RESEARCH ARTICLE

Tumours of Urogenital System in Dogs

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Abstract

A total of 10 canine urogenital tumour cases were evaluated for their clinical, haemato-biochemical, radiographic, ultrasonographic, cytological, and histopathological features. The cases included five canine transmissible venereal tumours (CTVT), four vaginal tumours, and one cryptorchid testicular tumour. CTVT occurred in younger dogs (3.9 ± 1.27 years) as ulcerated, cauliflower-like genital masses, whereas vaginal tumours affected older dogs (11.75 ± 1.43 years) and presented as protruding vulvar masses. The cryptorchid testicular tumour was diagnosed in a 7-year-old German Shepherd dog. Mild leukocytosis was observed initially in CTVT cases, with a significant reduction following vincristine therapy, while haemoglobin and erythrocyte values remained within normal limits. Cytology confirmed CTVT, whereas histopathology with Masson's Trichome staining identified vaginal and testicular tumours. Radiography and ultrasonography demonstrated well-defined soft tissue masses. CTVT was the most prevalent urogenital neoplasm, highlighting the importance of combining clinical examination, imaging, cytology, and histopathology for accurate diagnosis and treatment evaluation.

Key words: Biochemical parameters, Canine, Haematological parameters, Radiography, Tumour, Ultrasonography.

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Introduction

Tumours of the urinary and genital systems are rare in dogs. Genital tract tumours make up about 3% of all canine tumours (Devarajan *et al*., 2023). In a retrospective study made on canine neoplasms over 2017 to 2021 at VCC, Veterinary College, Anand (Gujarat) 562 cases had canine neoplasms, which included mammary tumours 322 (57.29%), oral tumours 59 (10.49%), bone tumours 36 (6.41%), CTVT 68 (12.09%) and other tumours 77 (13.70%) (Asodiya *et al.,* 2024). Among the uro-genital tumours, tumours of the vagina are common. Early surgical castration reduces testicular tumours in males. A round cell type neoplasia known as a transmissible venereal tumour (TVT) is spread by tumour cell mating and physical transfer. It is among the most prevalent benign tumours in dogs, affecting both sexes. The canine transmissible venereal tumour is primarily found in the external genital area. The tumour bulk grows and multilobular lesions are observed (Kucukbekir *et al*., 2021).

Dogs aged two to five years are most commonly affected by CTVT, with both sexes equally susceptible. A weakened immune system increases risk. The tumour mainly affects the external genitalia but can rarely metastasise internally. It is primarily spread through sexual contact. Fine-needle aspiration cytology (FNAC) is the simplest and fairly accurate method for diagnosis (Das *et al*., 2020). In female dogs, the exact aetiology of reproductive tumours remains unclear. Vaginal tumours of mesenchymal origin are rare and are most commonly diagnosed as fibromas or fibrosarcomas (Balamurugan and Sivasudharsan, 2021). Most uro-genital tumours are benign mesenchymal types, like leiomyomas or fibromas, slow-growing, non-invasive, and non-metastatic, arising from smooth muscle (Devarajan *et al*., 2023). This paper describes the isolated cases of tumours of urogenital system in dog of Junagadh region.

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Materials and Methods

This clinical study was carried out on 10 canine patients at Veterinary Clinical Complex and Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Junagadh-362 001, Gujarat, India. Diagnosis of uro-genital tumours was

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made based on physiological examination, haemato-biochemical parameters, radiography, ultrasonography, cytology, and histopathology. Details of the cases regarding age, sex, breed, particular symptoms exhibited by the animal, time of occurrence, feeding and watering history, etc. were recorded at the time of case presentation.

Clinico-Haemato-Biochemical Examination

Physiological parameters like rectal temperature, respiration rate, heart rate, color of the visible mucous membrane of all the selected dogs were recorded on day 0, 7th and 15th post-treatment days. Simultaneously, blood samples were collected aseptically for haemato-biochemical analysis. Samples collected in EDTA vials were used for detailed haematological analysis using auto-blood analyser (Abacus ABJ Vet-5 Auto blood analyser). Blood samples collected in clot activator vials were centrifuged and serum separated was stored at -20°C until analysed for total protein, creatinine, blood urea nitrogen, and aspartate and alanine aminotransferases (AST-ALT) using standard procedures and kits on automated biochemistry analyser (LW C100).

Radiography, Ultrasonography and Vaginal Cytology

For vaginal tumour cases, radiographs of the pelvis were taken in lateral recumbency for better visualisation of the vaginal growth. The radiographic exposure factors were based on the size of the patient. Focal film distance (FFD) of 90 cm was kept as a constant factor.

For testicular tumour case, the animal was positioned in lateral recumbency and ultrasonography of the abdomen was done. For vaginal tumour cases, ultrasonography of the perineal region was done.

Cytological smear prepared from an external genital growth in a dog affected by CTVT was examined using Field stain at 100X magnification.

Clinical Management

Vincristine sulphate @ 0.025 mg/kg BW, i/v, at weekly intervals for 4 weeks was used to treat the cases of CTVT. Additionally, Ondansetron @ 0.5 mg/kg BW, i/v, was also given to prevent vomiting, and Liver tonic was given to support liver function. The animals with vaginal tumour were restrained in the perineal position, and catheterisation of urinary bladder was performed using a sterile urinary catheter. An episiotomy incision was made. The tumour was removed by blunt dissection, separating it from the surrounding tissues. Haemorrhage was controlled using ligatures. Episiotomy repair was done in three layers-mucosa, muscle, and subcutaneous tissue. The vaginal mucosa was sutured with continuous lockstitch using 2-0 Polyglactin 910. The skin was closed with horizontal mattress sutures using non-absorbable Nylon.

In case of a testicular tumour, the animal was diagnosed with a tumour of the monorchid testicle. Therefore, both the scrotal testicle and the affected abdominal testicle were surgically removed.

Results and Discussion

The mean age of the five CTVT affected dogs was 3.90 ± 1.27 years. The mean age of four dogs with vaginal tumour was 11.75 ± 1.43 years. The most common clinical signs of CTVT included nodular to cauliflower-like growths on the penis, prepuce, or vaginal mucosa (Fig 1 A,B). Tumour masses were typically ulcerated, friable, and bleed easily, often accompanied by a serosanguinous (bloody) discharge. Priyadarshini *et al*. (2021) and Parikh *et al.* (2023) upon gross examination reported that tumour masses were observed surrounding the genital organs, exhibiting a pinkish or hyperemic, cauliflower-like appearance, often accompanied by ulceration and bleeding. The most common clinical signs of vaginal tumours included a protruded soft tissue mass from the vulva (Fig 1C). Additionally, a 7-years old German shepherd presented with a history of haematuria, dribbling of urine, hyporexia and edema of lower limbs upon clinical examination, was found to be monorchid (Fig 1D).

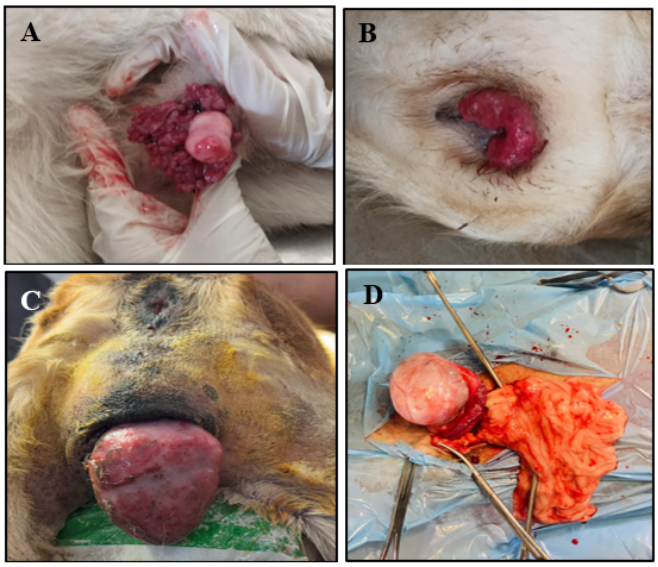


Fig. 1: Gross appearance of urogenital system tumour. A) Canine transmissible venereal tumour (CTVT) in male dog. B) CTVT in a female dog. C) Vaginal tumour. D) Monorchid testicular tumour.

Physiological Parameters

The mean ± SE values of rectal temperature (°F) recorded on day 0, 7th and 15th post-treatment days were 102.07 ± 0.46, 101.72 ± 0.29 and 101.87 ± 0.31, respectively, showing a non-significant decrease in rectal temperature. The mean ± SE values of heart rate and respiration rate showed a non-significant difference on day 0, 7th and 15th post-treatment

days. The colour of the mucus membrane and capillary refill time were found to be normal during the study period in all cases. Awaluddin *et al*. (2021) and Bhavani *et al*. (2024) also reported all vital signs within normal ranges in cases of canine transmissible venereal tumour.

In cases of vaginal tumours and monorchid testicular tumour, physiological parameters remained within normal limits during the study period with no significant changes on day 0, 7th and 15th post-operative days. This might be due to localised, slow-progressing, and non-systemic vaginal or testicular tumours in most cases.

Haemato-Biochemical Alterations

The mean ± SE values of total leucocyte count, neutrophils and platelets count in CTVT cases showed a significant ($p < 0.05$) decrease on 7th and 15th post-treatment days compared to the day of presentation (Table 1). This might be due to the vincristine chemotherapeutic drug interferes with cell division, including healthy cells in the bone marrow that produce a decrease in blood count. Braz and Marinho (2021) reported that dogs undergoing conventional chemotherapy exhibited significant alterations in leukocyte counts, resulting in leukopenia and neutropenia. A non-significant increase in creatinine levels was observed following treatment but remained within normal physiological range. All other haemato-biochemical parameters did not show discernible change ($p>0.05$) from pre-treatment to post-treatment periods.

In vaginal tumour cases, all the haemato-biochemical parameters were within normal physiological range. The haemoglobin and total erythrocyte count were non-significantly decreased post-operatively (Table 1). This decrease may be due to bleeding during surgery or haemoconcentration due to possible dehydration at the time of presentation. However, the values remained within the normal physiological limits during the study period. There was a non-significant decrease in neutrophil count after treatment but it remained within normal physiological limits during the study period. This decrease may be due to reduced local and systemic inflammation after removal of the tumour. Erdogan (2025) revealed mild leucocytosis and anaemia in bitch diagnosed with vaginal leiomyoma.

In the case of a cryptorchid testicular tumour, a low haemoglobin concentration and total erythrocyte count were observed, along with elevation in total leucocyte count and serum creatinine levels on the day of presentation. All parameters returned to within the normal physiological range following treatment (Table 1). Kisani *et al*. (2017) recorded anaemia and thrombocytopenia in a dog with cryptorchid testis Sertoli cells tumour.

Radiography, Ultrasonography and Vaginal Cytology Findings

Tentative diagnosis was made by clinico-physiological examination, radiography and ultrasonography. On radiography, out of 4 dogs which were positive for vaginal growth, 2 dogs revealed a prominent, well-defined soft tissue opacity mass in the vaginal region, that protruded outside the body (Extra-luminal) (Fig. 2A). Other 2 dogs revealed a prominent soft tissue opacity in the perineal/vaginal region, which did not protrude outside the body (Intra-luminal) (Fig. 2B). In all cases, ultrasonography found a well-defined, hypoechoic to heterogeneous soft tissue mass with evidence of active internal vascularity in the vaginal region in colour Doppler ultrasound (Fig. 3A). The confirmed diagnosis of canine transmissible venereal tumour was possible through cytology (Fig. 4A,B). Parikh *et al.* (2023) and Mihandoost *et al.* (2025) in vaginal cytology identified red blood cells, a mix of large and small intermediate cells, and characteristic round cells consistent with transmissible venereal tumour (TVT). The confirmatory diagnosis of a vaginal tumour was possible through histopathology (Fig. 5A,B).

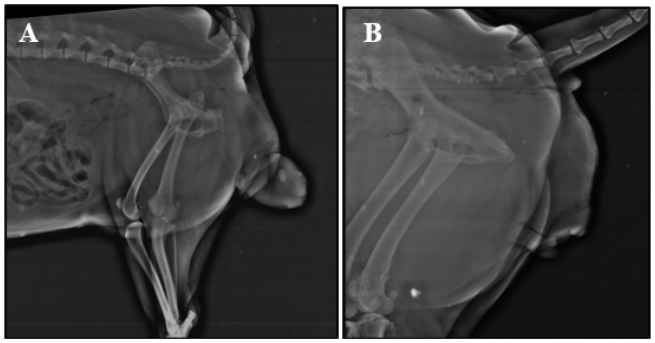


Fig. 2: X-ray of vaginal tumour. A) Extraluminal vaginal growth - Well-defined soft tissue opacity visible in the vaginal region which protruded outside the body. B) intraluminal vaginal growth - Prominent soft tissue opacity visible in the perineal/vaginal region without protruding outside the body

There was no testicle like structure shown in radiography in the case of cryptorchid testicular tumour. Ultrasonographically, the testicular tumour demonstrated a lobular outline with heterogeneous echotexture and cystic areas (Fig. 3B). In histopathology examination of testes, complete replacement of seminiferous tubules was noticed by fibrovascular tissues. Only remnants of seminiferous tubules were present with narrowing of lumen, multiple haemorrhages with fibrous connective tissue and presence of hemosiderin pigments (H & E X10) (Fig. 6A,B).

Outcome of Clinical Management

All TVT cases, except one, were medically managed using Vincristine sulphate @ 0.025 mg/kg BW, i/v, at weekly

Table 1: Haemato-biochemical changes in canine uro-genital tumour before and after treatment (Mean ± SE)

Parameters	Days	Canine CTVT (n=5)	Vaginal tumour (n=4)	Testicular tumour (n=1)
Haemoglobin (g/dL)	0	11.69 ± 1.90	13.62 ± 2.30	6.20
	15	13.70 ± 1.42	13.02 ± 1.38	9.73
Total erythrocyte count (x10^6/µL)	0	6.88 ± 0.50	7.40 ± 1.05	2.19
	15	7.45 ± 0.23	6.46 ± 0.31	4.11
Packed cell volume (%)	0	43.99 ± 1.63	47.05 ± 4.78	18.20
	15	45.83 ± 2.00	43.11 ± 3.93	22.91
Total leukocyte count (x10^3/µL)	0	24.59 ± 2.65	19.36 ± 3.79	17.34
	15	8.19 ± 0.97**	19.49 ± 4.77	10.81
Neutrophil (%)	0	75.27 ± 3.00	75.15 ± 4.74	71
	15	46.25 ± 1.49**	69.07 ± 7.64	76
Lymphocyte (%)	0	22.05 ± 3.66	15.45 ± 2.67	23
	15	18.05 ± 2.99	15.75 ± 3.31	18
Monocyte (%)	0	7.42 ± 0.44	6.50 ± 1.26	4
	15	6.55 ± 0.46	4.82 ± 1.54	5
Eosinophil (%)	0	1.02 ± 0.73	2.25 ± 1.45	1
	15	0.75 ± 0.47	1.35 ± 0.72	1
Basophil (%)	0	0.75 ± 0.25	0.62 ± 0.37	1
	15	0.50 ± 0.28	0.37 ± 0.37	0
Platelets (x10^5/µL)	0	4.23 ± 0.22	2.53 ± 0.96	2.20
	15	2.00 ± 0.24**	3.77 ± 0.62	2.77
Creatinine (mg/dL)	0	0.92 ± 0.18	0.83 ± 0.31	1.62
	15	1.14 ± 0.04	1.08 ± 0.10	0.97
Blood urea bitrogen (mg/dL)	0	29.74 ± 8.25	48.48 ± 5.87	49.11
	15	38.38 ± 6.24	46.80 ± 5.53	34.20
Aspartate transaminase (IU/L)	0	32.34 ± 5.37	37.41 ± 0.32	20.37
	15	41.44 ± 6.46	39.75 ± 1.45	29.00
Alanine transaminase (IU/L)	0	22.72 ± 5.96	33.25 ± 10.42	34.27
	15	24.23 ± 4.43	34.56 ± 9.20	33.00
Total protein (g/dL)	0	8.21 ± 0.89	8.26 ± 0.63	8.20
	15	7.70 ± 0.56	8.05 ± 0.62	7.22

**Significant between periods at p<0.01.

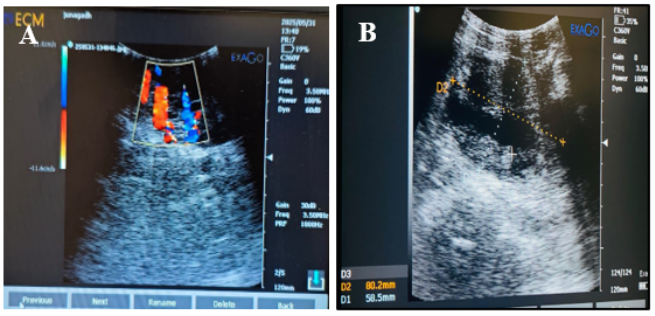


Fig. 3: Ultrasonography of vaginal tumour and testicular tumour. A) A well-defined, hypoechoic to heterogeneous soft tissue mass with evidence of active internal vascularity identified in the vaginal region. B) The majority of the testicular parenchyma replaced by hypoechoic to anechoic foci of various sizes and shape.

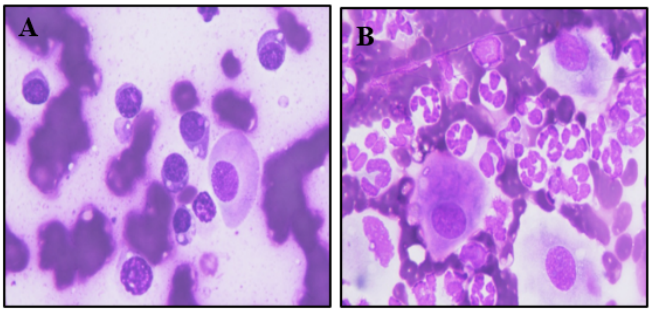


Fig. 4: Examination of cytological smear prepared from external growth. A) Monotonous population of discrete round mononuclear cells mixed with small amounts of peripheral blood, the eccentric round to slightly oval nuclei, the uniform chromatin patterns and the moderate amounts of pale blue cytoplasm with multiple, discrete, clear vacuoles at the periphery of the cell (Field stain X100). B) Predominant population of neutrophils admixed with large round cells (Field stain X100).

intervals for 4 weeks. There was no mortality, whereas, in one case surgical resection was done, which had growth at the prepuce region, with no reoccurrence observed after six months of follow-up. Leil and Rahman (2022) found that vincristine is an effective chemotherapeutic agent that promotes complete tumour regression by directly inhibiting both tumour cell division and bacterial proliferation. Therapeutic management proved fully effective in cases of canine transmissible venereal tumour (CTVT), with complete regression of the tumour mass observed within 4 weeks of

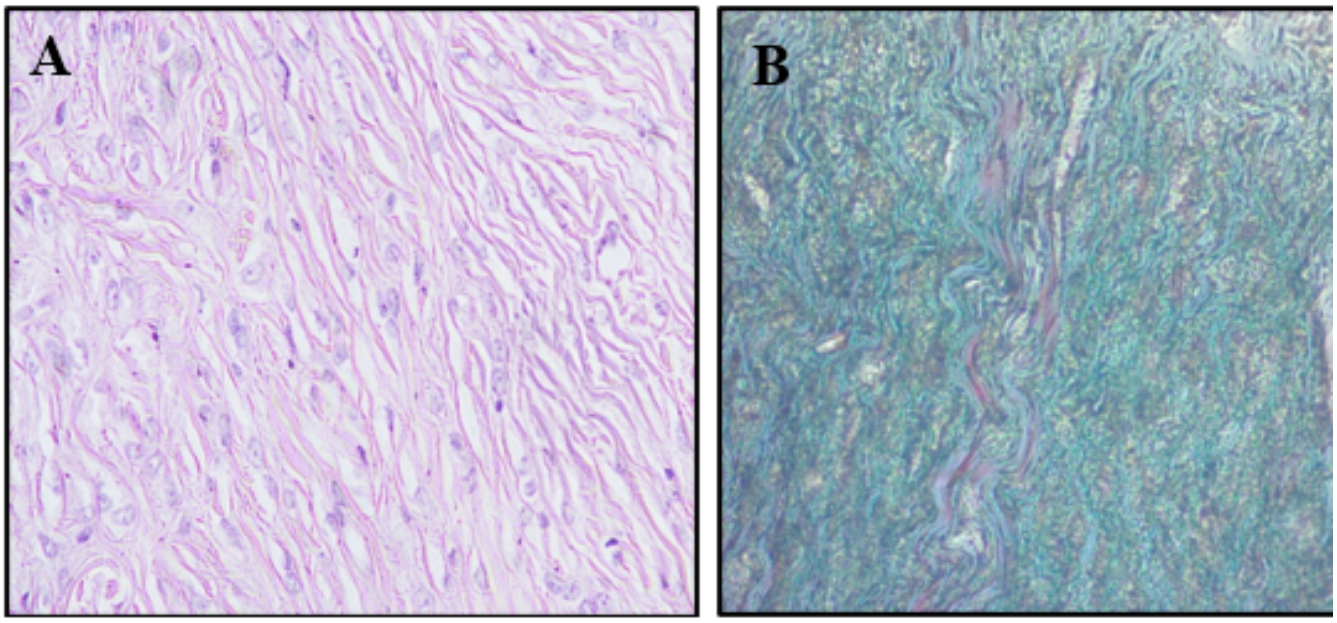


Fig. 5: Histopathology of vaginal tumour. I) Section showed parallel arranged proliferative fibrous connective tissue with prominent nucleus and nucleoli. (H & E X40). J) Same case. The proliferative fibrous connective tissue was confirmed with Masson's Trichrome X40.

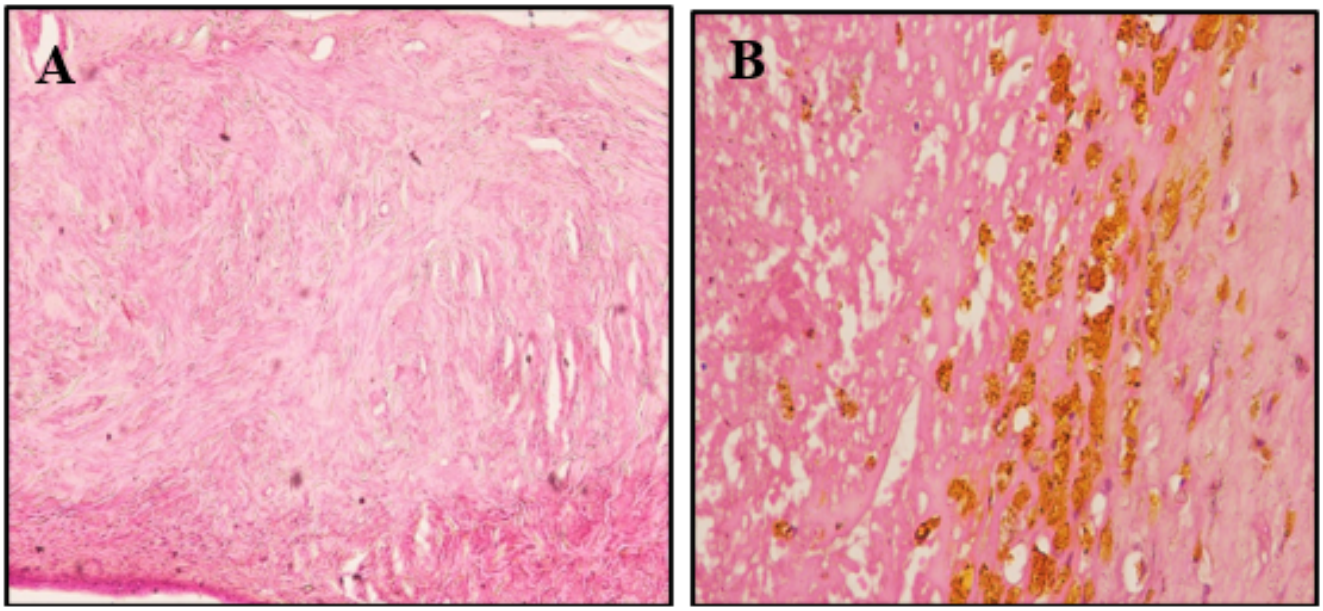


Fig. 6: Histopathology of testicular tumour. A) Complete replacement of seminiferous tubules by fibrovascular tissues. Only remnants of seminiferous tubules present with narrowing of lumen (H & E X10). B) Multiple haemorrhages with fibrous connective tissue and presence of hemosiderin pigments (H & E X10).

vincristine sulphate treatment. Vincristine sulphate is the preferred drug for treating canine transmissible venereal tumors (Saibaba *et al.,* 2015; Parikh *et al.,* 2023). Rugmini *et al.* (2025) successfully treated 4 cases of ocular TVT in dogs with Vincristine sulphate @ 0.025 mg/kg b.wt. at weekly interval in four sessions. Surgical intervention was required in only one case, where tumour regrowth occurred following initial therapeutic response.

Surgical resections were performed by episiotomy incision in vaginal tumour and all the cases were managed

without major complications. Ucmak *et al*. (2021) found that effective surgical management of vaginal leiomyoma in bitches should include both tumour excision and ovariohysterectomy, with particular attention given to minimizing the risk of recurrence. Similarly, Balamurugan and Sivasudharsan (2021) managed a vaginal tumour successfully by surgical resection without recurrence till 4 months of follow up. Surgical excision of the tumour mass proved effective for the complete resolution of vaginal tumours.

Surgical excision of monorchid testicular tumour and normal scrotal testicle was done in one dog that recovered without any complications. Padaliya *et al*. (2023) reported successful surgical excision of Sertoli cell tumours in two cases, with both patients recovering without complications. Surgical resection of the abdominal testicle proved to be an effective approach for the management of monorchid testicular tumours.

Conclusions

This multifaceted study on urogenital tumours in dogs revealed that the females are most frequently affected with such tumours, and amongst diagnostic modalities, cytology was found to be a confirmatory diagnosis. Vincristine sulphate was the treatment of choice for the canine transmissible venereal tumour. In males, castration with surgical resection of the retained tumourus abdominal testicle is recommended.

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