

Faculty of Vet. Med.,
University of Tehran Iran

Serological, clinical and histopathological studies on
enzootic bovine leukosis in a dairy farm in the suburbs of
Tehran

(With 4 Figures)

By

¹A. Raoofi, ²R. Sedaghat, M. Bahrami, ¹S. H. Mardjanmehr

¹Faculty of Vet. Med., University of Tehran, Tehran, Iran

²Faculty of Med, Shahed University, Tehran, Iran

Summary

Serum samples from 650 cows in a dairy farm in the suburbs of Tehran with a population of 1200 cattle were tested for bovine leukosis virus (BLV) by the ELISA test. All of 259 cows that were older than 4 years were seropositive for BLV. 13 cows with clinical signs of leukosis were culled from April 2002 to February 2003. After slaughtering, necropsy findings of 5 cows were recorded and histological samples of the affected organs were sent to the laboratory. Histopathological examination confirmed the leukosis.

Keyword: *enzootic bovine leukosis, dairy farm, Iran.*

Introduction

The adult, or enzootic, form of bovine lymphosarcoma is the most common neoplastic disease of cattle and is associated with bovine leukemia virus (BLV) infection (4). BLV is an exogenous C-type oncovirus in the Retroviridae family (2). Enzootic bovine leukosis (EBL) occurs worldwide and the prevalence of infection varies between countries (1). Persistent infection (development of detectable levels of antibodies) is most common that followed by

persistent lymphocytosis (PL) in 29% of infected animals, and less than 5% of infected animals develop lymphosarcoma (1). The clinical form of the disease is rarely seen in animals less than 2 years of age and is most common in the 4-8 years age group (2). Diagnosis of the viral infection is made by serological (AGID, RIA, ELISA) or virology (PCR) techniques, PL is identified by hematology and neoplastic tumors are identified by histological examination (2).

Materials and methods

This study was done in a dairy farm located in the suburbs of Tehran with a population of 1200 cows. All of the cows older than 4 years old (n=259) were tested by ELISA. Clinical signs of EBL including enlargement of lymph node(s), loss of body weight, inappetence, weakness, loss of milk production and abomasal ulceration, congestive heart failure, paresis and paralysis were considered and after systematic examination, the clinical findings were recorded. After slaughtering, necropsy findings of suspected cows including discrete firm white tumor masses or diffuse tissue infiltrate in any organ were recorded. Samples of gross lesions and enlarged lymph nodes were fixed in formalin and embedded in paraffin. Tissue sections were stained with haematoxylin and eosin. Confirmation of diagnosis was made by histopathological examination.

Results

In this dairy farm with a population of 1200 cows, the result of serum ELISA test indicated all of the 259 cows older than 4 years old were seropositive. One hundred-fifty-six cows with or without clinical signs of EBL were slaughtered from 25 April 2002 to 20 February 2003. Thirteen cows had the clinical signs of EBL. After slaughtering, the samples of lymph nodes, abomasums, and uterus were examined. Affected lymph nodes were enlarged and composed of both normal and neoplastic tissue. The latter is firmer and whiter than normal lymph tissue and often surrounds foci of bright yellow necrosis. Histologically, the tumor masses were composed of densely-packed, monomorphic lymphocytic cells. The results of histopathological examination confirmed the diagnosis of EBL in 5 cows (Figs. 1, 2, 3, 4). Of these, 3 cases had no clinical signs of EBL.

Discussion

Serological survey in this herd indicated 100% of cows (21.6% of total population) were positive reactors. Serum ELISA is more sensitive than other serological test (1). Serological surveys in cattle in the United States indicate prevalence rates within herds ranging from 0-100%. Infection with the virus is estimated to be at least 20% in the adult dairy cow population of the United States, 6-11% in Canada, 27% in France, and 37% in Venezuela (2). In New Zealand, the incidence of clinical EBL is rare, and it is estimated that in about 2% of the dairy herds, the infection level is at least 5-10% (2). The prevalence of infection in beef cattle in Australia is 0.22% (5). In a national survey in Canada, 40% of the herds contained BLV-infected cows. In Prince Edward Island in Canada, 49.2% of the herds tested had at least one positive reactor, and 5.5% of all the cows tested were positive (3).

In this herd, 13 cows (1.1%) were slaughtered for clinical signs of EBL. Confirmation of diagnosis by histopathological examination revealed the annual mortality rate of this herd is at least 0.4%. The occurrence of clinical lymphosarcoma in countries where the infection occurs is about 1 per 1000 per annum and in infected free countries, 1 per 50000 per annum (2). All of these data are subject to serious error because of the selective nature of the surveys are conducted, it is not possible to give accurate figures. Even in countries or areas where the infection and the disease are common, there are many herds that remain uninfected. Dairy cattle are much more commonly infected than beef cattle, and have a much higher incidence of lymphosarcoma, that is probably due to their closer confinement and the higher average age of the dairy herds (5). In severely affected dairy herds, an annual mortality rate of 2% is unremarkable and it may be as high as 5%. The prevalence of infection is higher in large herds than in smaller herds (2).

References

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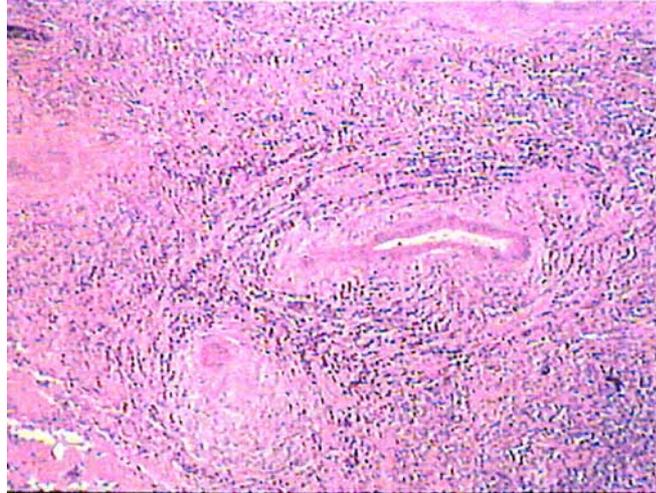


Figure 1- Neoplastic lymphocytes with uniform and hyperchromatic nuclei have extensively infiltrated the endometrium of uterus. The presence of tumor cells resulted in atrophy of endometrial glands and loss of them. Hematoxylin and eosin $\times 90$

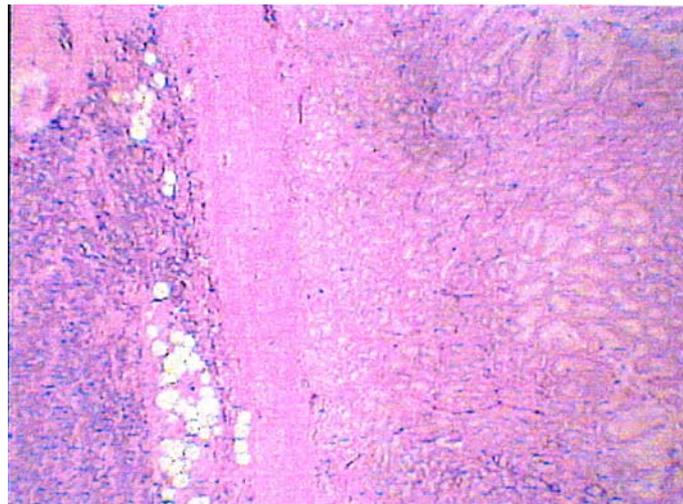


Figure 2- Neoplastic lymphocytes have extensively infiltrated the submucosa of abomasums. The normal abomasal glands are evident at the right. Hematoxylin and eosin $\times 30$

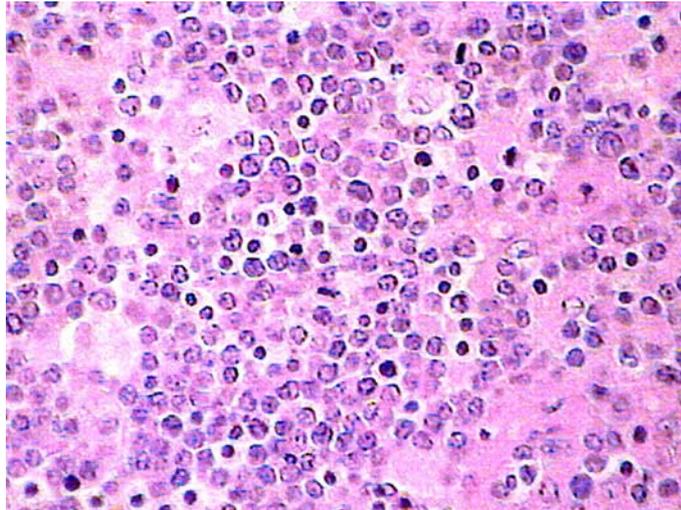


Figure 3- Lymphoblastic lymphosarcoma characterized by the uniform neoplastic lymphocytes with round to oval nuclei, hyperchromatic condensed chromatin, a single prominent nucleoli, and slight basophilic cytoplasm. Note the mitotic figures in the center and presence of numerous large macrophages giving “starry sky” appearance. Hematoxylin and eosin $\times 358$

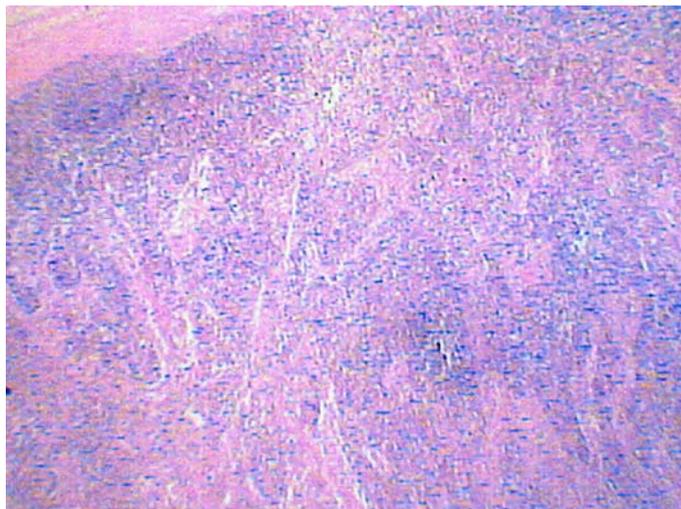


Figure 4- There is complete replacement of normal architecture of lymph node with lymphocytic proliferations. A remaining nodule and small portion of capsule are seen at the top of left. Hematoxylin and eosin $\times 30$