Pathology in Practice

In collaboration with the American College of Veterinary Pathologists

History

Six Yorkshire-cross castrated male pigs weighing 55 to 61 kg were received as part of an acute cardiovascular study at a research facility. One of the 6 barrows exhibited mounting and aggressive behavior toward other pigs in the cohort and the animal care staff. This animal was separated and individually housed due to this behavior.

Clinical and Gross Findings

Following an acute cardiovascular procedure performed on the anesthetized separated animal, the anesthetized pig was euthanized with an IV overdose of pentobarbital (Euthasol, Virbac AH, Inc.) in accordance with the Institutional Animal Care and Use Committee-approved protocol and AVMA Guidelines on Euthanasia. A complete autopsy on the euthanized pig was performed. Grossly, a mass was identified caudal to the right kidney and adjacent to the urinary bladder (Figure 1). The mass was smooth, gray, and soft and was contained within a capsule. The mass contained prominent vascular outlines. The mass measured approximately 9 x 7 x 5 cm, and on cut surface was tan with a cobblestone appearance. The mass was excised, and tissue was collected for histologic analysis. The tissue was fixed in neutral-buffered 10% formalin, embedded in paraffin wax, and sectioned at 4 µm; sections were mounted on glass slides and stained with H&E stain.

A subsequent autopsy of another animal in the cohort revealed a similar intra-abdominal mass; this animal did not exhibit any of the behavioral changes seen in the first pig.

Histopathologic Findings

Histologically, seminiferous tubules were diffusely atrophied with irregular, undulant basement membranes and lined by a single layer of Sertoli cells. The tubules were devoid of germ cells, spermatocytes, and spermatids and contained variable amounts of fibrillar to vacuolated eosinophilic material. The Sertoli cells had hydropic degeneration (Figure 2). There was no evidence of neoplasia.

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Morphologic Diagnosis and Case Summary

Morphologic diagnosis and case summary: undescended right testicle with diffuse atrophy of seminiferous tubules and loss of germ cells in a male pig.

Comments

Cryptorchidism—incomplete descent of 1 or both testes and associated structures—is the most common sexual development disorder of the male reproductive system. The tissue submitted for histologic analysis was confirmed as testis. Two of the 6 pigs in the research cohort were identified as cryptorchid. The nomenclature for classifying this anomaly of reproduction has been updated. The condition in the pig of the present report is now classified as XY, SRY+ testicular disorder of sexual development with the failure of testicular descent. Testicular descent occurs before birth in pigs. In postpubertal animals, the cryptorchid testes are smaller than their normal scrotal counterparts and often have a Sertoli cell-only pattern due to the deleterious effect of normal body temperature on spermatogenesis.

Cryptorchidism has a polygenetic basis and an autosomal recessive model of inheritance. The main underlying structural change in pigs is abnormal development of the gubernaculum, including its underdevelopment, excessive growth, or abnormal location. The 2 pigs in the research cohort were unilaterally cryptorchid with intra-abdominal testicular translocation. Superimposed atrophy occurs in an undescended testis at the time of puberty. Although undescended testes are more prone to develop neoplasia than are scrotally located testes, neoplasia was not evident in either affected pig of the present report, most likely due to the age of the animals.

Cryptorchidism has been documented in different species including humans, dogs, rats, mice, and horses as well as domestic and exotic cats. In humans, the condition has been associated with genetics, environmental exposure to contaminants (eg, maternal smoking or maternal radiation during pregnancy), the use of analgesic drugs by the mother during pregnancy, and premature birth. In humans, cryptorchidism is often associated with other developmental disabilities seen such as Down syndrome. Unfortunately, in most studies, the lack of adequate sample size and statistical power often preclude understanding the underlying associations for this condition in animals. Common sequelae to cryptorchidism in all species is infertility and neoplasia. However, neoplasia was not identified in the pigs of the present report because of their relatively young age.

Cryptorchidism, through its hormonal effects, can alter relaxation of coronary arteries, attenuate neointima formation after coronary balloon injury, and have proapoptotic effects on coronary smooth...
muscle, all of which potentially confound the outcome for the affected animal in an experimental study, skew the study results, and affect reproducibility of the study findings. Atypical behavior of an animal in a research cohort should alert investigators to the possibility of the animal being cryptorchid.

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References