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MULTIPLE ANOMALIES IN A WHITE-TAILED DEER FETUS

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Abstract: Multiple defects consisting of disproportionate dwarfism, internal hydrocephalus, porencephaly, inferior brachygnathia, multiple hepatic cysts and renal dysplasia with cystic tubular dilation, were diagnosed in a fetus from an apparently normal wild white-tailed deer *(Odocoileus virginianus).*

HISTORY

On April 24, 1972, a 10 month old, female white-tailed deer was collected near Harris, Saskatchewan as part of a research project on deer. The doe's general body condition was classed as fair to good for the season of the year. The femur bone marrow contained 72.4 per cent fat, compared to an average of 41.9 per cent fat in the bone marrow of three other fawns collected during April. The ovaries each contained a corpus luteum of pregnancy. The single abnormal fetus present was submitted for examination.

GROSS PATHOLOGY

The fetus was fully-haired, with black pigment covering the nose; the incisors were unerupted. These characteristics are those of a fetus of from 151 to 180 days of gestation.[1] The fetus had a distended abdomen, an enlarged domed cranium, exophthalmus and inferior brachygnathia (Fig. 1). There was medial rotation of the distal portion of both hind limbs and of the left fore limb. The crown-rump (CR) and hind foot (HF) measurements were 216 and 76 mm respectively, far shorter than the corresponding values of 396 and 251 mm respectively, for a fetus of 159 days of gestation.[1] The ratio of HF to CR measurements from the present case was 0.35:1 compared to a ratio of 0.64:1 computed from Armstrong's data,[1] indicating that the animal had disproportionately short limbs.

A radiograph of the intact fawn revealed that maxillary molar and premolar teeth were normally located, and that the mandibular molar and premolar teeth were impacted. There was total absence of the mandibular interalveolar space, with the mandible ending just anterior to the first premolar. The unerupted incisors were located ventral to the premolars. No abnormality was detected in the skeleton, other than shortness of long bones and mild lumbar lordosis.

Upon internal examination, the liver was found to contain three large blood-filled cysts which bulged from the hepatic parenchyma (Fig. 2). The kidneys were of normal size and shape, but were pale, and the subcapsular surface had a granular texture. On section the cortex was of a honey-comb nature containing numerous 1-3 mm diameter cysts. The remaining abdominal and thoracic viscera were unremarkable. When the head was skinned, the orbits were found to be shallow, producing the exophthalmus previously noted. The frontal, temporal and parietal bones were extremely thin and separated by wide fontanels. The cerebral hemispheres were greatly enlarged, with bilateral internal hydrocephalus. A 2 by 2.5 cm area of the parietal and occipital region of the right cerebral hemisphere was absent (Fig. 3).

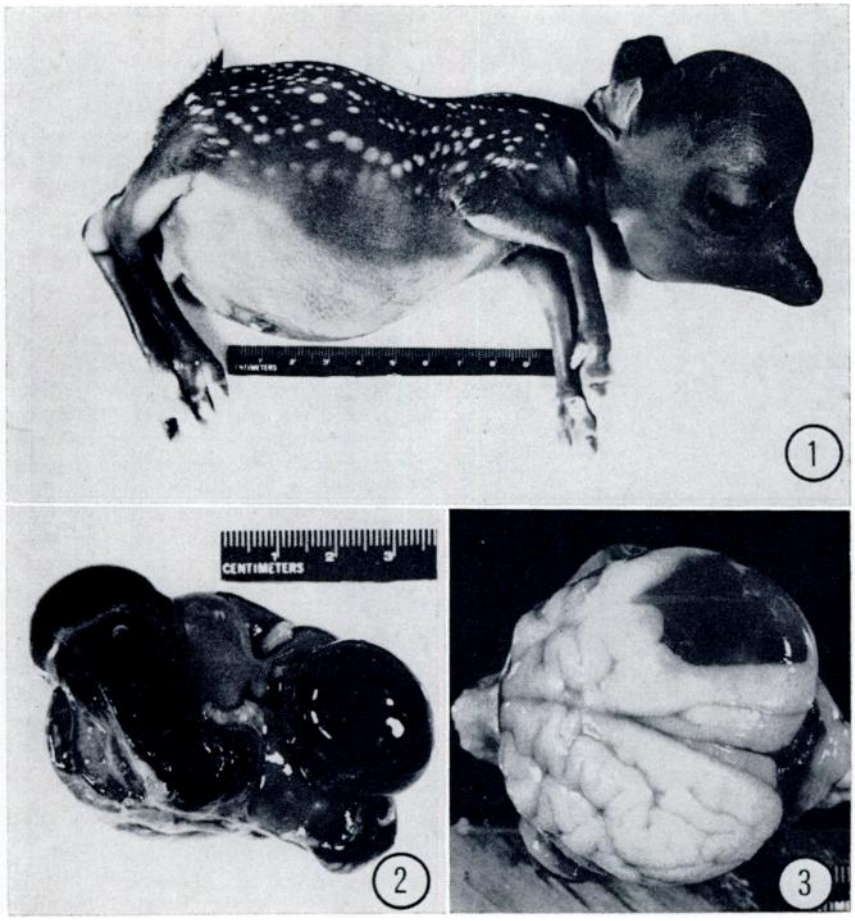

FIGURE 1. Lateral view of white-tailed deer fetus, showing domed cranium, inferior brachygnathia, pendulous abdomen, disproportionately short legs, and rotation of limbs.

FIGURE 2. Liver from white-tailed deer fetus. Note large blood filled cysts bulging from hepatic parenchyma.

FIGURE 3. Dorsal view of head with calvarium removed. Bilateral hydrocephalus and porencephaly.

HISTOPATHOLOGY

Representative samples of tissue were fixed in 10 per cent buffered formalin, processed routinely, sectioned at 6 μ and stained with hematoxylin and eosin.

The hepatic parenchyma which appeared normal merged with the large blood-filled cysts noted previously. These cysts had little structure, but in a few areas septae composed of cells resembling endothelial cells dissected the cystic spaces.

The kidneys were composed of loose connective tissue with only occasional nephrons present. Glomeruli, although

very few in number, appeared to be normally developed; however, some glomerular tufts appeared to be hyalinized. The few tubular elements present were cystically dilated. The epithelium lining these cysts was cuboidal and small collections of calcified material were present in many of the tubules. The cystic spaces were largely confined to the cortical area, the medullary region being composed almost entirely of connective tissue.

DISCUSSION

Multiple congenital defects such as reported here do not appear to have been previously described in white-tailed deer. The disproportionate dwarfism described was most like that of chrondrodystrophia foetalis. Domestic animals with this condition often have internal hydrocephalus but the condition is usually associated with prognathism rather than inferior brachygnathism.[3] Although hydrocephalus was likely due to interference with cerebrospinal fluid drainage, no morphologic site of obstruction was detected.

The term 'porencephaly' has been used for a number of cystic conditions in the brain; however, the condition observed in this case corresponds to the definition originally proposed by Herschl in 1859 (cited in Blackwood *et al.*[2]). The large, poorly defined, blood-filled cysts of the liver should likely be classed as hamartomata although in some respects they resemble a cavernous haemangioma, which has been reported to be one of the most common hepatic neoplasms in human neonates.[5] No reference was found to the occurrence of this condition in other fetal or neonatal animals.

The renal lesions observed correspond most closely to "Type 2" polycystic kidneys as classified by Osathanondh and Potter,[4] in that there was increased connective tissue, great reduction in numbers of nephrons, variability in cyst size, hyalinization of glomeruli, and cuboidal cell lining of the cysts. However, without evidence from microdissection we would prefer to regard the lesion as one of renal dysplasia, one of the characteristics of which was dilation of tubular elements.

The combination of defects present in this case would almost certainly have been incompatible with extra-uterine life. Since no investigation was performed, speculation as to possible etiology would be of little value in this case.

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