Ovarian Teratoma in a Mediterranean Tortoise

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Abstract: *A 61-year-old female Mediterranean tortoise (*Testudo hermannii*) presented after 1 week of tetraparesis. Coelomic ultrasonography revealed free fluid and an ovarian mass with multiple follicles. Blood analysis suggested renal failure. After initial medical treatment for kidney disease, the tortoise seemed to improve clinically, but the animal died 2 months later. Necropsy and histopathology revealed an ovarian teratoma. To our knowledge, this is the first reported case of a teratoma in tortoise gonadal tissue.*

FIGURE 1

Radiographs revealing small foreign bodies (*fb*) in the digestive tract, loss of normal coelomic structure definition, and lung compression (*lc*).

FIGURE 2

Ultrasonographic image of free liquid (*fl*) in coelomic cavity and an ovarian teratoma (*T*) with several round echoic structures resembling ovarian follicles in different maturation stages.

Presentation

A 61-year-old female Mediterranean tortoise (*Testudo hermannii*) presented after 1 week of tetraparesis. The owner reported that the animal had not laid eggs that year but had shown nesting behavior.

The tortoise was housed outdoors, where it was in contact with concrete, soil, trees, and grass. It hibernated in winter, when temperatures were above 41°F to 46°F (5°C to 8°C); in spring, temperatures were above 73°F (23°C), and in summer, above 86°F (30°C). The tortoise had free access to water and was fed mainly romaine and iceberg lettuce and some other vegetables and fruits, mostly oranges and apples. No supplements were added to the diet.

On physical examination, the animal weighed 4.4 lb (2 kg) and had sunken eyes. On neurologic examination, the tortoise was alert but had tetraparesis that manifested as slow limb retraction when the digits were squeezed and inability to stand up and walk, even though its muscular condition was apparently good. Fecal analyses (direct observation and Gram staining) were unremarkable. Survey radiographs revealed two small foreign bodies of mineral density, presumably within the digestive tract; loss of normal coelomic structure definition; and lung compression (**FIGURE 1**). Ultrasonography showed free liquid in the coelomic cavity and several rounded hyperechoic and hypoechoic structures that resembled ovarian follicles in different stages of maturation (**FIGURE 2**). The kidneys appeared small (1.17 × 0.8 cm) but had a normal

TABLE 1 Hematologic and Blood Chemistry Results

Parameter	Results at Presentation	Results at 1-Month Follow-Up	Reference Range[1,2]
Packed cell volume (%)	27	23	28–34
White blood cells (×10³/µL)	25.2	10.6	0.7–4.2
Lymphocytes (×10³/µL)	5.71	0.95	0.31–2.9
Monocytes (×10³/µL)	1.37	0.85	0–0.8
Heterophils (×10³/µL)	18.1	8.79	0.37–1.85
Calcium (mg/dL)	28.1	13.7	7.6–14.7
Phosphorus (mg/dL)	9.17	3.94	2.6–8.8
Uric acid (mg/dL)	62.84	3.97	0.1–2
Creatine kinase (IU/L)	370.5	245.2	26–215
Total protein (g/dL)	4.14	2.34	3.3–6.5[a]
Albumin (g/dL)	1.09	0.48	1.68–3.01[a]
α_1 Globulin (g/dL)	0.16	0.86	0.09–0.44[a]
α_2 Globulin (g/dL)	0.96	0.21	0.74–1.53[a]
β Globulin (g/dL)	1.76	0.69	0.28–1.36[a]
γ Globulin (g/dL)	0.16	0.09	0.13–0.19[a]

[a]Reference range from the Clinical Biochemistry Service of the Veterinary School of the Universitat Autònoma de Barcelona, Barcelona, Spain.

echoic appearance (**FIGURE 3**). No other abnormalities were observed.

A coelomic fluid sample analysis revealed an exudate effusion (total protein: 3.48 mg/dL, 20,000 red blood cells/µL, 1300 white blood cells/µL). The results of aerobic culture of the fluid were negative.

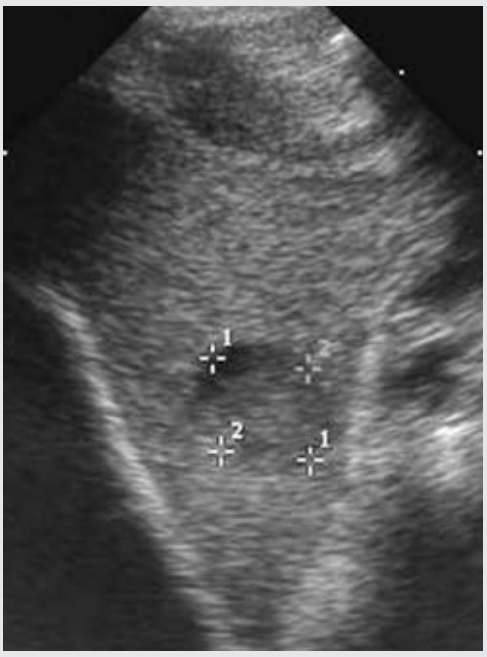
Hematology and blood chemistry results indicated renal disease with an infection/chronic inflammatory reaction[1,2] (**TABLE 1**). The differential diagnosis included coelomitis (of various etiologies, including infection and yolk) and renal disease. Endoscopy and biopsy were recommended, but the owner refused. Medical treatment was initiated with the administration of enrofloxacin[1–3] (Baytril, Bayer Animal Health; 5 mg/kg PO q48h for 2 weeks), allopurinol[3] (Zyloric, Glaxo Wellcome; 10 mg/kg PO q24h), and vitamin B complex[3] with L-carnitine (Hepadif suspension, Reig Jofre, Barcelona, Spain; 25 mg/kg PO q24h), and a homemade soft vegetarian diet of mostly green leaves was recommended.

Outcome

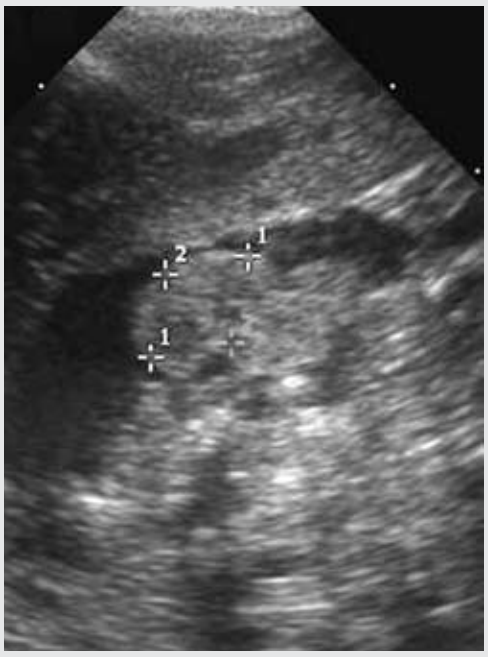
Although the tortoise seemed to improve with medical treatment, it died 2 months after presentation. The animal was submitted for a postmortem examination.

On gross examination, the coelomic aponeurosis appeared markedly thickened. All the coelomic organs had major adhesions to a spherical, intracoelomic, cystic mass 12 cm in

FIGURE 3 **Ultrasonographic images of coelomic organs.**



Normal liver and gallbladder (between calipers).



Right kidney (between calipers). The kidney has a normal echoic appearance but is small.

diameter. The mass was filled with an undetermined amount of brownish fluid and covered with a well-vascularized, fibrous capsule. Its wall was irregularly thickened, and numerous verrucous, yellow-white masses protruded into the lumen (**FIGURE 4**). Some of these masses were covered with a shiny, black, rigid layer reminiscent of scales. The cystic mass and the liver demonstrated some variably sized yolk-like structures (between 0.15 and 2.5 cm in diameter) on their dorsal surfaces. Gross identification of any ovarian or adrenal tissue was not possible.

Histologically, there were some rounded basophilic structures (300 to 500 µm in diameter), lined by few concentric granulosa cell layers, that were associated with the capsule of the cystic mass and corresponded to ovarian follicles. There were also small, rounded eosinophilic structures compatible with yolk that occasionally appeared to elicit a granulomatous reaction with associated cholesterol crystals. The cystic mass was composed of a dense, collagenous matrix occasionally lined by keratinized, stratified squamous epithelium (**FIGURE 5**) that corresponded to the black scales described above. Multiple cystic cavities were covered by either simple cubical to cylindrical, pseudostratified, ciliated epithelium (**FIGURE 6**) with goblet cells or keratinized, stratified squamous epithelium; in some cases, epithelial cells were grouped in acinar-like structures. Although there were no overtly differentiated tissues, the observed epithelial structures could have corresponded to tissues from different germ layers (respiratory tract, skin). The cavities were filled with either granular, mucinous, basophilic, occasionally calcified material or eosinophilic aggregates of keratin. Multiple islands of cartilaginous tissue (**FIGURE 7**), hemorrhagic areas, and scattered foci of mixed inflammation (with heterophils, lymphocytes, and macrophages) were seen. Due to its location and its composition by mature tissues from the different embryonic layers (ectoderm, mesoderm, and endoderm), the cystic mass was diagnosed as a benign teratoma.

Among the remaining organs, only the kidneys had significant lesions with tubulointerstitial fibrosis and multifocal granulomatous nephritis, in which some macrophages contained intracytoplasmic fungal hyphae.

FIGURE 4

The ovarian teratoma with fluid-filled vesicles.

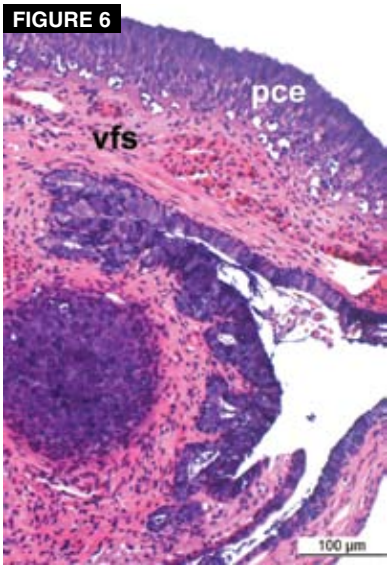
Discussion

Teratomas are parthenogenic tumors that develop from a single germ cell[4] and differentiate into tissue from at least two embryonic layers: ectoderm, mesoderm, or endoderm.[5] They may be benign or malignant. Malignant teratomas are undifferentiated, with both mature and embryonal elements.[5,6] Teratomas have been described in mammals, birds, and amphibians.

FIGURE 5

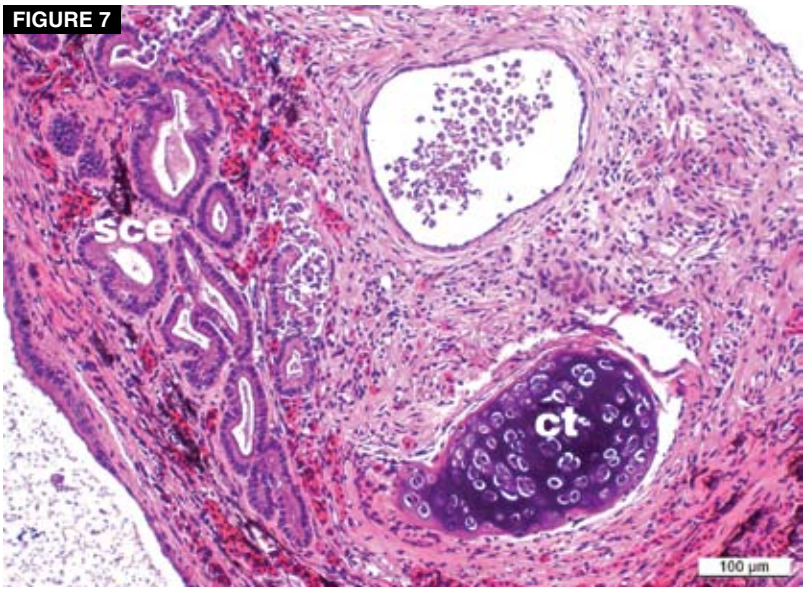
Histologic section of the teratoma showing keratinized stratified squamous epithelium (*kse*) and vascularized fibrous stroma (*vfs*).

FIGURE 6



Histologic section of the teratoma showing pseudostratified ciliated epithelium (*pce*) and vascularized fibrous stroma (*vfs*).

FIGURE 7



Histologic section of the teratoma showing simple cylindric epithelium (*sce*) and an island of cartilaginous tissue (*ct*).

In reptiles, this neoplasm has previously been diagnosed in lizards[7–10] and snakes.[11] The only two cases previously described in chelonians were malignant and benign ovarian teratomas described in red-eared sliders (*Trachemys scripta elegans*).[12,13]

The carapace and plastron can limit the extent of ultrasonographic examination of the coelomic organs in small chelonians; however, reproductive masses can be identified using ultrasonography.[7,14] In the present case, endoscopy would have been essential to confirm an ovarian mass because the presence of many round masses of mixed echogenicity resembled follicles in different maturation stages.

In this case, despite the response observed to the initial treatment, the chronic coelomitis associated with the large ovarian teratoma and the renal disease were likely the causes of death. All of these alterations caused a chronic wasting that could have contributed to the development of tetraparesis. Fungal lesions were only found in the kidneys. Mycotic pneumonia is more prevalent than mycotic kidney disease in chelonians, and renal fungal infections are generally related to systemic mycoses.[15] The presence of fungal forms in the kidney could have been caused by an ascending infection from the cloaca or bladder or by hematogenous spread from an initial focus that was previously resolved. A similar case of a renal fungal infection caused by *Geotrichum candidum* was reported in a giant tortoise (*Geochelone nigra*).[16] In the case described here, a microbiologic culture was not performed and fungi were only observed microscopically.

To our knowledge, this is the first reported case of ovarian teratoma in a Mediterranean tortoise (*T. hermannii*), and this condition should be considered in the differential diagnosis of intracoelomic neoplasms and gonadal masses in tortoises. **C**

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