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Case Report

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# Ovarian teratoma in a dog

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**Abstract:** A 3-year-old female dog was referred to the clinics of İstanbul University with the complaint of abdominal distention. On the basis of the clinical findings and ultrasonography, a mass was detected in the left ovary. An ovariohysterectomy was performed. Grossly, the mass, with dimensions of 15 × 11 × 8 cm, weighed 1.2 kg and contained hairs, cysts, fat, bone, and cartilage on the cut surface. Histology revealed the occurrence of well-differentiated components of all 3 germ layers and the mass was diagnosed as a benign mature cystic teratoma.

**Key words:** Dog, ovarian, teratoma

## Introduction

Teratomas are known to originate from the totipotent cells of remnants of embryonic notochord, which are normally located either in the ovary or testis and sometimes abnormally, as in the formation of sequesters (1). These cells are derived from 2 or 3 germ layers (ectoderm, mesoderm, and endoderm). Therefore, ectodermal structures such as skin adnexa (hair, keratin, and squamous epithelium) and nerve cells, and mesodermal elements such as osseous tissues, cartilaginous tissues, adipose tissues, fibrous tissues, smooth and striated muscles, and sometimes teeth, are found within the tumor mass. Even the intestinal and respiratory epithelial cells and pancreatic endocrine parenchyma, which are endoderm-derived components, might be detected (2-4).

Ovarian teratomas are classified among the ovarian germ cell tumors and are less frequently seen in domestic animals compared to their human counterparts. They have been detected most frequently in horses, pigs, dogs, cattle, chickens, and cats, respectively (3,5,6). Teratomas are classified as mature (benign) and immature (malignant) on the basis of their cellular morphology, according to the classification system of the World Health Organization. They are generally benign lesions in animals, contrary to their human counterparts (4,6).

An ovarian teratoma, which was the first case detected in a dog in the clinics of the Department of Gynecology of the Veterinary Faculty of İstanbul University was intended to be presented as a novelty.

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## Case history

A 3-year-old intact female dog was referred to the clinics of the Department of Gynecology and Obstetrics of the Faculty of Veterinary Medicine of İstanbul University with the complaint of abdominal distention for 2 months. A firm, palpable mass with regular margins was detected in the caudal abdominal region. An ultrasonography of the abdominal cavity revealed a mass with hypoechoic and anechoic areas, replacing the left ovary. The presence of the mass was then confirmed by an exploratory laparotomy and an ovariohysterectomy was performed. A tumor mass of 1.2 kg, with dimensions of 15 × 11 × 8 cm, was removed. Grossly, hairs, cysts, fat, and bone were detected on the cut surface (Figure 1). Specimens were fixed in 10% formalin, routinely processed, cut at about 3-5 μm in thickness, and stained with hematoxylin and eosin (H&E) to be evaluated under light microscope.

## Results and discussion

Histopathologically, epidermis and dermal adnexa (hair follicles and sebaceous and apocrine glands) were observed within the tumor mass. Numerous cysts of various sizes, the lumina of which were filled with keratin layers, hair matrix, and larger cystic spaces filled solely with keratin, were also detected (Figure 2a). Widespread hemorrhages and numerous vessels of obvious cavernous structure (Figure 2b) and the foci of the mononuclear inflammatory cells were visible in the dermis. Neural tissue, as in the well-defined structure of the neuropil, composed mostly of neurons and glial cells (Figure 2c), was the second most common component following the cutaneous elements. A single layer of cuboidal, ependymal cell-like epithelial cells, showing a growth pattern of papillary projections, was representative of the choroid plexus (Figure 2d). Clusters of mononuclear cells were visible in some areas of the neural parenchyma. Collagenous bundles were detected to have sharply separated the neural component and the areas containing epidermal cells and the dermal adnexa. Mesenchymal components included islands of cartilage, bone spicules, and adipocytes (Figure 2e). Ganglion cells were also detected in an area within the fibrous tissue (Figure 2f). Melanin-loaded cells, resembling retinal epithelium, were visible in an area adjacent to the neural component (Figure 2g). Moreover, lymphoid cells were found scattered throughout the areas of connective tissue and the smooth muscles. Respiratory cells with cilia, goblet cells, and mucous glands were observed in some other areas as well (Figure 2h).

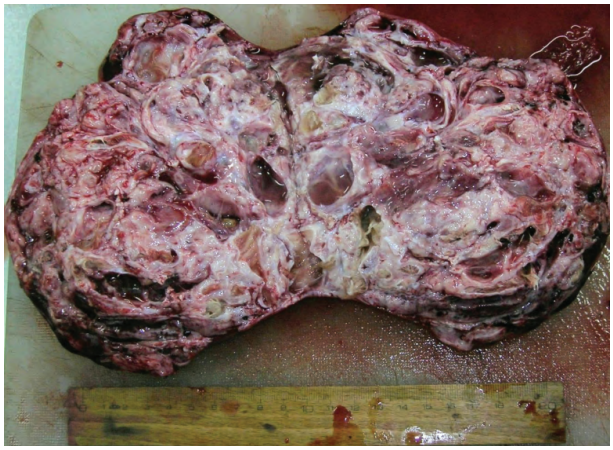

Figure 1. Multiple cystic structures and hair fibers on the cut surface of the tumoral mass.

The relevant case was diagnosed as a benign cystic teratoma due to the occurrence of the well-differentiated components of the ectodermal, mesodermal, and endodermal germ layers.

Primary ovarian tumors are rarely encountered in domestic animals. The prevalence of these tumors is rather low in dogs. Ovarian tumors constituted only 1% of the tumors of 2300 dogs in a survey performed by Cotchin (7). Sforna et al. (8) reported the percentage as 1.04% in their study, out of a total of 4770 canine tumors. Teratomas are pronounced among the canine germ cell ovarian tumors. Twenty percent of all human ovarian tumors were reported to be ovarian teratomas, whereas the incidence was known to be merely 1% for domestic animals. The prevalence of canine ovarian teratomas among all ovarian tumors ranged from 1.04% to 2.7% (8,9). Teratomas are most frequently encountered in the testis, both in men and animals. Testicular teratomas are known to exhibit malignancy, while ovarian teratomas generally show benign features (10,11). Testicular teratomas are more frequently seen in horses, whereas ovarian teratomas are found in dogs (3,11).

Ovarian teratomas are classified as mature, immature, and monodermal. Mature and immature teratomas are derived from more than one germ layer and monodermal teratomas arise from the predominant embryonic cell line within the tumor. Struma ovarii

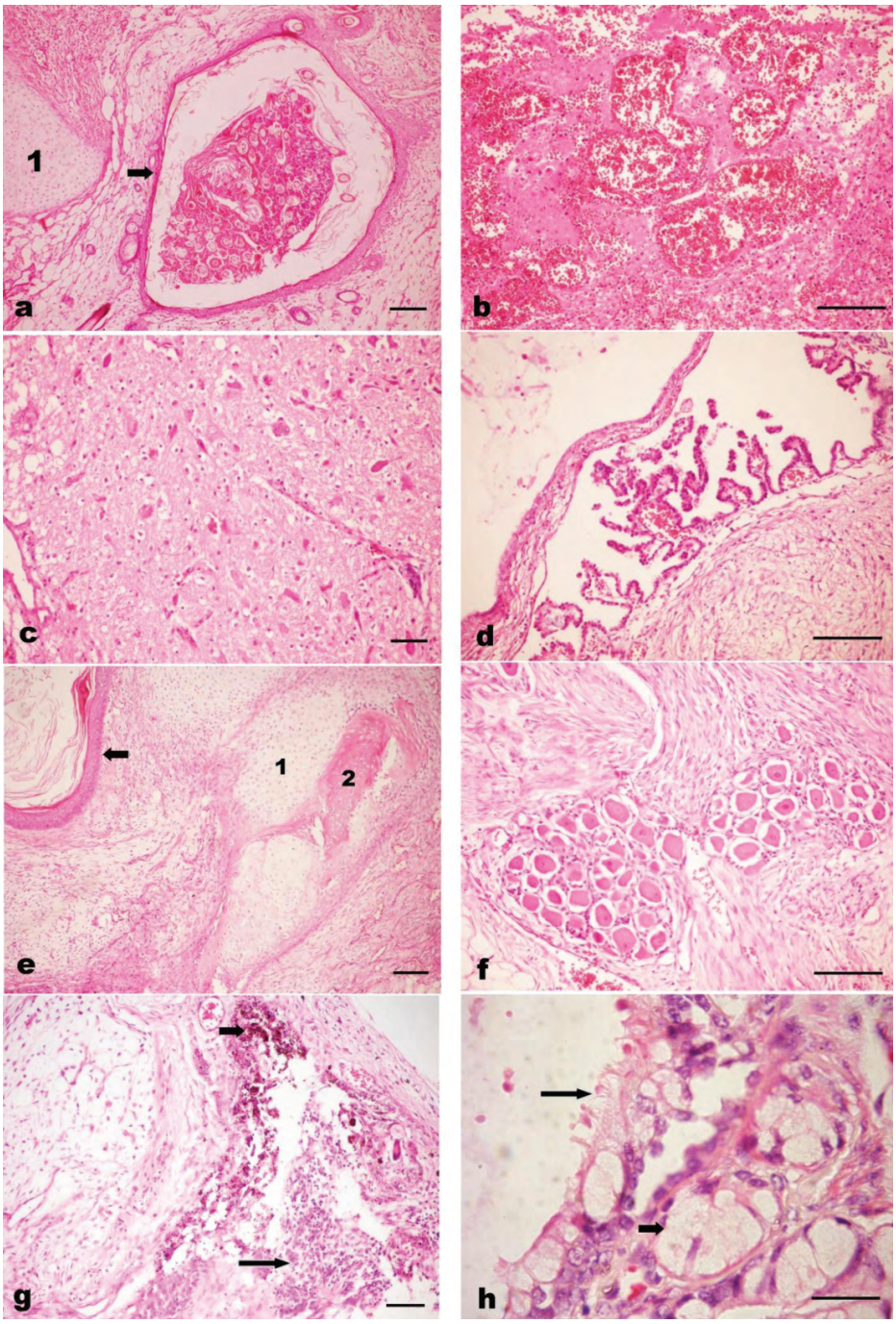


Figure 2. Images of tumor: a) At the center are hair follicles, lined by epithelium and filled with keratin layers and skin adnexa, with cartilaginous and adipose tissue at the periphery; H&E, bar = 50 µm. b) Hemorrhage and cavernous structures in the dermis; H&E, bar = 50 µm. c) Brain tissue, neurons, and glial cells; H&E, bar = 50 µm. d) Differentiation of the choroid plexus; H&E, bar = 50 µm. e) Epidermis, keratin layers, peripheral nerve bundles, and osseous structures; H&E, bar = 100 µm. f) Clusters of ganglion cells, including neurons within the peripheral nerve bundles; H&E, bar = 50 µm. g) Retinal epithelium and melanin-loaded cells adjacent to the neural tissue; H&E, bar = 100 µm. h) Surface tissue lined by goblet cells of the respiratory system and ciliary epithelium and the wall of the microcyst surrounded by mucinous glands; H&E, bar = 40 µm.

(the occurrence of mature thyroid parenchyma as the predominant component in the ovarian stroma) is the most frequently seen monodermal teratoma (4,6,12). Immature teratomas were formerly called solid teratomas, whereas mature teratomas were called cystic teratomas. However, since both mature and immature teratomas are known to include grossly identifiable solid, solid-cystic, or cystic areas, currently, the relevant terms are no longer in use (12).

Although there are some criteria available with respect to the gross appearances of mature and immature teratomas (grossly, mature teratomas are cystic and immature teratomas are solid), differential diagnosis is established principally on the basis of their histomorphological features. Fully differentiated embryonic tissues are present in mature teratomas. Mesodermal and ectodermal structures are found in 93% and 71%, respectively, while the ectodermal component has been reported to be exceptionally present (12). The proportion of malignant transformation of either component is 1% in mature teratomas, whereas at least 1 embryonic component is less or poorly differentiated in immature teratomas. Neural tissue is predominant in the majority of immature teratomas and the evidence of malignancy is the occurrence of immature neural parenchyma or neuroepithelial components. Furthermore, poorly differentiated cartilaginous, osseous, muscular, or epidermal tissues are present, as well (12).

The relevant case was diagnosed as a mature solid-cystic teratoma, since the histomorphological features of all of the components belonging to the 3 germ layers revealed well-differentiated embryonic tissue. Canine ovarian teratomas are mostly mature (benign) solid-cystic teratomas and are most frequently encountered in the left ovary (2,4). The current case was localized in the left ovary, as well. Teratomas have been reported by some authors to occur in dogs over 6 years of age (2,8) or from 6 months to 11 years of age with an average of 3 years (4,9,13). The dog in our case was 3 years old, which is compatible with the average.

Surgical removal of the mass is the sufficient therapy of choice, while concurrent performance of an ovariohysterectomy is recommended (2,4,6). An ovariohysterectomy was performed in the current case and no evidence of recurrence or any disease associated with the tumor entity was noted during the year following the onset. The necessity of an ovariohysterectomy in a case of unilateral teratoma is an issue of debate. Wilson et al. (3) reported an occurrence of a tumor mass located in the right ovary of a Rottweiler dog, and since the dog was pregnant at the time of diagnosis, only the right ovary was surgically removed. The dog was reported to have had a healthy delivery at 2 months postsurgery. In conclusion, taking into account the age, gestation possibility of the dog, and definitely the request of the owner, a unilateral ovariectomy could be considered as an option, substituting for an ovariohysterectomy.

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