**History**

A 14-year-old unilaterally castrated male dog with an abdominal mass was referred to the Unicore Animal Hospital for abdominal CT. The dog was adopted from a shelter 13 years ago and was found to have had a retained testis. During the past month, the owner noticed that the dog’s breasts had gradually enlarged. An abdominal mass was observed via ultrasonography at an initial clinic visit.

**Clinical and Clinicopathologic Findings**

Engorged breasts were observed, and an intra-abdominal mass was palpated on physical examination. Routine hematologic and serum biochemical results were within reference limits except for a slightly high BUN concentration (28.0 mg/dL; reference interval, 7.0 to 27.0 mg/dL). Results of CT indicated a large well-demarcated mass (6.3 X 7.0 X 5.2 cm) in the right caudal region of the abdominal cavity. The mass was rounded, had attenuation similar to soft tissue, and was mildly heterogeneous. Based on the history of unilateral cryptorchidism, the mass was suspected to have been a neoplasm within the retained testis. On the same day, ultrasound-guided fine-needle aspiration of the abdominal mass was performed, and then slides were stained with a modified Romanowsky stain. The samples were mildly cellular and comprised of medium to large, round to elongated pleomorphic cells with indistinct cell borders. These cells were arranged in sheets or formed rosette-like structures with eosinophilic extracellular material in the center, resembling Call-Exner-like bodies (Figure 1). The cytoplasm was lightly basophilic and contained numerous small to large vacuoles. Nuclei were round to oval, measuring 1.5 times the diameter of a RBC, with coarsely stippled chromatin, and single prominent nucleoli were observed occasionally. The anisokaryosis was moderate, and no mitotic cells were noted. Two days later, the abdominal mass was surgically removed and submitted for pathological examination. Macroscopically, it was firm, oval shaped, and 5.5 X 7.0 X 5.0 cm, with an irregular surface. The cut surface showed mottled light brown to white foci (Figure 2).

Formulate differential diagnoses, then continue reading.

**Histopathologic Findings**

Microscopically, an expansile and nonencapsulated growth, composed of neoplastic cells that populated the seminiferous tubules and were arranged in coalescing sheets, was observed. Some neoplastic cells circled an eosinophilic material (Figure 2), and this finding was consistent with the Call-Exner-like bodies found on cytologic smears. The intratubular neoplastic cells were separated by dense and mature fibrous connective tissue. The neoplastic cells were...
Morphologic Diagnosis and Case Summary

Morphologic diagnosis: Sertoli cell tumor with Call-Exner–like bodies.

Case summary: gynecomastia associated with Sertoli cell tumor arising from a cryptorchid testis in a dog.

Comments

Sertoli cell tumor is 1 of the 3 most common primary testicular tumors in dogs (the other 2 types are Leydig cell tumors and seminoma). These testicular tumors occur with nearly equal frequency in dogs. Cryptorchidism is a risk factor for Sertoli cell tumor in dogs, and the relative risk of Sertoli cell tumor (singly or in combination with other testicular tumors) among cryptorchid dogs is 23 times that of clinically normal dogs. It is proposed that the etiologic basis for developing Sertoli cell tumor subsequent to cryptorchism is a response to higher temperatures of the retained abdominal or inguinal positions than the scrotum.

Feminization is a paraneoplastic syndrome of Sertoli cell tumor in male dogs. Approximately 25% of tumor-bearing dogs exhibit single or multiple clinical signs of feminization, including gynecomastia, alopecia, atrophy of the contralateral testicle, squamous metaplasia of the prostate gland, and bone marrow suppression. These signs typically resolve following removal of the neoplasm, as noted with regression of the gynecomastia in this case. Hyperestrogenism is considered a factor associated with feminizing effects in canine Sertoli cell tumors due to the secretion of estrogen by neoplastic cells. Other secretory products of the tumor, such as inhibin, may also contribute to this syndrome.

The rosette-like structures noted in cytologic and histologic specimens were identified as Call-Exner–like bodies, a distinct feature that is emphasized in cytology but is seldom documented in the pathology of canine Sertoli cell tumors. To the best of our knowledge, only 1 prior study has described the cyto-histopathologic correlation of Call-Exner bodies in canine Sertoli cell tumors. Call-Exner bodies were first described by Emma Louise Call and Sigmund Exner in clinically normal ovaries of rabbits. They also exist in some healthy bovine follicles. This structure consists of an eosinophilic central core surrounded by peripheral rows of sex-cord cells. Call-Exner bodies are the hallmark of granulosa cell tumors, occurring in 30% to 60% of human cases. In a retrospective study of ovarian tumors in female dogs, Call-Exner bodies were found in 71% (5/7) of granulosa cell tumors. Another histopathologic study of canine granulosa cell tumors indicated that 65% (26/40) of cases had Call-Exner bodies. Aside from granulosa cell tumors, these structures have also been identified in few canine Sertoli

spindle shaped, elongated to polygonal with scant to moderate amounts of light eosinophilic granular cytoplasm, and had round to oval nuclei containing 1 to 2 prominent nucleoli.

Figure 2—Image of the cut surface (A) and photomicrographs (B and C) of the abdominal mass removed from the dog described in Figure 1. A—The cut surface shows mottled light brown to white foci. The scale at the bottom of the image is in centimeters. B—Neoplastic cells populate the seminiferous tubules and are separated by dense fibrous tissue. H&E stain; bar = 50 µm. C—A rosette-like structure surrounds eosinophilic secretory material, consistent with cytologic findings. H&E stain; bar = 25 µm.
cell tumors, although their overall prevalence in this neoplasm has not been investigated. Call-Exner bodies are regarded as a characteristic of neoplasms that contain epithelial elements of sex-cord origin, including Sertoli and granulosa cells. In the present case, although few neoplastic cells were harvested via fine-needle aspiration, 5 Call-Exner-like bodies were noted, which strongly supported a diagnosis of Sertoli cell tumor, rather than another testicular neoplasm.

The ultrastructure and composition of Call-Exner bodies have previously been analyzed. Electron microscopy demonstrated a reticulum of filaments branching from the basal lamina of Call-Exner bodies. The central eosinophilic material was identified as a secretory product containing hyaluronic acid with proteoglycan complexes and was regarded as the dispersed component of the follicular antrum. Several staining techniques have been applied to identify Call-Exner bodies in canine Sertoli cell tumors. The eosinophilic central material stains positive with periodic acid-Schiff, toluidine blue, Ziehl-Neelsen stain, and Alcian blue and does not stain with Congo red and Luxol fast blue. These staining results correspond with the characteristics of glycoproteins, which are speculated to be a component of the Call-Exner bodies.

In this case, the dog had gynecomastia, a typical feminizing clinical sign, which could also occur in Leydig cell tumors, although less commonly seen. Therefore, it was difficult to differentiate these 2 tumors on the basis of clinical signs, hematologic and biochemical tests, or diagnostic images. We further proceeded with fine-needle aspiration, but only few neoplastic cells were harvested, which was a problem for cytologic interpretation. However, due to the presence of Call-Exner-like bodies on the smears, it indicated that the testicular tumor was a Sertoli cell tumor rather than Leydig cell tumor, and the cytologic diagnosis was confirmed by histologic examination. Although typically considered a feature of granulosa cell tumors, Call-Exner bodies sometimes also occur in Sertoli cell tumors in dogs, and this is an additional clue that can be used to make a definitive diagnosis both histologically and cytologically. The breasts of the dog of the present report gradually regressed to normal size after surgery.

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References