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Canine Blastomycosis

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DEFINITION

Canine blastomycosis is a chronic disseminated or localized mycotic infection caused by Blastomyces dermatitidis. It is characterized by the formation of suppurative granulomatous lesions on any part of the body, but with a predilection for the skin, lungs, lymph nodes, and bones.

MORPHOLOGY

Blastomyces dermatitidis is a dimorphic fungus with a thick double contoured wall that reproduces by budding. At room temperature, the organism is in a mycelial phase. It is identified by large, spherical, thick walled yeast cells, forming figure eight patterns in affected tissues and exudates. Microscopically, the mycelia have oval to round conidia attached to the hyphae near septations. The average diameter of the forms found in tissues, pus, and exudates is 5–15 microns. In hematoxylin and eosin stained sections, the organisms usually are seen as a central granular mass surrounded by a refractile, double-contoured, unstained zone which is bounded by a thin outer wall.

INCIDENCE AND OCCURRENCE

In a survey conducted by Ramsey and Carter, among small animal practitioners and pathologists in various parts of the United States and Canada, the results would indicate that canine blastomycosis is a rare disease. However, reports collected from some areas would indicate that the disease in the dog is more prevalent than suspected.

Martin and Smith, found that up until 1939, 20% of all human cases reported in the United States were located in Illinois. In the dog, the disease has been reported from Illinois, Ohio, North Carolina, and Iowa. If the distribution of the canine disease parallels that of the disease in human beings in the United States, it should be found in most of the states bordering the Mississippi and Ohio Rivers and the Pacific and Atlantic Coast states.

Blastomycosis caused by Blastomyces dermatitidis is confined to North America, and the name, North American blastomycosis, has been applied to the disease to distinguish it from South American blastomycosis (Blastomyces brasiliensis) and European blastomycosis (Cryptococcus neoformans) in man and animals.

The disease has also been reported in the horse and sea lion.

CLINICAL SIGNS

Two clinical types of the disease are recognized: the systemic or generalized, and the cutaneous or the skin type.

In the systemic type, the infection usually occurs as a result of the entry of the organism by way of the respiratory tract. The infection is then disseminated throughout the body, particularly in connective tissue, bone, and skin. Often the disease appears slowly, insidiously, and
becomes widespread before the condition is suspected. Usually the course of the infection from the first indication of sickness to the termination has been several weeks to several months. There is a depression, continuous loss of weight, and a diminishing appetite. In terminal stages there may be a complete anorexia. There may be acute pneumonia at first, accompanied by a temperature rise of 103–105°F. At this stage, clinical differentiation from typical pneumonia may be difficult. There is usually a slight cough which increases in severity. There may be definite stenotic bronchial sounds at a point above the heart. Dehydration, nasal and ocular discharges, dyspnea, and multiple cutaneous abscesses may be apparent.

Radiograms often reveal masses located at the tracheal bifurcation. There is enlargement of the bronchial and mediastinal lymph nodes that often cause dyspnea, coughing, and displacement of the trachea. Occasionally, non-calcified nodules or consolidation of the lungs is evident.

The systemic form of blastomycosis occurs more frequently in animals than does the cutaneous form.

Cutaneous blastomycosis is characterized by multiple abscesses. These lesions occur mainly on the legs, between the toes, and behind the head. The skin lesions start as small papules. The papules soon give way to the formation of pustules or abscesses and these rupture to form ulcers. The pustules sometimes coalesce to form deep erosions with thickened walls. The contents of the abscesses are mucopurulent, thick, and yellow-grey in color. These abscesses often extend into the subcutaneous tissues and may metastasize to other parts of the body. These skin lesions may crust over slowly and spread to other areas by direct contact.

Lameness in one or more limbs is frequently observed and may be caused by mycotic arthritis or osteomyelitis. Occasionally, infected bone may become completely destroyed. In the involvement of limbs, stiffness of gait, swollen joints, and manifestations of pain are observed.

Secondary lesions which are detectable clinically are occasionally observed in the skin, eyes, mammary glands, and superficial lymph nodes. Miller described North American blastomycosis in a Scottish Sheep dog in which suppuration of the eye and prescapular and popliteal lymph nodes occurred.

**LESSONS**

The pulmonary lesions of blastomycosis are numerous, miliary and larger, grey-white nodules in all lobes of the lung. There may be nodular elevation of the pleura. The majority of the pulmonary nodules are firm granulation tissue. Some of them may coalesce and undergo central liquefaction or caseation, and then may fistulate into a bronchus or onto the pleura. The regional lymph nodes are commonly involved and contain granulomas, abscesses, or caseous foci. Calcification is usually absent.

Systemic blastomycotic infections of the skin can be described as multiple cutaneous or subcutaneous abscesses. These lesions originated as papules that soon became pustular with surrounding inflammatory reaction. These skin lesions are usually elevated from ¼ to 1 inch above the cutaneous surface of adjacent normal skin. The extension of abscesses into the subcutaneous tissues provides an avenue for the invasion of the lymphatic and blood streams with consequent metastases.

**DIAGNOSIS**

Diagnosis of blastomycosis may be obscure until terminal stages of the disease. A strongly presumptive diagnosis can be made on the basis of finding the organisms in smears or tissue sections. A positive diagnosis can be made only upon isolation and identification of *Blastomyces dermatitidis*.

Systemic blastomycosis must be differentiated from suppurative pneumonia, tuberculosis, neoplasms, osteomyelitis, pyemia, actinomycosis, and coccidioidomycosis. Cutaneous blastomycosis may simulate epithelioma or granulomata of the skin. To eliminate the above, it is only necessary to demonstrate the budding, thick-walled, yeast-like cells.

To the clinician the diagnosis may be based on history, clinical signs, radiogra-
phic evidence of calcified nodules, if present, enlarged bronchial or mediastinal lymph nodes, skin lesions, if present, and serologic tests. The Blastomycin Dermatitest can be used. To confirm the diagnosis, biopsy specimens, pus from abscesses, sputum samples and serum samples could be sent to a diagnostic laboratory.4

PROGNOSIS AND TREATMENT

The prognosis in systemic blastomycosis in the canine is regarded as poor. Most cases of disseminated blastomycosis end fatally. If the infection is limited to a single skin lesion, the prognosis may be fair to guarded depending on its location and severity.

Cutaneous lesions may be surgically excised or treated with 2-hydroxystilbamidine (an aromatic diamidine of stilbene group).4 Complete involution of the cutaneous lesions has occurred after a total of 4–6 gm. of stilbamidine is given by daily infusion for a period of one month or more. There may be improvement of solitary lesions with radiation therapy.

Amphotericin B is now considered the treatment of choice. Amphotericin B is given at a rate of $\frac{1}{2}$ mg/Kg every 3 days until a total dose of 25 mg of Amphotericin B has been given. This treatment is continued over a several week period, so the patient need not be hospitalized after the initial $1\frac{1}{2}$–2 weeks of therapy.

Considering the virulence of this pathogen, and the economic and public health implications, many have euthanized the patients and judiciously disposed of the carcass.

PUBLIC HEALTH CONSIDERATIONS

Although no instances of transmission from dog to man have been reported, there is no reason to believe that such transmission is not possible. If a case is diagnosed, there is no reason to become alarmed if the infected patient is handled with the utmost caution. Strict sanitary procedures such as wearing gloves and avoiding contact with exudates and lesions will decrease the chance of human exposure.

SUMMARY

Canine North American blastomycosis is a mycotic disease caused by Blastomyces dermatitidis. It is considered a relatively rare disease in the United States, but many cases may have passed undiagnosed. Canine blastomycosis is a chronic disease characterized by granulomatous lesions that tend to suppurate. The lesions are observed primarily in the lungs and on the skin, and to a lesser extent in other tissues.

The disease process is commonly terminated fatally, with treatment having variable significance and success. Because of the possible danger of transmission to man, all cases should be treated with extreme care and diligence.

BIBLIOGRAPHY