EMBRYONAL NEPHROMA IN THE CHICKEN:
REPORT OF TWO CASES

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Few data have been collected on embryonic neoplasms of the kidney. Comparatively speaking, they are rare in man and the lower animals. In human beings the condition is usually spoken of as Wilms' tumor, and it occurs almost exclusively in children. In the lower animals it has been reported as occurring in rabbits, swine, and chickens. A larger number of embryonic renal neoplasms has been reported as occurring in swine than in all other animals combined, and from this one might infer that the tumor is more common in swine than in other species. Day reported eight cases occurring in swine and later Feldman added a series of eleven cases. The five cases found in rabbits were reported by Scott, Polson, and Bell and Henrici. Mathews reported a series of twelve cases in chickens. The two cases constituting the basis of this report occurred in a flock of 400 white leghorn hens, and both birds came to necropsy on the same day.

REPORT OF CASES

Case 1: A white leghorn hen, aged twelve months and in good flesh, was found dead. At necropsy the posterior third of the left kidney was found to be greatly enlarged and dark, due to hemorrhage under the capsule. A large blood clot, which had escaped through a rupture in the capsule of the kidney, was found in the peritoneal cavity. Macroscopic evidence of metastasis to other organs could not be found. The right kidney was normal in size and color.

Case 2: A white leghorn hen, aged one year, was found dead. Necropsy revealed the right kidney to be enlarged and light gray (Fig. 1). The anterior half appeared as a rough, rounded mass measuring 2 by 3.5 cm. The posterior lobe of the right kidney was enlarged but was normal in color. The left kidney was normal in appearance. The liver was slightly enlarged, and contained a well circumscribed mass which was diagnosed as a hepatoma and was unrelated to the mass found in the kidney.
Pathologic Study of Tumors

The tumors in both cases were diffuse growths, and, except for some necrotic tissue, there was no line of demarcation between the neoplastic growth and the normal kidney. The capsule covering the tumor was continuous with the capsule covering the uninvolved portion of the organ. Beneath the capsule there were a few large vessels which in both cases were dilated.

A cross section of the tumor in Case 1 disclosed that the mass contained large hemorrhagic portions which were interspersed with smaller regions of necrosis. In Case 2, a cross section of the tumor revealed a gray necrotic center, whereas the peripheral portion contained a large number of cysts, which were filled with blood. Thick trabeculae could be discerned coming in from the periphery to divide the tumor into unequal portions.
Microscopic study of the tumors revealed a fibrous capsule over the surface of each, the density varying with the individual neoplasm. Bands of fibrous connective tissue were found running throughout the entire mass. Some of these bands were made up of well organized connective tissue, whereas others were more immature and could be discerned passing into and displacing the necrotic material found between the normal renal tissue and

![Image](image_url)

**Fig. 2. Immature and Undifferentiated Cells**

The cellular elements are disposed diffusely, with no tendency to form definite structures. × 660.

the tumor. In the latter regions the nuclei of the cells were larger and more spherical, very granular, and lighter in color than those of the more mature cells. Mitotic figures were not difficult to demonstrate in the immature fibroblastic elements of the neoplasm.

On the abundant stroma of fibrous connective tissue were nests of immature, undifferentiated cells (Fig. 2). In places, the
embryonal cells had formed imperfect tubules and glomeruli-like structures, without a definite pattern, lined by several layers of high cuboidal or columnar epithelium. In other parts of the same tumor there was no apparent attempt on the part of the cells to form definite structures; they were disposed as diffuse masses of undifferentiated cells.

In the more mature portions of the tumor were found many cysts of different size, lined by a single layer of flat epithelial cells and filled with a pink-staining homogeneous material.

The tumors were vascular. Large blood vessels were found throughout them. In Case 1, there was evidence of diffuse hemorrhage and large collections of plasma throughout the entire tumor, and the surface of the tumor was entirely covered by a blood clot to a considerable depth. In this case the changes seemed
to be more cellular than in Case 2. There were large masses of undifferentiated cells which seemed to be distinctly embryonal in nature. In Case 1 there were few portions of the tumor in which the epithelial cells formed definite tubular structures. The opposite, however, was true of Case 2. The tumor in this case contained a larger proportion of fibrous connective-tissue stroma, whereas the regions of imperfect tubules and glomeruli were abundant (Fig. 3); these regions were definitely adenomatous. Large cysts were more numerous in this tumor than in that of Case 1.

**Comment**

Wide variation is observed in the histologic pattern of the embryonal nephroma. One type presents a picture of proliferating epithelial cells forming tubule-like structures (Fig. 4) built on a
scanty stroma of connective tissue, whereas another type has true sarcomatous tendencies with few epithelial cells. All gradations in the ratio of connective tissue to epithelium are seen in these tumors or even in different parts of the same tumor. They may be distinctly cellular and embryonal in nature, and the cells may be found in large, compact masses, or the cells may be more mature and form imperfect tubules and structures resembling glomeruli. Mitotic figures are easily demonstrated, and the tumors appear morphologically malignant, but only infrequently have they been found to metastasize to other organs.

The tumors in which the epithelial cell predominates might be spoken of as adenocarcinomas, whereas those that have a predominantly fibroblastic structure may be referred to as adenosarcomas. To others that contain muscle fibers, the name adenosarcorhabdomyoma is often applied. These tumors all contain essentially the same elements: a stroma of fibrous connective tissue, epithelial cells forming cysts or tubules, and nests of immature and undifferentiated neoplastic cellular elements. However, to describe adequately the individual variation which occurs in these neoplasms or the different parts of the same neoplasm, it would be necessary at times to use a combination of all the terms that are employed to designate these complex tumors. Since these tumors possess embryonal elements which are potentially capable of differentiating into either epithelium or connective tissue, they should be designated by a term which does not over-emphasize one or the other of these elements. To call such a tumor an adenocarcinoma is to ignore the sarcomatous features which have been present in all of the tumors of this kind which have been observed in the common fowl. Likewise, the sarcomatous tendencies should not be stressed by using the term adenosarcoma. As an appropriate designation of these tumors, which is indicative of their histogenesis, the term embryonal nephroma is acceptable.

The cases reported in this paper both occurred in female white leghorn birds, aged one year, and although the number thus far reported is too small to allow definite conclusions to be drawn, it would seem that embryonal nephromas do not become apparent earlier in life than other neoplastic diseases of the common fowl.

Mathews reported that in all of the cases he observed the tumors exerted pressure on the nerve supply to the leg, causing complete paralysis of the limb on the affected side. Interference with locomotion was not observed in either of the birds mentioned in
this report. Mathews has stated further that in the cases which he observed the tumors were attached to the spinal column, dorsal to the kidney, and that they were separated from the kidney by a fibrous capsule. This condition was not found in the two cases reported here. The neoplasms were within the kidney; attachment to the skeleton other than the normal attachment of the kidney could not be discerned, and the tumors were separated from the normal tissue by a small region of necrosis which could be accounted for by the pressure exerted by the tumor. In other places bands of embryonal cells or connective tissue could be seen pushing into the remaining renal tissue.

**Summary**

Two cases of embryonal nephroma of the chicken are reported. These tumors belong to the group of neoplasms which, when found in human beings, commonly are known as Wilms' tumors. These tumors differ from the few others previously reported as occurring in chickens, because of the fact they were growing within the kidney, were unattached to the spinal column, and were not encapsulated. Although these tumors had the histologic appearance of a malignant growth, metastasis was not demonstrated. Similar neoplasms have been reported in children, rabbits, and swine.

**Bibliography**


