NOTE *Pathology*

Seminoma with Hyperesterogenemia in a Yorkshire Terrier

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ABSTRACT. A male 8-year-old Yorkshire Terrier dog with unilateral cryptorchism was presented for investigation of reduced appetite and multifocal alopecia. Abdominal sonography and radiography demonstrated abnormal enlargement of left testicle in abdominal cavity. Both of the retroperitoneal cryptorchid testicle and the other contralateral testicle were removed surgically. The concentrations of testosterone and estradiol in blood collected from the jugular vein and the two spermatic veins were evaluated and the results revealed high estradiol concentration. The retroperitoneal cryptorchid testicle was enlarged, firm, bulging sphere mass. The cut surface revealed homogeneous white color and lobulation by septa. The contralateral testicle in scrotum showed atrophic testicle and enlarged epididymis. Histopathologically, the retroperitoneal cryptorchid testicle was diagnosed as seminoma. We thought that hyperesterogenemia and alopecia in this case was probably related with his seminoma, although high correlations between Sertoli cell tumor and alopecia have been reported. To our knowledge, this report may be a rare case of seminoma with hyperesterogenemia and alopecia.
KEY WORDS: canine, hyperesterogenemia, seminoma.

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Testicular neoplasia and Leydig cell hyperplasia are common findings in aged dogs unlike in other domestic animals and in men [3]. The prevalence varies from 0.068 to 4.6% in male dogs and up to 60% of the aged animals appeared to have testicular tumors in studies that included old dogs [4, 7]. The three main types of testicular tumors in dogs are Sertoli cell tumors, seminomas and Leydig cell tumors, and these tumors occur at about equal frequencies [2]. Cryptorchism is an important risk factor for the development of testicular tumors, causing a 26-fold increase in the risk for Sertoli cell tumors and a 15-fold increase for seminomas [1]. The more frequent occurrence of these tumors in the right testicle can be accounted for by cryptorchism, which is more common on the right side [2]. The right testicle arises more cranially than the left and has a longer distance to travel in order to reach the scrotum [2]. Both Sertoli cell tumors and Leydig cell tumors can cause increased estrogen production leading to signs of feminization and alopecia, but seminomas were not endocrinologically active [3]. In this report, we describe a case of seminoma with hyperesterogenemia and alopecia in a dog with the cryptorchism of left testicle.

A male 8-year-old Yorkshire Terrier dog (K2405) with unilateral cryptorchism was presented to NY Animal Hospital (Anyang, South Korea) for investigation of reduced appetite and multifocal alopecia. We ruled out dermal pathogens such as *demodex canis*, *Sarcoptes scabiei, Candida (C.) albicans, C. glabrata, C. Krusei, C. tropicalis, C. lustianiae, Malassezia pachydermatis* and allergens from negative test results. Abdominal sonography and radiography demonstrated abnormal enlargement of left testicle in abdominal cavity. Both of the retroperitoneal cryptorchid testicle and the other contralateral testicle were removed surgically. During orchidectomy, the ductus deference and the pampiniform plexus were double clamped and transected between the clamps. The clamp on the testicular side of the plexus was removed immediately after transection and the blood draining from both spermatic veins was collected. The concentrations of testosterone and estradiol in blood collected from the jugular vein and the two spermatic veins were evaluated and the results revealed high estradiol concentration (Table 1). Gross examination of the cryptorchid testicle showed enlarged (4 cm in diameter), firm, bulging sphere mass (Fig. 1a). The cut surface revealed homogeneous white color and lobulation by septa (Fig. 1b). The contralateral testicle in scrotum showed atrophic testicle (1.5 cm in diameter) and hypertrophic epididymis. The cut surface showed brown color of atrophic testicle and enlarged epididymis (Fig. 1c). The trimmed tissues was fixed in 10% neutral buffered formalin, and embedded in paraffin. Four μm sections were made and stained with hematoxylin and eosin (H & E) for microscopic examination. Histopathologically, the retroperitoneal cryp-

Table 1. The concentrations of estradiol and testosterone in peripheral and testicular venous blood from K2405 dog with unilateral cryptorchism

Serum origin	Estadiol (pmol/l)	Testosterone (nmol/l)
Peripheral venous blood		
Normal control[a)]	12.9	13.1
K2405	78.5	12.1
Testicular venous blood		
Left (Seminoma) K2405	405	859
Right (Unaffected) K2405	289	796

a) Hormone concentrations were also measured with the blood collected from other Yorkshire Terrier, who was 7-year-old male dog and had no testicular tumor.

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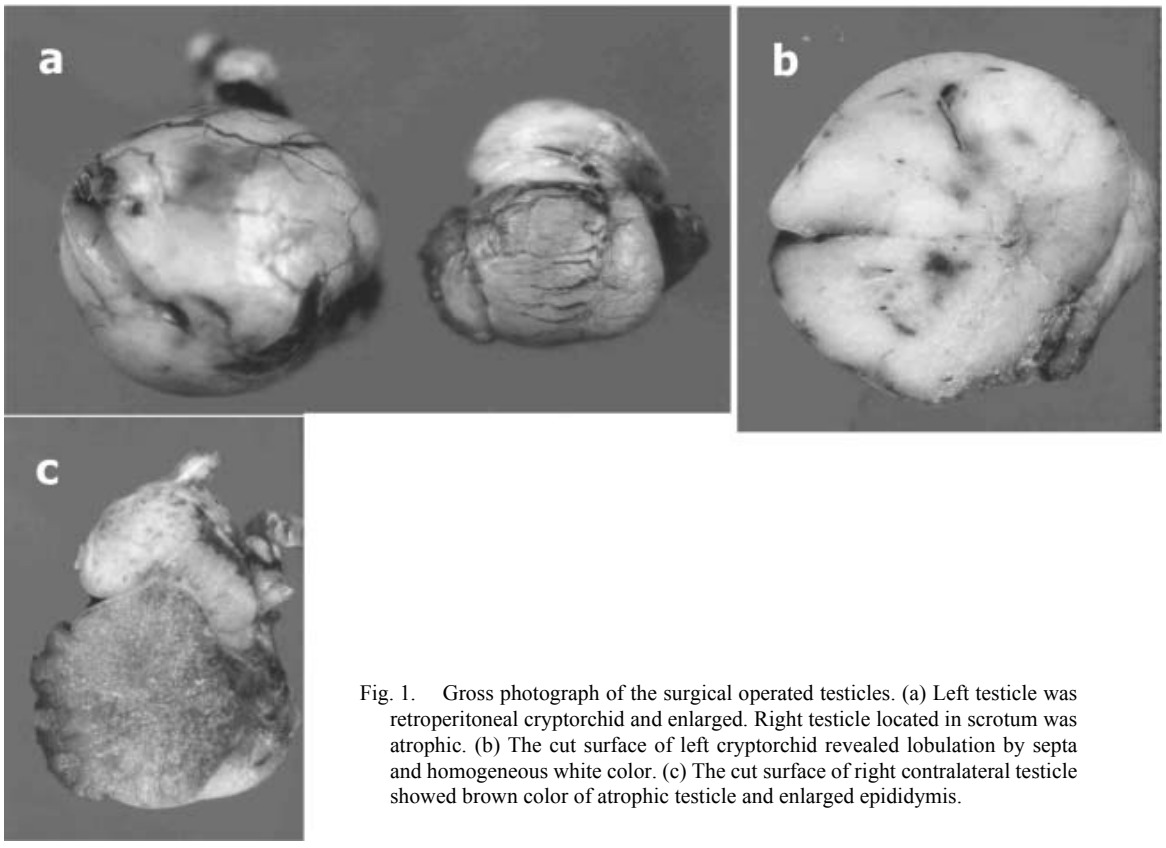

Fig. 1. Gross photograph of the surgical operated testicles. (a) Left testicle was retroperitoneal cryptorchid and enlarged. Right testicle located in scrotum was atrophic. (b) The cut surface of left cryptorchid revealed lobulation by septa and homogeneous white color. (c) The cut surface of right contralateral testicle showed brown color of atrophic testicle and enlarged epididymis.

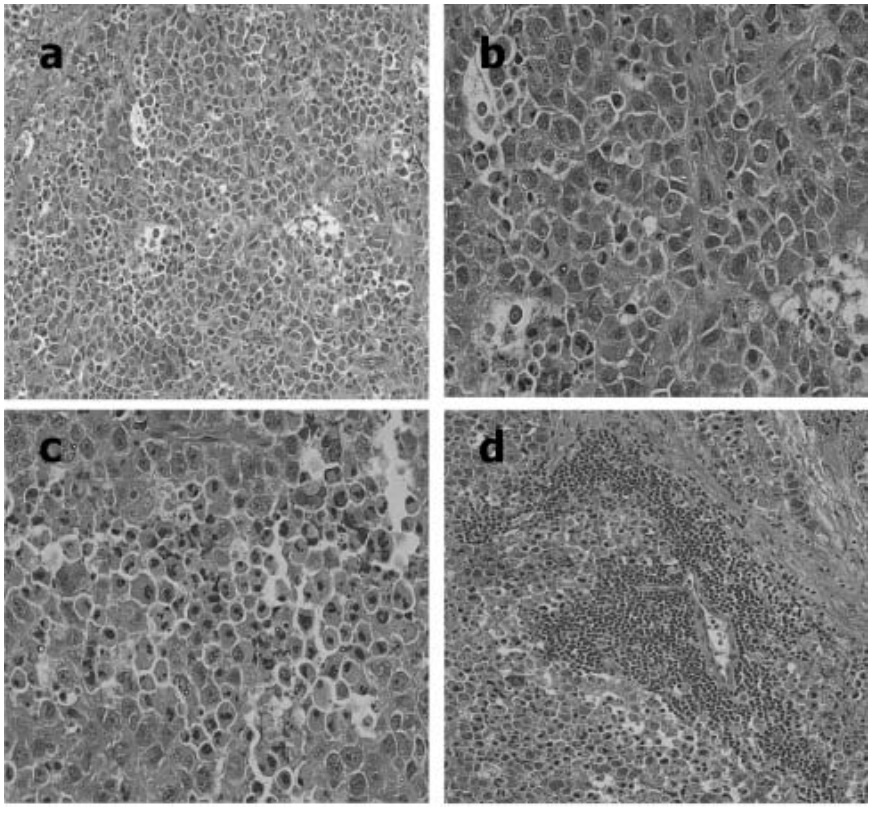

Fig. 2. Histopathological photograph of the retroperitoneal cryptorchid testicle. (a) Disappearance of normal spermatogenic cells and replacement with tumor cells separated by thick collagenous connective tissue septa was shown. H & E stain, × 200. (b) The neoplastic cells were fairly uniform in size and shape, and are large, polyhedral, or rounded. H & E stain, × 400. (c) Degenerative and necrotic cells were found frequently. H & E stain, × 400. (d) In some areas, lymphocyte infiltration was observed. H & E stain, × 200.

torchid testicle showed disappearance of normal spermatogenic cells and replacement with tumor cells separated by thick collagenous connective tissue septa (Fig. 2a). Also, the normal architecture of seminiferous tubules was destructed and most tumor cells proliferated in a solid sheet pattern, although some cells were surrounded by collagenous fibers like seminiferous tubules. The neoplastic cells were fairly uniform in size and shape, and are large, polyhedral, or rounded (Fig. 2b). The cell outlines are indistinct and the nucleus was large and of variable size, round, and hyperchromatic. The nucleoli were large and prominent and mitotic figures were common. The cell cytoplasm was scanty and acidophilic. Degenerative and necrotic cells were found frequently (Fig. 2c). In some areas, lymphocyte infiltration was observed (Fig. 2d). The architecture of epididymis was found as a very small portion. On the other hand, the contralateral testicle in scrotum was atrophic with no tumor cells. Histopathologically, the reduction and shrinkage of seminiferous tubules was observed. Also, by Johnsen's criteria [3], some seminiferous tubules revealed low Johnsen scores, implying abnormal spermatogenesis. In such tubules, there were no germ cells or there was a partial or complete arrest at the spermatocyte or spermatid stage (Fig. 3a). The epididymis revealed marked fibrosis in the thickened connective tissues (Fig. 3b). This case was diagnosed as seminoma on the basis of pathognomic findings of cryptorchid testicle. We could not find any lesions of Leydig cell tumor or Sertoli cell tumor. Multiple follow-up examinations and radiographs revealed no evidence of metastasis. The hair of alopecia area had regrown after surgical orchidectomy and at 3 months postoperative, the dog had a coat quality considered to be nearly normal.

The development of seminoma in dogs can be traced from the seminiferous tubules, where it arises from spermatogenic epithelium [2]. Testicular tumors may cause feminization in dogs, which is characterized by gynaecomastia, atrophy of the contralateral testis, a pendulous prepuce and attractiveness to other male dogs, as well as fatal bone marrow depression in severe case [3, 5]. Feminization is attributed to the secretion of excessive amounts of estrogens by the tumor. In humans, estradiol in blood is derived mainly from Leydig cells and adipocytes after conversion from testosterone, but Sertoli cells and germ cells can also produce estrogen [6]. However, in dogs, Sertoli cell tumors are mainly known to produce high estrogen concentration, but it is not clear whether Leydig cell tumors and seminomas also secrete estrogens [3]. Feminization occurs in 19% of dogs with a histologically diagnosed Sertoli cell tumor and in 5% of dogs with a Leydig cell tumor [3]. We thought that hyperesterogenemia and alopecia in this case was probably related with his seminoma, although high correlations between Sertoli cell tumor and alopecia have been reported. To our knowledge, this report may be a rare case of seminoma with hyperesterogenemia and alopecia with the cryptorchism of left testicle in dog.

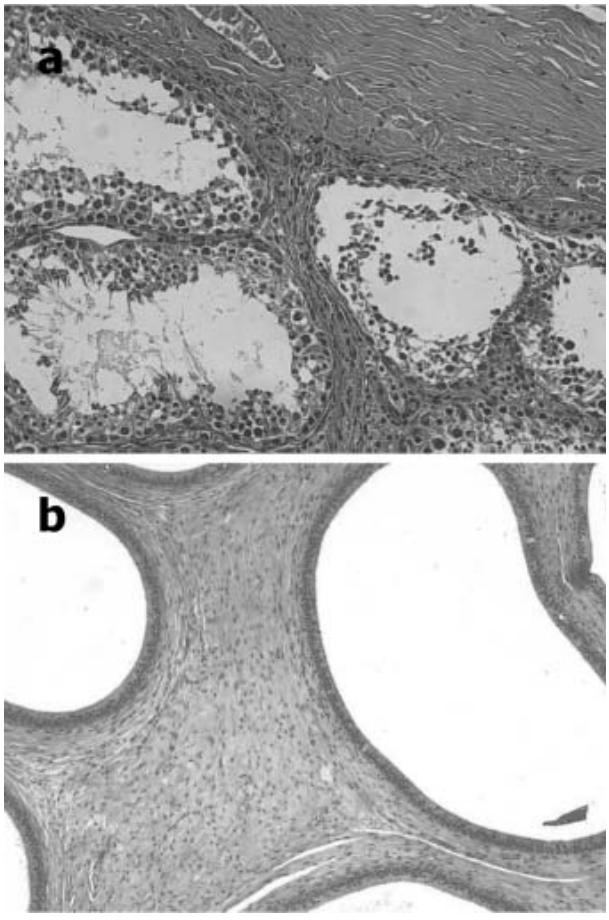

Fig. 3. Histopathological photograph of contralateral testicle. (a) Some seminiferous tubules revealed decreased spermatogenic cells, implying abnormal spermatogenesis. H & E stain, × 200. (b) The epididymis revealed fibrosis. H & E stain, × 100.

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