

Renal Adenocarcinoma in a Cow

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Class of 1940

A GRADE Holstein cow, owned by the Iowa State College Dairy Department, was entered in the Veterinary Clinic on March 6, 1940, for final clinical examination to be followed by necropsy. Upon arrival, a history of general debility and emaciation over a period of about five months was given. The patient had a high pulse rate and a temperature of 103°.

The rapid agglutination test for Bang's disease and the thermic test for paratuberculosis, using an avian tuberculin injection, were negative. Palpation of the udder revealed an extensive fibrosis which suggested chronic mastitis. This tentative clinical diagnosis was confirmed by a strip-cup examination in all quarters.

Laboratory Tests

A blood count showed 7,460 leucocytes and 6,165,000 erythrocytes with a differential count of polymorphonuclear leucocytes, 40%; lymphocytes, 53%; monocytes, 2%; and eosinophiles, 3%. The clotting time was four and one-half minutes. The results of urine analysis were: specific gravity, 1.012; reaction, alkaline; albumin, very positive; blood, positive; and acetone bodies, bile salts, and sugar, absent. The urinary sediment contained streptococci, erythrocytes, transitional epithelial cells, amorphous phosphate granules, leucine and tyrosine.

Rectal examination disclosed the presence of a large growth in the region of the right kidney but the nature of the growth could not be determined to any great extent as it extended too far forward.

Post Mortem Findings

On March 9, 1940, electrical euthanasia

was used and a post mortem examination was made. Diffuse neoplastic infiltration of the entire right kidney, which weighed 15 kilograms (33 pounds), left only small areas of more or less normal parenchyma in the medulla. In these areas there was black linear pigmentation. The perirenal tissues and the posterior vena cava were infiltrated with neoplastic tissue. In the posterior vena cava adjacent to the kidney, a roughened, eroded, nodular area about 2 by 3 cm. ($\frac{3}{4}$ by $1\frac{1}{8}$ inches) in diameter was found on the intima. At this point there was a recent thrombus and around it on the intima there were small nodules, 1 to 2 cm. in diameter. Where the posterior vena cava passed through the dorsal portion of the liver, similar small nodules were found on the intima and in the adjacent hepatic tissue. All of the neoplastic tissue was somewhat tough and fibrous.

The right ureter was 4 or 5 cm. in diameter. Its serous surface was nodular for a distance of about 10 cm. from the kidney. The left kidney was about twice the normal size which was apparently a compensatory hypertrophy. The characteristic gelatinous infiltration of the epicardial and mesenteric fat which is characteristic of cachexia was noted. The wall of the urinary bladder was edematous and in the mucosa were two pea-sized, soft, spongy cysts.

Tissue Sections

Tissue blocks from the right kidney, right ureter, urinary bladder, renal lymph node, spleen, posterior vena cava, and the liver were taken and sections were prepared for microscopic study. In the spleen hemosiderosis was quite marked but no neoplasia was seen. The only apparent pathological changes in the

wall of the urinary bladder were the edema and the formation of small mucous cysts.

The sections of the kidney, liver, posterior vena cava, renal lymph node, and ureter showed an infiltration of neoplastic cells which had a tendency to arrange themselves somewhat in the form of tubules. This tendency might have been due to the fact that these cells may have had their origin in the renal epithelium. In the metastatic growths in the liver the clumps of cells were often larger than in other locations. Moreover, there was evidence of necrosis of the central cells, probably due to insufficient nutrition. While this gave the appearance of an attempt at tubule formation, it could not be said to be a true formation of these structures. In the liver, posterior vena cava, and renal lymph nodes the filtration was chiefly of large epithelial cells with vesicular nuclei. These tumor cells were accompanied by a scant growth of connective tissue.

In the sections of the kidney and ure-

ter there were areas that gave evidence of chronic inflammation. In these areas there were extensive fibrosis, hyaline casts in distended uriniferous tubules, fibrosis and mucoid degeneration of the vessel walls, and only a few normal glomeruli and tubules. There was considerable infiltration of lymphocytes into these areas but only occasionally were collections of tumor cells observed. A few calcareous deposits were noted. In other areas of the kidney and ureter the number and also the malignancy of the tumor cells were much more striking. This was due to the absence of connective tissue, to the presence of many clumps of tumor cells showing frequent mitotic division, and to the tendency of the cells to form tubules.

Because the tumor cells were very much like the renal epithelium in appearance, showed a tendency to form tubule-like structures and metastasized to other parts of the body, the tumor was diagnosed as adenocarcinoma of renal origin.

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