Cytologic detection of Call-Exner bodies in Sertoli cell tumors from 2 dogs

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Abstract: A 14-year-old Italian Griffon and an 11-year-old mixed breed dog were presented to our clinic with monolateral testicular enlargement. In both dogs, a firm, nodular, and nonpainful mass was palpated, and ultrasonographic examination of testicular parenchyma showed a large and irregular nodular area with hyperechogenic features. Fine-needle aspirates of the masses were highly cellular and consisted of populations of large elongated vacuolated cells in sheets and palisades, with finely granular chromatin and prominent nucleoli, consistent with neoplastic Sertoli cells. A variable number of structures also were observed that consisted of a central round area of amorphous, deeply eosinophilic, hyaline material surrounded by a peripheral, rosette-like arrangement of single or multiple rows of Sertoli cells. These structures were suggestive of Call-Exner bodies. Histologic sections of the tumors obtained following castration confirmed the diagnosis of Sertoli cell neoplasia and the presence of Call-Exner bodies. The Call-Exner bodies were intensely positive with PAS, toluidine blue, and Ziehl-Neelsen stains, moderately positive with alcian blue, and negative with Congo red and Luxol fast blue. Call-Exner bodies, thought to represent an attempt by neoplastic cells to form basement membrane, are seen most frequently in granulosa cell tumors, but are occasionally reported in testicular tumors that contain epithelial elements of sex-cord origin. To our knowledge, this is the first description of Call-Exner bodies in cytologic specimens from dogs, and only the fifth report of their presence in canine testicular neoplasms.

Case Presentation

Two male dogs, a 14-year-old Italian Griffon and an 11-year-old mixed breed, were presented to our clinic with a history of monolateral testicular enlargement. At the time of presentation, the first dog was in good health, whereas the second one had cutaneous chronic dermatitis, with flank alopecia, erythema, and mild pruritus. Both dogs had a firm, nodular, and nonpainful mass in the enlarged testis. Examination of the contralateral testis was unremarkable. Ultrasonographic examination of the affected testicular parenchyma in both dogs showed a large and irregular nodular area with hyperechogenic features, without enlargement or alteration of the sublumbar lymph nodes. For diagnostic purposes, fine-needle aspiration of the testicular masses was done by using a 25-gauge needle with suction and without ultrasonographic guidance. Multiple samples from the testicular masses of both dogs were obtained; the slides were air-dried and stained with May-Grunwald-Giemsa for cytologic evaluation.

Smears from both dogs were similar in appearance. The smears were highly cellular and consisted of a population of medium to large (approximately 21–30 μm), round to elongated cells arranged in large sheets and frequently in palisades. The cells had lightly basophilic cytoplasm, sometimes with indistinct borders, which often contained many small to large clear vacuoles. Nuclei were round to oval, with fine granular chromatin and single prominent nucleoli. Mitotic figures were observed occasionally. A variable number of structures were observed that consisted of a central round area of amorphous, deeply eosinophilic, hyaline material surrounded by a peripheral, rosette-like arrangement of single or multiple rows of the nucleated cells (Figure 1). In the specimen from 1 dog, a few individual cells contained eosinophilic intracytoplasmic inclusions. On the basis of the cytologic features, a
Sertoli cell tumor with Call-Exner-like bodies was diagnosed in both cases. Because of the potential for hormonal changes secondary to hyperestrogenism and the risk of tumor progression and malignant transformation, both dogs underwent bilateral castration.

By macroscopic examination, the enlarged testis contained an intraparenchymal gray to yellow, dry, uniform mass that almost totally replaced the testicular tissue. After fixation in 10% buffered formalin, the neoplastic tissue was routinely processed, embedded in paraffin, and stained with H&E. Specimens from both dogs had morphologic characteristics of Sertoli cell tumors, with the neoplastic cell population arranged in irregular tubular structures surrounded by thick fibrous bands. Neoplastic cells were columnar, had vacuolated cytoplasm, and had round to oval nuclei with irregularly clumped chromatin. The cells were arranged in multilayered palisading structures, with their long axes perpendicular to the basement membrane. In some areas, concentric structures consisting of peripheral rows of neoplastic Sertoli cells arranged in pseudorosettes around an intensely eosinophilic region and a brighter central lamellated area were observed, consistent with Call-Exner bodies (Figure 2). Periodic acid-Schiff (PAS), alcian blue at pH 2.5, silver methenamine, Congo red, Luxol fast blue, toluidine blue, and Ziehl-Neelsen stains were done on histologic sections. In the tumors from both dogs, Call-Exner bodies were intensely positive (purple) with PAS; moderately positive (blue) with alcian blue; negative (brown to black) in the lamellated region with silver methenamine; negative with Congo red and Luxol fast blue; and intensely positive (blue) with toluidine blue and Ziehl-Neelsen stains (Table 1). This staining pattern was consistent with criteria previously established for Call-Exner bodies. In the cells from the tumor of the dog in which the cytoplasm occasionally contained eosinophilic inclusions, intense PAS-positivity was observed.

Discussion

In H&E-stained histologic sections, Call-Exner bodies are small spaces filled with eosinophilic fluid and basement membrane material surrounded by rosette-like granulosa cells. They occur most often in maturing ovarian follicles and in ovarian tumors of granulosa cell origin and, when present, are a useful diagnostic feature. Ultrastructurally, Call-Exner bodies contain a core of whorled fibrillary laminae, arranged in parallel and concentric laminar structures, and are associated with irregularly distributed fibers. Other investigators demonstrated that these structures may be lined by moderately electron-dense basal lamina that can be convoluted throughout the center of the cavity.

Call-Exner bodies appear to be characteristic of neoplasms that contain epithelial elements of sex-cord origin (Sertoli and granulosa cells). In human beings,
granulosa cell tumors (GCT), the most common sex-cord tumor of the ovary (and the least common neoplasm of the testis), and gonadoblastoma of the testis may contain Call-Exner bodies.⁷ In animals, sex-cord stromal tumors include GCT of the ovary, and interstitial cell and Sertoli cell tumors of the testis; gonadoblastoma is a mixed gonadal tumor that includes germ-cell and sex-cord elements.⁹ Call-Exner bodies are found in some GCTs⁴ and have been described in Sertoli cell tumors in cattle¹⁰ and in dogs.²,³ Gonadoblastomas have not been described in dogs, with the exception of a single tumor that resembled gonadoblastoma⁵; in that report, Call-Exner bodies were not reported. In Sertoli cell tumors, Call-Exner bodies are thought to represent an attempt by neoplastic Sertoli cells to form a basement membrane; normal Sertoli cells probably produce the tubular basement membrane.¹¹

Previous descriptions of the cytology of testicular tumors in the dog have been published.¹² The features described for Sertoli cell tumors were highly diagnostic, including large sheets of vacuolated cells that were frequently arranged in palisades. To the best of our knowledge, this is the first description of Call-Exner bodies in cytologic specimens of testicular tumors. The singular morphologic feature of Call-Exner bodies can be confused with an acinar arrangement and can lead to an incorrect diagnosis of adenocarcinoma. Awareness of these particular structures can be helpful, together with other features, in the diagnosis of Sertoli cell tumor.

References


