment:** The duration of this case of lymphoblastoma could not be ascertained but seemingly it was long if the original "lumps" are significant. If not, then the course was short, death resulting from the cardiac and renal failure induced by the severe and persistent hypertension. Pleural effusion is common in follicular lymphoblastoma, but here it was thought to be cardiac rather than lymphomatous in origin.

**Case 4.** Mrs. J. H., age 61, the wife of a missionary to China for many years, visited the outpatient department on March 5, 1946, with the complaint of a lump in the right groin. Sixteen years before, while in China, her left eye had been removed for what was found to be a malignant tumor of unknown type. On July 24, 1941, 32 cm. of rectum and sigmoid were removed and a colostomy performed for a neoplasm which was localized and found to be an adenocarcinoma. On May 17, 1943, a tumor in the left inguinal region was removed. A microscopic study of this lymph node showed greatly enlarged lymph follicles with some confluence. The individual cells making up these follicles possessed a curious pleomorphism. They invaded the capsule and the surrounding fat. The diagnosis was "malignant lymphoblastoma." A preauricular lymph node which had become enlarged in 1943 disappeared completely following high voltage roentgen therapy. Late in February, 1945, a growth on the hard palate was resected. Sections showed fibrous tissue moderately infiltrated with lymphocytes, a few plasma cells, eosinophiles, and occasional polymuclear neutrophiles. There were no Reed-Sternberg cells. The interpretation was chronic granulomatous inflammation. On April 3, 1945, a tumor was removed from the region of the right scalenus muscle; sections as studied by Dr. S. B. Pessin showed a distorted lymph gland with the normal architecture completely destroyed. The predominant cells were large and medium-sized lymphocytes, containing a vesicular nucleus with one or two distinct nucleoli. There was a small amount of fibrosis in some areas and considerable delicate reticulum. Occasional mitotic figures were seen. The diagnosis was reticulum cell lymphosarcoma.

Early in November, 1945, the patient noted a lump in the right groin which brought her to the State of Wisconsin General Hospital on March 6, 1946. Eight days later, the node from the right groin was removed and at the same time a 3 cm. node from the thyroid was excised. General examination at this time showed no other lymph node enlargement nor enlargement of the spleen and liver. There was no anemia; the total leukocyte count was 4,300 with a normal differential count. The section from the thyroid showed closely spaced giant follicles, but some fusion of follicles had taken place so that the picture resembled a fully developed reticulum cell lymphosarcoma. The diagnosis of Dr. Walter Jaeschke was follicular lymphoblastoma.

The patient has remained well to date and her case has been followed in the outpatient department.

**Comment:** This is a rather amazing case with the evidence, quite reasonably substantiated, of multiple malignancies. The reports of the several lymph-node studies might well leave one confused, and perhaps the pathological findings were
not the same in the original studies as in the last. This emphasizes, it seems, the close relationship between follicular lymphoblastoma and other malignant disease (lymphosarcoma). The last biopsy was sufficiently characteristic to justify the inclusion of the case in this series.

Case 5. J.G. This patient, a white male of 82, was admitted to the State of Wisconsin General Hospital on April 24, 1945. He had an enlarged right tonsil, which had first been noticeable four months before and had been progressively growing. There was no pain nor bleeding, and although the patient was conscious of the mass, it caused no real difficulty in eating.

The patient was very deaf and almost blind. The teeth were very carious. The enlarged right tonsil protruded well into the midline and filled half the throat. The mass was irregular, hard, and nontender. There was no enlargement of the lymph nodes, nor of the spleen and liver.

The blood count showed a hemoglobin of 11.6 Gm. (70 per cent); erythrocytes 3,600,000; the leukocyte count was normal. A roentgenogram of the chest showed no enlargement of mediastinal nodes.

The tonsils were removed surgically. The left was fibrous. The right tonsil was 4 x 2.3 x 2 cm. There was loss of usual architecture, although a number of large giant follicles could faintly be made out. Throughout the sections there were occasional endothelial cells, numerous small round cells closely resembling lymphocytes, and occasional mitotic figures. The interpretation of Dr. W. D. Stovall was follicular lymphoblastoma. The patient died of bronchopneumonia six days after the operation. Post-mortem examination was not permitted.

Comment: The disease in this instance involved, so far as could be determined, only the tonsil. Baehr, Klemperer, and Rosenthal observed that in their cases the tonsils and lymphatic apparatus of the gastrointestinal tract had not been involved. Baggenstoss and Heck report 2 cases with tonsillar involvement and two other reports describe nasopharyngeal tumors with the histologic picture of follicular lymphoblastoma in which neither the lymph nodes nor spleen were grossly involved. Tonsillar involvement with other types of lymphosarcoma is by no means rare.

Case 6. S.W., a male Chippewa Indian 60 years old, was admitted to the Wisconsin General Hospital on April 29, 1943, complaining chiefly of weakness. He had been in good health until six weeks previously, when he began to suffer from weakness which became progressive. Four weeks before admission, he had gone to his local doctor, and a week later he noted swelling of the penis and scrotum which progressed. Three days before admission he developed swelling of the left leg. In response to questioning he revealed that for two years he had noted enlarged nodes in the left inguinal region and similar nodes on the right for four or five months. During the past six weeks, nodes in the axillary and cervical region and an abdominal mass became apparent. There had been a nonproductive cough, and for seven weeks intermittent tarry stools. The patient had had pleurisy at the age of 21.

Physical examination showed a moderately well-nourished man. Scattered in the cervical, supraclavicular, and axillary regions were moderately firm, discrete nodes 1 to 2 cm. in size, and there was a tiny left epitrochlear node. There were similar nodes, 2 to 3 cm. in diameter, in the inguinal regions, and a large firm mass filled most of the left side of the abdomen. Expansion of the left lung was limited, and there was dullness at the left base. The liver and spleen were not palpable. The penis, scrotum, left lower extremity to the mid-thigh, and the right foot were moderately edematous.

Laboratory studies showed a hemoglobin of 13.3 Gm. (80 per cent); erythrocytes 4,250,000, leukocytes 6,700 with neutrophiles 64 per cent; lymphocytes 19 per cent, monocytes 1 per cent; and eosinophiles 5 per cent. Blood Wassermann was negative; Hanger’s cephalin-cholesterol flocculation test was negative. Roentgenogram of the chest showed atelectasis at the left apex with displacement of the trachea to the left. There was extensive fibrosis and some calcification of the pleura with a small left pleural effusion.

* The biopsy section of April 3, 1945, has been reviewed and the diagnosis of reticulim cell lymphosarcoma confirmed.
creased destruction of the cortex in the distal portion of the femur. Biopsy of a right epitrochlear node showed no evidence of recurrence of the mediastinal mass. X-ray of the right femur showed in-

The mediastinal shadow was widened, and radiating areas of infiltration extended into the field of the lower left lung. X-ray of the colon following barium enema showed marked narrowing of the sigmoid apparently due to an extrinsic mass. Gastrointestinal roentgenograms showed that the esophagus deviated sharply to the left in its upper portion and that the trachea was displaced in consequence of the fibrotic and calcified pleura of the left apex. The stomach was displaced upward because of abdominal masses and fluid. The duodenal loop was large and rounded, probably as a result of a mass of nodes about the head of the pancreas. Biopsies were done of an inguinal node, of an epitrochlear node, and later of an axillary node. Large hyperplastic follicles were noted, which almost crowded out the pulp lymphocytes.

Dr. W. D. Stovall interpreted these nodes as malignant giant folliculoma (follicular lymphoblastoma).

The patient, after a period of twenty essentially afebrile days in the hospital during which time he received eight treatments of 300-r each of roentgen therapy (H.V.L. cu. = 1.4 mm., distance 50 cm.) to the anterior and posterior mid-abdomen, was discharged on May 19. He had been seen in the hospital and in the outpatient department at intervals of about three months to December 11, 1946, his hospital admissions totaling ten. He had continued to have quite general enlargement of the lymph nodes, and on his second admission the spleen and liver were enlarged. At times superficial nodes were as great as 5 to 6 cm. in diameter. Roentgen therapy to various sites had been given with each admission. On several occasions, abdominal paracentesis, resulting in the removal of as much as 3,000 cc. of creamy, foul-smelling fluid, was done. Temporary improvement followed each course of therapy. In August, 1945, when he was admitted for the seventh time, he complained of having suffered shooting pains in the legs for ten days, making it impossible to walk. For four days previously, he had walked dragging his feet. He could move his toes slightly. Examination at this time showed scattered superficial nodes 1.5 to 3 cm. in diameter, persistence of pulmonary changes, and marked weakness of the legs, though he could move them a little in bed. The knee jerks were present, but Achilles reflexes and abdominal reflexes were absent. Babinski and confirmatory signs were present bilaterally. There was tenderness over the spine at the level of the sixth and seventh dorsal vertebrae. Spinal tap was done and there was evidence of block.

Laboratory studies showed a hemoglobin of 10.7 Gm. (69 per cent); erythrocytes 3,030,000; lymphocytes 4,340 with a relative lymphocytosis. Spinal fluid showed a negative serology, gold sol 0.0133-0.0100; no cells; sugar 63 mg.; protein 415 mg. per 100 cc. of blood. X-ray of the spine showed no alteration in the vertebra, but roentgenogram of the chest showed distinct increase in the mediastinal mass with metastatic nodules in the right pleura. The patient received four roentgenographic treatments of 300-r each to the anterior and posterior mediastinum and was discharged as improved. He gradually regained some strength in his legs but in October, 1945, was still unable to walk. On this admission the hemoglobin was 8.2 Gm. (50 per cent); erythrocytes 3,550,000. The chest x-ray showed a marked decrease in the width of the mediastinal mass but an increase in the size and number of the metastatic nodules on the field of the right lung. Further roentgenotherapy was administered to the mediastinum.

The patient was next admitted on August 1, 1946, complaining of pain and weakness about the right knee and in the right leg which was relieved by rest. He was thin and pallid. There were scattered enlarged lymph nodes 1 to 4 cm. in diameter. There was a 3 x 3 cm. tender nodule on the medial side of the right femur just about the knee. Roentgenogram of the right femur at the junction of the middle and lower thirds showed an osteolytic lesion involving the shaft of the femur for a distance of 7 to 8 cm. A large central rarefaction extended almost through the cortex laterally, and there were a number of smaller rarefactions which were intercommunicating. Pathologic fracture was thought to be imminent. The patient was placed in a hip spica cast and seven treatments of 150-r each of roentgen therapy (H.V.L. cu. = 1.05 mm. to 1.60 mm., distance 50 cm.) were administered to the femur through a window in the cast. As the right testis was enlarged, irregular, and hard, and was believed to be involved by tumor, a small amount of therapy was directed to it, also.

The patient next entered the hospital on November 26, 1947. The pain in the right lower extremity persisted but was less severe and less constant. The patient was thin and pallid. A few superficial nodes were palpable. There was tenderness of the left fifth rib. The cast was still in place on the right lower extremity. Hemoglobin at this time was 11.3 Gm. (70 per cent); erythrocytes 4,330,000; leukocyte count 2,650 with 56 per cent neutrophiles and 8 per cent eosinophiles. The basal metabolic rate was plus 13 and plus 15. Serum proteins were albumin 4.9 Gm. and globulin 1.1 Gm. per 100 cc. Roentgenogram of the chest showed no evidence of recurrence of the mediastinal mass. X-ray of the right femur showed increased destruction of the cortex in the distal portion of the femur. Biopsy of a right epitrochlear node...
which was made on December 3 showed the outlines of giant follicles (three and a half years after the inguinal biopsy) which were interpreted by Dr. Walter Jaeschke as follicular lymphoblastoma. After five treatments of 100 r each in air (H.V.L. cu. = 1.4 mm., distance 50 cm.) to the femur through a window in the cast, the patient was discharged. The last admission was April 17, 1947. The patient at this time was emaciated. Biopsy of the bone lesion showed several small cellular foci composed of closely packed small cells, apparently lymphocytes. There were no follicles. The interpretation of Dr. Walter Jaeschke was necrotic lymphoid tissue.

The patient died April 25, 1947. The autopsy was done by Dr. John W. Harman of the Department of Pathology, and he reported that the autopsy demonstrated a large, firm, diffuse, greyish-white retroperitoneal mass which included both adrenal glands, infiltrated the pancreas, was attached to the undersurface of the liver and surrounded and constricted the pelvi-ureteric junction of the left kidney. There were several discrete nodules of similar tissue in the liver (see fig. 4). The only enlarged lymph nodes seen were the left epitrochlear and right external iliac. The spleen weighed 150 Gm. Microscopically the
Follicular lymphoma was found in the retroperitoneal mass, liver nodules, and enlarged lymph nodes. The large follicles were widely separated by diffuse areas of small lymphocytes and were composed of similar cells themselves. By reticular stain, the follicular structure was accentuated; each follicle was surrounded by a zone of compressed reticulin fibers. In all sections, the cell type was almost exclusively small lymphocytic; only rare clastocytes were seen. The splenic structure was normal; the follicles were few, small, and widely separated by the pulp. Diagnosis: "malignant follicular lymphoma."

Comment: A male Indian with follicular lymphoblastoma which may have begun in 1941 and was diagnosed in 1943, evidencing widespread disease with probable involvement of the spinal cord and definite involvement of bone with resultant destruction. The architecture of the lymph nodes had changed, but some char-
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The characteristics of follicular lymphoblastoma persisted in the biopsy done in December, 1946, although the patient's condition was poor and the disease far advanced. The development of a bone disease such as this strongly suggests that we are dealing with a malignant tumor such as a lymphosarcoma. Finally, at autopsy, four years after onset of the illness, there was still the characteristic pathologic change of the follicular lymphoblastoma.

DISCUSSION

The six cases herein described represent varying symptomatic states dependent upon varying sites of the lesions and emphasize the protean manifestation of follicular lymphoblastoma. Two cases, No. 5 and No. 6, present previously rarely reported or unrecorded lesions.

Analysis of these cases tends to confirm observations made by Baehr, Klemperer, and Rosenthal and by Baggenstoss and Heck. The disease tends to, but does not invariably, pursue a relatively slow course. The onset is ordinarily insidious. Pleural effusion was prominent, occurring in 3 of the 6 cases. Ascites was demonstrated in case No. 6. Hypochromic anemia was almost invariably present, when the patient was seen late, rarely so if seen early. The leukocyte counts showed nothing characteristic early or late. Cachexia was unusual until late in the disease. This is quite characteristic of other types of lymphosarcoma, however, whereas anemia appears relatively early in Hodgkin's disease. The course in those of our cases followed for long periods certainly suggests that one is dealing with a neoplastic process, malignant in character. Bone destruction, prominent in one case, No. 6, and involvement present in another, No. 2, further suggests the malignant character of follicular lymphoblastoma. In a word, our observations, although not extensive, tend to confirm the conclusion of Baehr, Klemperer, and Rosenthal and Baggenstoss and Heck that this is a form of lymphosarcoma, and that, although readily amenable to roentgen therapy it is not ordinarily curable by this type of therapy, as has been suggested.

This series does not enable one to form an opinion as to the duration of the disease, but general opinion holds that the course is slower than with the other forms of lymphosarcoma. Of our cases, No. 6 has been ill for four years and may have had lymph node involvement for six years. Case No. 1, whom we observed from early in her course to almost the end, survived about eighteen months. Baggenstoss and Heck have discussed well the pathologic differentiation of follicular lymphoblastoma and lymph node hyperplasia of inflammation and our observations add nothing in this regard. Evans has listed the pathologic differences of lymphadenitis of secondary syphilis and follicular lymphoblastoma.

CONCLUSIONS

Six cases of follicular lymphoblastoma are here reported. They demonstrate a variety of pathologic lesions with a characteristic histologic picture with variable symptoms and signs. Tonsillar involvement was unique as the sole demonstrable lesion in one. Bone involvement occurred in two.
Study of these 6 cases leads us to believe that we are dealing with a clinical and pathologic entity and a malignant tumor, one which is usually highly sensitive to roentgen therapy, but ordinarily recurrent and progressive.

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