PROBABLE HODGKIN'S DISEASE IN A DOG: REPORT OF A CASE

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Hodgkin's disease is not infrequently seen in man, but there have been few reports of cases in which it has been found to affect animals. McFadyean in 1903 reported four cases of the disease in dogs and one in a hog, and Hodgson in the same year reported one case in a hog. From the descriptions of the condition in these cases it is probable that they were not true Hodgkin's dis-

![Image](image_url)

**FIG. 1. RELATION OF ABDOMINAL MASS TO THE PANCREAS AND SURROUNDING STRUCTURES**

ease but perhaps same variety of lymphoblastoma. MacMahon in 1934 reported the case of a dog which he considered had Hodgkin's disease. This animal had a large, firm nodular swelling of the right cervical lymph nodes. Necropsy did not reveal any additional pathologic changes. Histologically MacMahon considered the tumor to have the characteristics of Hodgkin's disease.

**REPORT OF A CASE**

A four-year-old male shepherd dog was brought to one of us (Schlotthauer) because of a gradual but progressive, symmetrical enlargement of the abdomen of one month's duration. There had been associated anorexia with severe nausea and vomiting for one week prior to examination. The dog was thought by his owner to have an intestinal obstruction and repeated enemas had been given, without apparent benefit. When the animal was first

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seen, it was stuporous, semi-conscious and was considered to be in a dying state. Constant nausea was present and on one or two occasions small amounts of a dark foul-smelling liquid were vomited. The abdomen was tense and distended with fluid. The dog's physical condition was considered too poor for surgical intervention and it was killed by ether inhalation.

At necropsy the abdomen was found to be filled with approximately 3 liters of clear ascitic fluid. A large, firm, irregular but smooth, nodular grayish tumor appeared to involve the pancreas and the peripancreatic and mesenteric lymph nodes (Fig. 1). This was thought to have caused partial intestinal obstruction. All of the mesenteric lymph nodes were enlarged and firm. The liver was about twice the normal size, and the spleen was two or three times the normal size. Both organs were studded with numerous grayish miliary nodules (Fig. 2). The kidneys and other abdominal organs appeared normal. The apex of each lung was studded with superficial, small solid nodules not unlike those seen in the liver and spleen. The peribronchial and mediastinal lymph nodes were firm and enlarged three to four times. The heart was normal. There was no enlargement of the cervical or other peripheral lymph nodes. Grossly these lesions were thought to resemble Hodgkin's disease as seen in man, but such a diagnosis was not ventured because of the rarity of the condition in animals.

**Microscopic Findings**

Hematoxylin and eosin and Mallory-Heidenhain stained sections were prepared from representative tissue of the liver, spleen, abdominal mass, mesenteric lymph node, lung, and bone marrow. While the microscopic picture in each of these instances was essentially the same, it seems desirable to describe the lesions in these various situations separately.

**Liver:** The most striking alterations were those which occurred in the liver. Throughout the parenchyma of this organ were scattered multiple discrete foci of foreign tissue of the greatest dimensional variation (Fig. 3). This large amount of new tissue within the substance of the liver caused a marked reduction in the parenchyma. The majority of the foci were oval or circular, but in many areas they were irregular. The remaining parenchyma did not reveal any significant pathologic changes other than passive congestion.

Generally speaking these collections of foreign tissue had a neoplastic appearance. The
FIG. 3. MULTIPLE FOCI OF FOREIGN TISSUE IN LIVER. X 75

FIG. 4. SECTION OF LIVER, SHOWING MULTINUCLEATED GIANT CELL WITH SURROUNDING FIBROSIS AND ASSOCIATED CELLULAR REACTION. X 660
FIG. 5. SECTION OF LIVER SHOWING CELLULAR REACTION, WITH A MULTINUCLEATED CELL
RESEMBLING A DOROTHY REED GIANT CELL.  X 570

Note the large amount of reticular matrix.

FIG. 6. SECTION OF LIVER, SHOWING DIFFERENT VARIETIES OF CELLULAR ELEMENTS,
INCLUDING ONE MULTINUCLEATED FORM.  X 660
majority were extremely cellular in their make-up. In some areas, however, there was marked fibrosis, but in no instance was there fibrous encapsulation. Necrosis or related retrograde processes were not seen.

The lesions when viewed under a higher-power lens revealed enormous numbers of eosinophilic granulocytes, which constituted a major part of the cellular reaction. There were also present considerable numbers of rather pale-staining, reticulum- or epithelioid-like cells, variable numbers of lymphoid cells, and a few plasma cells (Fig. 4). Binucleated and multinucleated cells resembling the so-called Sternberg or Dorothy Reed giant cells associated with Hodgkin's disease in man were present (Figs. 5 and 6). The more cellular lesions revealed a delicate, but definite reticular matrix which contained numerous vascular channels of variable dimensions throughout. Fibrosis seemed to originate in the central portion of the lesion, and in many instances the peripheral portions remained highly cellular and progressive. A brownish-black to brownish-yellow granular pigment contained within unidentified cells was present throughout most of the lesions.

**Lung**: The lungs showed more or less diffuse pneumonitis with irregular and ill defined areas of consolidation (Fig. 7). In the consolidated areas there was complete obliteration of the normal histologic structure of the lung, the parenchyma having been replaced by a highly cellular tissue of the same general constituents as the foci in the liver, except that there were fewer eosinophilic granulocytes. Many of the cells had the appearance of immaturity, and in some of the lymphoid forms mitosis could be demonstrated. In addition to the so-called Dorothy Reed cells an occasional giant cell resembling the Langhans type was present (Fig. 8). Fibrotic changes, while evident, were not as apparent as in the lesions of
the liver and no demonstrable encapsulation of the respective foci was observed. The foci were expanding peripherally into the surrounding tissue of the lung.

**Spleen:** The spleen revealed a condition of general hyperplasia, which was particularly evident in the splenic nodules, and to a lesser degree in the pulp tissues. A typical splenic nodule disclosed a compact accumulation of reticulum or epithelioid cells, large numbers of eosinophilic granulocytes, lymphoid cells, and large mononuclear and binucleated cells similar to those observed in the liver and lung. Plasma-cell forms were rather numerous in certain regions. Mitosis was observed infrequently. A fibrous stroma was constant, although dense fibrosis was not present. In a few instances the cellular process had invaded the trabeculae (Fig. 9). There was no penetration of the splenic capsule by the proliferative tissue, although in a few instances the capsule was thinned by the activity of the underlying cells. The pulp spaces were markedly altered owing to excessive numbers of cellular elements of the same character as observed in the splenic nodules. Giant cells of the Langhans type were not noted in the spleen.

**Abdominal Mass:** The excessive amount of fibrosis evident in the abdominal mass suggested a non-specific type of infection of considerable chronicity. This was particularly true of certain portions where the continuity of the fibrous tissue was interrupted in a few areas by cellular foci. The cells of these foci were predominantly acidophilic granulocytes, and relatively few pale-staining epithelioid-like forms were present. In less cellular areas were packets and irregular clumps of pale-staining cells with a vesiculated nucleoplasm and a few eosinophils.

There were large diffuse collections of cells in other portions of the mass in which fibrosis was not as advanced. The predominant cell was definitely polymorphonuclear, although many eosinophils were also present. The picture was in general that of a chronic purulent type of infection. Epithelioid-like forms and occasional large mononuclear cells, with slightly vacuolated nucleoplasm, were also observed. Polynucleated giant cells or giant cells of the Langhans type were not seen. A fibrous matrix, with a moderate number of vascular channels distributed throughout, was seen.

![Fig. 8. Cellular Reaction in Lung, with a Giant Cell Resembling the Langhans Type. X 660](image-url)
FIG. 9. SECTION OF SPLEEN SHOWING INVASION OF A TRABECULA BY THE CELLULAR PROCESS. × 150

FIG. 10. SECTION OF MESENTERIC LYMPH NODE SHOWING REPLACEMENT BY DENSE FIBROUS TISSUE AND ATROPHIC CELLULAR ELEMENTS. × 660
Mesenteric Lymph Nodes: The normal structure of the lymph node was entirely absent, the lymphoid elements having been replaced by a rather compact, dense fibrous tissue in the meshes of which were considerable numbers of cells. Among these most of the forms present in the liver, lungs, and spleen could be identified (Fig. 10). Many of the cells were atrophic. The capsular structure remained intact and there was no evidence of the underlying process extending beyond the normal periphery of the node. Some of the larger vessels revealed perivascular infiltration by this cellular process, but invasion of the media was not observed.

Bone Marrow: There was pronounced hyperplasia of the myeloid tissue obtained from the left tibia and humerus. Most of the vascular spaces had been obliterated by the tremendous over-production of myeloid cells, the majority of which were eosinophilic granulocytes. Mitosis was rather common, but cellular changes, such as occurred in the liver, spleen, and lungs, were not observed.

Comment

We believe that all the essential criteria of Hodgkin's disease as seen in man are presented by the pathologic findings in this case. Certainly, if it cannot be called Hodgkin's disease, we are at a loss for a diagnosis. We have preferred to classify the condition, however, as an instance of probable Hodgkin's disease, because of the extreme rarity with which the condition has been observed in animals.

The pathologic picture in the abdominal mass was somewhat dissimilar to that seen in the other lesions. The terminal stage of Hodgkin's disease is complete fibrosis, although all stages of the disease may be found in the same case. It is highly probable that this tumor earlier presented the same picture seen in the other lesions; that the process then progressed to nearly complete fibrosis, and, as frequently occurs, became in part secondarily infected.

A study of the peripheral blood of the animal would have been of interest, but as the diagnosis was not suspected until after death, this was not possible.

Summary

A case of probable Hodgkin's disease affecting a dog has been described. Authentic cases of this disease in animals are extremely rare, but the gross and microscopic picture observed in this case exhibited all of the essential criteria of Hodgkin's disease in man.

Bibliography