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Research Article

TESTICULAR TUMOR AND ASSOCIATED CLINICAL, HORMONAL AND HEMATOBIOCHEMICAL SYMPTOMS AND ITS SUCCESSFUL SURGICAL MANAGEMENT IN CANINES

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ABSTRACT: Seven cases of Sertoli cell tumors in dogs were treated with a history of alopecia, hyperpigmentation, and estrogenic behavior at Madras Veterinary College Hospital, India. The average age of the affected canines was nine years, and they were of mixed breed, including Labrador and Spitz. Although most dogs were brought in for reasons unrelated to Sertoli cell tumors, many exhibited one or more clinical signs associated with this type of tumor. These indicators included prostatic changes, alopecia, hyperpigmentation, hematological changes due to bone marrow suppression, gynecomastia, and feminization associated with hormonal alteration. The recorded cases demonstrated an association between Sertoli cell tumors and cryptorchidism, as all the dogs had one or both testicles undescended. The histopathological features of the tumors varied, with no consistent correlation observed with metastatic potential. All the cases were successfully managed surgically and after two months there was complete remission of all symptoms.

Keywords: Cryptorchid, Dog, Sertoli cell tumor, Feminization, Laparotomy, Orchiectomy.

INTRODUCTION

Testicular tumor in dogs occurs as a result of uncontrolled and abnormal growth of testicular cells [1]. Three primary types of testicular tumors are identified in dogs: Seminoma or germ cell tumors, interstitial cell tumors, and Sertoli cell tumors [2]. Cryptorchidism is the commonly encountered predisposing factor for testicular tumors as evident in the present cases. In the present report, the frequency of Sertoli cell tumors in cryptorchid cases was observed to be higher than in those with scrotal testes, aligning with the findings reported by White [3]. Tumors comprising more than one type of tissue with diverse testicular cancer cells are not uncommon [4]. Sertoli cell tumors are locally invasive, rarely metastatic, and more frequently seen in cryptorchids [5]. This type of tumor is active hormonally, inducing signs of hyperestrogenism in 20-30% of the patients, which includes feminization, gynecomastia, atrophy of contra-lateral testicle, squamous metaplasia of the prostate gland, prostatitis, symmetrical alopecia, hyperpigmentation and estrogen-induced bone marrow suppression [6, 7]. Nevertheless, there is no conclusive evidence that estrogen alone is accountable for all these symptoms. Approximately 15% of Sertoli cell tumors have been associated with bone marrow suppression. The prognosis is consistently poor for dogs experiencing pancytopenia attributed to estrogen-induced myelotoxicity [8]. Currently, there is insufficient data and practical recommendations for patients presenting complications associated with Sertoli cell tumors. In alignment with existing literature, this case report delineates seven cases of Sertoli cell tumors, with or without cryptorchidism, and infrequently associated intraabdominal locations. Accompanied by a spectrum of clinical symptoms and characteristic signs of hyperestrogenism, these cases are detailed in the report. The document also offers insights into the successful surgical management of these instances. This study contributes to our

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comprehension of the clinical presentation and management of these challenging cases, addressing a significant gap in the veterinary medical literature.

MATERIALS AND METHODS

Case history

In this study, seven adult male dogs of various age groups and breeds were presented at the Small Animal Outpatient Unit of the Madras Veterinary College Teaching Hospital in Chennai, India. These dogs presented with a spectrum of clinical manifestations, encompassing alopecia, weight loss, features indicative of feminization syndrome, and the presence of one testicle not positioned in its typical location within the scrotum.

Diagnosis

The evaluation and diagnostic procedures included clinical signs, hematology, and endocrine evaluations, summarized in Table 1. Additionally, ultrasound and radiographic evaluations were performed. It's worth noting that there exist contemporary techniques, such as Raman spectroscopy and the assessment of tumor markers, which have applications in detecting both benign and malignant tumor growth. However, it is important to highlight that these methods are not widely employed in veterinary practice [9,10].

Ultrasound and radiographic examinations

Ultrasound examinations were conducted as follows: Ultrasound of the left caudal abdominal quadrant, revealed an unorganized, complex structure (Fig. 1) and an enlarged prostate in the first case (Fig. 2). In the second case, ultrasound showed hyperechoic tortuous testicular lines and a hypoechoic testicular shadow (Fig. 5). Ultrasound of the para penile region in the fourth case unveiled an unorganized mass like structure with enlarged hypertrophied spermatic cords and an edematous fluid-filled cystic cavity (Fig. 6).

Additionally, lateral radiographs were obtained for a comprehensive survey to rule out anatomical abnormalities, revealing a smoothly contoured homogeneous mass located in the caudal abdominal region, just cranial to the bladder (Fig. 3). In one case, an ultrasound-guided biopsy was conducted on a heterogeneous mass (10 × 5.2 cm) situated near the inguinal region to validate the presence of Sertoli cells (Fig. 4). To assess the potential for metastasis and the general health of vital organs, additional thoracic radiographs and ultrasound examinations were conducted.

Surgical management

Most of the dogs required surgical interventions after ruling out metastasis and ensuring the health of other organs [11]. Depending on the location of the retained testicle, either intra-abdominal or para penile, the surgical incision was determined. Cases with reduced hematological parameters required a blood transfusion to mitigate anesthetic risks preoperatively and during the procedure.

In cases 1, 3, 4, 6, and 7, where the testicles were cryptorchid, para penile, and scrotal, appropriate incisions were made according to the testicular location. In cases 4 and 7, cystic fluid was aspirated using a sterile infusion set, and the fluid was sent for histopathological analysis, revealing the presence of neutrophils and inflammatory cells. The testicular tumor was excised after ligating the respective spermatic cords. Grossly, the testicular tumors were enlarged and entirely neoplastic, with an atrophic contralateral testicle in cases 1, 4, 6, and 7 (Fig. 9, 10, 11, 12). case 3 was an exception, as it presented with an evident mass along with the contralateral testicle.

In cases 2 and 5, where the testicular tumor was intra-abdominal, a caudal midventral celiotomy was performed. The left or right neoplastic testis was exteriorized and excised, while in case 3, spermatic cord torsion of the left testis within the abdomen was identified. After the procedure, the content of the prostatic cyst was aspirated, and the abdomen was closed. Macroscopically, the testicular tumors displayed a round and irregular shape, entirely replaced by neoplastic tissue with a spongy texture and a greyish color. Histological sections validated the diagnosis of a Sertoli cell tumor featuring a pseudotubular pattern, marked by highly vacuolized elements, and concurrent testicular diseases in dogs (Fig. 7, 8). A cytological examination of the prostatic cyst content unveiled epithelial cells displaying indications of squamous metaplasia. The atrophied intrascrotal testicle was removed, followed by scrotal ablation.

RESULTS AND DISCUSSION

Cryptorchidism is a prevalent testicular developmental disorder in dogs, primarily linked to genetic factors [12]. In retained testes, there exists an elevated risk of developing neoplasms, including Sertoli cell tumors and seminoma [13]. Sertoli cell tumors and seminomas typically have a low probability, less than 15%, of metastasizing. However, in rare instances, carcinomas may develop when metastasis occurs [14]. With age, there are more chances of developing a

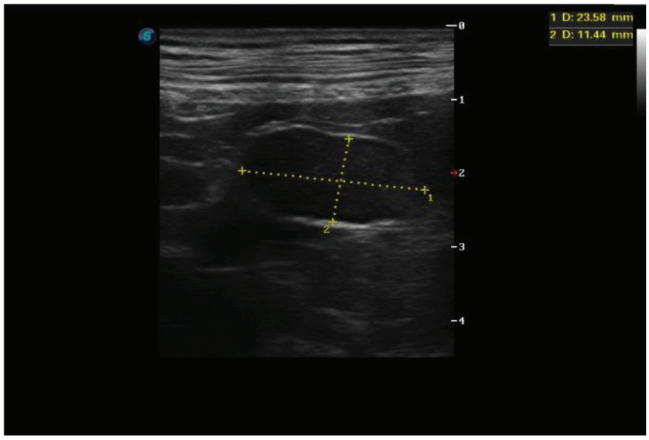

Fig. 1. Complex heterogenous mass (5.8 × 3.2) near Caudal left abdominal quadrant.

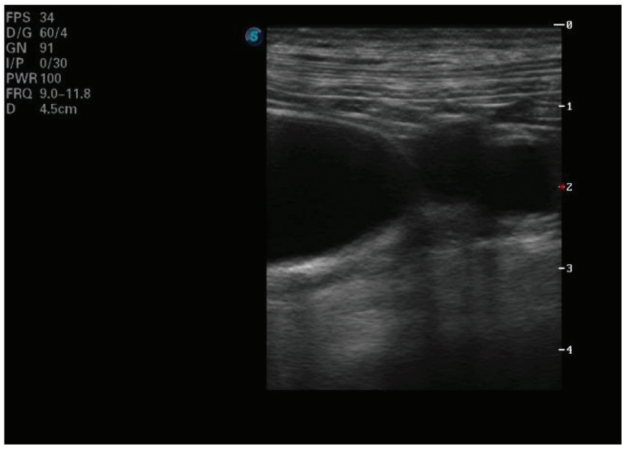

Fig. 2. Enlarged prostate with non-homogenous echogenicity.

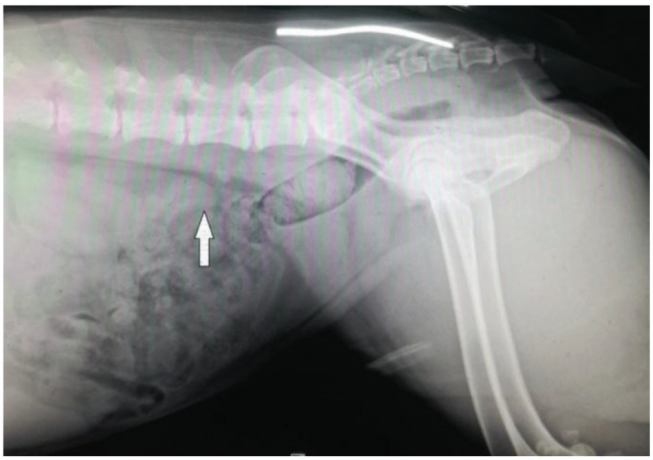

Fig. 3. Soft contoured homogenous mass at the caudal abdomen.

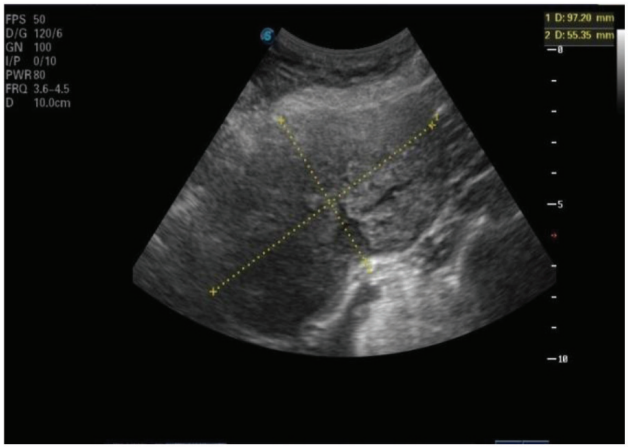

Fig. 4. Heterogenous mass (10 × 5.2 cm) near inguinal region.

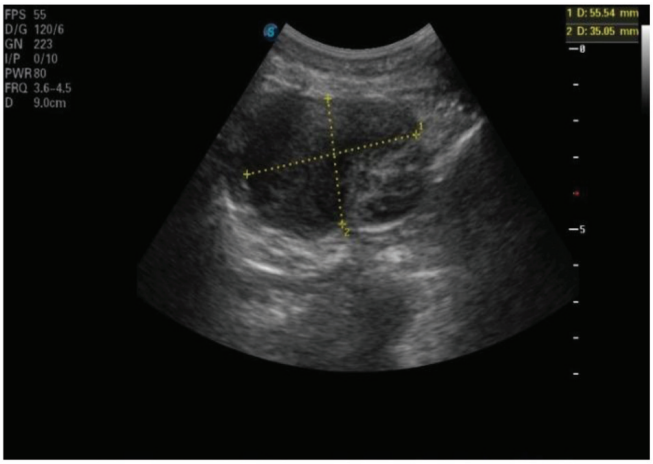

Fig. 5. Hyperechoic tortuous testicular lines and a hypoechoic testicular shadow. Testicle size (9.3×4.2)

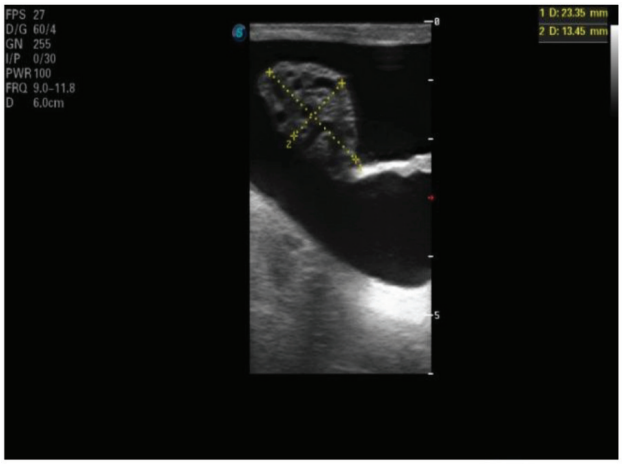

Fig. 6. Complex mass (4.3 × 2.4) with hypertrophied spermatic chord and anechoic fluid with cyst.

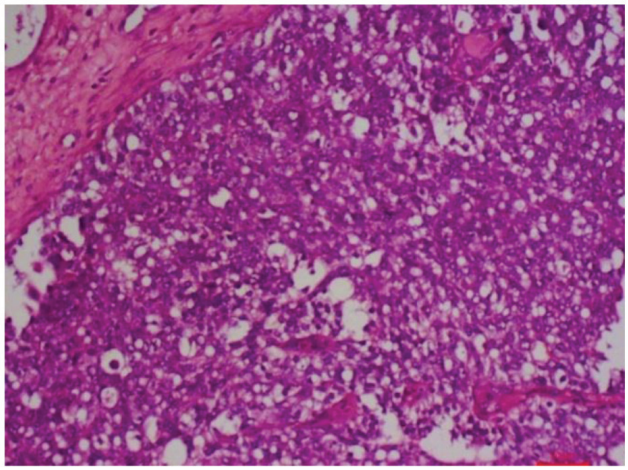

Fig. 7. Intratubular pattern with vesicular hyperchromatic nuclei.

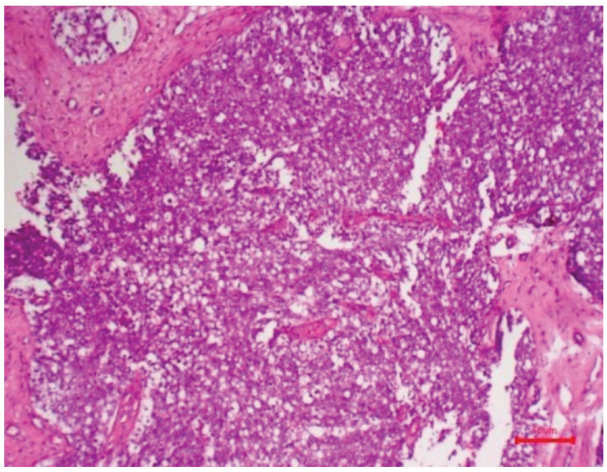

Fig. 8. Diffuse Sertoli cell tumor. Large polyhedral shaped neoplastic cells.

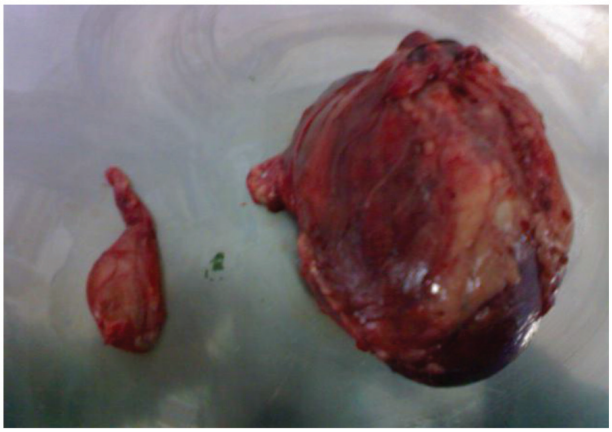

Fig. 9. Enlarged and neoplastic testicular tumor with atrophied contralateral testes.

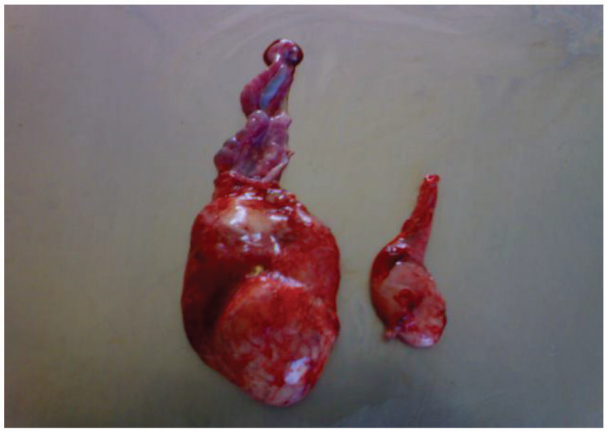

Fig. 10. Enlarged, round and irregular testicular tumor with atrophied contralateral testes.

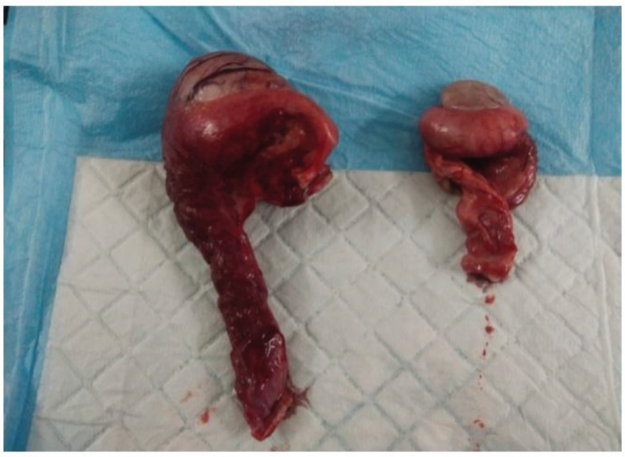

Fig. 11. Round and irregular testicular tumor with atrophied contra-lateral testes.

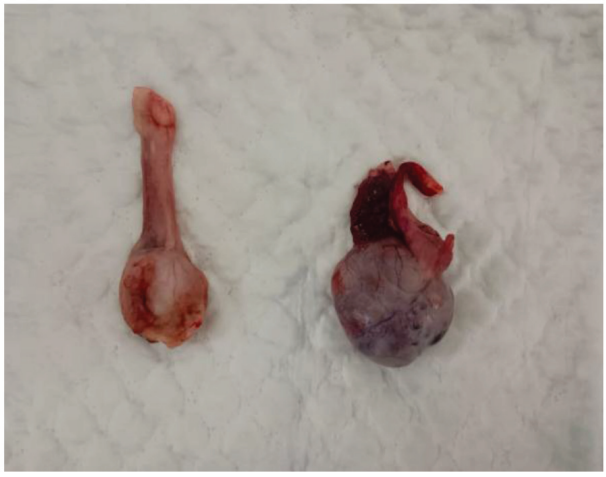

Fig. 12. Irregular testiclur tumor with spongy appearance. Contra-lateral testes atrophied.

Table 1. Testicular tumor case study in seven dogs - clinical data and hormonal profile.

Case detail	Main symptoms	Hormonal status	Normal range	Hematological status	Normal range
10 year old Labrador	Alopecia, Feminine behavior	P4 = 0.40 E2 = 20.9 T = 0.55	0-1 ng/mL 0-15 pg/ml 5-60 ng/ml	HCT: 25.7 Hb: 11.90 RBC: 4.37 WBC: 21.60 Platelet: 90	41 – 58 % 14.1 - 20.1 g/dL, 5.7 - 8.5 × 10^6/µL, 5.7 - 14.2 × 10^3/µL 186 – 545 × 10^3/µL
4 year old Pomeranian	Symmetrical alopecia, hyperpigmentation, intra-abdominal gynecomastia, prostatic dysfunction	P4 = 0.60 E2 = 18.9 T = 0.35	do	HCT: 15.7 Hb: 8.90 RBC: 3.37 WBC: 25.60 Platelet: 80	do
11 year old non-descript	Symmetrical alopecia in the flanks and thighs prostate appeared enlarged and painful	P4 = 1.60 E2= 18.9 T = 0.2	do	HCT: 22.0 Hb: 7.10 RBC: 2.36 WBC: 33.30 Platelet: 80	do
9 year old Spitz	Symmetrical alopecia in the thighs, prepuce edematous with gynecomastia, Bilateral cataract, left testicle atrophy	P4 = 1.40 E2 = 10.9 T = 0.5	do	HCT: 25.0 Hb: 9.10 RBC: 5.26 WBC: 28.30 Platelet: 90	do
9 year old Labrador	Hyperpigmentation with asymmetrical alopecia, cryptorchid, preputial sagging, Gynecomastia	P4 = 1.62 E2 = 11.2 T = 0.3	do	HCT: 22.0 Hb: 8.30 RBC: 4.28 WBC: 32.30 Platelet: 80	do
11 year old non-descript dog	Asymmetrical alopecia, cryptorchid testicle, preputial sagging, Gynecomastia.	P4 = 1.32 E2 = 9.2 T= 0.6	do	HCT: 29.0 Hb: 9.30 RBC: 7.28 WBC: 22.30 Platelet: 180	do
8 year old Labrador	Hyperpigmentation with asymmetrical alopecia	P4 = 1.72 E2 = 8.2 T2 = 0.4	do	HCT: 17.0 Hb: 8.20 RBC: 5.27 WBC: 28.30 Platelet: 80	do

[P4: Progesterone; E2: 17 beta- estradiol; T: Testosterone; HCT: Hematocrit]; Hb: Hemoglobin].

teticular tumor [15]. Around 70% of Sertoli cell tumors originating in abdominal or cryptorchid testes are functional and linked to a feminizing paraneoplastic syndrome. This syndrome is marked by signs such as non-pruritic, bilateral symmetrical alopecia, hyperpigmentation, a pendulous penile sheath, prostatic dysfunctions, gynecomastia, attraction to other males, and the adoption of a female posture during urination [16], as observed in the majority of cases in the current report.

Non-regenerative anemia and bone marrow suppression are usually the sequelae of estrogen-induced myelotoxicosis [8]. Undescended or cryptorchid testes are more prone to testicular neoplasia, as observed in the present report. Spermatic cord torsion occurs more frequently in retained neoplastic testes, exacerbating clinical signs and leading to a poor prognosis. The risk of this condition further escalates with the progressive enlargement of the neoplastic organ.

The sole external clinical indicator of this neoplastic transformation was associated with feminizing syndrome which is quite characteristic as described by Peters *et al.* [7]. Prostatic dysfunction was diagnosed during the progression of this syndrome in the majority of cases. This encompassed benign hyperplasia, squamous metaplasia, and prostatic cysts, along with associated symptoms in most instances. Elevated estrogen levels likely correlated with the abnormal hematological and hormonal profile, and these levels normalized a few months following the surgical removal of the neoplastic testes. Atrophy of the contralateral testis is a common finding [7]. It is not clear whether this is a result of feminization or age because most tumors occur in older dogs. By investigating the morphology of the testis, and the endocrinological and fertility status of the dog this phenomenon is explained.

CONCLUSION

In conclusion, the present study emphasizes the importance of diagnosis and treatment of cryptorchid dogs and possible complications that may occur over time.

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