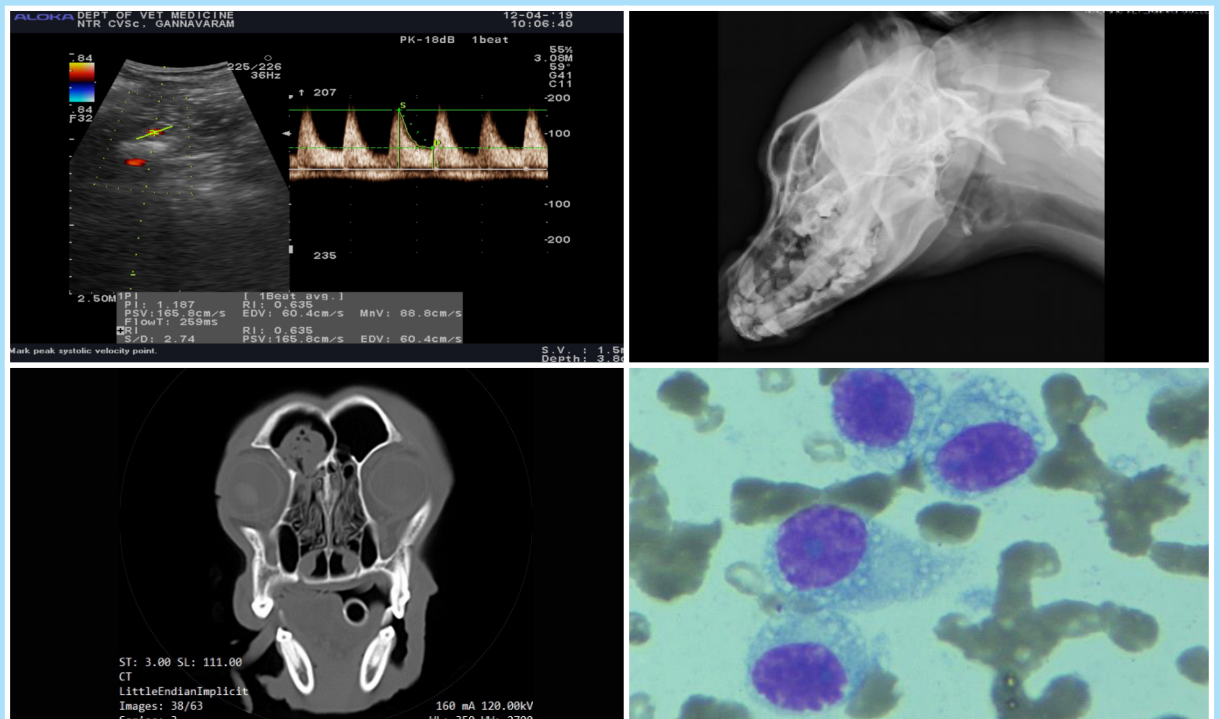


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## Renal morphometric and doppler studies in different stages of canine chronic kidney disease

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### Abstract

Doppler ultrasound is a useful diagnostic tool to evaluate renal blood flow in canine chronic kidney disease (CKD). The aim of this study was to describe and compare renal blood flow in different stages of CKD dogs based on the ultrasonographic appearance of kidneys. One hundred and three dogs with CKD confirmed clinically, hematologically, biochemically and ultrasonographically were included in the study. Ten healthy dogs with no haematological and ultrasonographic abnormalities of kidneys were also included in the study as control group. Based on SDMA levels, the dogs with CKD were divided into four groups *viz.*, Stage I (n=17), Stage II (n=15), Stage III (n=25) and Stage IV (n=46). The Renal volume was measured with two-dimensional ultrasonography. All the dogs were subjected to pulsed-wave doppler to obtain hemodynamic parameters such as resistance index (RI) and pulsatility index (PI) which were significantly ( $P < 0.05$ ) higher in CKD stage III and IV dogs than control. However, no significant difference was reported in RI and PI values in dogs with CKD Stage I and II ( $P > 0.05$ ). It could be concluded that hemodynamic parameters appear as useful markers to understand the pathological process and progression in dogs with CKD.

**Keywords:** Canine, Chronic kidney disease, Doppler studies, Morphometry, Renal artery.

### Introduction

Chronic kidney disease is defined as the presence of structural or functional abnormalities of one or both kidneys that have been presented for an extended period, usually 3 months or longer and is commonly diagnosed in the geriatric population (Nabi *et al.*, 2018). There are many potential causes for initial kidney damage which included trauma, infection, immunological diseases, neoplasms, renal ischemia, genetic anomalies and exposure to toxins. Unfortunately, the compensatory mechanisms that respond to nephron loss (glomerular hypertension, hyperfiltration) facilitate progression of chronic kidney disease, potentially contributing more than the original injury (Polzin, 2011). Early diagnosis is key in stabilising renal function and in ameliorating the disease progression.

Trans abdominal B-mode ultrasonography could be instrumental in differentiating renal diseases into diffuse (nephritis and end stage kidney), regional (hydronephrosis and nephrolithiasis) and focal or multifocal (polycystic kidney) and the dogs in stage I and II did not show any structural abnormalities associated with chronic renal disease. (Kavitha *et al.*, 2013; Nyland *et al.*, 2015). Renal volume could be an important parameter in detecting severity of disease and it was calculated using the formula as the volume of an ellipsoid which gives a good indication of the true renal volume (Barrera *et al.*, 2009)

However, ultrasonography was poor in detecting early changes in renal diseases that begins with altered blood flow. Renal doppler ultrasonography, provides a realtime information about the anatomy and haemodynamics during various stages of chronic kidney disease (Bragato *et al.*, 2017). Renal resistive index (RI) and pulsatility index (PI) measurements are

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used for calculation of the resistance to tissue perfusion in chronic kidney disease and these alterations were directly proportional to severity and progression of disease (Morrow *et al.*, 1996). Limited studies were available that demonstrate the hemodynamic changes in the vascular supply during pathology of different stages of chronic kidney disease. The aim of this study was to determine the morphometric and doppler measurements in different stages of chronic kidney disease according to the IRIS classification (2019) and comparison with healthy dogs.

### Materials and Methods

The study was performed on one hundred and three client owned dogs diagnosed with different stages of CKD based on SDMA. Dogs were evaluated for clinical signs of systemic illness, haematological and biochemical changes. Haematological parameters such as hemoglobin (g/dL), packed cell volume (%), total erythrocyte count ( $\times 10^6/\mu\text{l}$ ), total leukocyte count ( $\times 10^3/\mu\text{l}$ ) and differential leukocyte count (%) were estimated as per the standard procedures described by Jain (2000).

Ultrasonography and doppler measurements were recorded before the treatment. Two standard planes of sections were imaged in each kidney to measure renal parameters. Coronal or sagittal section was taken along the long axis of kidney to measure the maximum bipolar length (L) and the width at the renal pelvis (W) were measured. Then the Head of transducer was rotated through  $90^\circ$  to achieve a transverse section. Fine adjustments were made until the section was as round or oval as possible and renal pelvis could be clearly seen and the depth (D) was measured. Renal volume was calculated from the measurements by using the formula

of ellipsoid  $V = (L \times W \times D) 0.523$  in both left and right kidneys in chronic kidney diseases compared to healthy animals. The renal measurements were also compared in dogs based on their body weight (Jeyaraja *et al.*, 2015). The dogs above 15kg and below 15kg bodyweight were grouped separately.

Color Doppler was used to visualize the intrarenal vasculature. Renal Doppler measurements were obtained from the renal, interlobar or arcuate arteries. Sample volume was positioned in the middle of the renal vessels and the angle of correction did not exceed  $60^\circ$ . Doppler examination required more than 10 minutes in most of the dogs because of the panting or tachypnea. Colour mapping signals were visualized on both transverse and longitudinal ultrasound scan sections around the renal arteries (Koenhemi and Gonul, 2019) Hemodynamic indices *viz.*, resistive index (RI), pulsatility index (PI) were calculated and recorded with the help of software provided in the machine.

Serum biochemical parameters like creatinine, blood urea nitrogen, total protein, albumin, serum alanine amino transferase and serum alkaline phosphatase were estimated by using a Thermo Scientific Instrument (Multiskan GO Analyser) using standard kits manufactured by Transasia Biomedicals Ltd., Erba-Mannheim. All the dogs under study were subjected to trans abdominal ultrasonography by following the standard procedure using ALOKA PROSOUND  $\alpha$  6 machine equipped with 3.5 to 7.5 MHz trans-abdominal curvilinear and linear probes. Ten apparent healthy dogs with no haematological and biochemical abnormalities were also included in the study as control group. Based on the SDMA levels, the affected dogs were categorized into four stages which was adopted by IRIS (2019).

SDMA concentration ( $\mu\text{g/dL}$ )	CKD Stage			
	I	II	III	IV
	14-18	18-35	36-54	>54

The ultrasonographic measurements were analyzed by One-way Analysis of Variance (ANOVA) using SPSS (SPSS 20.0, Chicago, IL, USA). Tukey's multiple comparison post hoc test was also used to find the differences between groups.

### Results and Discussion

In the present study, the dogs with chronic kidney disease were categorized into 4 stages based on SDMA values as 16.50 per cent of dogs in stage I

(17/103), 14.56 per cent in stage II (15/103), 24.27 per cent in stage III (25/103) and 44.67 per cent in stage IV (46/103). The mean  $\pm$  SE of SDMA in stage I, II, III and IV were  $16.59 \pm 0.53 \mu\text{g/dL}$ ,  $25.07 \pm 1.30 \mu\text{g/dL}$ ,  $46.89 \pm 1.09 \mu\text{g/dL}$  and  $87.51 \pm 3.11 \mu\text{g/dL}$  respectively. The SDMA values in the affected dogs ranged from 14 to 152  $\mu\text{g/dL}$  in this study. The mean hematological and biochemical parameters observed in healthy and dogs with different stages of chronic kidney disease were presented in Table 1 and Table 2 respectively

**Table 1: Mean± SE of Haematological Parameters in healthy control and dogs with different stages of chronic kidney disease**

S.No	Parameter	Healthy Control	CKD(n=103)			
			CKD (I) (n=17)	CKD(II) (n=15)	CKD(III) (n=25)	CKD(IV) (n=46)
1.	Haemoglobin (g/dL)	14.55 <sup>c</sup> ±0.47	14.54 <sup>c</sup> ±0.06	11.48 <sup>b</sup> ±0.86	11.38 <sup>a</sup> ±0.83	9.09 <sup>d</sup> ±0.32
2.	Packed cell volume(%)	46.61 <sup>c</sup> ±1.39	43.61 <sup>bc</sup> ±0.19	34.24 <sup>b</sup> ±2.68	33.34 <sup>a</sup> ±2.17	22.91 <sup>a</sup> ±1.44
3.	Total Erythrocyte count (10 <sup>6</sup> /cumm)	6.51 <sup>c</sup> ±0.14	7.27 <sup>b</sup> ±0.03	5.51 <sup>b</sup> ±0.45	5.59 <sup>a</sup> ±0.37	4.74 <sup>e</sup> ±0.18
4.	Total Leukocyte count(10 <sup>3</sup> /cumm)	12.21 <sup>a</sup> ±0.88	13.64 <sup>a</sup> ±0.31	15.11 <sup>b</sup> ±2.02	17.54 <sup>c</sup> ±1.77	13.35 <sup>b</sup> ±0.98
5.	Differential Leukocyte count					
	Neutrophils(%)	74.80 <sup>a</sup> ±0.18	74.94 <sup>a</sup> ±0.47	79.73 <sup>b</sup> ±3.11	79.93 <sup>b</sup> ±2.55	84.20 <sup>c</sup> ±1.37
	Lymphocytes(%)	22.92 <sup>a</sup> ±0.92	24.88 <sup>a</sup> ±0.48	18.73 <sup>b</sup> ±2.86	18.55 <sup>b</sup> ±2.62	14.24 <sup>c</sup> ±0.97
	Monocytes(%)	1.02±0.46	0.18±0.09	0.14±0.13	0.40±0.32	1.07±0.26
	Eosinophils(%)	1.00±0.01	0±0.00	1.40±0.43	1.12±0.36	0.49±0.2
	Basophils(%)	0.26± 0.34	0±0.00	0±0.00	0±0.00	0.00± 0.00

Means with similar superscripts did not vary significantly in a row (P>0.05)

**Table 2 : Mean±SE of serum biochemical parameters in healthy dogs and dogs with different stages of chronic kidney disease kidney disease.**

S.No	Parameter	Healthy	CKD (n = 10 <sup>3</sup> )			
			I (n = 17)	II (n = 15)	III (n = 20)	IV (n = 46)
1.	Creatinine (mg/dL)	0.69 <sup>a</sup> ±0.10	0.84 <sup>a</sup> ±0.07	1.83 <sup>b</sup> ±0.09	2.85 <sup>c</sup> ±0.15	8.93 <sup>c</sup> ±0.51
2.	Blood Urea Nitrogen (mg/dL)	16.36 <sup>a</sup> ±1.07	14.90 <sup>a</sup> ±0.39	37.76 <sup>ab</sup> ±3.75	55.87 <sup>b</sup> ±6.01	127.25 <sup>d</sup> ±16.41
3.	Total Protein (g/dL)	7.83 <sup>d</sup> ±0.66	6.49 <sup>d</sup> ±0.29	6.93 <sup>cd</sup> ±0.33	5.60 <sup>a</sup> ±0.28	5.54 <sup>a</sup> ±0.23
4.	Albumin (g/dL)	3.25 <sup>c</sup> ±0.07	2.86 <sup>b</sup> ±0.04	2.85 <sup>b</sup> ±0.30	2.54 <sup>a</sup> ±0.24	3.11 <sup>c</sup> ±0.12
5.	Globulin(g/dL)	3.71 <sup>d</sup> ±0.68	3.73 <sup>d</sup> ±0.31	4.08 <sup>d</sup> ±0.28	3.06 <sup>b</sup> ±0.19	2.43 <sup>a</sup> ±0.21
6.	A/G ratio	0.87 <sup>a</sup> ±0.23	1.32 <sup>a</sup> ±0.07	0.79 <sup>a</sup> ±0.13	0.97 <sup>a</sup> ±0.12	1.27 <sup>b</sup> ±0.87
7.	Alanine aminotransferase(U/L)	17.81 <sup>a</sup> ±3.92	19.24 <sup>a</sup> ±0.28	22.63 <sup>a</sup> ±3.69	30.18 <sup>b</sup> ±3.35	27.98 <sup>b</sup> ±1.49
8.	Alkaline phosphatase(U/L)	48.37 <sup>a</sup> ±5.77	51.88 <sup>a</sup> ±0.77	61.28 <sup>ab</sup> ±8.38	87.22 <sup>b</sup> ±7.91	145.52 <sup>c</sup> ±20.30

Means with similar superscripts did not vary significantly in a row (p>0.05)

Ultrasound investigation was a useful and reliable method to detect renal pathology. The mean nephrosonographic measurements in healthy and dogs with kidney diseases were depicted in Table 3. There was significant (P>0.05) reduction in the length, width

and depth of both the kidneys between healthy and dogs with CKD. Similarly a significant reduction (P<0.05) in both kidneys was also seen in dogs with CKD with that of healthy control. The mean ± SE of renal volume in CKD was significantly less (P<0.05) than control

**Table 3: Mean  $\pm$  SE values of nephrosonographic measurements in healthy and dogs with chronic kidney disease.**

Parameter		Dogs with body weight <15KG		Dogs with body weight >15KG	
		Control	CKD	Control	CKD
Length (cm)	Left	4.6 <sup>a</sup> $\pm$ 0.32	3.43 <sup>b</sup> $\pm$ 0.14	6.8 <sup>1</sup> $\pm$ 0.12	5.8 <sup>2</sup> $\pm$ 0.32
	Right	4.5 <sup>a</sup> $\pm$ 0.36	3.58 <sup>b</sup> $\pm$ 0.13	6.7 <sup>1</sup> $\pm$ 0.15	6.2 <sup>2</sup> $\pm$ 0.24
Width (cm)	Left	2.7 <sup>a</sup> $\pm$ 0.16	2.49 <sup>b</sup> $\pm$ 0.08	3.8 <sup>1</sup> $\pm$ 0.07	3.5 <sup>2</sup> $\pm$ 0.15
	Right	2.7 <sup>a</sup> $\pm$ 0.14	2.39 <sup>b</sup> $\pm$ 0.02	3.7 <sup>1</sup> $\pm$ 0.22	3.4 <sup>2</sup> $\pm$ 0.14
Depth(cm)	Left	2.8 <sup>a</sup> $\pm$ 0.12	2.48 <sup>b</sup> $\pm$ 0.09	3.7 <sup>1</sup> $\pm$ 0.13	3.5 <sup>1</sup> $\pm$ 0.12
	Right	2.8 <sup>a</sup> $\pm$ 0.13	2.50 <sup>b</sup> $\pm$ 0.09	3.6 <sup>1</sup> $\pm$ 0.14	3.4 <sup>1</sup> $\pm$ 0.14
Volume(cm <sup>3</sup> )	Left	17.98 <sup>a</sup> $\pm$ 3.18	11.01 <sup>c</sup> $\pm$ 0.57	50.02 <sup>1</sup> $\pm$ 2.49	39.16 <sup>3</sup> $\pm$ 3.32
	Right	17.79 <sup>a</sup> $\pm$ 2.18	11.18 <sup>c</sup> $\pm$ 0.64	46.67 <sup>1</sup> $\pm$ 3.20	41.12 <sup>3</sup> $\pm$ 3.28

Means bearing different superscripts differed significantly with in a row (P<0.05)

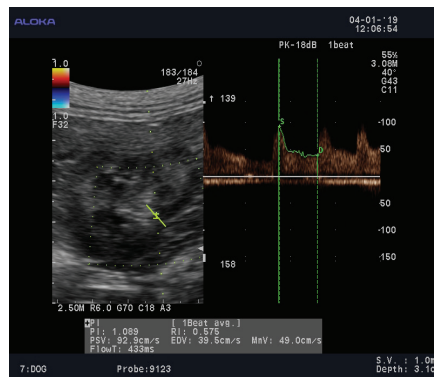
The wave form of renal artery was recorded in healthy control and dogs with CKD using pulsed wave doppler. The mean resistive index (RI) and pulsatility index(PI) values recorded in healthy and dogs with kidney diseases were presented in Table 4.

**Table 4:Mean $\pm$  SE values of renal resistive and pulsatility indices in different stages of CKD dogs and healthy dogs**

S. No	Parameter	Control	CKD			
			I (n=17)	II (n=15)	III (n=25)	IV (n=46)
1.	Resistive Index	0.59 <sup>a</sup> $\pm$ 0.12	0.57 <sup>a</sup> $\pm$ 0.14	0.61 <sup>a</sup> $\pm$ 0.12	0.64 <sup>b</sup> $\pm$ 0.14	0.73 <sup>c</sup> $\pm$ 0.11
2	Pulsatility Index	1.02 <sup>a</sup> $\pm$ 0.32	1.01 <sup>a</sup> $\pm$ 0.38	1.38 <sup>a</sup> $\pm$ 0.24	1.46 <sup>b</sup> $\pm$ 0.36	1.59 <sup>b</sup> $\pm$ 0.42

Means with similar superscripts did not vary significantly in a row (p>0.05)

Non-significant difference (P<0.05) was noticed in mean values of RI and PI in chronic kidney disease stage I and II with the healthy control while the same in chronic kidney disease stage III and IV varied significantly (P<0.05).

**Figure1. Pulsed wave doppler of renal artery in Mongrel with Stage I CKD**



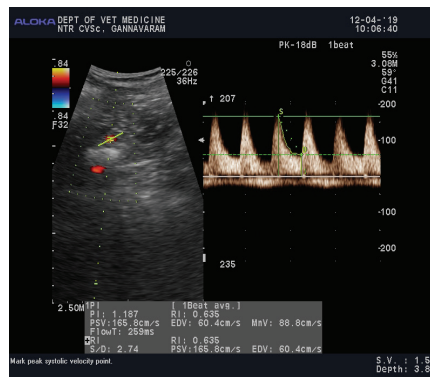


Figure 2. Pulsed wave doppler of renal artery in German Shepherd dog with Stage II CKD

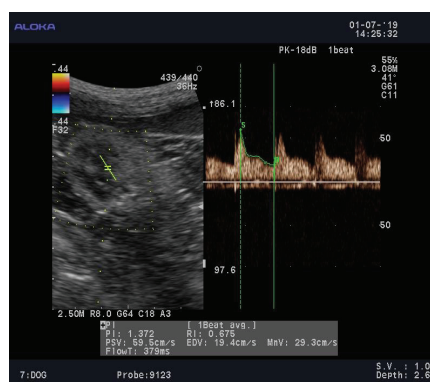


Figure 3. Pulsed wave doppler of renal artery in Labrador dog with Stage III CKD

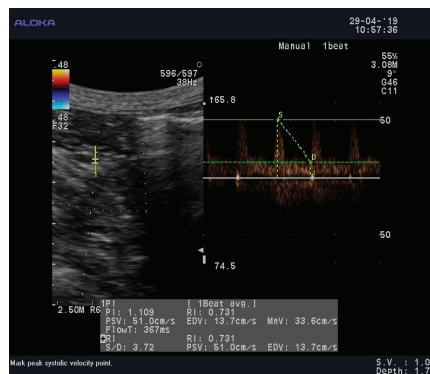


Figure 4. Pulsed wave doppler of renal artery in a Pomeranian dog with Stage IV CKD

In the present study, the renal measurements related to body weight of dog obtained ultrasonographically was in accordance with that of Jeyaraja *et al.* (2015) who concluded that renal volume was the accurate reflection of renal mass. The renal dimensions in the present study revealed bilateral reduction in the renal volume in CKD dogs which indicated severe renal impairment. The length, width and depth significantly varied only in dogs affected with chronic kidney disease. These findings commensurate

with Hecht and Henry (2011) and Jeyaraja *et al.* (2015), who observed small sized kidney in chronic kidney disease. Further it was documented that a normal renal size does not preclude renal disease, but departure from normality provide extra information which may contribute towards diagnosis (Kaya,2012).

In Veterinary Medicine, despite many diagnostic methods such as physical examination, CBC and biochemical blood examination, urinalysis, radiography

and ultrasonography was well established, little attention was given to the evaluation of renal vascular supply ( Koenhemi and Gonul, 2019). The RI and PI values as measured by doppler ultrasonography in the present study(  $0.64 \pm 0.14$ ,  $1.46 \pm 0.36$  in stage III and  $0.73 \pm 0.11$ ,  $1.59 \pm 0.42$  in stage IV) were in concurrence with that of Rivers *et al.* (1997); Novellas *et al.* (2007) and Koenhemi and Gonul (2019). Increase in RI and PI were suggestive of increased intrarenal vascular resistance associated with reduced renal function in the advanced stages of renal disease (Saraiva, 2010 and Winther *et al.*, 2012). According to Morrow *et al.* (1996 ) and Parolini *et al.*, (2009), elevated RI with normal nephrosogram at the time of initial presentation indicates interstitial nephritis or tubular degeneration which lead to rapid progression of CKD with poor prognosis. Bragato *et al.* (2017) also documented that the early changes in renal diseases begins with change in blood flow and renal doppler ultrasonography is one of the important diagnostic tool in determining CKD progression.

In conclusion, our study demonstrated that Doppler ultrasound is an accurate diagnostic tool to reflect hemodynamic changes in renal pathology in different stages of CKD and also helps in monitoring the prognosis of CKD which in turn helps in designing an effective therapeutic protocol and keep the disease under long-term control.

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## Clinical, Radiographic and Rhinoscopic Features of Primary Intra-Nasal Transmissible Venereal Tumour in Four Dogs and Its Treatment

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### Abstract

Transmissible venereal tumours are contagious tumours that typically affect intact male and female canines. Four dogs were presented to Small-Animal out-patient unit of Madras Veterinary College Teaching Hospital with a history of chronic unilateral epistaxis and sneezing. Leukocytosis with neutrophilia was a consistent finding in all dogs whereas the serum biochemical values were unremarkable. Lateral and dorsoventral radiographs of the skull revealed space occupying lesion suggesting soft tissue mass in the nasal cavity. Rhinoscopy confirmed the presence of tumour mass occluding the nasal passage. Nasal cytology revealed the presence of characteristic transmissible venereal tumour cells. Chemotherapy was initiated with Vincristine sulfate at the dose rate of 0.7 mg/m<sup>2</sup>. All four dogs showed complete clinical recovery after four weekly doses of vincristine chemotherapy. Radiography repeated after four weeks confirmed the absence of mass in nasal cavity.

**Keywords:** Dog, Nasal TVT, Radiography, Rhinoscopy, Vincristine

### Introduction

Transmissible venereal tumour (TVT) in canines is a naturally occurring allogeneic tumour transmitted from dog to dog mostly through coitus. The most common predilection site is external genitalia, but it can be implanted on the oral, nasal and conjunctival mucosa or less commonly, the skin (Gurel *et al.*, 2002). Signs of canine nasal TVT include facial asymmetry, lymphadenopathy, oro-nasal fistula, epistaxis and other nasal discharge (Papazoglou *et al.*, 2001; Sankar *et al.*, 2016). The present work describes primary intranasal TVT in four intact male dogs and its successful treatment with vincristine sulfate.

### Materials and methods

Four intact male dogs brought to the Small-Animal out-patient unit of Madras Veterinary College Teaching Hospital suffering from nasal TVT were included in the study. All four dogs were privately owned but had a history of occasional free roaming lifestyle and thereby contact with stray dogs. These dogs were subjected to detailed anamnesis, clinical examination, haemato-biochemical analysis, radiographic and rhinoscopic examinations. Computed tomography of the skull was performed only in one dog due to financial restraints by the other three pet owners. All diagnostic imaging was done in these dogs under general

anaesthesia in a standard manner. The radiographs of the skull were taken in standard dorsoventral (DV) and lateral views. Computed tomography of the skull was performed as described by Schwarz and Saunders (2011) where contiguous images were obtained from the caudal limit of the frontal sinuses to the nares with the animal on sternal recumbency. Rhinoscopy was performed as per the procedure described by McCarthy (2005) using anterograde and retrograde methods. A flexible bronchoscope (bronchoscope 3.5 mm diameter with two-way deflection- Olympus type BF 1T150, Japan) was used for posterior rhinoscopy. An arthroscope with cystoscopy sheath (2.7 mm 30-degree Karl Storz, Germany) was used for anterior rhinoscopy. Nasal swabs obtained from both nasal cavities were subjected to cytological analysis. Rhinoscopy-guided biopsy samples were obtained only in one dog whereas sampling was hindered due to excessive bleeding and obscuring of nasal passage in other three dogs. Tissue sample obtained using endoscopic forceps were fixed in 10 per cent formalin and used for histopathological studies (Bancroft and Gamble, 2008). Chemotherapy using vincristine sulphate at the dose of 0.7 mg/m<sup>2</sup> body surface area, intravenously, at weekly intervals was instituted in all dogs. Treatment was continued until the tumour mass regressed completely, as determined by weekly cytological and clinical evaluations. Weekly blood samples were taken prior to next vincristine chemotherapy for complete blood count evaluation.

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# Department of Veterinary Surgery and Radiology

## Results and discussion

In the present study, dogs were aged between 2 and 7 years, were sexually intact with a mean age of 4 years and sex predilection for male dogs (4/4; 100.00 per cent) similar to the findings of Papazoglou *et al.* (2001). The persistent clinical findings in all dogs with intranasal transmissible venereal tumour were unilateral epistaxis (Plate 1) and intermittent sneezing. Other clinical signs were stertor (2/4, 50.00 per cent) and

submandibular lymphadenopathy (1/4, 25.00 per cent). Nasal discharge in these dogs was purely haemorrhagic and was concurrent with sneezing. Similar signs were reported by Dhillon *et al.* (2021) in dogs with intranasal TVT. In the present study, no genital lesions were found in any of the four dogs, hence the nasal lesions were considered to be primary intra nasal transmissible venereal tumour as reported by Papazoglou *et al.* (2001) in six dogs.

### Plate 1 - Clinical Signs in dogs with Nasal TVT

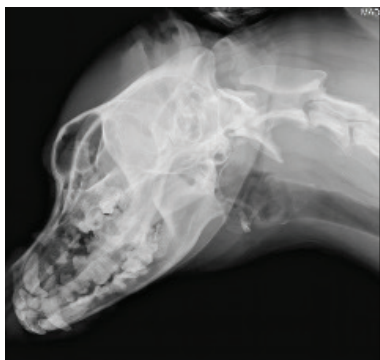


Unilateral epistaxis

Leukocytosis with neutrophilia was evident in haematology of all six dogs which concurred with reports of Priyadarshini *et al.* (2021) which is probably due to infection in tumoral tissue and its periphery as a result of immunosuppression, leading to secondary bacterial invasion, whereas the serum biochemical values in dogs with nasal TVT were unremarkable in the present study similar to the findings of Papazoglou *et al.* (2001) and Singh and Sood (2016).

The radiographic findings in the present study were unilateral opacities of the nasal cavity and frontal sinus without osteolysis (Plate 2). Radiographic findings in cases of histologically or cytologically confirmed intranasal TVT were radiopacity, bone lysis and frontal sinus involvement (Rezaei *et al.*, 2016). No bony lesions were reported by Dhillon *et al.* (2021) in dogs with nasal TVT similar to the present study.

### Plate 2 - Radiography of Skull in Dogs with Nasal TVT



Lateral radiograph of skull –Loss of trabecular pattern in nasal cavity and increased radiopacity of the frontal sinus

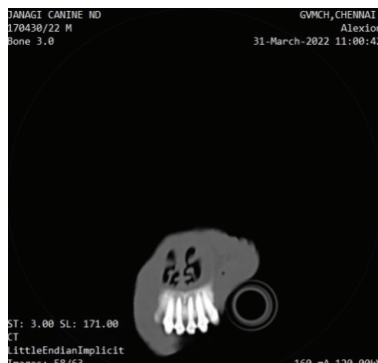


Dorso-ventral radiograph of skull - Loss of turbinate-bone detail with increased radiopacity of the nasal cavity on the right side

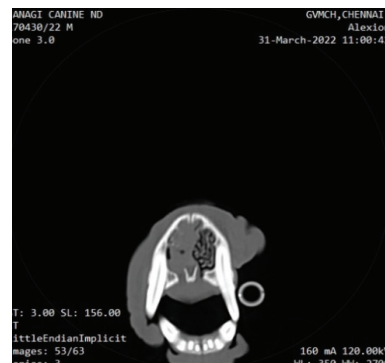
In skull CT, soft tissue opacity and contrast enhancing mass was present in the nasal cavity and

frontal sinus (Plate 3). Parker *et al.* (2021) observed soft tissue opacity with mild turbinate loss in the skull CT of a dog with nasal TVT.

### Plate 3 – Sequential Computed Tomography Images Through The Nose of A Dog with Nasal Transmissible Venereal Tumour (Rostral To Caudal)



a. at the level of incisors



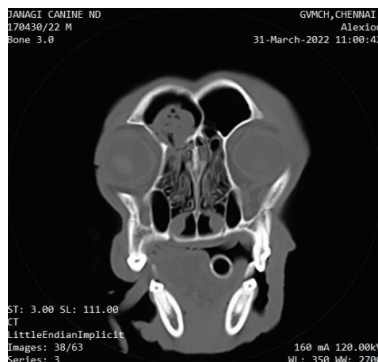
b. at the level of canine



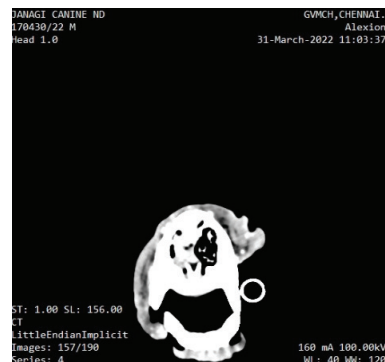
c. at the level of lateral nasal gland



d. at the level of maxillary recess through orbital region



e. through frontal sinus



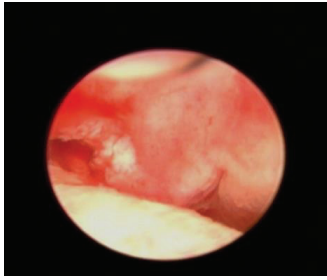
f. contrast enhanced image at the level of canines

(b) homogenous soft-tissue density occupying left nasal cavity with extensive turbinate destruction and (f) showing corresponding contrast enhanced mass. (d) and (e) dependent soft tissue density of the left ventral frontal sinus.

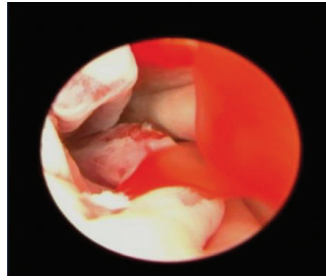
Anterior rhinoscopy revealed nasal mucosal hyperaemia, excessive fragility of nasal mucosa and nasal obstruction by friable, multiple soft tissue masses (Plate 4) similar to findings of Papazoglou *et al.* (2001). Posterior rhinoscopy revealed haemorrhage in all the cases. Rhinoscopy guided biopsy samples were obtained

only in one patient which was later confirmed by histopathological examination. In remaining three dogs, obtaining a representative biopsy sample was hindered by excessive nasal bleeding obscuring the nasal passage. Rhinoscopy revealed multifocal patches of discrete, white, wispy, vascularized abnormal tissue in intranasal TVT according to Parker *et al.* (2021).

#### Plate 4 - Rhinoscopy in Dogs with Nasal TVT



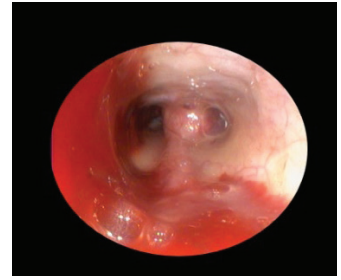
Tumour mass obstructing the nasal passage



Tumour mass occupying the nasal cavity and bleeding



Tumour mass in between turbinates

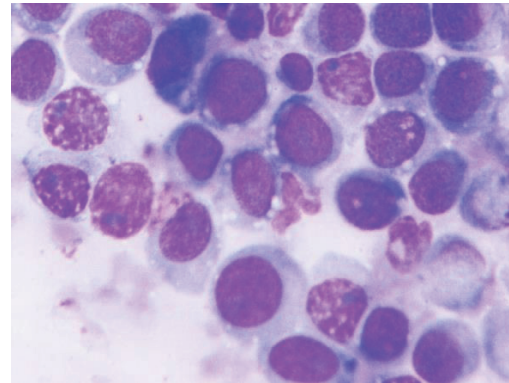
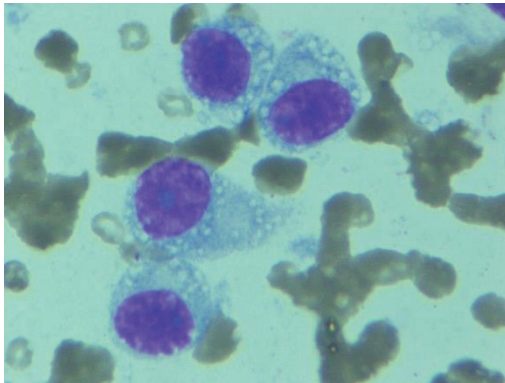


Posterior choanae: tumour mass

Cytology revealed the presence of transmissible venereal tumour cells in nasal swab obtained from all four dogs (Plate 5). The characteristic cytological features of nasal cytology in dogs with nasal TVT were abundant round, discrete, individual cells with increased nuclear: cytoplasmic (N:C) ratio, moderate amounts of

pale, basophilic cytoplasm with clear, punctate vacuoles similar to the findings of Ramanmurthy *et al.* (2021). Histopathological examination revealed sheets of round cells with pale eosinophilic cytoplasm containing clear cytoplasmic vacuoles, large round to oval nuclei containing finely stippled to vesicular chromatin in accordance to Parker *et al.* (2021).

#### Plate 5–Nasal Cytology in Dogs with Nasal TVT



Nasal cytology of dog with nasal transmissible venereal tumour showing cells with intracytoplasmic vacuolations 100 X

The positive response of all four dogs to vincristine chemotherapy was based on weekly clinical and radiological examinations of the nasal cavities. The most effective therapeutic modalities for TVT are chemotherapy and radiotherapy (Rogers *et al.*, 1998). Vincristine monotherapy, administered intravenously for four weekly cycles at the dose of 0.7 mg/m<sup>2</sup> has been very effective for regression of intranasal TVT mass in the present study. A similar successful outcome with vincristine monotherapy was reported by Singh and Sood (2016), Ignatenko *et al.* (2020), Dhillon *et al.* (2021), Nwoha *et al.* (2021) and Parker *et al.* (2021). Radiography repeated after four weeks confirmed

the absence of mass in the nasal cavity. Cytological assessment of nasal swabs obtained after chemotherapy revealed normal nasal cytology. All four dogs showed complete resolution of clinical signs after four weekly cycles of treatment without any adverse effects.

In conclusion, our data suggest that nasal TVT should be considered as a differential diagnosis in dogs with chronic epistaxis and sneezing which have a good response to vincristine treatment upon definitive diagnosis. This study provides a detailed description of diagnostic imaging in canine nasal TVT, and successful medical management with vincristine.

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## Demographic Incidence of Recumbent Cow Syndrome In Cauvery Delta Region of Tamil Nadu, India

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### Abstract

This study investigates the demographic incidences of recumbent cow syndrome in 156 recumbent cows referred to veterinary hospital over a period of 9-month from March 2023 to November 2023 at Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu. They were examined & categorized based on breed, age, and period of occurrences. The incidence of recumbent cow was higher incidences during May month and lower during November month. Whereas the highest incidence of recumbent cow syndrome was noticed in Jersey crossbred cow (69.8%) followed by Holstein Friesian cross bred (25.0%) and native breeds (5.1%) whereas higher incidence of recumbent cow syndrome was observed in cows with the age group of 6 to 8 years. These findings emphasize the need for targeted management strategies to address this challenging metabolic disorder in dairy farming, considering specific time period or season, breeds, and age groups.

**Keywords:** Downer cow, Breed, Age, Season

### Introduction

Dairy farming plays a significant role in securing the livelihood of rural farmers by providing employment and income generation in rural areas and ensuring nutrition to poor rural households (Senthilkumar *et al.*, 2014). Most challenging issues affecting dairy productivity is the presence of production induced metabolic diseases resulting from negative balance of a particular nutrient. Most of metabolic disorders occur around calving and are associated with transition period of the cow from 3 weeks before parturition to 3 weeks after parturition (Radostits *et al.*, 2007). Among the metabolic disorders, recumbent cow syndrome is one of the most common and costly disease that occurs in lactating dairy animals during the peripartum period. The downer cow syndrome is caused by several etiological factors including metabolic disorders caused by mineral deficiency, injury during parturition, paralysis by nerve and muscle damage after calving, nervous and musculoskeletal problems following recumbency and systemic diseases caused by toxemia (Radostits *et al.*, 2007), among mineral deficiency hypocalcaemia is one of the most common primary cause of recumbency cow, approximately 58% of animals manifest within 1 day of parturition and 37% during the first 100 days of lactation (Yogeshpriya *et al.*, 2019). This study deals with the incidence of downer cow syndrome in Cauvery delta region of Tamil Nadu.

### Materials and Methods

The study was conducted at Department of Veterinary Medicine, Veterinary College and research Institute, Orathanadu. A total of 156 recumbent animals were examined and treated during a period of 9 months from March 2023 to November 2023 in which the signalment, anamnesis was recorded and also the cause of recumbency was investigated thoroughly by careful physical and clinical examination and laboratory analysis before each treatment. All the recumbent cows were categorized according to the causes of recumbency as per the clinical examination and laboratory analysis to assess the incidence and etiological factors causing recumbency in dairy cows. Incidences of recumbent cow syndrome were studied according to breed, age and period of occurrence (months) based on the data obtained during examination of animals.

### Result

#### a. Month wise incidence

The month wise incidence of recumbent cow presented during the study period was presented in Table 1 (Fig. 1). The incidence of recumbent cow was higher during May month and lower during November month. Highest incidence of recumbency in pre calving and post calving recumbent cows were noticed during June month and May month respectively.

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**b. Breed wise incidence**

Out of 156 recumbent cows examined during study period, the highest incidence of recumbent cow syndrome was noticed in Jersey cross bred cow (69.8%) followed by Holstein Friesian cross bred cows (25.0%) and native breeds (5.1%) (Fig .2). Among them Incidence/ prevalence is highest in post calving Jersey cross bred cows. The breed wise incidence of recumbent

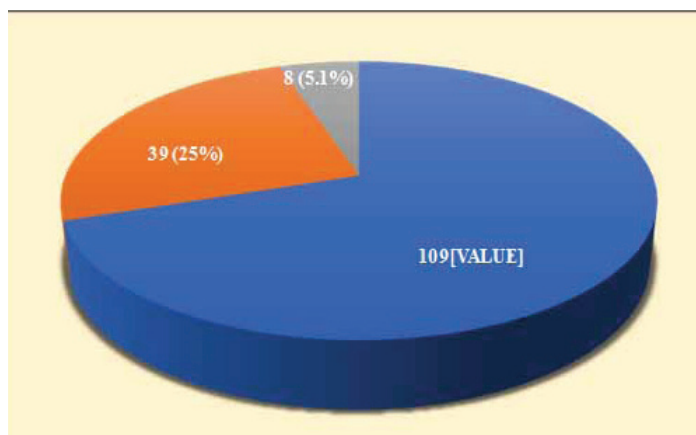
cow encountered during the study period were presented in (Fig.2)

**c. Age wise incidence**

Comparatively the higher incidence of recumbent cow syndrome was observed in cows with the age group of 6 to 8 years (41.6%), followed by the recumbent cows with age of 3 to 6 years (24.3%), recumbent cows with the age of above 8 years (21.7%) and those cows with below 3 years (12.1%) (Fig. 3).



**Fig. 1. Month wise incidence of recumbent dairy cows**



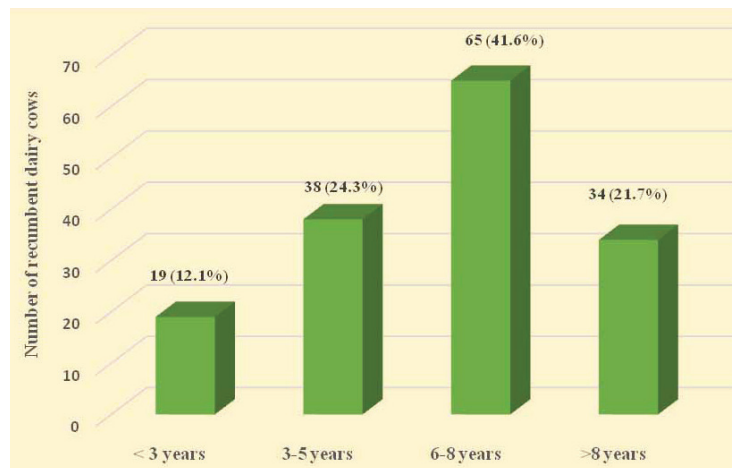
**Fig. 2. Breed wise incidence of recumbent dairy cow**

**Table 1. Month wise incidence of recumbent dairy cows**

Recumbent dairy cows	Total No.	Months (from March 2023 to November 2023)								
		Mar	Apr	May	June	July	Aug	Sep	Oct	Nov
Pre calving recumbent cows	54 (34.6%)	8 (5.1%)	9 (5.7%)	5 (3.2%)	11 (7.0%)	8 (5.1%)	7 (4.5%)	4 (2.5%)	1 (0.6%)	1 (0.6%)
Post calving recumbent cows	102 (65.4%)	13 (8.3%)	10 (6.4%)	21 (13.4%)	11 (7.0%)	9 (5.7%)	11 (7.0%)	10 (6.4%)	10 (6.4%)	7 (4.5%)
<b>Total</b>	<b>156</b>	<b>21 (13.4%)</b>	<b>19 (12.1%)</b>	<b>26 (16.6%)</b>	<b>22 (14.0%)</b>	<b>17 (10.8%)</b>	<b>18 (11.5%)</b>	<b>14 (8.9%)</b>	<b>11 (7.0%)</b>	<b>8 (5.1%)</b>

**Table 2. Breed wise incidence of recumbent dairy cows**

Recumbent dairy cows	Total No.	Breed		
		Jersey cross bred cow	Holstein Friesian Cross bred cow	Native breed cows
Pre calving recumbent cows	54 (34.6%)	44 (28.2%)	10 (6.4%)	-
Post calving recumbent cows	102 (65.4%)	65 (41.6%)	29 (18.6%)	8 (5.1%)
<b>Total</b>	<b>156</b>	<b>109 (69.8%)</b>	<b>39 (25%)</b>	<b>8 (5.1%)</b>

**Fig. 3. Age wise incidence of recumbent dairy cows**

## Discussion

In this present study, the monthly distribution of the incidence of recumbent cow syndrome was higher during May month and lower during November month. Highest incidence in pre calving and post calving recumbent cows were noticed during June month and May month respectively. Similar finding was also reported by Senthilkumar (2016) who found that there is significant association between downer cow syndrome and season and reported highest risk during the summer. Soto *et al.* (2003) opined that the heat stress was a common condition predisposing dairy cattle to eat less and be more susceptible to recumbency and other metabolic diseases including ketosis and milk fever etc. Shortage of green fodder and heat stress in addition to specific etiological factors might be the reason for the increased incidence of metabolic diseases including downer cow syndrome during summer season (Senthilkumar, 2016). But this study was in contrast with Beder *et al.* (2020) found that the winter was the potential risk factor causing downer cow syndrome due to Poor exposure to adequate sunlight and subsequent improper vitamin D production increased the risk of developing

hypocalcaemia causing downer cow syndrome. Cox *et al.* (1986) who reported that the monthly distribution of downer cases indicated that most cases (39%) occurred during the three coldest months (December-February) while the lowest incidence (16%) was during the spring (April-June).

During the study period, the highest incidence of recumbent cow syndrome was noticed in Jersey cross bred cow (69.8%) followed by Holstein Friesian cross bred cows (25.0%) and native breeds (5.1%). Among them the highest incidence was observed in post calving Jersey cross bred cows. The study was supported by Sivaraman *et al.* (2019) who reported that Jersey cross bred cattle had highest incidence of recumbent cow syndrome followed by Holstein Friesian cattle in Veterinary College Hospital at Namakkal Tamil Nadu during the period 2015 to 2019. Similarly, Chiwome *et al.* (2017) observed that the incidence of recumbency due to milk fever in Jerseys (14.78%) was significantly higher ( $p < 0.05$ ) than that in Holsteins (4.82%). Radostits *et al.* (2007) also stated that Jersey breeds were more susceptible for recumbency associated with parturient paresis than other breeds and

increased incidence in Jersey cows may be associated with the older age of the many Jersey cows. Goff (2008) explained this discrepancy by stating that Jersey cattle have lower intestinal calcitriol receptor concentrations than Holstein Friesian cattle. This higher incidences in jersey crossbred animals might be occurred in this study area due to increase in the population of Jersey crossbred animals by artificial insemination.

The higher incidence of recumbent cow syndrome was observed in cows with the age group of 6 to 8 years (41.6%), followed by the recumbent cows with age of 3 to 6 years (24.3%), recumbent cows with the age of above the 8 years (21.7%) and those cows with below 3 years (12.1%). This was in accordance with Hassan *et al.* (2020) who observed the highest incidence of recumbent cow syndrome in cows with five to seven years compared to those aged two to four years. It was also similar to the findings of Erb and Grohn (1988) who documented that the risk of a cow developing parturient paresis rises with age in multiparous animals. Sivaraman *et al.* (2019) reported that the highest incidence of recumbent cow syndrome is in cows with 4-5 years age group (23.92%) followed by cows with 3-4 years (18.71%) and 2-3 years (16.91%). This could be due to decreased ability obtain calcium from bone stores and thus a decline in the active transport of calcium in the intestine in aging animals. Ageing also leads to a decline in some of the 1,25 di hydroxy cholecalciferol receptors (Xu *et al.*, 2021). The animals of the present study were maintained in different feeding and husbandry management practices for different age group of animals and this may have attributed for the increase in incidence of recumbent cow syndrome in animals with the age of 3 to 8 years.

### Conclusion

The study highlights the more incidence of recumbent cow in Jersey crossbred cow during summer season. Whereas the highest incidence also observed in cows with the age group of 6 to 8 years. These findings suggest a need for targeted management strategies, especially during specific months and for particular breeds and age groups, to mitigate the impact of this costly and challenging metabolic disorder in dairy farming. Further research and interventions are needed to elevate the region's individual circumstances which may contribute to improved dairy cow health and productivity among marginal dairy farmers of Tamil Nadu.

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## Efficiency of Therapeutic Laser for Treatment of Chronic Non Healing Wounds in Cats

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The study on wound healing has focused on similarities rather than on differences between species. Recent studies by authors have revealed significant differences between the cat and the dog with respect to cutaneous healing. These differences made us to reconsider wound care dogma of the feline species. Research has shown significant quantitative and qualitative differences in wound healing between cats and dogs and wound heals in the former more slowly. Since, Laser Therapy enhances the phases of wound healing, the present study was undertaken to assess the efficiency of laser for chronic non healing in cats. Clinical cases of cats that were presented to the small animal surgical outpatient unit of madras veterinary college for conservative treatment. The wounds that underwent therapy were subjectively evaluated, histopathology, pain score assessment and color flow doppler ultrasonography were performed. Based on the findings from Subjective Evaluation, Wound Planimetry, Histopathology and Pain Score Assessment it was inferred that wounds of Group I animals treated with Therapeutic Laser healed faster with earlier epithelialisation, granulation, wound healing, increased collagen density and significant reduction in pain when compared to Conservative Treatment group.

**Keywords:** Feline - Chronic Wounds - Therapeutic Laser - Wound healing.

### Introduction

The study on wound healing has focused on similarities rather than on differences between species and there is a general assumption that wound healing is more or less homogenous across species lines, at least among mammals. The aim of wound healing was to promote rapid wound closure and to prevent excess scar formation. Laser Therapy modulates wound healing and is stimulatory in origin. In addition, Laser Therapy has a positive effect through acceleration of inflammation, increased collagen synthesis and tensile strength. Laser Therapy also appears to be inhibitory for pain receptors and sensory nerves thereby increasing the threshold for chronic wound pain. The beneficial effects of Laser Therapy is more focused to the proliferative phase of wound healing since it increases fibroblast activity and is rather inhibitory in the early inflammatory phases of the wounds. Research has shown significant quantitative and qualitative differences in wound healing between cats and dogs and wound heals in the former more slowly. Since the Laser Therapy enhances the phases of wound healing, the present study was undertaken to assess the efficiency of laser for chronic non healing wounds through Subjective valuation, Color Flow Doppler, Wound planimetry and histopathology.

### Materials and Methods

The study was conducted on twelve cats brought to the Small Animal Outpatient Unit at Madras Veterinary College with a history of chronic non-healing wounds. These cases were divided into 2 groups with 6 animals in each group. The cases were selected based on the following inclusive and exclusive criteria viz., Traumatic wounds, Lacerated wounds, Radiation wounds, Photosensitisation injuries and Burn injury and exclusive criteria viz., Parasitic wounds, Systemic septic wounds and Self mutilated wounds. Group I Cases were treated with therapeutic laser, Group II were treated with with conservative treatment. The cats were sedated with Xylazine (Xylaxin, Indian Immunologicals) @1mg/kg body weight and Butorphanol (Butodol-2, Neon) @ 0.2mg/kg body weight. Highly uncooperative and aggressive cats were additionally administered Ketamine Hydrochloride @10 mg/kg (Aneket, Neon) and then intubated. Brachycephalic breeds such as Persian cats were sedated with Butorphanol @ 0.2 mg/kg, followed by Midazolam (Mezolam/ Neon) @ 0.2mg/kg and Ketamine @10 mg/kg body weight. The wound was lavaged and debrided, for the Conservative or Laser Therapy was performed.

All animals of Group I with chronic non healing wounds were subjected to Laser Therapy on Days 0, 3, 7 and 14 or until granulation was evident. The device was placed at 6ft distance from the electrical outlet

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(100- 240V). The hand piece was held perpendicular to the wound surface of the patient and the laser emission commences once the foot/finger switch is activated. The hand piece is moved slowly over the entire wound area in a zig zag manner for the duration of the treatment. Therapeutic Laser treatment at 4.8 Watts for 1.5 minutes was given, at a distance of 1-2 inches from the patient (Plate no.1 &2)

The animals of Group II were subjected to Conservative Wound Management on the day of presentation and on alternate days (48 hours) or till the wound healing was evident. The Conservative Therapy was done by lavaging, debridement and appropriate wound dressings.

In Group I and II, the wound healing was evaluated based on the physical observations such as colour, odour and presence of exudates on day 0, 3, 7 and 14 days of treatment. In all the three groups, the colour coding namely red, yellow and black as reported by Wilson (2012) were followed and observations. Chronic non-healing open wounds were observed for the presence of any mal, offensive, repulsive, acrid or putrid odour. Open wounds were observed for the type of exudates, serous as clear without blood, pus or debris, serosanguineous as bloody and bright red fluid and purulent discharge as thick, cloudy and yellow (Jones *et al.*, 2003).

Wound planimetry was used to determine the area of epithelization by subtracting the area of contraction and area of granulation of the wound. The planimetry values have also been used to calculate the cumulative percentage of wound contraction, wound epithelization and wound healing. Color flow Doppler ultrasonography was used to perform a subjective assessment of the wound bed's vascularity on the 3<sup>rd</sup>, 7<sup>th</sup> and 14<sup>th</sup> day ( Plate No.3). A 3.0 mm punch biopsy instrument was used to take tissue sample from the wound center and wound bed margin on 3<sup>rd</sup>, 7<sup>th</sup> and 14<sup>th</sup> day with or without sedation.

Punch biopsy is considered as a module for histological analysis to evaluate collagen density using Masson's trichrome stain (Plate No.4). Using Abramov's histological scoring system, the histological parameters were graded on Days 3, 7 and 14 for both groups of animals. The Glasgow CMPS-SF pain scoring system developed by Reid *et al.*(2007), was used to assess the pain scores according to six behavioural

signs, viz. vocalisation, attention to wound, mobility, response to touch, demeanour and posture/activity. The scores for each response varied from 0 to  $\geq 3$  (i.e. least pain to most pain). The pain scores of each animal were calculated as the sum of the individual scores of each behavioural category (e.g., pain score of animal A = i+ii+iii+iv+v+vi). This assessment was performed on Days 3, 7 and 14 for all animals of both Groups I and II. Table No. 9.

## Results and Discussion

The wounds of the groups were subjectively evaluated for the colour, odour and exudate on days 0, 3<sup>rd</sup>, 7<sup>th</sup> and 14<sup>th</sup> after initial presentation. The animals of Group I and II were evaluated subjectively on the basis of the wound colour, odour and exudate on Days 0, 3, 7 and 14 or until the day of complete granulation. On the day of initial presentation, most of the wounds were yellow or black, with offensive odour and copious exudate on the wound bed. These observations concurred with Amalsadvala and Swaim (2006), who stated that chronic wounds in felines were usually pale, unhealthy and weak with friable granulation tissue.

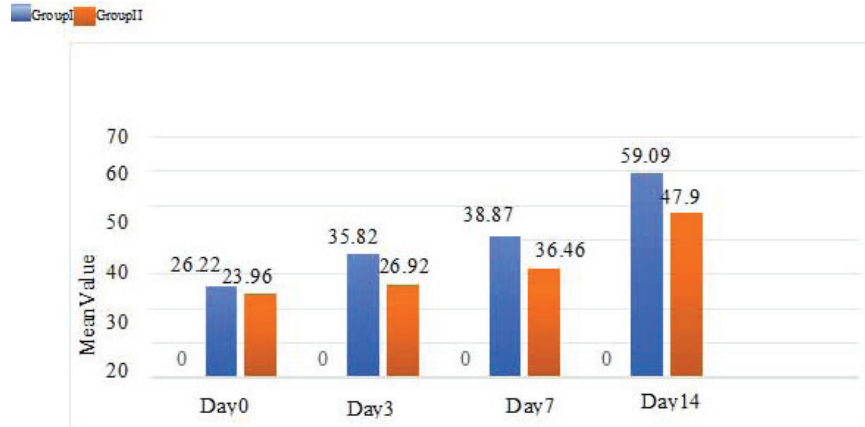
On Day 14, all animals of Group I had red-coloured wound beds and only five animals had red coloured wound bed in Group II, which indicated all the animals of Group I had healthy granulation tissue by Day 14. This is in accordance with Pryor and Millis (2015) who mentioned Laser Therapy showed effective healing of chronic wounds in two to three weeks duration (Plate No.5,6,7,8). The observations also concurred with the study of Weller and Sussman (2006) who observed that red-coloured wounds were in the terminal stages of healing process. On Days 3, 7 and 14 of wound healing, there was an increased percentage of epithelialisation in Group I than Group II ( Plate No.9,10,11,12). This could be due to the property of Therapeutic Laser to accelerate epithelialisation as reported by Hochman (2018) and Perego *et al.* (2016).

Significant difference was noticed in the percentage of epithelialisation within the Groups I and II. These observations concurred with the study of Pope (1993) who stated that the number of inflammatory cells dropped during the transition to proliferative phase and the epithelialisation commenced, as the granulation tissue served as a smooth surface for the epithelial cells to migrate from the wound borders (Table No.1 and Figure No.1).

**Table No. 1: Percentage of Wound Epithelialisation of Group I and II (MEAN±S.E)**

Parameters	Day 0	Day 3	Day 7	Day 14	F-Value
Group I	26.22±0.63 <sup>a</sup>	35.82±1.14 <sup>b</sup>	38.87±2.51 <sup>b</sup>	59.09±1.78 <sup>c</sup>	67.87**
Group-II	23.96±1.27 <sup>a</sup>	26.92±3.68 <sup>ab</sup>	36.46±1.21 <sup>b</sup>	47.91±2.79 <sup>b</sup>	34.68**
t-Value	1.58 <sup>NS</sup>	4.70**	3.46**	3.37**	

**Figure No. 1: Percentage of Wound Epithelialisation in Group I and II**



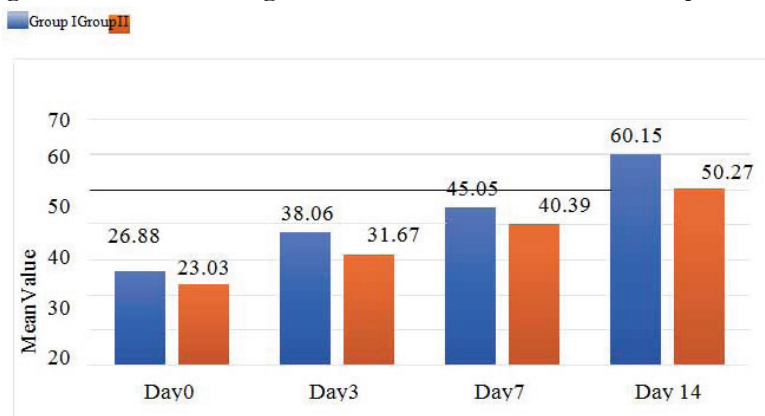
On Days 3, 7 and 14 of wound healing, there was increased percentage of wound contraction in Group I than Group II (Table No.2 and Figure No.2). This could be due to the property of Therapeutic Laser to increase fibroblast production, proliferation and collagen deposition as suggested by Suárez Redondo(2015) and

Perego *et al.*(2016). Significant difference was also noticed in the percentage of contraction within the Groups I and II due to the formation of fibroblasts, which peaked around the 7<sup>th</sup> day after injury and is responsible for commencement to angiogenesis, epithelialization and wound contraction, as stated by Neagos *et al.* (2006) in their study.

**Table No. 2: Percentage of Wound Contraction of Group I and II (MEAN±S.E)**

Parameters	Day 0	Day 3	Day 7	Day 14	F-Value
Group I	26.88±0.84 <sup>a</sup>	38.06±0.92 <sup>b</sup>	45.05±2.65 <sup>c</sup>	60.15±1.03 <sup>d</sup>	80.22**
Group-II	23.03±1.32 <sup>a</sup>	31.67±2.00 <sup>b</sup>	40.39±0.99 <sup>c</sup>	50.27±2.42 <sup>c</sup>	35.57**
t-Value	2.43*	2.92**	3.23**	3.74**	

**Figure No. 2: Percentage of Wound Contraction in Group I and II**



On Days 3,7 and 14, there was increased percentage of wound healing in Group I compared to Group II (Table No.3 and Figure No.3). This could be due to property of Therapeutic Laser to enhance wound healing by increasing neovascularisation, fibroblast proliferation, keratinocyte proliferation, early epithelialisation, growth factors and greater tensile

strength of the wound as stated by Pryor and Millis (2015) in their study. Significant difference was also noticed in the percentage of wound healing within the Groups I and II. This concurred with the study of Sharpe and Martin(2013) who stated that the combination of epithelial migration and contraction of the wound bed achieved wound healing.

**Table No.3: Percentage of Wound Healing of Group I and II (MEAN±S.E)**

Parameters	Day 0	Day 3	Day 7	Day 14	F-Value
Group I	26.27±0.77 <sup>a</sup>	37.93±1.09 <sup>b</sup>	43.81±1.98 <sup>c</sup>	55.49±2.20 <sup>d</sup>	55.80 <sup>**</sup>
Group-II	22.72±1.11 <sup>a</sup>	31.60±1.51 <sup>b</sup>	40.38±1.06 <sup>c</sup>	48.02±2.46 <sup>d</sup>	44.55 <sup>**</sup>
t-Value	2.62 <sup>*</sup>	3.38 <sup>**</sup>	3.51 <sup>*</sup>	2.25 <sup>*</sup>	

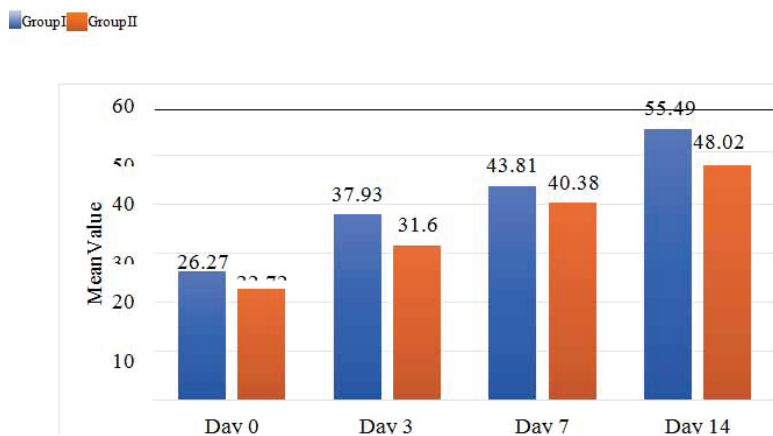
Mean bearing similar superscript do not refer significantly

NS = Nonsignificant (P>0.05)

\* = Significant (P<0.05)

\*\* = Highly significant (P<0.01)

**Figure No. 3: Percentage of Wound Healing in Group I and II**



The statistical inference for acute inflammation, chronic inflammation, granulation tissue density, granulation tissue maturation, re-epithelialisation and neovascularization were found to be non-significant between the groups. However, there was significant increase in collagen density of Group I compared to Group II (Plate No.13,14,15,16). The increased collagen density in Group I can be attributed to the property of Therapeutic Laser which increases collagen deposition and organization as stated by Lopez and Brundage (2019), Pryor and Millis (2015), Hochman (2018), Dycus (2014), Fesseha (2020).

neovascularisation in Group I compared to Group II which may be due to the reason that photobio modulation enhances angiogenesis, collagen deposition and re-epithelialisation.

Although there was no statistically significant difference in the histological parameters between the groups, microscopic evaluation revealed increased granulation tissue density, re-epithelialisation and

Colour Flow Doppler Ultrasonography was done on Days 3, 7 and 14. The non-parametric study was undertaken to determine the presence of healthy vascular supply to the wound bed which would reflect on the status of the wound. This was in accordance to the work of Gokulakrishnan *et al.* (2018), who used colour flow Doppler ultrasound to subjectively assess the vascularity of skin flap in their study. Non-parametric *Chi* square test was used to statistically analyse the ultrasound grading between Group I and II. The result from the statistical analysis revealed no significant difference between the two groups on Days 3,7 and 14 of evaluation. Even

though there was no statistical significance between Group I and II, on Day 7, five animals of Group I showed high degree of confidence for detection of the blood vessels while Group II had only two animals with high degree of confidence for detection. This might be attributed to the property of Therapeutic Laser to increase the production of nitric oxide which caused vasodilation and which in turn triggered angiogenesis as explained by Hochman (2018) in his study.

Interpretation from the statistical analysis revealed significant difference in the animals of Group I in comparison with Group II animals (Table No.4). Thus, animals which underwent Laser Therapy had significant pain relief and this might be due to the property of Therapeutic Laser to enhance serotonin and beta-endorphin secretion which in turn had a positive effect on pain relief as stated by Wardlaw *et al.*(2019) and Cotler *et al.* (2015) in their study.

**TableNo. 4: Non parametric statistical analysis of pain assessment of Group I and II (Kruskal-Wallis Test and Mann-Whitney Test)**

Groups Testvalue (Between Groups)	Days			Test Value (Withingroups)	
	3	7	14	K-W Value	P-Value
I	1.50±0.50	0.67±0.49	0.00±0.00	<b>8.57*</b>	<b>0.012</b>
II	4.33±1.38	2.50±0.80	0.17±0.16	<b>8.39*</b>	<b>0.015</b>
<b>M-W Value</b>	<b>22.0<sup>NS</sup></b>	<b>28.5*</b>	<b>21.0<sup>NS</sup></b>		
<b>P-Value</b>	<b>0.240</b>	<b>0.043</b>	<b>0.699</b>		

NS =NonSignificant(P>0.05)

\* =Significant(P<0.05)

\*\* =Highly significant(P<0.01)

The profound pain relief in animals that underwent Laser Therapy may be due to the ability of Therapeutic Laser to relieve both acute and chronic pain by modulation of peripheral nerve conduction velocities as explained in the study by Fesseha (2020).

It also concurred with the work of Lopez and Brundage (2019) who suggested that biostimulation by Laser Therapy promoted regeneration of tissues as it reduced inflammation which in turn reduced the subsequent pain.



**Plate no. 1**  
Therapeutic laser instrument



**Plate no. 2**  
Laser therapy application at 4.8 watts for 1.5 minutes



**Plate no. 3**  
Colour Flow Doppler Ultrasonography procedure



**Plate no. 4**  
Punch Biopsy Procedure





**Plate no. 5**  
**Group I Contaminated wound with blackish necrotic tissue on the wound bed – Day 0**



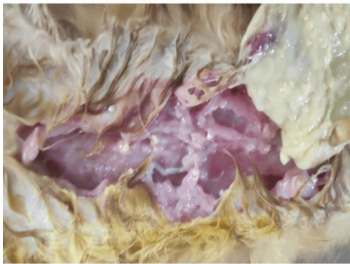
**Plate no. 6**  
**Group I Granulation tissue and partial wound contraction – Day 14**



**Plate no. 7**  
**Group I Blackish necrotic tissue and purulent discharge on the wound bed –Day 0**



**Plate no. 8**  
**Group I Evidence of wound contraction– Day 14**



**Plate no. 9**  
**Group II Severely contaminated yellow colored wound bed with copious purulent discharge – Day 0**



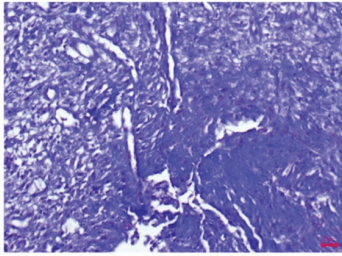
**Plate no. 10**  
**Group II Wound contraction and granulation tissue – Day 14**



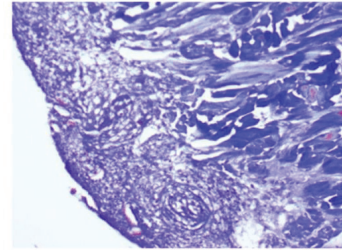
**Plate no. 11**  
**Group II Chronic wound after debridement– Day 0**



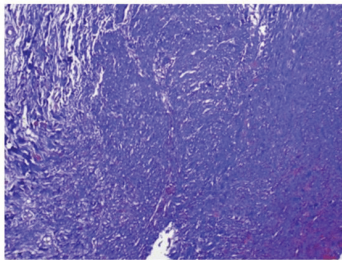
**Plate no. 12**  
**Group II Evidence of Wound contraction– Day 14**



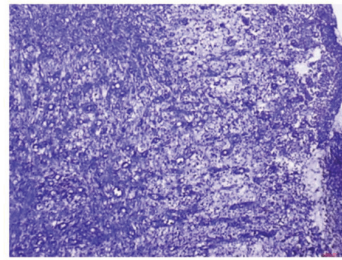
**Plate no. 13**  
**Group I- Fibroblasts arranged loosely, low collagen tissue density- masons trichrome staining day 0**



**Plate no. 14**  
**Group I - Fibroblasts thin and well arranged, increased collagen density masons trichrome staining day 14**



**Plate no. 15**  
**Group II –Moderate collagen density with mild angiogenesis masons trichrome staining day 0**



**Plate no. 16**  
**Group II - partial epithelialisation with moderate collagen activity masons trichrome staining day 14**

## Conclusion

Based on the findings from Subjective Evaluation, Wound Planimetry, Histopathology and Pain Score Assessment it was inferred that wounds of Group I animals treated with Therapeutic Laser healed faster with earlier epithelialisation, granulation, wound healing, increased collagen density and significant reduction in pain when compared to conservative treatment group.

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## Efficacy of Oral Sarolaner In canine Demodicosis

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### Abstract

Dogs presented to small animal dermatology unit of Veterinary Clinical Complex, Rajendranagar with a history of extensive itching, alopecia, hyperkeratinisation, skin discoloration, formation of scales and crusts with regular deworming and vaccination status were taken for the study. Clinical examination was conducted and dogs with of lichenified skin, alopecia, erythema, papules, comedones as well as the presence of Demodex mite on skin scrapping were included in the study. Dogs were randomly divided into two groups, viz., group I (n=28) treated with tab. ivermectin (400 mcg/kg, PO, SID) until two successive negative scrapings and group II (n=28) treated with tab. Sarolaner, an isoxazoline class parasiticide administered orally at a dosage of 2 mg/kg once a month till three months. Mites were counted once in 15 days in both groups. Parasitological cure in group I was 60.71, 78.57 and 92.85 percent respectively, in subsequent months, whereas in group II 67.85 and 100 percent respectively, after the first and second month of therapy. Notably, dogs in group II demonstrated full clinical recovery by the second month of treatment with no reported relapses. Additionally, all the dogs were also managed with chlorhexidine shampoo bath weekly once and immune boosting syrup once a day.

**Keywords:** canine demodicosis, ivermectin, sarolaner

The skin holds a significant sensitive organ and plays a crucial role in its aesthetic appeal. Demodicosis is a common parasitic dermatosis stands out as a prevalent category among the various skin disorders, underscoring the substantial impact on the overall health and well-being of dogs (Sakina and Mandial, 2011). Managing certain cases of demodicosis can pose challenges in treatment, especially when traditional approaches encounter difficulties or prove ineffective. Despite using topical amitraz, the prognosis of the disease remains complex, with a significant number of cases exhibiting resistance or remain intolerant to this product. Oral administration of ivermectin within the range of 0.3–0.6 mg/kg on a daily basis is a suitable therapeutic approach for generalized demodicosis in canines. However, ivermectin can lead to severe neurological side effects, including lethargy, tremors, mydriasis, and in sensitive dogs, even death (Paterson *et al.*, 2014). This toxicity is attributed to the extended duration of therapy or overdosing by owners. So, the current study was carried out to compare the efficacy of oral ivermectin and oral sarolaner as a therapy to treat demodicosis.

### Materials and methods

Clinical trial was carried out at Veterinary Dermatology unit, College of Veterinary Science in Hyderabad. Dogs were included in the study after

obtaining written informed consent from its owner. The study implemented at fortnightly follow-up schedule and cases where owners willingly participated in regular follow-ups were considered. Dogs displaying clinical signs of generalized demodicosis were diagnosed and eligibility for inclusion was determined based on the presence of skin lesions affecting an entire body region or having five or more localized lesions, including alopecia, erythema, comedones, papules, pustules, casts, scales, or crusts. Additionally, eligible dogs had to exhibit a minimum of four to five live Demodex mites (immature or adult) in three deep skin scrapings. Pregnant, lactating or breeding dogs, those undergoing immunosuppressive therapy, receiving systemic or topical antimicrobials, recently treated with an ectoparasitic agents and dogs with mange caused by Sarcoptes mites were excluded from the study. Dogs below the age of seven months were not enrolled. The study prohibited concurrent treatment with any other ectoparasitic agents throughout the duration.

Sarolaner (group I dogs) was given orally @ 2 mg/kg once monthly for 3 months. Whereas, Ivermectin (group II) was given orally @ 400 mcg/kg once daily until three subsequent negative scrapings. In both groups, therapy was followed and dogs were reviewed until three months. Live Demodex mites were counted in the three most severely affected sites and deep skin scrapings from each primary dog on days 0, 15, 30,

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45, 60, 75 and 90 days. Scraped material mixed with mineral oil was microscopically examined at 40X magnification to count adult and immature mites, the presence of Demodex eggs also noted. The severity of clinical signs was assessed before treatment on day 0 and days 15, 30, 45, 60, 75 and 90 of therapy (Becskei *et al.*, 2018). A Parasitological cure was determined when all skin scrapings were consistently negative. The study was concluded when no live mites were found on two consecutive skin scrapings.

## Results and Discussion

Dogs diagnosed with generalised demodicosis were randomly divided into two therapeutic groups with 28 dogs in each. Dogs enrolled under the sarolaner group had an average age of 1.5 years and an average body weight of 14.2 kg. Among them, 57.14% (16/28) were purebred, while 42.85% (12/28) were of mixed breed, 64.28% (18/28) male, and 35.71% (10/28) were female. In the ivermectin group, dogs had a mean age of 1.9 years and a mean body weight of 15.6 kg. Among these dogs, 67.85% (19/28) were purebred and 39.28% (11/28) were of mixed breeds, 57.14% (16/28) were female and 42.58% (12/28) were male.

During the study, one dog treated with sarolaner and two dogs treated with ivermectin received concurrent systemic antibiotic treatment at various points due to pyoderma associated with demodicosis. At the beginning of the study, many dogs exhibited symptoms such as alopecia, erythema, casts, crusts, comedones, papules and pustules. Throughout the study duration, improvement in clinical signs was noticed in both the treatment groups. However, the overall reduction in the extent of affected body surface reached nearly 96% in the sarolaner group and nearly 84% in the ivermectin group by the conclusion of the study.

Within the sarolaner treated group, all 28 dogs successfully completed the study. However, in the ivermectin-treated group, two dogs completed the study without achieving a parasitological cure. These two dogs were withdrawn from the study on day 90 due to lack of efficacy and subsequently managed with sarolaner. The parasitological cure rates in group I were 60.71% (17/28), 78.57% (22/28) and 92.85% (26/28) in the subsequent months. In group II, the cure rates were 67.85% (19/28) and 100% (28/28) after the first and second month of therapy respectively (Table 1).

**Table 1: Mite count evaluation and parasitological cure**

Therapy	Day 0	Day 15	Day 30	Day 45	Day 60	Day 75	Day 90
<b>Group I Ivermectin (n=28)</b>							
<b>Range of mite count</b>	10-250	5-80	0-60	0-25	0-10	0-5	0-5
<b>Average mite count</b>	56.93	35.68	28.75	10.82	2.39	1.18	0.68
<b>% Reduction in mite count</b>	-	37.33	49.50	80.99	95.80	97.93	98.81
<b>% of mite free dogs</b>	-	28.57	60.71	72.95	78.57	89.64	92.85
<b>Group II Sarolaner (n=28)</b>							
<b>Range of mite count</b>	20-280	0-60	0-25	0-10	0	0	0
<b>Average mite count</b>	72.57	26.67	12.84	6.20	0	0	0
<b>% Reduction in mite count</b>	-	73.33	87.16	93.80	100	100	100
<b>% of mite free dogs</b>	-	62.98	67.85	89.56	100	100	100

The current investigation suggests that ivermectin (400 µg/kg, PO, SID) was not successful in adequately managing demodicosis in all the cases which was in accordance with the findings of Fondati (1996), who documented a lack of efficacy of ivermectin in demodicosis. The findings from this clinical study affirm the effectiveness and apparent safety of sarolaner in treating generalized demodicosis in dogs, consistent with

previous controlled studies, they reported significant improvement after being treated with sarolaner (Six *et al.*, 2016 and Becskei *et al.*, 2018). During the study, one dog treated with sarolaner and two dogs treated with ivermectin received concurrent systemic antibiotic treatment at various points due to pyoderma associated with demodicosis. This additional treatment may have contributed to the resolution of clinical signs

of demodicosis (Rao *et al.*, 2020). Following three months treatment with sarolaner, a 100% parasitological cure was observed in all cases, with all dogs being mite free. In contrast, the ivermectin-treated group did not achieve a parasitological cure in all dogs, leading to the withdrawal of therapy in two dogs due to lack of efficacy. The efficacy of sarolaner appears better than ivermectin.

The findings of quick reduction in mites along with a marked improvement in skin and coat condition in sarolaner administered dogs was in accordance with findings of Becskei *et al.*, (2018). The distinct and rapid resolution of clinical signs observed in the sarolaner treated group showed its practical utility in clinical cases, offering effectiveness without any side effects. With the convenience of a monthly treatment regimen, it eliminates the necessity for daily therapy and constant monitoring. The ease of administration enhances its practical adaptability, making sarolaner a valuable and user friendly option for managing demodicosis in dogs.

### Conclusion

In the present study sarolaner demonstrated superior efficacy compared to ivermectin, achieving a 100% parasitological cure within three monthly treatments. The findings suggest that sarolaner can be a valuable alternative, especially considering its superior efficacy and the challenges associated with ivermectin therapy.

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## Lorazepam Therapy for Canine Status Epilepticus

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### Abstract

Canine status epilepticus is naturally occurring epilepsy in dogs, a life-threatening emergency needs to be treated immediately. Prolonged episodes are known to cause damage in multiple areas of brain. For instantly stopping the seizure activity benzodiazepines are chosen as first-line therapy in dogs. The effectiveness of intravenous lorazepam has not yet been well established in veterinary patients. The purpose of the study was to find the seizure free interval in status epilepticus dogs when compared to diazepam. Twelve actively seizing dogs were randomly divided into two groups and administered with intravenous lorazepam @ 0.2mg/kg and diazepam @ 0.5 mg/kg. The parameters like physical parameters, seizure free period, level of consciousness and motor activity were analysed in both the groups. On evaluating the physical parameters there was a significant post ictal temperature when compare to control animals. There was a significant increase in seizure free period when compare to diazepam group. Lorazepam didn't alter the level of consciousness and motor activity in treated dogs. To conclude, lorazepam significantly increased the seizure free period when compared to diazepam in status epilepticus dogs.

**Keywords:** Status Epilepticus, Lorazepam, Diazepam, Seizure free Period

A seizure is one of the common neurological emergencies noted in dogs (Kobata *et al.*, 2020). Cluster seizures (CS) and status epilepticus (SE) have the terrible distinction of being the most lethal and are difficult to treat in dogs, cats as well as people (Dewey, 2006). They are a life-threatening emergency, it must be recognised right at once and treated as soon as possible (Golubovic and Rossmeisl Jr, 2017a; Kobata, *et al.*, 2020). Prolonged episodes are known to cause damage in multiple areas of brain (Golubovic and Rossmeisl Jr, 2017a). Poorly controlled epilepsy is known to cause a huge emotional as well as a financial burden for pet parent witnessing the pet undergo an epileptic episode. The persistence of a seizure has a high potential to increase mortality and morbidity as well as the financial burden (Coles *et al.*, 2013). For the purpose of instantly stopping the seizure activity benzodiazepines are chosen as first-line therapy in both veterinary and human medicine (Kobata *et al.*, 2020; Almohaish *et al.*, 2021; Charalambous *et al.*, 2021). Delay in administering a benzodiazepine medication reduces the ability to manage a seizure and can result in increased chances of mortality (Almohaish *et al.* 2021). The effectiveness of intravenous lorazepam has not yet been well established in children as well as in veterinary patients (Sreenath *et al.*, 2010). Insufficient clinical trials in veterinary medicine have limited the clinical use and understanding of lorazepam (Heller, 2015). There is a huge paucity of veterinary data in lorazepam usage to

canine status epilepticus and cluster seizures not only in India but also in other countries. With this the study was aimed to rule out inter-ictal period, level of consciousness and motor activity in lorazepam administered SE cases.

### Materials and Methods

The clinical study was conducted at Critical Care Unit of Madras Veterinary College for a period of one year. The actively seizing and/or dogs who had repetitive seizures in a short period of day were rushed to the Critical Care Unit and were taken for this study. These cases were identified to had status epilepticus. A total of 12 actively seizing dogs were randomly taken for this study. Animals with a known metabolic, toxic, traumatic and neoplastic cause of seizure were excluded from this study. These 12 animals were randomly grouped as follows: group I administered with Lorazepam at 0.2mg/kg body weight as a bolus dose (n=6). Group II administered with diazepam (n=6) at the dose rate of 0.5 mg /kg body weight after the establishment of intravenous line. Great care while administering the bolus dose of lorazepam to avoid the arterial spasms. Animals were kept under observation for up to 12 hours post administration of intravenous lorazepam and diazepam for stabilization and observation. The owners were encouraged to report the epileptic episode within this 12-hour post drug administration period as per Naeser *et al.*, (2004). Further they were encouraged to report the timing of seizure onset and its duration. The

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inter ictal period for these drugs were assessed for up to 12 hours post administration or upto occurrence of seizure in case seizure occurred prior to the said time. Apparently healthy animals which were brought for general check-up or for routine vaccinations were taken as control group(n=6).

The level of consciousness was determined as per Silverstein and Hopper, (2014).

### Motor Activity Assessment Score (MAAS)

The motor activity was extrapolated from a human study (Umunna *et al.*, 2015) and modified to veterinary needs. The scoring of animals was done on basis of observations noted during post drug administration period directly by clinician. Animals which do not move even with noxious stimuli were considered as unresponsive, scored 0. Those animals with open eyes and had limb movement to noxious stimuli considered as responsive only to noxious stimuli, scored 1. Animals with open eyes, turns head toward loud auditory stimulus or moves limb when touched are scored 2. Calm and cooperative animals (score 3) don't require external stimulus to elicit movement and the animal responding to its name. Score 4 animals are restless and cooperative and stimulus is required to elicit movement and patient is trying to lick catheter or tubes. Agitated animals are scored 5 and dangerously agitated, uncooperative animals are scored 6.

The collected data were subjected to descriptive analysis by using SPSS software (version 21) to derive

Mean  $\pm$  S.E., t-test (two paired) for comparison of interictal period. Single factor one way ANOVA was used for physical, hematological and biochemical parameters and Mann Whitney- U test for qualitative parameters analysis in this study.

### Results

The clinical cases with status epilepticus were subjected to two different drugs of benzodiazepines viz., Lorazepam and Diazepam and their effect was analyzed in this study. Both the drugs were administered through intravenous route. The changes in physical parameters were given in table 1. There was a significant increase in immediate post ictal temperature of SE affected animals when compared to control animals. The difference in temperature was significant within the affected groups also. The difference between the rectal temperature 5 minutes after stabilization, pulse rate, heart rate were non-significant with control and between them. The respiratory rate in the lorazepam treated group i.e., Group I (n= 6) ranged from 20 breaths per minute to 66 breaths per minute with a mean  $\pm$  S.E. of  $44.5 \pm 6.66$  breaths per minute. The respiratory rate for diazepam treated i.e., Group II (n=6) ranged from 14 breaths per minute to 58 breaths per minute with a mean  $\pm$  S.E. of  $40 \pm 6.41$  breaths per minute. A highly significant difference was noted between the control (Group III) and the status epilepticus animals even after therapy. This indicates that cases presented with seizures had tachypnoea. Other parameters vary without any significance.

**Table 1. Mean  $\pm$  S.E. values of Physical Parameters (ANOVA: Single factor)**

Parameters	Mean $\pm$ S.E.			F	P-value	F crit
	Group I	Group II	Group III			
Immediate Post Ictal Temperature ( $^{\circ}$ F)	103.43 $\pm$ 0.48 <sup>a</sup>	101.97 $\pm$ 0.3 <sup>b</sup>	100.75 $\pm$ 0.22 <sup>c</sup>	14.48	0.0**	3.68
Temperature Post Stabilization ( $^{\circ}$ F)	101.75 $\pm$ 0.51	101.13 $\pm$ 0.35	100.75 $\pm$ 0.22	1.77	0.20	3.68
Pulse Rate (/min)	134.33 $\pm$ 21.37	102.33 $\pm$ 14.52	120.17 $\pm$ 11.5	0.96	0.4	3.68
Heart Rate (/minute)	135.17 $\pm$ 19.72	102.67 $\pm$ 13.89	111.67 $\pm$ 6.71	1.35	0.29	3.68
Respiration Rate (/minute)	44.5 $\pm$ 6.66 <sup>a</sup>	40 $\pm$ 6.41 <sup>a</sup>	17 $\pm$ 1.75 <sup>b</sup>	7.37	0.01**	3.68
SpO2 (%)	96 $\pm$ 1.10	93.83 $\pm$ 2.15	98.5 $\pm$ 0.43	2.72	0.1	3.68
Blood Pressure (mmHg)	118 $\pm$ 11.60	122.50 $\pm$ 5.59	120 $\pm$ 7.07	0.07	0.93	3.68

\*P<0.05 (Significant at 5% level); \*\*P<0.01 (Significant at 1% level),

NS: Non-significant, Mean bearing same superscript (a, b, c) did not differ significantly.



The level of consciousness score (LOC) for Group I and II ranged from 1 to 4 and 2 to 4 respectively. The motor activity assessment score (MAAS) for Group I and II ranged from 1 to 4 and 1 to 3 respectively. The

study did not show a significant difference in level of consciousness and MAAS using either of the drugs. On Mann-Whitney U test analysis (Table 2) there was no significant difference between LOC and MAAS of SE animals with control.

**Table 2. Mann-Whitney U test analysis for comparison of LOC score and MAAS Between lorazepam and diazepam group**

S.No	Null Hypothesis	test	Sig.	Decision
1.	The distribution of score LOC is the same across categories of drug	Independent samples Mann-Whitney U test	0.589 <sup>1</sup>	Retain the null hypothesis
2.	The distribution of motor activity assessment (MAAS) is the same across categories of drug	Independent samples Mann-Whitney U test	0.180 <sup>1</sup>	Retain the null hypothesis
Asymptomatic significant differences are displayed. The significance level is 0.05 <sup>1</sup> Exact significance is displayed for this test.				

The inter ictal period for lorazepam treated Group I ranged from 80 minutes to 300 minutes. For Group II, diazepam treated group, the period ranged from 34 minutes to 290 minutes. The test of significance revealed a significant difference in seizure free Period between Group I and Group II at 5% level ( $P < 0.05$ ).

Lorazepam appears to have a significant difference ( $\rho = 0.044$ ) with diazepam in regard to duration of seizure control post injection for dogs with cluster seizures and status epilepticus. Lorazepam appears to have a significant difference ( $\rho = 0.044$ ) with diazepam in regard to duration of seizure control post injection for dogs with status epilepticus.

**Table 3. The significance level of inter-ictal period between the groups.**

Parameter	Group I	Group II
Seizure free interval (Minutes)	218.5 ± 35.18	94 ± 41.13
t- value (Equal variances assumed)	2.300	
Sig. (2-tailed)	0.044*	
*Significant at 5% level ( $P < 0.05$ )		

## Discussion

Benzodiazepines represent the first-line and widely-used treatment choice and still remain crucial for management of canine SE (Golubovic and Rossmeisl Jr, 2017b). In a human study, lorazepam was as effective as phenobarbital or diazepam plus phenytoin in patients with generalized convulsive status epilepticus (Treiman et al., 1998). In a study on dogs with emergency seizure disorders 3% of pet owners were used lorazepam as primary medicine to control seizure episodes in dogs (Kahn, 2023). Lorazepam may be useful as antiepileptic therapy with IV administration in the dog (Podell et al., 1998). The mean ± S.E. of seizure free period for

diazepam treated animals (Group II) was 94 ± 41.13 minutes i.e., 1.57 hours whereas it was 218.5 ± 35.18 minutes (3.6 hrs) for lorazepam. The result from our study correlate with Naeser *et al.*, (2004) where they compared the median seizure-free interval between lorazepam and diazepam administration in canines. They indicated the median seizure free interval was 2.8 hr (ie. 168 min) and 3.4 hr (i.e., 204 min) for diazepam and lorazepam respectively. Further it also correlates with a study using SAS detection algorithm for seizure recurrence detection. This study stated that the dog administered diazepam had a recurrence of another seizure 1.5 hour after administration (Coles *et al.*, 2013).

Lorazepam has more potent activity at benzodiazepine receptor and has longer half-life after IV administration to dogs with SE (Thomas and Dewey, 2016). The distribution half-life of lorazepam is also high than that of diazepam due to its low lipid solubility i.e 2-3 hours for lorazepam and 15 minutes for diazepam (Sirven and Waterhouse, 2003). Lorazepam may have enhanced antiepileptic potency due to increased binding to the high affinity benzodiazepine receptors and elevated concentrations of parent drug in the brain after serum concentrations has declined and help in controlling status epilepticus (Podell *et al.*, 1998). Status epilepticus animals significantly had higher post ictal temperature than control group. These findings correlates with Wachtel *et al.*, (1987) who stated that generalized tonic-clonic seizures are similar to a vigorous workout and hence can cause a rise in body temperature. Hence it was proved in our study that the increase in body temperature was due to increased muscular activity, loss of electrolyte and hypovolemic shock. Devinsky, (2004) stated that in some cases ictal parasympathetic activity or sympathetic inhibition and may result in tachypnoea. Our findings correlates with it. The intravenous administration of lorazepam increased the interictal period to 3.6 hours and lorazepam administration doesn't alter the level of consciousness and motor activity at therapeutic doses. Lorazepam causes some rare adverse reactions, including a manic-like reaction on withdrawal, delirium, and paradoxical precipitation of tonic seizures or myoclonus in children. It can both relieve and worsen behavioral disturbances in demented elderly patients (Lee *et al.*, 1994; Tueth, 1995). However, there was no significant difference in level of consciousness and motor activity in dogs treated with lorazepam and control. To conclude lorazepam significantly increased the seizure free period when compared to diazepam in status epilepticus dogs.

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## Newcastle Disease Outbreak in Backyard Poultry: Herbal Remediation Using *Phyllanthus Polygonoides* and *Carica Papaya* Leaves

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### Abstract

Newcastle disease (ND) is a devastating disease of backyard poultry and causes great economic losses to the economy of the individual as well as the nation. The study was undertaken to assess the effectiveness of herbal leaves extracts of *Phyllanthus polygonoides* and *Carica papaya* for control of Newcastle outbreak in backyard poultry. A total of 60 representative desi fowl (chicken 50, turkey 7 and duck 3) from 40 flocks were presented to Veterinary Clinical Complex, VC&RI, Orathanadu for treatment. The sample like oropharyngeal fluid/ cloacal swab collected from 40 representative birds from 40 flocks (Chicken-30, turkey-7 and Duck-3) and performed haemagglutination test. Out of 40 birds screened, 18 birds (Chicken-13, turkey- 4 and Duck- 1) were positive for haemagglutination test and showed the presence of Newcastle disease virus and confirmed by PCR. The infected birds were treated with aqueous extract of *Carica papaya* and *Phyllanthus polygonoides* leaves @ 0.5ml/ kg b.wt orally once a day for 3 days. Most of the birds recovered in single dose, the moderately infected birds recovered after 3 days of treatment. The herbal extract was also used prophylactically other than the infected birds in their respective flocks to prevent the infection. None of the adult birds in their flocks become infected and protected from infection. The aqueous extract of *Phyllanthus polygonoides* and *Carica papaya* leaves were highly effective for control of ND in backyard poultry, it could be used prophylactically every 30 days to prevent Newcastle disease outbreak in backyard poultry to minimize economic losses to the farmers.

**Keywords:** Newcastle disease, HA, *Phyllanthusspp*, Papaya

Poultry industry is one of the most developed sectors in the world. The explosive growth of backyard chickens as an industry results from increasing consumer demands for organic meat and eggs. The economic returns from backyard poultry provide additional income to rural poor with low investment (Puro and Sen, 2022). The major problem in backyard poultry is increased incidence of diseases due to unregulated bio-security and limited veterinary care on native birds (Ayala *et al.*, 2020). Among infectious diseases, Newcastle disease (ND) poses a great economic threat to poultry industry since, it was discovered (Alexander, 2000). The occurrence of ND in backyard poultry has devastating effect on particular area or village due to huge morbidity and mortality rate in naive poorly vaccinated or unvaccinated birds (Puro and Sen, 2022). ND is an acute and highly fatal viral disease of domestic and wild birds caused by Avian Paramyxovirus-1, the strains of NDV produce a range of low pathogenicity to high pathogenicity (Ogaliet *al.*, 2018). Infection with the virulent ND viruses in the field causes sudden death without clinical signs, however, some of the affected birds

shows greenish diarrhea, gasping, respiratory distress, torticollis and paralysis of leg and wings (Arthanari Eswaran *et al.*, 2018; Getabalewet *al.*, 2019). Currently, Ethno veterinary practices are gaining attention to treat the diseases in livestock and poultry. The present article describes the management of Newcastle disease outbreak in backyard poultry by using aqueous extract of *Phyllanthus polygonoides* and *Caricapapaya* leaves.

The representative desi fowl from various villages of Thanjavur District with a history of sudden death, huddling stance and anorexia, a total of 60 birds from 40 flocks (Chicken-50 birds from 30 flocks, Turkey-7 flocks from 7 birds and Duck-3 flocks from 3 birds) were presented for treatment from August 2021 to July 2022. The individual flock size was 4-300 numbers and reported mortality rate was in the range of 30-70%. Randomly, clinical samples like oropharyngeal/cloacal swabs were collected from clinically affected birds in 0.5 ml of phosphate buffered saline (PBS) for HA test and stored in deep freezer at -20°C. Some of the birds were died on arrival to Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu and postmortem examination was also performed.

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The sheep blood was collected in proportion of 1.1 ml of sterile Alsever's solution (sodium chloride 0.42g, Sodium citrate 0.8g, dextrose 2.05g and citric acid 0.055g dissolved in 100 ml distilled water) for each ml of blood. The sheep RBC was washed thrice with sterile normal saline by gentle centrifugation at 1500 rpm for 10 minutes and prepared 1% Sheep RBCs (Packed RBC 1ml and 99ml sterile normal saline) and stored at 4°C.

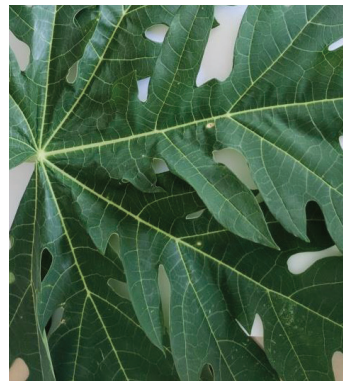
The haemagglutination test was performed in oropharyngeal fluid and cloacal swab by using 1% Sheep RBCs as per the procedure described by Bilal *et al.* (2014). The vaccine virus (Lasota virus) was used as positive control. The HA test carried out in V-bottom microtitre plate, 25 µL of normal saline was added in each well in the first row upto 10<sup>th</sup> well. Positive control and RBC control was maintained in 11<sup>th</sup> and 12<sup>th</sup> well. Then 25 µL of oropharyngeal fluid/ cloacal fluid was added in the first well and made serial two fold dilution

upto 10<sup>th</sup> well, and discarded 25 µL from 10<sup>th</sup> well, subsequently 25 µL of 1% sheep RBCs was added in each well and mixed well, let it in room temperature for 30 minutes. The reciprocal of highest dilution showing 100% agglutination was considered as titre of HA.

The fresh *Phyllanthus polygonoides* plant (Fig. 1) and *Carica papaya* leaves (Fig. 2) were collected and washed with water to remove dirt. The whole plant of *Phyllanthus polygonoides* and *Carica papaya* leaves were chopped with knife. The equal quantity (1:1) of both leaves was homogenized with blender with an addition of small quantity of water. The juice (aqueous extract) was obtained by squeezing the content in muslin cloth and stored at 4°C. The clinically affected and normal birds were treated with aqueous extract of *Phyllanthus polygonoides* and *Carica papaya* @ 0.5ml/Kg b.wt orally once a day for 3 days. The severely infected birds were treated twice in a day for 3 days.



**Fig 1. *Phyllanthus polygonoides***



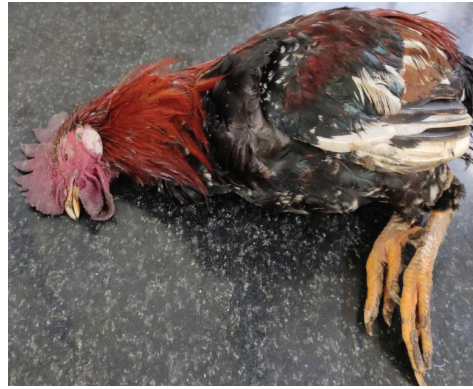
**Fig 2. *Carica Papaya* leaf**

The physical examination of clinically affected birds showed dullness, cyanosis of comb, whitish or greenish diarrhea, crop stasis, mucus discharge from mouth, gasping, torticollis and lateral recumbency (Fig. 3-6). The post mortem examination of dead birds revealed haemorrhagic lesions in the trachea, proventriculus and caecal tonsil (Fig. 7-8). Out of 40 birds (flocks) screened, 18 birds (45%) from 18 flocks (Chicken-13, turkey- 4 and Duck- 1 ) were positive for haemagglutination test and showed the presence of ND virus and confirmed by PCR. This finding was similar to that of Okpanachiet *al.* (2020), who reported that 46% of chicken was positive by HA test. The HA titre in positive cases were 1:2 to 1:16 (Fig 9-10). Both infected and apparently healthy birds in affected flocks were treated with an aqueous extract of *Phyllanthus polygonoides* and *Carica papaya* leaves for 3 days. The birds showed

gradual improvement after treatment. The whitish/greenish diarrhea and mucus discharge from beak was gradually stopped and resumed feed and water intake within 3 days. Most of the birds recovered in single dose, the mildly infected birds recovered in single dose, whereas moderately infected birds were recovered in 2<sup>nd</sup> and 3<sup>rd</sup> dose. Herbal treatment was very effective in mild to moderately infected birds (90%), which was less effective in chicks and severely infected adult birds (10%) especially those are presented in comatose condition. The plant juice was used prophylactically to protect the unaffected birds in that flock and prevented the ND for 30 days. The efficacy of individual plant juices tested was found to be ineffective. The combined plant juice was highly effective against ND in backyard poultry. Faejiet *al.* (2019) reported that the administration of n-hexane extract of *Phyllanthus amarus* @ 250 mg/ L 14 days before challenge protected from ND.



**Fig 3. Whitish and Greenish diarrhea**



**Fig 4. Cyanosis of comb and wattle**



**Fig 5. Mucus discharge from mouth**



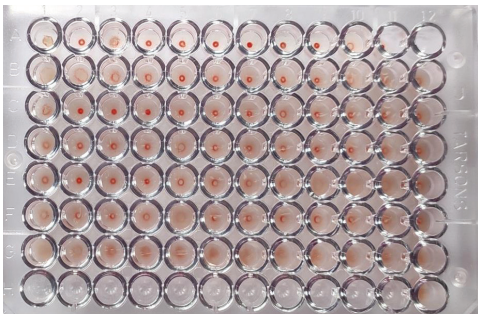
**Fig 6. Paralysis of wing and leg**



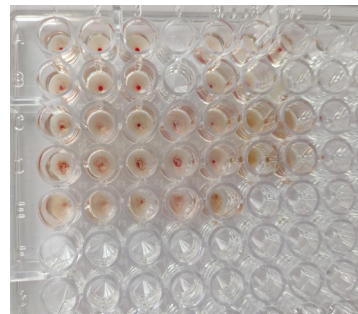
**Fig 7. Haemorrhage in proventriculus**



**Fig 8. Tracheal haemorrhage**



**Fig 9. Haemorrhage in proventriculus**



**Fig 10. HA positive samples:  
HA titre 1:2 to 1:16**

The plant genus *Phyllanthus* consists of more than 1000 species, of which many are used as traditional medicines (Sarin *et al.*, 2014), and rich in phytochemicals such as tannins, terpenes, alkaloids, glycosidic compounds, saponins, and flavones (Nisar *et al.*, 2018) and possess wide spectrum of pharmacological activities like antiviral, antibacterial and anti-inflammatory (Patel *et al.*, 2011). The *P.niruri* has enormous pharmacological activities such as antimicrobial, antiviral activities against Hepatitis B, hepato-protective and immunomodulatory activity (Lee *et al.*, 2016). Papaya leaf extract has strong medicinal properties such as antibacterial, antiviral, antitumor, hypoglycemic and anti-inflammatory activity. Additionally, the leaf juice of papaya increases the platelet counts in people suffering from dengue fever (Singh *et al.*, 2020). Pandey *et al.* (2016) studied and reported the papaya extract and papaya associated phytochemicals have anti-inflammatory and immunomodulatory properties.

The aqueous extracts of *Phyllanthus polygonoides* plant and *Carica papaya* leaves was cheap and effective therapy for management of ND disease in backyard poultry. It could be used prophylactically to control ND in desi fowl to reduce economic losses to the farmers. Further research is needed to evaluate the molecular mechanism of blocking of virus attachment on host cell membrane to prevent the viral infection.

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## Clinico-Pathological Alterations and Therapeutic Management of Thiram Poisoning in Cattle

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### Abstract

As there is very scarce literature on fungicide poisoning in livestock animals and in view of reporting fungicide poisoning in cattle in the study area, the present study was conducted to study the clinico-pathology of thiram poisoning in cattle and to standardize the therapeutic regime for the poisoning cases. Clinical cases suspected for Thiram poisoning on the basis of confirm evidence from animal owner were subjected to clinical examination, hematology and therapeutic management. Cases died of severe poisoning were subjected to post-mortem examination. A total of 17 cattle suspected for Thiram poisoning on the basis of history and clinical signs of sudden onset of anorexia, salivation, shivering, teeth grinding, restlessness, prolonged sitting, tympany, colic, dyspnea and constipation or diarrhea in few cases were taken for the study. Significant increase in heart rate and respiration rate was observed while hematological analysis showed non-significant changes compared to healthy counterparts. Post-mortem and histopathological examination of cattle died of thiram poisoning showed mild hepatocellular degeneration, tubular necrosis in kidneys with focal infiltrates while marked edema and congestion was evident in lung tissues. The ailing cattle were treated with fluid therapy, anti-inflammatory drugs, vitamin B complex, atropine sulphate, antihistaminics along with laxative and prebiotics-probiotics showed good response to treatment with complete clinical recovery in 4-5 days of treatment. Being there is no specific antidote, the cases of fungicide like Thiram poisoning could be managed with symptomatic treatment along with regular clinical assessment.

**Keywords:** Cattle, Clinico-pathology, Thiram poisoning, Treatment

Agrochemical poisoning is frequently reported in the livestock as agriculture and livestock farming in India is inter-related (Jadhav *et al.*, 2023). Fungicides are pesticides that specifically inhibit or kill fungi underlying diseases of agricultural crops. Thiram is a fungicide commonly used for seed treatment to prevent attack of fungi on seeds and to increase germination percentage (Gupta, 2010). The full chemical name is Tetramethylthiuram disulphide. It is used as a fungicide, seed protectant, animal repellent, rubber accelerator and bacteriostatic in soap. It is available as dust, flowable, wettable powder, water dispersible granules and water suspension formulations. It is most commonly used in mixtures with other fungicides. It is applied as post-harvest in a number of seed crops including small and large seeded vegetables, cereal grains, cotton seeds and soybeans. It is applied to protect the seeds from a possible fungal attack and thereby sustain germination potential of the seeds in agricultural practices (Kavita *et al.*, 2015). There are few studies on various types of fungicide poisoning in livestock animals limited only to case reports (Akkina and Estberg, 2018, Siddiqui *et al.*,

2019, Jadhav *et al.*, 2023). The present communication highlights the clinico-pathological alterations and therapeutic management of Thiram poisoning in cattle.

Clinical cases suspected for poisoning with evidence by animal owner that the packet of fungicide powder being chewed or ingested by the animal followed by onset of illness were included in the study. The clinical cases of poisoning reported to Veterinary Clinical Complex of the college with history of moderate salivation, restlessness and accidental ingestion of polythene bags containing Thiram powder (40-75% W.S) while grazing were included in the study. Confirmed cases were subjected to detailed clinical examination and haematological analysis. The cattle suffering from severe toxicity which succumbed to death in spite of treatment were subjected to post-mortem examination as per the standard bovine necropsy protocol. Various tissue samples were collected in 10% neutral buffered formalin for histopathological examination. After fixation, the tissue samples were embedded in paraffin wax. The blocks were cut to obtain 4-5 um thick sections which were further subjected to hematoxylin and eosin (H&E) staining technique as described by Bancroft and

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Gamble (2007). The cases of poisoning were subjected to detailed clinical examination and hematological analysis before start of treatment. As there is no specific antidote the treatment was done with supportive medications which included fluid therapy, anti-inflammatory drugs, vitamin B complex, atropine sulphate, antihistaminics, herbal laxative, pre and probiotics.

The data generated with respect to clinical and hematological parameters from ailing cattle was compared with data of healthy cattle using independent 't' test using SPSS software.

Various fungicides are encountered in field during agricultural operations. Understanding mechanisms of fungicide action and toxicity is important because humans and domestic animals get exposed to these pesticides accidentally or intentionally (Oruc, 2010). Full chemical name for Thiram is tetramethylthiuram disulphide. It is used as a fungicide, seed protectant, animal repellent, rubber accelerator, and bacteriostat in soap (Osweiler *et al.*, 1985). At high doses it acts as a repellent to birds, rabbits, rodents and deer in fields and orchards. Thiram is available as dust, wettable powder, water suspension formulations and in mixtures with other fungicides. It has been used in the treatment of human scabies, as a sunscreen and as a bacteriostat in medicated soaps and certain antiseptic sprays. Another important source of thiram for environmental contamination is the degradation of the two widely used ethylene bisdithiocarbamate fungicides, ferbam and ziram (Dalvi, 1988).

There is very scarce literature about Thiram poisoning in cattle (Akkinu and Estberg, 2018, Siddiqui *et al.*, 2019, Jadhav *et al.*, 2023). Thiram is moderately toxic by ingestion, but it is highly toxic if inhaled. A total of 17 cases were found suffering from thiram poisoning in cattle. All the cases were admitted to the clinic have brought the packets of thiram or instruction details written overleaf recovered while accidental ingestion by animals as evidence of poisoning. History and circumstantial evidence revealed greater number of cases of fungicide poisoning occurred during cultivation of soybean crop during Kharif season by animals grazing near the recently sown soybean field. Unscientific handling and improper disposal of fungicide instead of its scientific use for seed treatment might be responsible for toxicity in livestock. Among affected cattle only 3 were female while 14 were male used for drought work.

Clinical examination of the ailing cattle showed signs of salivation, anorexia, shivering, teeth grinding, restlessness, tympany and dullness in mild to moderate

cases while symptoms like incoordination, convulsions and prolonged sitting were observed in moderate to severe form of thiram poisoning. Defecation status in affected cattle varied from constipation to diarrhea. Straining with mild rectal prolapse was observed in one cattle while abdominal colic was reported in two cases. Similarly, conjunctival mucous membrane colour varied from pink to congested. Clinical examination of ailing cattle showed non-significant changes in body temperature while significant ( $P > 0.05$ ) increase in heart rate and respiration rate in thiram poisoning affected cattle compared to healthy counterparts. Hematological analysis showed non-significant changes when compared to healthy cattle. Siddiqui *et al.* (2019) reported hypersalivation, congested mucous membranes, sub-normal body temperature, head shaking and mydriasis in Thiram poisoning affected bull. The non-specific signs might be attributed to dose of Thiram ingested by the ailing animals. Clinical signs in thiram poisoning in cattle were anorexia, listless behavior, dyspnea, convulsions and death due to cardiac arrest (Kaya and Bilgili, 1998). Thiram is metabolized in the body to toxic metabolites as dimethyldithiocarbamate and carbon disulfide. These compounds have been shown to inhibit hepatic microsomal enzymes (Dalvi and Deoras, 1986). Inhibition of egg laying was reported in layer hens when thiram levels in ration were in the range of 100-500 ppm (Lorgue *et al.*, 1996). An outbreak of thiram poisoning on Spanish poultry farms showed softening of egg shells, depressed growth rate and limb abnormalities in around 1 million birds due to contamination of corn with thiram (Guitart *et al.*, 1996).

Since there is no specific antidote for thiram poisoning in animals, the treatment of all cases was done symptomatically with objective of evacuation of the toxin from gut and supportive therapy. Treatment comprising of Atropine sulphate, fluids, steroidal / non-steroidal anti-inflammatory drugs, pre and probiotics, vitamin B complex and laxative. Cattle showed neurological signs were treated with Diazepam for at least 2 days or till resolution of nervous signs. The treatment comprising of fluid therapy (Dextrose 5% + Ringer Lactate) @ 2-4 liter IV twice daily for 3-5 days, atropine sulphate @ 0.02 mg/kg IV twice daily for 1 day, vitamin B complex @ 10 ml IM for 3-5 days, steroidal (Dexamethasone @ 0.1 mg/kg) / non-steroidal anti-inflammatory drugs (Meloxicam @ 0.5 mg/kg) IV once daily for 3-5 days, prebiotics and probiotics @ 2 boli twice daily for 3-5 days along with laxatives (Magnesium Sulphate @ 0.5-1 gm/kg) twice daily for 1-2 days was instituted for the thiram poisoning affected cattle. As indicated above the

diazepam was used in the present study to control the convulsions in affected cattle. Siddiqui *et al.* (2019) treated successfully one case of thiram poisoning in non-descript bull using atropine sulphate, chlorpheniramine maleate, diuretic furosemide, flunixin meglumine and fluid therapy. As there is no specific antidote for thiram poisoning, symptomatic treatment using gastrointestinal demulcents, adsorbents, cardiorespiratory stimulants

and treatments to control convulsions has been indicated (Oruc, 2010). The treated cattle showed progressive recovery depending on the severity of poisoning with average recovery period of 3.93 days (2-6 days). Out of 17 cases suffering from thiram poisoning two severe cases succumbed to death in spite of initiation of treatment while 15 cases recovered successfully with instituted treatment indicating 88.23% recovery rate.

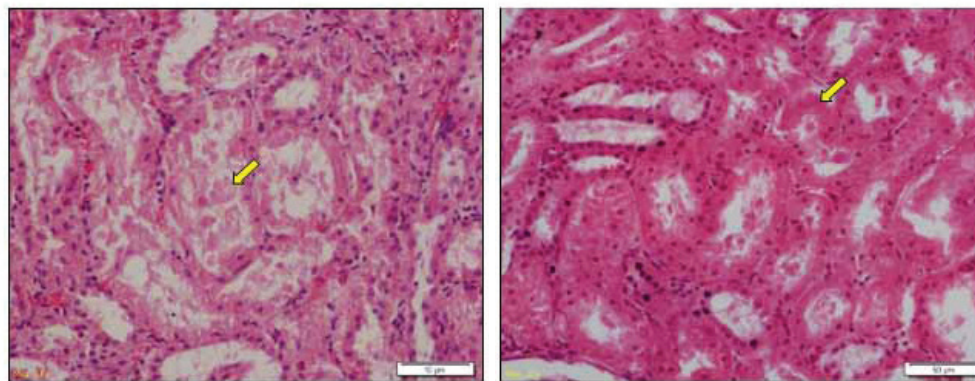
**Table 1: Mean ( $\pm$  S.E.) values of vital and hematological parameters in thiram poisoning affected and healthy cattle.**

Sr. No.	Parameter	Affected (n=15)	Healthy (n=10)	T value
1.	Body temp. ( $^{\circ}$ F)	101.54 $\pm$ 0.32	101.21 $\pm$ 0.16	0.761 <sup>NS</sup>
2.	Heart rate (/min)	73.90 $\pm$ 3.91	52.10 $\pm$ 0.48	5.605**
3.	Resp. rate (/min)	26.60 $\pm$ 1.02	22.00 $\pm$ 0.51	4.080**
4.	TEC ( $\times 10^6/\mu$ l)	6.32 $\pm$ 0.30	5.97 $\pm$ 0.34	3.025 <sup>NS</sup>
5.	Hb (gm/dl)	10.40 $\pm$ 0.46	10.49 $\pm$ 0.48	-0.202 <sup>NS</sup>
6.	PCV (%)	26.54 $\pm$ 1.50	30.57 $\pm$ 1.84	-1.70 <sup>NS</sup>
7.	TLC ( $\times 10^3/\mu$ l)	11.60 $\pm$ 1.71	10.45 $\pm$ 0.75	1.619 <sup>NS</sup>
8.	Granulocyte (%)	43.96 $\pm$ 7.57	47.47 $\pm$ 3.39	-0.399 <sup>NS</sup>
9.	Lymphocyte (%)	53.49 $\pm$ 7.14	47.27 $\pm$ 2.56	0.791 <sup>NS</sup>
10.	Monocyte (%)	2.55 $\pm$ 0.75	5.27 $\pm$ 0.94	-2.001 <sup>NS</sup>
11.	Platelets ( $\times 10^3/\mu$ l)	165.80 $\pm$ 22.67	170.40 $\pm$ 11.37	-0.184 <sup>NS</sup>

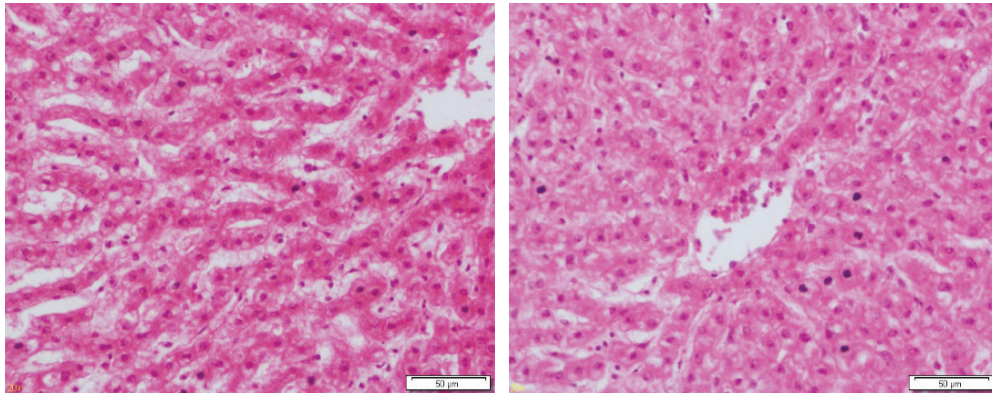
NS: Non-significant, \*\*: Highly significant (P<0.01)

Two severe cases of thiram poisoning which died in spite of treatment were subjected to post-mortem examination. Histopathological examination of liver, kidneys and lungs mild to moderate hepatocellular degeneration, marked renal tubular epithelial necrosis and sloughing and pulmonary edema along with congestion respectively (Fig. 1-3). Hepatotoxicity has been found to be one of many toxic effects of thiram in

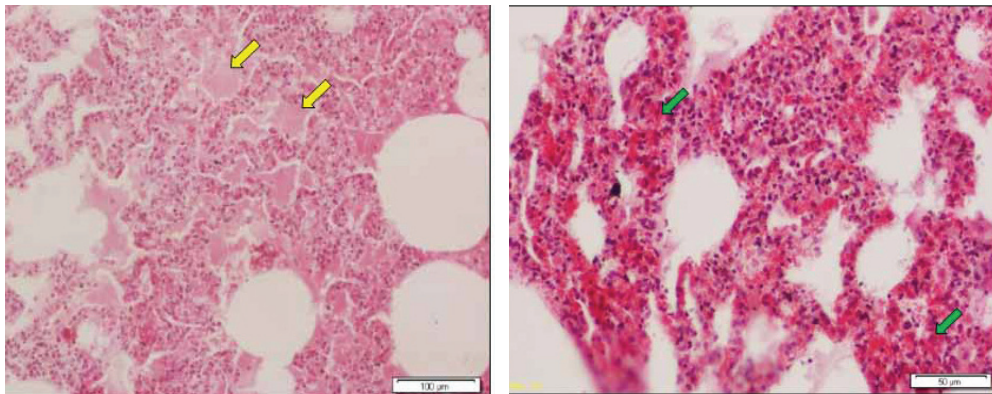
exposed workers and test animals. Typical pathology of thiram poisoning has been reported as liver enlargement and dysfunction, hepatitis, degenerative changes and focal necrosis (Hasegawa *et al.*, 1988; Maita *et al.*, 1991). The findings of mild to moderate hepatocellular degeneration in the present study are in accordance with the findings of experimental thiram poisoning in F344 rats by Hasegawa *et al.* (1988).



**Fig.1: Histopathological Lesions. Kidneys: Marked renal tubular epithelial cells necrosis and sloughing (arrow) (H & E Stain, Bar=50  $\mu$ m )**



**Fig.2: Histopathological Lesions. Liver: Mild to moderate vacuolar hepatocellular degeneration and necrosis (H & E Stain, Bar=50 µm).**



**Fig.3: Histopathological Lesions. Lung: Note the presence of marked oedema (yellow arrow) and congestion (green arrow) (H & E Stain, Bar=50 µm).**

Fungicide were the most commonly observed agrochemical poisonings in cattle during Kharif season due to accidental ingestion of carelessly disposed fungicide packets in agriculture field. Clinical syndrome comprising of anorexia, salivation, tympany, abdominal colic and occasionally nervous signs was observed in ailing cattle. Symptomatic treatment with regular assessment of the cases found effective in successful recovery in mild to moderate cases of thiram poisoning. Awareness about careful and scientific use of any agrochemicals in agriculture operations among farmers is required to prevent the accidents of poisoning in livestock animals.

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## Clinical Insights of Lumpy Skin Disease in Cauvery Delta Region of Tamil Nadu

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### Abstract

Lumpy Skin Disease (LSD) is a contagious and life-threatening affliction affecting both cattle and calves, marked by the emergence of nodules on the skin and various body areas. Notably, in calves, the impact extends beyond generalized lesions, leading to a frequent occurrence of respiratory distress. Secondary bacterial infection also often aggravates the condition. A total number of 36 animals among which 29 animals were less than six months age and 7 were above six months of age were presented to Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu during the period of April to June 2023 with the history of eruptive lesions all over the body showing signs of Lumpy skin disease with various clinical manifestations like nodular lesions all over the body, fever, nasal discharge, lymphadenopathy, inspiratory dyspnoea, along with diffused edematous swelling of all limbs and diarrhoea in calves. In Indigenous adult cattle, diffused edematous swelling of limbs either unilateral or bilateral along with brisket and jowl edema were observed. Mortality rate in calves less than 3 months is 75 %. In adult animals, the mortality rate was high in Indigenous breeds compared to cross bred cattle. Animals were treated to combat secondary bacterial infections with antibiotics along with supportive like Syr. Lavitone H 3ml per.os daily as supportive therapy. The cases with severe clinical manifestation were even treated with steroid Inj. Prednisolone @1mg/kg b.wt. Animal treated for 15 days, gradual recovery was noticed. Vector control need to be implemented to prevent the disease associated with economic losses.

**Keywords:** Lumpy skin disease, Limb edema, lymphadenopathy

Lumpy skin disease is caused by Lumpy skin disease virus (LSDV), which belongs to the genus Capripox virus, a part of the Capripox viridae family, that affects cattle, calves and water buffaloes. The LSDV shares antigenic similarities with sheeppox virus and goat pox virus. It is transmitted by vectors like blood-sucking insects, certain species of biting flies and mosquitoes, or ticks (Tuppurainen *et al.* 2013). According to the United Nations Food and Agriculture Organisation (FAO), infected animals shed the virus through oral and nasal secretions which may contaminate common feeding and water troughs. Thus, the disease can either spread through direct contact with the vectors or through contaminated fodder and water. Studies have also shown that it can spread through animal semen during artificial insemination (Farag *et al.* 2020). The incubation period is around 4 and 14 days post infection. Initially It causes high fever with swollen lymph nodes, nodules on the skin which is around 5cm in diameter and can also lead to death, especially in young animals that have not previously been exposed to the virus (Tageldin *et al.* 2014). It also causes depression, anorexia, rhinitis, conjunctivitis, excess salivation. Necrotic lesions can

develop in respiratory and gastrointestinal tract. It causes severe damage to the hides of the animal and also there will be drop in milk production and leads to economic loss to farmers (Tageldin *et al.* 2014). The LSDV can remain viable in infected tissue for more than 120 days and quarantine restrictions are of limited use (Gumbe, 2018). Nasal discharge could be seen as a result of extent upper respiratory tract infection (Irons *et al.* 2005). Our study provides valuable clinical insights into the recent shifts in LSD, shedding light on diagnostic challenges and the impact on affected cattle populations. We discuss observed changes in lesion morphology, severity of clinical signs in calf.

A total of 36 animals, among which 29 were less than six months age and 7 were above six months of age which were presented to Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu during the period of April to June 2023 with the history of anorexia, pyrexia, eruptive lesions all over the body showing signs of Lumpy skin disease with various clinical manifestations like edema of limbs, diarrhoea, nodular lesions all over the body along with respiratory distress and two cases with corneal opacity. The confirmatory diagnosis was made by PCR. Blood and serum samples collected from those

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animals and haemato-biochemical parameters revealed the presence of anemia and leucocytosis along with hypoproteinemia and hypoalbuminemia. These animals treated with antibiotic Inj. Ceftiofur @1.1 mg/Kg B.W, antihistaminic Inj. Chlorpheniramine maleate @ 0.5 mg / kg B.W, anti-inflammatory Inj. Meloxicam @ 0.5 mg / kg B.W and along with supportive like syr. Lavitone H @ 3ml s.i.d for 30 days per os. Ocular wash also done with 1% Boric acid and nasal and oral wash with 10% Potassium permanganate solution. Animals with respiratory distress treated with Vitamin C 3ml IV and N-acetyl cysteine @ 10mg/kg B.W IV. After 10 days of ofvigorous treatment animal showed uneventful recovery without any complications.

The calves affected with lumpy skin disease showed severe nodular lesions all over the body especially on face, eyes, nostrils and muzzle region (Fig: 1, 1a,1b and 1c), fever, nasal discharge, lymphadenopathy, inspiratory dyspnoea, along with diffused edematous swelling of all limbs and diarrhoea with straining in calves. The nodules were converted to ulcers and scab like lesion on later stages (Fig. 2 and 2a). Some of the animals were presented with few lumpy nodules on the body without affecting the appetite. The nodules were ruptured between 7-15 days of onset followed by oozing of white to serosanguinous purulent discharge with big ulcers formation. Some animals showed peculiar signs like lymphadenomegaly (Fig: 3) and limb edema (Fig: 5) and corneal opacity (Fig: 4) and facial deformity (Fig: 6

and 7). Animals presented with diffused edema recovered after discharging sero - haemorrhagic fluid from the edematous site. Most of the clinical observations were coincided with other published data (Farak *et al.* 2020). The calves with severe respiratory distress had more complications comparatively. Mortality rate in calves less than 3 months is 75 % (22/29). In adult animals, the mortality rate was high in Indigenous breeds compared to crossbred cattle. Leucocytosis was observed in the LSD infected animals presented in this study 2 days post infection, hypoproteinemia and hypoalbuminemia was also noticed. Animals were treated to combat secondary bacterial infections with antibiotics along with supportive like Syr. Lavitone H 3ml per.os daily for 15 days. The cases with severe clinical manifestation were even treated with steroid Inj. Prednisolone @1mg/kg B.W for 5 days , Inj. Ascorbic acid @ 10 mg/ Kg B.W (G-Vit -C®) was given as anti-oxidant, Inj. N-acetyl cysteine @10 mg/Kg B.W (Muconix®) as mucolytics for 5 days, and the owner was also advised to give milk from the animals recovered from Lumpy Skin Disease as passive immunization to calves. Gradual recovery was noticed only after 15 days of clinical presentation. It was evidenced in this study that, prognosis of LSD in calves was poor when animal showed symptoms of diarrhoea. This is the last clinical manifestation of LSD noticed in all calves died. LSD complications like facial deformity, corneal opacity, permanent scar noticed on the body. Vector control need to be implemented to prevent the disease associated with economic losses.



**Fig 1 and 1a: Nodular lesions all over the body**



**Fig 1c: Swollen eyelids with ocular discharge in LSD affected calf**



**Fig 1b: circumscribed Nodules noticed in the neck and ear region**

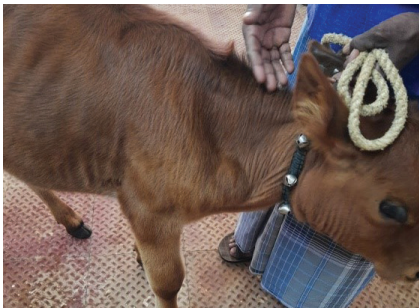




**Fig 2: Ruptured LSD nodule – scab formation**



**Fig 2a:Ulcerative scab on the nasal bridge**



**Fig 3: Lymphadenomegaly in LSD affected calf**



**Fig 4: Ocular discharge with mild corneal opacity in LSD calf**



**Fig 5: LSD Calf with limb edema and severe respiratory distress**



**Fig 6: Facial deformity in LSD affected calf**



**Fig 7: Ruptured LSD nodule – Deformed Facial structure**

N-acetylcysteine (NAC), recognized as both a mucolytic and antioxidant pharmaceutical agent, exhibits potential influence on various inflammatory pathways. Functioning by supplying sulfhydryl groups, it serves as a precursor for reduced glutathione, while also directly scavenging reactive oxygen species (ROS). This dual action contributes to the regulation of cellular redox status. Additionally, functioning as a mucolytic, NAC has the capacity to reduce sputum viscosity, potentially enhancing bronchial clearance. This effect, in turn, holds promise for alleviating dyspnea and optimizing lung function (Sadowska *et al.*, 2006). In viral diseases, treatment focused on controlling secondary infections to combat clinical severity and mortality. Further studies need to be conducted in identifying various other clinical manifestation in evolving new strains of LSD.

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## Study on the Effect of Immunoglobulins in treatment of Canine Parvovirus infected Dogs

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### Abstract

Canine parvovirus infection is one of the most common well-known diseases in dogs caused by CPV 2 strains with high morbidity and mortality rates. The present communication documents the effect of intravenous administration of immunoglobulin in the rise of leucocyte count in dogs with parvo viral infection. Confirmation of the canine parvovirus infection was carried out by the detection of CPV antigen in the faeces of dogs by chromatographic immunoassay principle and these dogs were negative for Canine Corona Virus (CCV) infection which was screened by chromatographic immunoassay principle diagnostic kit and negative for *Ancylostoma* infection by examine the microscopic examination of faecal samples. Six dogs aged between 2 to 6 months were selected to administer the purified immunoglobulin (@ 0.4 ml/kg body weight intravenously for three days) in addition to the symptomatic and fluid therapy. Therapeutic response was noticed by elevation in the leucocyte count on the fifth day of therapy. In conclusion, it is highly recommended the administration of immunoglobulin at the early stage of infection will be helpful in fast recovery and saving the dogs.

**Keywords:** Dogs, CPV antigen test, leucopenia, immunoglobulin

Canine parvovirus (CPV) infection is considered one of the oldest viral infections in dogs causing high morbidity and mortality in young dogs. Globally, CPV-2a, 2b and 2c are considered the most common parvovirus species causing disease in dogs (Prittie, 2004). Noticeable clinical signs in this were vomiting, abdominal pain, diarrhoea often with blood, severe dehydration and hypovolemic shock (Crawford and Sellon, 2010). Recordable haematological parameters were lymphopenia, neutropenia and leucopenia. Most commonly it is diagnosed based on clinical examination but it requires to differentiate CPV infection from the other conditions causing haemorrhagic enteritis including canine coronavirus infection (CCV) and *Ancylostoma* in young puppies. During the early stages of infection, leucopenia causes high mortality and dogs are prone to secondary bacterial infection (Saho *et al.*, 2007). Hence, the present study was carried out to assess the therapeutic effect of immunoglobulin administration over the leucocyte count in dogs.

The study was carried out on the dogs presented to the clinic with a history of passing bloody foul-smelling diarrhoea. Dogs in the present study belonged to different breeds, both sexes and aged between 2 to 6 months. Confirmation of the parvovirus

infection was carried out by the antigen detection test kit in the faecal samples. The antigen Rapid CPV/CCV test kit (Bionote Rapid CPV Ag/CCV Ag Canine test kit) is a chromatographic immunoassay for the qualitative detection of canine parvovirus antigen and coronavirus antigen in canine faeces. For assessing the efficacy of passive immunoglobulin therapy against CPV infection six dogs diagnosed with CPV infection was selected for the study. The procedure was carried out as per the manufactures instructions. Dogs with parvovirus infection were administered with injection ceftriaxone @ 25 mg/kg body weight once in a day, injection ranitidine @ 2 mg/kg body weight BID, injection ondansetron @ 0.5 mg/kg body eight BID, injection containing B complex vitamins, injection dextrose 5% and ringers lactate as per the dehydration status (Reddy *et al.*, 2015). An injection containing the liquid suspension of purified hyper immune immunoglobulin (Canglob- P ®) at the dose of 0.4 ml/kg body weight intravenously for 3 days was administered. Five millilitres of blood was collected into vacationers containing EDTA as an anticoagulant before therapy and after 5 days of therapy. The haematological parameters such as haemoglobin (g/dL), packed cell volume (%), total erythrocyte count ( $\times 10^6/\mu\text{L}$ ), total leukocyte count ( $10^3/\mu\text{L}$ ), differential leucocyte count, percentage of

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neutrophils, lymphocytes, eosinophils and monocytes were estimated as per the standard procedures. Dogs included in the present study were negative for Canine Corona Virus (CCV) infection which was screened by chromatographic immunoassay principle diagnostic kit and negative for *Ancylostoma* infection by examine the microscopic examination of faecal samples. Statistical analysis was carried out to record the statistical difference between before and after therapy of haematological parameters.

Dogs were selected for the study with positive canine parvovirus antigen by two lines in the CPV slot in the test kit and negative for CCV infection and *Ancylostoma* parasitic ova. Haematological changes before and after treatment is presented in Table-1. Earlier, in many studies immune-chromatography

based test kits were employed for the detection of parvovirus in faecal samples of dogs, since it is a rapid, simple, reproducible and sensitive diagnostic test (Filipov *et al.*, 2011). In the present study utilization of a rapid diagnostic test kits for the diagnosis of parvovirus infection used to isolate the infected dogs and to prevent the spread of infection further (Al- Tayib, 2014). Predisposing factors for the development of clinical disease were lack of protective immunity, intestinal parasites and malnutrition. The infection is spread by direct transmission from the oro-faecal route or by indirect transmission by the oro-nasal route through aerosols. The virus induced damage followed by secondary bacterial infection of intestinal mucosa of CPV affected dogs leads to septic shock (Behera *et al.*, 2015).

**Table 1. Haematological changes in dogs with canine parvovirus infection**

S.No	Parameter	Before therapy (Mean±S.E)	After Therapy (Mean±S.E)	P value
1.	Haemoglobin (g/dL)	7.12 <sup>a</sup> ±0.31	8.73 <sup>b</sup> ±0.44	0.004**
2.	Packed cell volume (%)	34.51 <sup>a</sup> ±0.48	27.02 <sup>b</sup> ±0.83	0.002**
3.	Total erythrocyte count (×10 <sup>6</sup> µl)	3.60 <sup>a</sup> ±0.18	4.54 <sup>b</sup> ±0.29	0.001**
4.	Total leucocyte count (×10 <sup>3</sup> µl)	2.68 <sup>a</sup> ±0.92	6.78 <sup>b</sup> ±0.81	0.001**
5.	Neutrophils (%)	51.02 <sup>a</sup> ±1.28	64.80 <sup>b</sup> ±2.08	0.038*
6.	Lymphocytes (%)	43.88 <sup>a</sup> ±3.08	29.29 <sup>b</sup> ±1.35	0.042*
7.	Eosinophils (%)	4.32±0.18	4.81±0.27	0.24 <sup>NS</sup>
8.	Monocytes (%)	1.88±0.22	2.03±0.09	0.32 <sup>NS</sup>

\*P<0.05; \*\*P<0.01; <sup>NS</sup>P>0.05; <sup>abc</sup> Columns bearing different superscripts differ significantly.

In the present study, reduced haemoglobin levels might be due to loss of blood due to gastric and intestinal haemorrhages (Biswas *et al.*, 2005) and it is a common finding in chronic infection due to suppression of erythropoiesis in the bone marrow (Goddard and Leisweitz., 2010). Elevated levels of packed cell volume were noticed during the infection due to severe dehydration. Reported haematological findings were in association with the previous reports on canine parvovirus infection of dogs by Yilmaz and Senturk (2007) and Castro *et al.*, (2013). During the chronic phase of the infection, leucocytosis may be noticed because of the invasion of the secondary bacterial infection. Reduced levels of total leucocyte count due to the destruction of leucocyte progenitor cells by the CPV virus (Goddard and Leisweitz,

2010). Reduced leukocyte count was noticed during the disease's conditions, due to this puppies may susceptible to other secondary complications (Reddy and Sivajothi, 2016). Green and Decaro (2012) documented that pups with very low leucocyte count may prone for high mortality. During the disease, correction of dehydration and re-establishment of circulating blood volume is important to prevent hypovolemic shock. Administration of intravenous immunoglobulin to dogs in the early stages of CPV infection helps to neutralize the virus present in the predilection sites in turn results in reduction of intestinal inflammation associated with the viral infection and also prevent the development of secondary bacterial infection. This is helpful in faster recovery of CPV affected dogs. In previous

studies, Saurtini *et al.* (2014) documented the effect of yolk derived immunoglobulin IgY intravenously in dogs with CPV-2 infection and noticed faster clinical recovery and to attain better weight gain. Administration of immunoglobulin Y (IgY) specific antibodies which were isolated from chicken egg yolk have the ability to neutralize the virus, so it cannot infect host cells and stops the viral spread. Previous study on immunoglobulin therapy for CPV

infection was carried out by Rishikesavan *et al.* (2021) in a dog but in their study laboratory assessment of post therapeutic response was not carried out. Improvement in the haemoglobin, packed cell volume and leucocyte count were noticed after treatment in the dogs selected for the study. There is a statistically significant difference noticed between before and after therapy which might be due to the provision of passive immunity against the CPV infection by the immunoglobulin administration.



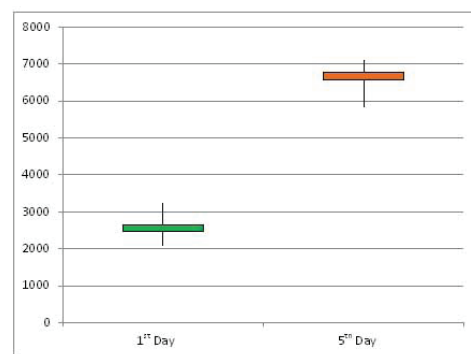
**Fig 1. Haemorrhagic diarrhoea – Common sign of canine parvovirus infection**



**Fig 2. Positive test kit for parvovirus infection (Bionote Rapid CPV Ag/CCV Ag Canine test kit)**



**Fig 3. Injection (Canglob- P®) contains passive immunization against parvovirus infection**



**Fig 4. Graphical representation of leucocyte count before and after therapy in dogs with canine parvovirus infection.**

It is concluded the inclusion of specific immunoglobulin against canine parvovirus in the treatment regimen during the initial stages of infection will ensure the favourable recovery and prevent mortality.

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## Arterial Thromboembolism in a Domestic Cat – A report

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### Abstract

Arterial thromboembolism is more common in cats. Generally, it develops without premonitory signs. When the thrombus lodged in aortic trifurcation posterior paresis develops. This paper documents one such case and its successful management. A four-year-old male domestic shorthair cat was presented with the sudden history of being unable to stand and walk for the past three hours. Clinical examination revealed that there was paraparesis on the hind limbs, pulse deficit in both the hind limbs, cold extremities, and cyanotic digital paws. Echocardiographic, radiographic and hemato-biochemical analyses were inconclusive. The absence of femoral pulse, pain in hind limbs and absence of blood flow in the Doppler blood pressure and ultrasonographic exam of abdominal aorta cranial to the iliac bifurcation confirmed the aortic thromboembolism. The animal was treated with buprenorphine @ 0.02 mg/kg every 6 hours, injection enoxaparin @ 1 mg/kg every 8 hours, and tablet clopidogrel 75 mg total dose (1/4 -0 - 0). On the fourth day of therapy, the animal showed deep pain, improvement in digital pad and mild voluntary motor activity. On the seventh day of therapy, the animal showed significant improvement and after 10 days of therapy, the animal showed an uneventful recovery. The paper presents paraparesis due to aortic thromboembolism in a domestic cat and its management.

**Keywords:** Thromboembolism, Paraparesis, Enoxaparin, Clopidogrel

Arterial thromboembolism (ATE) has been reported in both dogs and cats. Thrombosis is the pathologic formation of a blood clot within a vessel, while an embolus occurs when a thrombus breaks off and obstructs blood flow in a distal location (Williams et al., 2016). ATE is mostly reported in male cats with no breed predisposition (Chuang et al., 2001; Ferasin, 2009). ATE occurs as a complication of dilated cardiomyopathy, unclassified cardiomyopathy, other forms of cardiac disease, hyperthyroidism, and neoplasia (Smith et al., 2003). Distal aortic thromboembolism is one of the most serious complications in the cat and one of the most common causes of hind limb paresis (Schoeman, 1999). Saddle thrombus is a catastrophic lesion where a blood clot gets embolised and lodged into the aortic trifurcation (Borgeat et al., 2014). It is a fatal disease that may progress very quickly as a cat can go from being healthy to be in severe distress within few minutes (Brent et al., 2006). Arterial blood flow is decreased to tissues distal to the thrombus as a result of mechanical obstruction and vasoconstriction of the collateral blood supply (Fuentes, 2012). ATE is characterised by an acute onset of paraparesis or paraplegia, weak or absent femoral pulses, pain, pale or cyanotic footpads and nails and hypothermia of the distal limbs (Goncalves et al., 2008). For clinical purposes, it is often defined as thromboembolism to more

than one limb (Borgeat et al., 2014). ATE often doesn't have advance warning (Fuentes, 2012). Motor function is usually absent or reduced distal to the stifles, with skin sensation absent distal to the tarsus. The combination of pelvic limb lower motor neuron signs with absent femoral pulses and cold extremities is pathognomonic for ATE (Volk et al., 2003). If the embolised thrombus is small, rapidly lysed or collateral circulation is quickly re-established, motor function may be present by the time the cat is presented (Fuentes, 2012). The prognosis is considered guarded if both hind limbs were affected and the survival rate varies from 29–45% (Borgeat et al., 2014; Mitropoulou et al., 2022). Medical treatment aimed at thromboembolic diseases consists of the use of antiplatelet drugs, heparin products, and vitamin K antagonists (Lunsford and Mackin, 2007). The present paper describes a clinical case of posterior paresis due to iliac thromboembolism in an Indian short hair cat and its successful management.

### Case History and Treatment

A four-year-old male domestic short hair cat was presented to the Emergency and critical care unit of Madras Veterinary College with the history of being unable to stand and walk (Fig 1) for the past three hours. The history happened suddenly without any other premonitory signs. The animal had severe non-specific pain on the hind limbs. Paraparesis on the hind limbs, absence of pulse in both the hind limbs, cold extremities

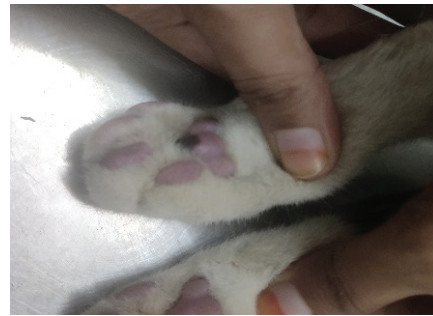
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**Fig 1. Paraparesis in cat due to ATE**



**Fig 2. Cyanotic digital pads due to ischemia**



**Fig 3. After therapy appearance of the digital pad (3<sup>th</sup> day)**

with cyanotic digital paws (Fig 2) were the significant observations recorded. Neurologic examination reveals the absence of deep pain in the hindlimbs and tail. Radiography of the spine, pelvis, hind limbs, and thorax was inconclusive. On ultrasonographic examination, it was found that isoechoic thrombus in the iliac trifurcation and extending into both external iliac arteries. The heart rate and rhythm were normal in thoracic auscultation. The animal had normal cardiac biometry on echocardiography of the heart. Routine hemato-biochemical exhibit hyperglycemia i.e., serum glucose is 134 mg/dl. Further, the Doppler blood pressure over the distal meta tarsal artery proved an absence of blood flow. The case was diagnosed based on clinical signs, absence of a pulse in Doppler and ultrasonographic examination of abdominal aorta cranial to the iliac bifurcation confirmed the aortic thromboembolism. Immediately after diagnosis the animal was treated with buprenorphine @ 0.02 mg/kg every 6 hours, Injection enoxaparin @ 1 mg/kg every 8 hours and tablet clopidogrel 75 mg total dose (1/4 - 0). On the fourth day of therapy the animal showed deep pain, improvement in digital pad (Fig 3) and mild voluntary motor activity. On the seventh day of therapy, the animal showed significant improvement and after 10 days of therapy, the animal showed an uneventful recovery. Supportive care consisted of passive warming, analgesia, nutrition through a nasogastric tube, and physiotherapy. Limb reperfusion was defined as a

palpable and/or detectable pulse signal with Doppler BP machine.

### Discussion

ATE occurs when a thrombus, often formed in the left auricle, embolizes to a peripheral artery leading to ischemia of the affected vascular bed (Schoeman, 1999). Several retrospective studies suggest that euthanasia at presentation is common and <50% of patients survive to discharge (Borgeat *et al.*, 2014). If ATE affects two limbs, around 30–40% of treated cats survive to discharge (Schoeman, 1999; Smith *et al.*, 2003). The favourable outcome in our present study might be due to its small size, rapidly lysed or collateral circulation is quickly re-established as stated by (Smith and Tobias, 2004). The exact etiology of ATE is unknown (Hassan *et al.*, 2020). It may occur as a complication of feline hypertrophic cardiomyopathy (HCM). Approximately 12%–21% of cats with hypertrophic cardiomyopathy may develop ATE (Hogan *et al.*, 1999; Fuentes, 2012). The etiology due to hypertrophic cardiomyopathy has been ruled out by echocardiographic examination. Other diseases associated with ATE may include pulmonary neoplasia and thyroid disease. Rarely, no underlying condition is found (Fuentes, 2009). Significant pulmonary carcinoma was not evinced in radiography. Hence the possible etiology might be hyperthyroidism. However, the owner was not willing for a thyroid profile

examination. The etiology in our case was arrived at based on exclusion criteria. Most cats presenting with ATE have no known history of cardiac disease, and peracute signs of pain and paralysis may be the very first indication of advanced cardiac disease. It is generally accepted that before the development of ATE in cats, the thrombus formed within the left side of the heart. Eventually, the thrombus dislodges and is carried through the systemic vasculature until it becomes lodged due to the diameter of the thrombus exceeding the diameter of the vessel lumen (Smith and Tobias, 2004). The higher level of blood glucose might be due to stress hyperglycemia which is a common phenomenon in cat. The exact mechanism leading to the formation of intracardiac thrombi is unclear, however (Fuentes, 2009). If the embolus settles in the “saddle” location at the aortic trifurcation, both rear limbs are affected. In one study this was the most common presentation, occurring in 71% of cases. Unilateral rear limb thromboembolism is much less common (Smith and Tobias, 2004). Most cats with ATE are presented for acute-onset lameness, plegia, or paralysis of the affected limbs. Affected limbs are virtually always painful, musculature is frequently firm, and pulses are weak or nonpalpable. Nailbeds and pads may appear pale to cyanotic depending on the degree of ischemia, and affected limbs may feel cooler than nonaffected limbs (Fuentes, 2009). The clinical signs reported in cases align with earlier reports. Human recombinant tissue-type plasminogen activators like Tenecteplase and Reteplase are available for clinical use. As a nonfeline protein, it has the potential to be antigenic. As these molecules are costly in nature they are used in this case. Massive administration of anticoagulant drugs as quickly as possible was crucial in preventing the irreversible damage of the limbs (Hassan et al., 2020). Enoxaparin is a low molecular weight heparin, given a dose of 100 U/kg (1 mg/kg) every 8 hours (Lunsford and Mackin, 2007). A study by Mitropoulou et al., (2022) reported the use of intravenous continuous rate infusion of enoxaparin in combination with oral clopidogrel @ 18.75 mg/cat q24h PO for cats with ATE. Intravenous enoxaparin with oral clopidogrel was used in our case with a successful outcome. Reports of mean survival times for cats treated for ATE range from 51–350 days (Moore et al., 2000). The article presents successful diagnosis of paraparesis due to aortic thromboembolism in a domestic cat and its management.

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## Successful Therapeutic Management of Knemidocoptiasis in A Budgerigar (*Melopsittacus Undulatus*) – A Case Report

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### Abstract

A blue coloured male Budgerigar (*Melopsittacus undulatus*) was presented to the Veterinary Clinical Complex, VCRI, Orathanadu, with the history of pruritus, feather loss, yellowish lesion on the face, legs and feet with decreased appetite for the past one week. On clinical examination the bird appeared dull, depressed with scaly lesion on face and legs. Parasitological examination revealed the presence of adult *Knemidocoptes* sp., The bird was treated with oral Ivermectin @ 200µg/kg body weight specify duration and interval, benzyl benzoate topical application along with multivitamin supplementation. The bird was uneventfully recovered after two weeks of treatment.

**Keywords:** Budgerigar, *Melopsittacus undulatus*, *Knemidocoptes* sp., Ivermectin, Benzyl benzoate

People rear birds as pets for a variety of reasons which includes their colour pattern, vocals and beautiful attributes. Budgerigar (*Melopsittacus undulatus*) is a popular pet bird in India, just next to pigeons, both in urban and rural areas. They are also known as the common pet parakeet or shell parakeet and popularly nicknamed as budgies. Because of its small size, inexpensive cost and their ability to mimic human speech, it is the world's third most popular pet after domesticated dogs and cats (Bhadesiya *et al.*, 2021). Knemidocoptiasis (scaly leg mange) is a common skin condition in older birds and fowls worldwide, particularly in tropical regions. It is not an economically significant condition in chickens due to its delayed development and lack of lameness in infested hosts. These *Knemidocoptes* mites primarily affect by burrowing into the feet and shanks of the birds, inhabiting beneath the epidermal scales (Harwood and James, 1979). *Knemidocoptes pilae* causes scaly face/leg mange in budgerigars and spongy lesions on the feet, cere, beak and eye (Bhadesiya *et al.*, 2021). The transmission of *Knemidocoptes* sp., in highly susceptible budgerigars occurs either by direct or indirect contact (María *et al.*, 2014). The current paper deals with the occurrence of *Knemidocoptes* sp., infestation in a budgerigar and its successful therapeutic management.

### Case History and Observation

A blue coloured male budgerigar (*Melopsittacus undulatus*) (Fig. 1) was presented to the Exotic and Special Species Medicine Referral Clinic, Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu with the history of pruritus, feather loss, yellowish lesions on the cere, beak, legs and feet with inappetance for the past one week. Clinical examination of the bird revealed scaly and crusty lesions over the cere, beak and legs. Scrapings from lesions were processed by adding 10% sodium hydroxide solution and subjected to centrifugation process. Further, the sediment was examined for ecto-parasites (Soulsby, 1982) under low power microscopy. Microscopic examination of skin scrapings confirmed the presence of *Knemidocoptes* sp., (Fig. 2, 3) characterized by a globose body, short stumpy legs, two longitudinal chitinized bars at the level of the legs and absence of spines on the dorsal surface.

### Treatment and Discussion

The bird was administered with ivermectin @200µg/kg orally every once in a week for two consecutive weeks, multi-vitamin syrup @ 1ml every day. The owner was advised to apply topical treatment to the affected bird with 25% benzyl benzoate. Following two weeks of treatment, the follow-up scrapings examination revealed the absence of mites.

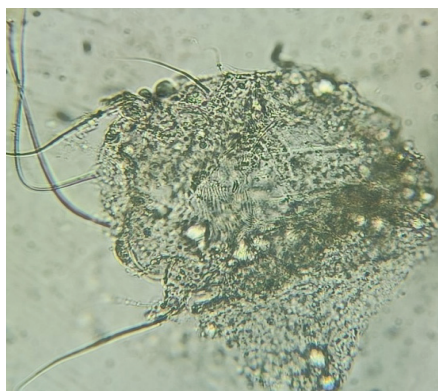
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**Fig. 1. Budgerigar with scaly crusty lesion in face (cere) and legs [arrows]**



**Fig. 2. *Knemidocoptes* sp., in x100 magnification**



**Fig. 3. *Knemidocoptes* sp., from scrapings in x 400 magnification**

Mange caused by mites (*Knemidocoptes* sp.) burrow into the feet and shanks of affected birds, living beneath the epidermal scales, and particularly harbours in the stratum spinosum (Urquhart *et al.*, 1987). Soulsby (1982) documented three major species of *Knemidocoptes* that produce scaly legs in birds worldwide. *K. mutans* causes scaly leg mange in adult chicken, while *K. pilae* and *K. jamaicensis* could cause mange in different bird species. *K. gallinae* causes depilating itch in domestic fowls. *K. pilae* infestation may remain latent for a long period until triggered by stress, such as cold or new environment in budgerigars. Scaly face in the budgerigar is considered pathognomonic for knemidocoptiasis (Greve, 1986) with hyperkeratotic encrustations on the beak, cere and legs (Koski, 2002) affecting the preening and respiratory functions (Ladds, 2009). The present case also reports the presence of both scaly face and legs in the bird.

Ivermectin is commonly used to treat both ectoparasites and endoparasites in veterinary practice. In the present case, the oral administration of ivermectin along with topical application of benzyl benzoate proved

to be highly effective in treating *Knemidocoptes* sp., infestations in budgerigar. Disinfection using formalin will address a effective prevention in transmission of mites between the birds.

#### **Acknowledgement**

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## Caseous Lymphangitis in a Goat Farm

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### Abstract

Caseous lymphadenitis (CL) is a sporadic bacterial disease of chronic suppurative lymphadenitis in goats. The prevalence of caseous lymphadenitis is considered high in many countries, but detailed research on prevalence rates, farm practices, and abattoir findings is limited in India. This paper reports the presence of this disease on an endemic form in a goat farm. A two-year-old mixed breed doe was presented with the history of swelling in mandibular region and inappetence for the past one week. Greenish pus was aspirated from it and Giemsa stain confirms the presence of coccobacillus bacteria. Culture and isolation identified it as *Corynebacterium pseudotuberculosis* on 10% sheep blood agar. The abscess drained off, flushed with 5 % iodine solution and treated with injection lincomycin @ 10 mg/kg until recovery. Clinical investigation in the farm after a month revealed that four more animals were affected with caseous lymphadenitis. All of them confirmed based on bacterial culture and isolation. Rearing goats as semi-intensive flocks, sharing of grazing fields together with other animals, commingling of animals after grazing particularly in the night time, rupture of abscess in the shelter itself, improper knowledge about disease and poor husbandry practices favours the endemicity of this disease in goats.

**Keywords:** Goats, Caseous Lymphadenitis, Endemicity, Lincomycin

### Introduction

Goats are multifunctional animals, mostly maintained by small scale, landless farmers particularly in the developing countries (Devendra and Liang, 2012). Asia has the largest world population of goats of about 60% (556 million, followed by Africa with 311 million). India (35.2%), China (29.3%) and Pakistan (12.0%), together maintain 77% of the world population and 42% of all goat breed types. Goat production system in India has been slowly moving from extensive to intensive system of management. Intensive goat farming leads to spreading of many diseases which results in high mortality (Sahoo *et al.*, 2019). Caseous lymphadenitis (CL) caused by *Corynebacterium pseudotuberculosis* is a chronic disease of small ruminants distributed worldwide (Varela-Castro *et al.*, 2017). The bacteria can survive in faeces or can be found on the ground for several weeks (Windsor, 2011), favouring its dissemination (Williamson, 2001). The principal route of infection is through oral mucosa or skin wounds. Chronic suppurative lymphadenitis of external and internal lymph nodes has been described in sheep and goats (Gururaj *et al.*, 2018). Abscesses are usually found externally on goats, but the visceral form is more common in sheep (Williamson, 2001). The ability of the organism to survive in the animal's environment for

several weeks contributes to its ability to spread within a flock. Economic losses result mostly from condemnation of infected carcasses and devaluation of hides (Mittal *et al.*, 2010). In a study by Kumar *et al.*, (2012), 51.9 % pus samples from suspected cases of CLA yielded *C. pseudotuberculosis* on culture on Sirohi goats of Rajasthan. There are only few reports of its occurrences among sheep and goats in India (Mohan *et al.*, 2008). CL is considered one of the most economically important diseases in many countries however, being a non-notifiable disease in many countries including India, its actual prevalence, extent of infection and associated losses have been largely underestimated (Kumar *et al.*, 2013). This paper reports the presence of this disease in a goat farm.

### Case History and Treatment

A two-year-old mixed breed doe was presented to the Teaching Veterinary Clinical Complex, Orathanadu with the history of swelling in mandibular region and inappetence for the one week (Fig 1). The swelling was slow developing in nature and grows over weeks. On palpation it was found that the animal had abscess on the mandibular lymph node. The abscess was aspirated and sample was sent to culture and isolation of organism. The pus was greenish in color with blood mixed in nature (Fig 4). Giemsa stain confirms the presence of coccobacillus bacteria and further, *Corynebacterium pseudotuberculosis* was isolated on

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10% sheep blood agar when incubated at 37 °C for 48–72 hours. The colony was observed as yellowish white, opaque convex colonies with matt surface. No visceral abscess was ruled out by survey radiography of thorax and abdominal ultrasound. The abscess was completely drained, flushed with povidone iodine and the pus material was disposed safely. The animal was treated with parenteral lincomycin (@ 10 mg/kg) until recovery. One month later the owner brought another



**Fig 1. Mandibular abscess due to CL**

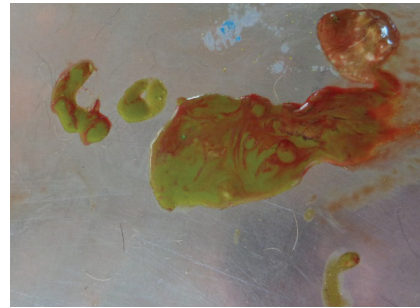


**Fig 3. Prescapular abscess due to CL**

animal with the swelling in the prescapular area (Fig 3). It was found that the abscess was similar to previous animal and aspirated pus was whitish, thick and caseous in nature. Culture and isolation point the same etiology. Visit to the goat farm identified four more-animal with CL. Occasional rupture of abscess (Fig 2) use to occur in some animals. All the affected animals were treated with lincomycin for five days. The owner was advised to isolate the affected animals.



**Fig 2. Ruptured abscess with fistulous tract in mandibular lymphnode**



**Fig 4. Greenish blood mixed pus drained from CL**

## Discussion

Caseous lymphadenitis is a chronic bacterial disease of sheep, goats and other warm blooded animals (Dorella *et al.* 2006). The prevalence of caseous lymphadenitis was found to be significantly higher in adult than in young animals, in both sheep and goats (Abebe and Tessema, 2015). All the affected animals in our report were adults. The disease presents in two main forms: an external form characterized by infection of subcutaneous tissue and superficial lymph nodes and an internal form characterized by abscess development in internal (Williamson 2001). The cases presented in this paper were of superficial form. Radiographic and ultrasonographic examination did not reveal involvement of the internal organs. The use of imaging modalities such as radiography, ultrasound, or CT may increase the detection of internal abscesses (Grosso *et al.*, 2020). Further all of the affected animals in the herds

were healthy and with adequate weight gain. Differences in the place of the abscesses between sheep and goats have been reported, the superficial form among goats is common (Guimarães, *et al.*, 2011; Umer, *et al.*, 2017). Internal involvement can be subclinical, but it is associated with weight loss and ill thrift (Williamson 2001). External abscesses in the lymph nodes of the head and neck are more common in goats than sheep (Guimarães, *et al.*, 2011). The superficial lymph nodes of mandibular, parotid, cervical, subiliac, popliteal or mammary tissue and in subcutaneous tissues are affected more commonly (Umer *et al.*, 2017). The reported cases in study also had abscess in mandibular and prescapular lymphnodes. Bacterial isolation is necessary to identify the causative agent (Guimarães, *et al.*, 2011). Hence all the pyogenic materials were cultured in 10 % sheep blood agar and colonies were confirmed by stained smears in our report as per Mohan *et al.* (2008). The

abscess matures and ruptures through a fistula, draining infective purulent into the environment (Williamson 2001) and similar draining tracts were noticed in the present study. The 99.25% isolates of *Corynebacterium* are susceptible to lincomycin (Maria da *et al.*, 2013). Transmission can occur through direct or indirect contact or through wounds that come into contact with pus from the abscesses of sick animals, the organism can also penetrate the intact skin (Baird and Fontaine, 2007). Bacterial survival is improved when it is mixed with particulate fomites like wood, straw, and feces. (Williamson 2001). This paper reports the endemicity of the caseous lymphadenitis in a goat flock.

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## Medical management of cutaneous lymphoma and associated ileus in a Labrador dog

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### Abstract

A 6 years old male Labrador dog was presented to Small Animal Medicine unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu with the history of hair loss and multiple skin lumps all over the body. Dog was treated for atopic dermatitis past three weeks. On Clinical examination revealed generalized alopecia, lymphadenopathy and nodule like skin lumps all over the body. Hemato-biochemical analysis were revealed anemia, lymphocytosis and hypoproteinemia. FNAC of skin lump revealed cutaneous lymphoma. Radiography and ultrasonography examination revealed no evidence of metastasis. Dog was treated with modified Wisconsin Madison protocol. On 15th week of protocol dog showed distended abdomen and constipation, further abdominal ultrasonography revealed distended loop and ileus. Hence the present case was diagnosed as vincristine associated ileus in a dog. Neostigmine was administered to restore the intestinal motility. Dog showed uneventful recovery from cutaneous lymphoma as well as vincristine associated ileus.

**Keywords:** Dog, Cutaneous lymphoma, , Ileus, Neostigmine Vincristine

### Introduction

Canine cutaneous lymphoma also known as epitheliotropic lymphoma, typically a T-cell lymphoma, (Zandvli *et al.*, 2016). According to the WHO, cutaneous lymphoma classified as *Mycosis fungoides*, Sezary syndrome and pagetoid reticulosis (Moore *et al.*, 2009). Cutaneous T-cell lymphoma was typically present as a chronic multifocal skin disease, but also affect the mucous membrane and mucocutaneous junctions (Moore *et al.*, 2009). Skin lesions include diffuse erythema, scaling, focal hypopigmentation, plaques and nodules (Magnol *et al.*, 1996). Diagnosis includes clinical pathology, imaging techniques like radiography, CT and ultrasonography, cytology, histology, immunophenotyping, PCR and biomarkers evaluation. Treatment protocol for cutaneous lymphoma was Modified Wisconsin Maddison protocol (Ettinger *et al.*, 2017). This protocol includes cytotoxic drugs like Doxorubicin, Cyclophosphamide, Vincristine and Prednisolone. Each drug exhibits different kind of side effects. Doxorubicin associated with significant cardiac toxicity (Johnson-Arbor and Dubey, 2022), Cyclophosphamide associated with urinary toxicity such as hemorrhagic cystitis and Vincristine associated

with neurotoxicity with peripheral neuropathy, paralytic ileus and myelosuppression (Katzung *et al.*, 2012). Vincristine induced paralytic ileus could be treated by administration of parasympathomimetic drug Neostigmine (Ilbanet *et al.*, 2019). In the present case similar kind of Vincristine associated paralytic ileus was recorded and it was managed with Neostigmine without altering the Modified Wisconsin Maddison protocol.

### Case History and Clinical Observations

A 6 years old male Labrador dog was presented to Small Animal Medicine unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu, with the history of hair loss and raised erythematous skin lesions all over the body. The dog was treated for atopic dermatitis for past three weeks.

On clinical examination animal revealed pale mucous membrane, enlargement of the palpable lymph nodes and nodular like skin eruptions were noticed all over the body surface (Fig 1 and 2). Hematological examination revealed anemia and lymphocytosis. Serum biochemistry revealed hypoproteinemia. Dermatological examination revealed negative for fungal infection and scabies.

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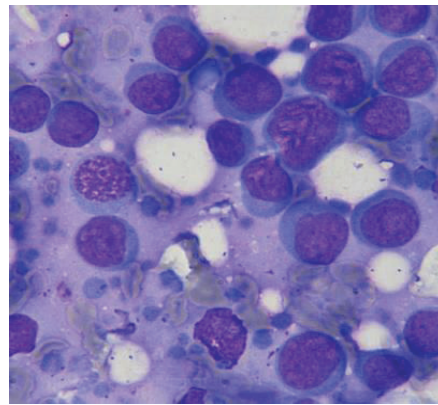
\*Corresponding author: sara82vet@yahoo.com



**Fig 1. Nodule like skin lumps**



**Fig 2. Generalized alopecia**



**Fig 3. Lymphoblastic cells**

Fine Needle Aspiration Cytology of nodular skin eruptions were revealed more number of lymphoblastic cells with less basophilic cytoplasm (Fig 3). Ultrasonography and radiographical examination revealed absence of metastasis. These findings were strongly suggesting of cutaneous lymphoma. .

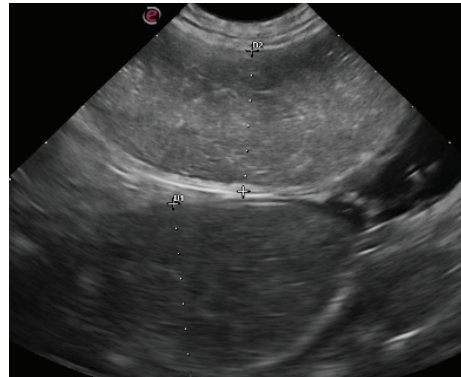
#### **Treatment and Discussion**

Animal was treated with 19 weeks Modified Wisconsin Maddison protocol. The drugs used

in this protocol were Doxorubicin @ 30mg/m<sup>2</sup>, Cyclophosphamide @ 0.5mg/m<sup>2</sup>, Vincristine @ 0.5mg/m<sup>2</sup> and Prednisolone @ 2mg/kg for one week tapering dose upto 0.5mg/kg (Zandvliet, 2016; Ettinger *et al.*, 2017). Dog showed signs of recovery from cutaneous lymphoma whereas during the Maddison protocol at 15<sup>th</sup> week dog had constipation and distended abdomen (Fig 4). Ultrasound examination revealed distended intestinal loops and ileus (Fig 5). Abdominal radiography revealed fecal stasis (Fig 6).



**Fig 4. Distended abdomen**



**Fig 5. Distended intestinal loops**





**Fig 6. Fecal stasis**

In this present case ileus may be due to Vincristine and it leads to autonomic neuropathy and gastrointestinal disturbances (Vera *et al.*, 2017). Cytotoxic nature of Vincristine damages the myenteric plexus which implicate intestinal hypomotility and directly suppress motility in colorectum. This ileus condition was treated by oral Neostigmine @ 0.2mg/kg, a cholinergic drug. Neostigmine having anticholinergic esterase activity and increasing the activation of muscarinic receptors by inhibiting the breakdown of acetylcholine, there by stimulating the colonic motor activity and decreasing the intestinal transit time and induce the GI contractions especially in the colon (Katzung *et al.*, 2012). Similarly, this condition in human was called as Ogilvie's syndrome. Patients had developed Ogilvie's syndrome two to ten days after infusion of vincristine and the syndrome resolving after its discontinuation (Sandler *et al.*, 1969). Hence the periodical evaluation of GI system should be advocated during the Modified Wisconsin Maddison protocol to early identification of paralytic ileus. Neostigmine was found to be very effective to restore GI motility due to Vincristine associated ileus during the Modified Wisconsin Maddison protocol in a dog.

### Acknowledgement

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**Fig 7. Animal after recovery**

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## Successful Clinical Management of Chronic Mastitis Cum Udder Abscess in A Transition Cow

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### Abstract

Based on ultrasonographic findings and ABST results, a Holstein Friesian cross-bred cow eight and half months pregnant, which had udder swelling accompanied by thick yellowish milk discharge from all quarters except the left forequarter, which had a yellowish discharge with flakes was diagnosed and subsequently treated for chronic mastitis cum udder abscess.

**Keywords:** Cow, Chronic Mastitis, Udder, abscess, *Staphylococcus spp.*, *Bacillus spp.*,

### Case History and Clinical Observations

A full-term pregnant Holstein Friesian cross-bred cow presented to a Large Animal Medicine Unit with a history of udder swelling and thick yellowish milk discharge from all quarters except the left fore quarter (Fig. 1 and 2). The animal was treated for the past one week with intramammary preparation containing Ceftriaxone and supportive therapy. Physical examination revealed elevated temperature (40.3°C), edematous swelling at the gland cistern and thick yellowish milk discharge from all quarters except the left fore quarter, which had a yellowish discharge with flakes. All quarter milk samples were collected aseptically in separate containers for culture. The milk sample was inoculated in nutrient broth on the first day and incubated overnight at 37°C and the overnight grown culture was streaked in nutrient agar plate to obtain pure colonies on the 2<sup>nd</sup> day. The isolates were identified as *Staphylococcus spp* based on their cultural, biochemical and staining properties. The pure colony of *Staphylococcus spp* isolated was then subjected to Antibiotic sensitivity test (ABST) in the Muller Hinton agar plate (Himedia Pvt ltd, Mumbai) against antibiotics like Streptomycin 25 mg, Oxytetracycline 30 mg, Cotrimaxazole 25 mg, Gentamicin 10 mg Amikacin 30 mg, Enrofloxacin 10 mg, Ciprofloxacin 5 mg, Ceftriaxone/ Sulbactam 30/ 15 mg and found to be sensitive to Enrofloxacin, Ciprofloxacin, Gentamicin, and Clotrimazole and resistance to Streptomycin and Amoxicillin antibiotics.

Ultrasonography of the left fore quarter was done by using a Sonoray DS 50 Plus Vet ultrasound machine equipped with a curved probe that had adjustable MHz capacity (2.5 to 5 MHz) curvilinear probe in standing posture without sedation. Gel contact techniques are adopted as per standard protocols (Cartee *et al.*, 1986; Venkatesan *et al.*, 2020). Which revealed multiple anechoic cavities with pockets of hyperechoic areas (Fig.5).

### Results and Discussion

The animal was continuously treated based on ABST results with inj. Gentamicin @ 5mg per kg body weight IV, inj. Enrofloxacin @ 5 mg per kg body weight IM, inj. Flunixin meglumine@ 1mg per kg body weight IM and inj. Vitamin AD<sub>3</sub>E 10 ml IM for 3 days and uneventful recovery was noticed after 5 days of treatment. On the seventh day animal delivered a female calf. Udder swelling was found reduced and milk was normal in all quarters except the left quarter on the twelfth day. Further investigation of the left forequarter revealed hard swelling at the cranial region, yellowish watery milk and fine needle aspiration revealed the presence of thick pus (Fig. 3 and 4).

Milk sample and ultrasound guided aspirated pus of left forequarter subjected to microbiological examination. milk discharge showed *Staphylococcus spp* and ultrasound-guided aspirated pus discharge showed *Bacillus spp.*, infection. The animal was once again treated for udder abscess by evacuation from the left fore quarter and impregnated the cavity with seton daily for 5 days and recovered uneventfully (Fig.6 and 7).

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Udder abscesses are commonly observed in cases of chronic suppurative mastitis, manifesting as distinct and localized lesions on the udder. These lesions are primarily caused by environmental pathogens that are prevalent in the surroundings (Venkatesan *et al.*, 2020 and Piccinini *et al.*, 2012). Munif *et al.* (2022) reported that among the udder affections in dairy cows, the

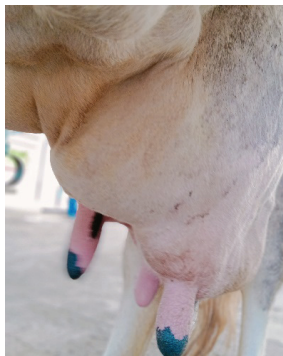
prevalence of udder abscess was 9.26 percent and udder myiasis 11.11 percent. Abd-El-Hady, 2015 reported that among the udder affections in cattle, Gangrenous mastitis had a higher percentage (10%) followed by abscesses (5.83%), hematoma (5.6%), rupture of suspensory ligament (2.8%), and deep wounds (1.4%).



**Fig.1. Swelling of Left forequarter**



**Fig.2. Curdy discharge was observed in the left fore quarter and other quarters showed yellowish discharge on first day of presentation**



**Fig.3. Hard swelling at the cranial region of Left fore quarter (on the 12<sup>th</sup> day of review)**



**Fig.4. Yellowish discharge – Left fore quarter (on the 12<sup>th</sup> day of review)**



**Fig. 5. Ultrasonography of the left fore quarter (using a Sonoray DS 50 Plus Vet ultrasound machine with 2.5 to 5 MHz curvi linear probe) - Multiple anechoic cavities with pockets of hyperechoic areas**



**Fig. 6. Pus was evacuated from the left fore quarter and impregnated the cavity with seton daily**



**Fig.7. Recovered udder**

Chronic mastitis leads to fibrosis of all four quarters of the udder (Ijaz *et al.*, 2014). Long-standing udder swelling cases need to be ultrasonographical evaluated to rule out localized udder infection. Venkatesan *et al.* (2020) reported ultrasonographic examination of the udder showed hyperechoic alveolar tissue with anechoic or heterogenous content in the four dairy cows with chronic mastitis. Ultrasonography of the udder can be used to diagnose pathological alterations of the udder such as inflammation, mucosal lesions, tissue proliferation, foreign bodies, milk stones, congenital changes, hematoma and abscesses (Rajamahendran *et al.*, 1994). Hence ultrasonographic guided aspiration of udder abscess will be non-invasive and minimize tissue injury which may be encountered in blind aspiration and or partial mastectomy techniques.

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## Management of High Fiber Induced Diarrhoea in Kittens – A Case study

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### Abstract

Kitten diarrhoea is one of the common clinical presentations and it is caused by multiple etiopathology. One of the poorly documented etiologies is high fiber-induced diarrhoea in kittens. This study documents the occurrence of diarrhea in eight three-month-old kittens from a single household. These kittens, who received regular deworming and vaccinations, were fed a commercially available diet high in fiber (5%) on a daily basis. Cats were reported to be passing watery and odorless stools for a week in spite of treatment with antibiotics and supportive medications. Clinical examination revealed dehydration, dullness and poor body condition. Faecal samples examination did not reveal any parasitic ova. Based on the history, clinical and laboratory examination the condition was diagnosed as high fiber induced diarrhoea in kittens and was successfully recovered with the shift of diet to low fiber and supplements of probiotics.

**Keywords:** Kittens, High fiber, Diarrhoea, Diet Change

The most common malady facing small animal physicians in feline practice is diarrhoea in kittens. Development of the clinical signs varies from self-limiting diarrhoea, mild to the severity in nature and can cause fatal dehydration. Diarrhoea in kittens is associated with different etiologies which include bacterial, parasitic and viral origin; feeding of cows milk, feeding at inedible household items, sudden change in the diet plan and environmental stress. Despite the most common and important of condition in kittens, poor information is available on the role of dietary modifications i.e. crude fiber content in diet (Barr, 2006). Hence the present communication puts a record on the role of crude fiber in diet for the management of diarrhoea in kittens. One of the commonly neglected components in the aetiology of the development of diarrhea in cats is the nutritional aspect.

### Case History and Clinical Observations

The current investigation focused on eight kittens, approximately three months old, which had been dewormed and vaccinated. These kittens were brought to the clinic due to a reported case of diarrhoea within a single household. All the cats were fed with commercially available dry food with high fiber (5%). Kittens were reported to be passing watery stools for one week in spite of treatment with antibiotics. Clinical examination revealed dehydration, dullness, rough hair coat and poor body condition. Examination of faecal

samples did not detect any parasitic eggs or gram-negative bacteria. Ultrasonography of the abdomen revealed increased peristaltic movements of intestines. Based on the vaccination and regular deworming history, negative for parasitic ova and high fiber content condition was diagnosed as high fiber induced diarrhoea in kittens.

### Treatment and Discussion

In the present study, faecal examination was carried out to know about the aetiology by the direct faecal smear, stained smear and faecal flotation technique. This was negative for cysts, oocysts and ova of parasites. The kitten diet was shifted to the diet with low fiber (1.5%) and supplementation of probiotics and oral rehydration therapy was carried out. Improvement in clinical condition was noticed by the third day of treatment and a pattern of clinical recovery and faecal consistency was recorded (Fig. A, B, C). In the present study, kittens were administered with different antibiotics which could not have any improvement. Indiscriminate use of antibiotics often results in the development of antibiotic resistance and which will alter the commensal intestinal microflora finally lead to exacerbation of diarrhoea. As a part of the treatment kittens were treated with probiotics along with the change in diet. Probiotics such as *enterococcus*, *bifidobacteria* and *lactobacillus acidophilus* will influence the gut microflora by inhibiting pathogenic micro-organisms and enhancing immunity. These things are highly recommended in kittens with intact mucosal barriers due to infectious or non-infectious diarrhoea (Marks *et al.*, 2011). Despite of many advantages of

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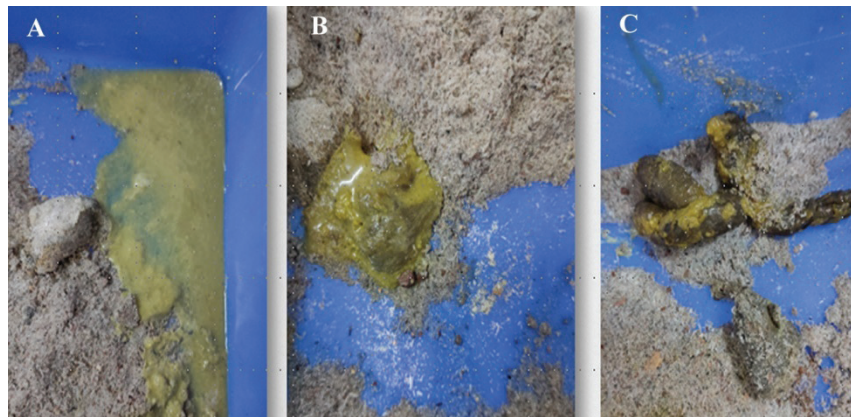
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having a pet, there is a possibility of transmission of zoonotic diseases from diarrhoeic kittens (Nagamori *et al.*, 2018). *Toxocara* species have been identified as the cause of parasitic zoonosis (Sivajothi and Reddy, 2019). *Cryptosporidium* species is also a causative agent for diarrhoea (Loftin *et al.*, 2019). These parasitic infections can cause watery diarrhoea with or without blood, vomitions, anorexia and dehydration. In the present study, laboratory studies were carried out to exclude possible parasitic infections. Gastrointestinal disorders are the most common problems in cats, and the clinical signs associated with these diseases, vomiting, diarrhoea, anorexia, or weight loss, are some of the most and many gastro intestinal diseases are not complete without the concurrent addition of appropriate dietary therapy (Zoran, 2008). In most cats hairball regurgitation can cause complications like intestinal blockage, the inflammation of mucosa and melena (Canon, 2013). Its highly recommended addition of fiber in the diet to increases the passage rate and stimulate gastric contraction to expel the hairballs if any in the duodenum (Dann *et al.*, 2004). But few authors documented that there is no effect of fiber content in the transit time (Armbrust *et al.*, 2003). High fiber has the role in prevention of hairball formation and it is advisable in adult cats. But in the present study, without knowledge

about the high fiber in the diet owners were continuing to give the medications. Probiotics have the role of treating diarrhoea by improving the gut microbiota, enhancement of immunity and by manipulating of intestinal defence barriers (Peters *et al.*, 2019). Nutrition plays an important role in cat stool consistency and poor nutrition leads to chronic diarrhoea. Diarrhoea can be prevented by low-fat food, high protein, low-carbohydrate, soluble fibers, omega-3 fatty acids and antioxidants. Carbohydrates should be low in level and from multiple sources. Meat source proteins are more soluble than plant source. The diet should not contain gluten, lactose or preservatives. Dietary fibers are two types i.e. soluble fibers and insoluble fibers. Soluble fibers tend to cause slow gastric emptying and transit time. Insoluble fibers tend to assess water and increase faecal volume and are useful in normalizing gastrointestinal motility. Excessive soluble fiber can cause loose and watery stools and the production of excessive gas, while excessive insoluble fiber can cause excessive stool volume.

### Conclusions

In kittens with diarrhea unresponsive to standard therapy and lacking a definitive diagnosis, a high-fiber diet played a significant role. Transitioning from a high-fiber to a low-fiber diet is expected to aid in resolving chronic diarrhea in kittens.



**Fig. A, B, C: Improving the faecal consistency during the course of treatment**

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## Therapeutic management to concurrent infection of *Haemoproteus columbae* and *Trichomonas* spp. in domestic rock pigeons

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### Abstract

Two domestic rock pigeons were presented to Veterinary Clinical Complex, VC & RI, Orathanadu, TANUVAS with the history of circling, rotating its head, complete inappetence and regurgitation. On clinical examination bird appeared dull, depressed and circling of head appreciated and also noticed the presence of *Pseudolynchia canariensis*. Blood smear examination revealed a characteristic halter shaped gametocytes of *Haemoproteus columbae* encircling the nucleus of erythrocytes and the crop fluid examination revealed the presence of *Trichomonas gallinae*. Faecal sample examination revealed the absence of intestinal parasites. The birds were treated with oral Chloroquine @5mg/kg body weight and Metronidazole @50 mg as total dose along with the multivitamin supplementation. The whole flock in the house hold were treated with Permethrin (0.25%) spray by external application to control vector population. After five days of the treatment the clinical condition of the birds were reviewed which showed complete recovery without any complications.

**Keywords:** Pigeon, Avian malaria, Canker, Chloroquine, Metronidazole.

Domestic pigeons (*Columba livia*) belong to the Columbidae family and are commonly seen in urban areas worldwide. Pigeons and doves make about 50% of all birds maintained in captivity for food, recreational activity, entertainment, and display (Harlin and Wade, 2009). Protozoal infections can cause serious impacts on birds, including stunted growth, reduced egg production, and susceptibility to diseases (Ashford, 1971). The disease caused by *Haemoproteus columbae* in pigeons is called as pseudo malaria or pigeon malaria transmitted by *Pseudolynchia canariensis*, affects domestic as well as wild pigeons which is highly fatal to young pigeons (Soulsby 1982). *Trichomonas gallinae*, a flagellated protozoan, causes avian Trichomoniasis, a disease that affects the upper digestive system of birds, especially pigeons. The disease has been described as canker. A digestive or canker disease was characterised by pyogenic oropharyngitis, ingluvitis, proventriculitis, and descending hepatitis (Chi *et al.*, 2013). This paper presents the concurrent infection of *Haemoproteus columbae* and *Trichomonas gallinae* in a rock pigeon with its therapeutic management.

### Case History and Observation

Two Domestic rock pigeon of young age were presented to the Large Animal Medicine Unit of Veterinary Clinical Complex, Veterinary College

and Research Institute, Orathanadu, TANUVAS with a history of circling, rotating its head, complete inappetence and regurgitation. Nine pigeons in the flock of thirty-seven had already died with the same symptoms. On clinical examination ruffled feather, ocular discharge from both the eyes, white cheesy material in the oral region and ulceration of tongue were noticed and in addition *Pseudolynchia canariensis* was also recovered from the feathers. Blood from wing vein was collected in a vacutainer containing Heparin as an anti-coagulant and crop fluid was also collected by using sterile butterfly catheter. Faecal examination of the birds revealed absence of parasitic ova. The haematological analysis revealed RBC of  $1.7 \times 10^6$  / $\mu$ l, Haemoglobin 4.3 g/dL, PCV 15% which shows the bird was anaemic and WBC of  $11.5 \times 10^3$  / $\mu$ l, Heterophils 56%, Lymphocytes 39% and Eosinophils 4%. Blood smear study showed halter shaped immature gametocytes of *Haemoproteus columbae*. Crop fluid on microscopical examination in wet mount revealed *Trichomonas gallinae*.

### Treatment and Discussion

Based on the clinical observations and laboratory findings the pigeon was found to have multiple infections with *Haemoproteus columbae*, *Pseudolynchia canariensis*, and *Trichomonas* spp. The birds were treated with oral Chloroquine @5mg/kg B.W. and Metronidazole @50mg as total dose twice a day with supportive multi-vitamin syrup for 7 days

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was supplemented as it removes stress and enhances immunity. The pigeons recovered on fifth day without any complications. Permethrin (0.25%) was recommended as a topical insecticide for controlling vectors in pigeon habitats.

*Haemoproteus columbae*, a haematozoan homologous to the malaria parasite *Plasmodium*, causes pigeon malaria in both domestic and wild pigeons (Selvaraj *et al.*, 2013). The regional variation in *H. columbae* prevalence in pigeons is primarily influenced by vector abundance, in which our study confirms the presence of *Pseudolynchia canarenensis*. Clinical symptoms of *H. columbae* infection include anorexia, lethargy, depression, dyspnea, circling movement, and diarrhoea (Maharana and Kumar, 2016) which is in agreement with our study. Chloroquine, an antimalarial drug, is utilised to treat *Haemoproteus* sp. infection. Medications are not generally suggested for treating, since they are non-pathogenic parasites in most of the condition (Ritchie,

1999). Buparvaquone is highly effective in treating clinical *H. columbae* infection in pigeons, according to previous research (Razmi *et al.* 2011). Young pigeons, known as “squabs,” are often infected with *Trichomonas gallinae*, which may ultimately result in mortality. However, adult and recovered pigeons can also be carriers without showing clinical signs (Mohamed *et al.*, 2022). The clinical condition is characterised by greenish fluid or cheesy materials in the mouth and crop, which is a typical lesion in all canker birds (Seddiek *et al.*, 2014). This study reports greenish diarrhoea, yellowish cheesy material in oral cavity, ruffled feathers, weakness, and depression, identical to Paul *et al.* (2015). Metronidazole and Ronidazole are the most often used drugs to treat cankers globally. The administration of metronidazole in our case showed effective results, supporting Hochleithner *et al.* (2021) observations. Control measures like vector control, proper cleaning of droppings, provision of separate waterer and feeder and routine prophylactic measures were advised.



Fig. 1. Rock pigeon showing torticollis



Fig. 2. Cheesy white material in the oral cavity



Fig. 3. *Pseudolynchia canarenensis* recovered from the wing

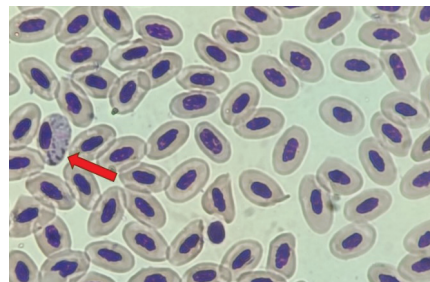


Fig. 4. Halter-shaped gamonts of *Haemoproteus columbae* in the nucleated RBC

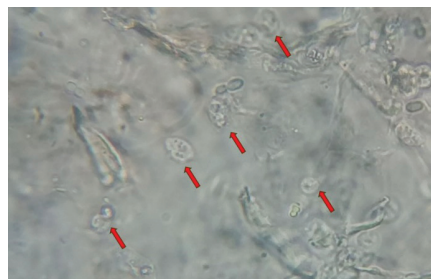


Fig. 5. *Trichomonas* sp., in crop fluid

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## Endoscopic Retrieval of Sewing Needle from Oesophagus in A Cat

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### Abstract

Endoscopy is a commonly performed non-invasive procedure in companion animals to remove any foreign objects struck at the upper gastrointestinal tract. A year-old Persian short-haired female cat was presented with a history of dyspepsia, vomiting, retching and gasping for a period of 4 days. The detailed history revealed that the cat had consumed fish one week back and the symptoms were noticed after three days. Thoracic radiography confirmed the presence of a fine radioopaque structure that has perforated the cranial esophagus and trachea. Endoscopic evaluation revealed the tip of a sewing needle with thread in the esophageal lumen and the same was successfully retrieved through endoscopy. The cat showed an uneventful recovery following antibiotic and supportive therapy.

**Keywords:** Endoscopy, sewing needle, esophagus and trachea, cat

### Introduction

Ingestion of any foreign objects may be a life-threatening problem if overlooked. The most frequently ingested foreign bodies in pet animals are magnets, latex teats, wood foreign bodies, such as skewers or ice pop sticks, corn cobs, pet toys, children's toys and solidified wood glue, sewing needles (Pratt *et al.*, 2014; Cornell and Koeing, 2015) and fish bones (Trams, 2003). Endoscopy is a non-invasive procedure that is performed in companion animals to remove any foreign objects struck at the upper gastrointestinal tract. This procedure is advantageous over surgical correction because it is time-effective and has a lesser risk to animals (Deroy *et al.*, 2015). The present paper puts on record about accidental ingestion of a sewing needle by a cat and its successful retrieval by endoscopy.

### Case History and Observations

A year-old Persian short-haired female cat was presented with a history of dyspepsia, respiratory distress, gasping, coughing, vomiting and retching for a period of four days. Detailed history revealed that the cat was offered fish one week back and the cat had started showing symptoms after three days. Clinical parameters were within the normal limits. Lateral x-ray of the chest and neck revealed the radio opaque needle piercing the oesophagus and trachea. The endoscopic procedure was carried out under general anesthesia. The cat was premedicated with atropine @0.04mg/kg as preanaesthetic, followed by ketamine (@ 11 mg/kg) and xylazine (@ 1 mg/kg, i/m). Following retrieval of the

foreign body, the cat was administered with ampicillin (@20 mg/kg for 3 days) and a single dose of ethamsylate (@0.4 ml i/m).

### Results and Discussion

Clinical examination of the affected cat revealed severe gasping, and retching along with a protuberance of the ventral aspect of cervical esophagus that was painful on palpation. These findings are in accordance with Abd Elkader *et al.* (2020) and Webb (2014) who reported that anorexia, retching and gasping are the common presentation signs in cats that were suspected of oesophageal foreign bodies. Right lateral thoracic x-ray revealed the presence of a fine radio-opaque structure that had perforated the esophagus, trachea and esophageal muscles (fig. 1).



**Fig. 1: Right lateral X-ray of the cat. Radio-opaque fine structure (arrow) that has perforated the esophagus (E), trachea (T) and the tip lodged in the cervical muscles (C) giving a protuberance (\*) of ventral neck.**

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Radiography is more useful in evaluation of esophageal foreign bodies in dogs and cats when compared to physical methods of examination (Sitaria *et al.*, 2020 and Tyrrell, 2006). A sewing needle blunt

end with a small length of cotton thread was seen in the cervical esophagus (fig. 2) during endoscopy. Using a retractor forceps the needle was successfully retrieved from the esophagus (fig. 2B).



**Fig. 2: Endoscopic appearance of thread (arrow); sewing needle with thread retrieved from the esophagus (B)**

Endoscopy is one of the non-invasive tools that has a dual role in both diagnosis and retrieval of foreign bodies in upper gastrointestinal tract (Zoran 2005 & Binvel *et al.*, 2018). Several authors have reported the endoscopic retrieval of non-penetrating (Michels *et al.*, 1995) and penetrating foreign bodies (Webb 2014) from the upper gastrointestinal tract in dogs and cats. However, the present case reports perforation of the sewing needle through the esophagus, trachea, and dependent cervical muscles. The findings of the present case is in accordance with Pratt *et al.*, (2014). The sharp-pointed objects should be removed within 24 hours due to the risk of complication (Birk *et al.* 2016). Though the present case was presented after 4 days and with complications of perforation of the surrounding structures, the oesophageal wall was still smooth, and thin and there was no oesophageal ulcer indicating the needle and threads did not induce a severe inflammatory response (Han 2003). The cat was later treated with inj. stypochrome, amoxicillin and ondansetron on day 1, but followed antibiotic for 2 more days. The treatment used in the present case is in agreement with (Abd Elkader *et al.*, 2020) who documented that drugs should be used for a considerable duration to prevent certain complications like the formation of stricture and establishment of infection. The cat was recovered uneventfully following therapy.

### Conclusion

Successful retrieval of sewing needle from the oesophagus of cat through endoscopy is placed on record

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## Medical Management of Acute Spinal Cord Injury with Aspiration Pneumonia in A Kid

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### Abstract

A two-month-old, non-descript female goat kid was brought to the Medicine Unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu, with a history of continuous high-pitched bleating, respiratory distress, and forelimb paresis over the past two days. The animal has appeared lethargic with an abnormal gait. Neurological examination revealed sluggish sensory and motor reflexes in the forelimbs and palpation elicited pain in the thoracic and dorsal spinal areas (C<sub>7</sub>-T<sub>2</sub>). Auscultation revealed exaggerated heart sounds and prolonged expiration. Radiographic examination ruled out spinal involvement but revealed left lung consolidation with pulmonary infiltration. Cerebrospinal fluid analysis showed an increase in neuron-specific enolase (NSE). The condition was tentatively diagnosed as acute spinal cord injury with aspiration pneumonia. Inj. Progesterone and intranasal Budesonide were administered along with a Progesterone patch applied to the lateral neck region. Successful medical management led to gradual clinical improvement observed from the seventh day and completely recovered after 15 days of treatment.

**Keywords:** Acute spinal cord injury, Aspiration pneumonia, Progesterone, Kid

### Introduction

Spinal cord injuries frequently occur in small ruminants, particularly goats, due to factors like degenerative changes, accidental injuries or trauma, idiopathic and any infectious causes. Lesions in different spinal segments result in noticeable signs such as difficulty walking, staggering gait, urine and faecal incontinence and relaxed anal tone leading to severe consequences (Jubb *et al.*, 2017). Diagnosis involves assessing spinal reflexes, including deep pain and withdrawal reflexes, conscious proprioception, wheelbarrow reflexes, placing reflexes etc. and also by utilizing advanced techniques like X-rays, MRI, or CT scans for lesion localization. Steroids were usually preferred in any neurological disorder. Nowadays, hormone progesterone usage has been increased among the veterinary fraternity in neurological conditions like myasthenia gravis with great success (Ramkumar *et al.*, 2023).

### Case History and Clinical Observation

A two-month-old non-descript female goat kid was brought to Medicine Unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu, presented with continuous high-pitched

bleating, respiratory distress and forelimb paresis for the past two days. The animal was appeared dull with mild dyspnoea. Although there was no orthopaedic involvement, the forelimbs showed flaccid paresis and mild rigidity of hindlimbs (Fig .1) with “two-engine gait” (Foss *et al.*, 2013). Pain was observed during palpation of the thoracic and dorsal spinal areas (C<sub>7</sub> – T<sub>2</sub> vertebrae). Auscultation revealed exaggerated heart sounds with prolonged expiration. Neurological examination indicated sluggish and exaggerated deep pain and withdrawal reflexes in the forelimbs and hind limbs respectively, while the cutaneous trunci reflex was sluggish behind the dorsal thoracic region.

Radiographic examination showed no spinal vertebral involvement but indicated pulmonary infiltration and left lung consolidation. To confirm neurological involvement, cerebrospinal fluid was collected for Neuron-Specific Enolase (NSE) estimation (Hatfield *et al.*, 1992) by ELISA, revealing levels of 32 ng/ml, exceeding the normal range. Hematobiochemical parameters were normal except for neutrophilia. The confirmatory tool for Spinal cord injuries is usually made by X- ray and advanced imaging techniques like CT or MRI. However, because of the non-availability of such diagnostic tool, the clinical examinations along with the elevated NSE Values, made us to arrive at a confirmatory diagnosis as Acute Spinal Cord injury.

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Initially, the condition was treated with Inj. Clindamycin (@ 10 mg/kg, i/m), Inj. Prednisolone (@ 1 mg/kg, i/m) and Tribivet (@ 2 ml, i/v, diluted with normal saline) for three days of treatment, no clinical improvement was noticed. On the fourth day, Inj. Progesterone (@ 6 mg/kg, deep i/m) along with intranasal Budesonide was administered. To maintain plasma progesterone concentration, Progesterone patch

(PROSYNC – NF) @ 30 mg was applied to the lateral aspect of the neck after proper clipping (Fig. 2). Notable clinical improvement was observed after 7 days and complete recovery was achieved by the 15th day (Fig. 3). Post-treatment radiographic examination revealed a significant reduction in pulmonary infiltration and cerebrospinal fluid NSE value was decreased to 10.21 ng/ml.

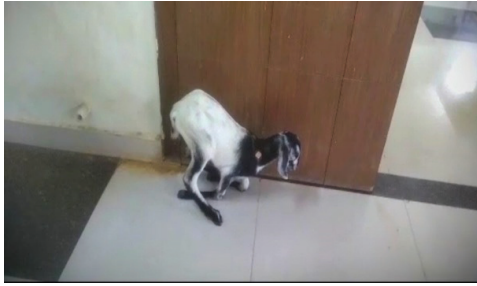


Fig. 1. “Two-engine gait” in a female kid



Fig. 2. Progesterone patch at lateral neck region.



Fig. 3. Complete clinical recovery after 15 days.

## Discussion

Acute spinal cord injuries were prevalent in small ruminants, particularly goats, often linked to spinal luxation or fractures. Besides the primary mechanical injury, damage to the spinal cord involves secondary pathological changes like oedema, haemorrhage, demyelination, and necrosis. Biochemical alterations, including the release of free radicals, leukotrienes, and prostaglandins, contribute to further injury and compromise blood flow to the spinal cord (Thomas, 2021). Assessing ataxia or paralysis in neurologically disordered patients is challenging but can be facilitated with a systematic approach. A comprehensive physical and neurological examination aids in lesion localization within the spinal cord segments ( $C_1$ - $C_6$ ,  $C_7$ - $T_2$ ,  $T_3$ - $L_4$ , and  $L_4$ - $S_3$ ). By correlating specific clinical signs such as upper motor neuron (UMN) tetra paresis, lower motor neuron (LMN) paresis of forelimbs, UMN paresis of hind limbs, UMN bladder and faecal incontinence, reduced anal tone, and flaccid tail, lesions in different spinal segments can be identified through careful clinical

and neurological examination (Ronaldo *et al.*, 2010). In the current case, the lesion was predominantly localized in  $C_7$ - $T_2$ , presenting distinct signs of LMN paresis in the forelimbs and UMN paresis in the hindlimbs.

The diagnostic approach for neurological disorders in small ruminants involves a thorough analysis of history, clinical and neurological examinations, and laboratory tools such as hematobiochemical parameters, urinalysis, and CSF analysis, aiding in lesion localization (Polizopoulou *et al.*, 2016). Neurological disorders are commonly associated with concurrent ailments (Walter *et al.*, 2007; Allen *et al.*, 2013). In the current case, the kid was presented with flaccid paresis of forelimbs, mild hind limb rigidity and mild dyspnoea. Radiographic examination revealed pulmonary infiltration, suggesting alveolar changes, possibly due to aspiration during feeding (Mekibib *et al.*, 2019; Ahsan *et al.*, 2010).

Treatment for acute spinal cord injury was based on the underlying etiology, typically involving antibiotics, steroidal or non-steroidal anti-inflammatory

drugs and vitamin supplements. Prednisolone has been considered as a first-line of treatment for spinal injuries in animals to reduce nerve injury and muscle inflammation (Lu *et al.*, 2016). In this case, the animal received Inj. Prednisolone @ 1 mg/kg to counteract spinal injury and Inj. Clindamycin @ 10 mg/kg for lung involvement. Clindamycin was chosen due to its efficacy against anaerobic bacteria, which are commonly associated with aspiration pneumonia (Schreiner, 1984). Despite of initial drug administration, no clinical improvement was observed, prompting a change in the therapeutic regimen, progesterone and budesonide were added. Progesterone synthesized in glial cells of the peripheral nervous system, has a recognized neurotrophic role, promoting axonal growth, maturation, and repair of damaged nerve fibres (Koenig *et al.*, 2000; El-Etr *et al.*, 2015; Ramkumar *et al.*, 2023). In this case, exogenous progesterone likely accelerated regenerative processes and fostered axonal maturation. The mechanism involves the stimulation of neuronal genes expressed in neurofilaments, microtubules and axolemma (Koenig *et al.*, 2000).

Progesterone was administered as a transdermal patch (PROSYNC – NF 1.2g) at the prescapular region, chosen for its neuroprotective properties and has less complication with high effectiveness (Kajaysri *et al.*, 2017). Budesonide, a locally-acting glucocorticoid with potent anti-inflammatory action, was administered as a nasal spray, reducing airway oedema and inflammation (Mohamed *et al.*, 2017). This multi-faceted approach has shown a marked reduction in pulmonary infiltration and NSE values by progesterone treatment in goat kid with acute spinal cord injury and aspiration pneumonia.

## Conclusion

In summary, the acute spinal cord injury in the kid was successfully treated with progesterone which revealed a novel therapeutic approach. Further investigations were required in this field to prove progesterone administration against neurological disorders. Early diagnosis and prompt treatment played a pivotal role, contributing to a better prognosis and complete clinical recovery.

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## Cabergoline therapy against hyperadrenocorticism in a dog

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### Abstract

A 9-year-old male Labrador dog was presented to Small Animal Medicine Unit of VCRI, orathanadu with a history of chronic skin infection for the past 6 months. Clinical examination revealed alopecia, skin thinning, calcinosis cutis and comedones with pendulous abdomen. Laboratory examination revealed increased ALP and hyperglycemia. Hepatomegaly and bilateral adrenal gland hyperplasia were noticed on ultrasonography. Based on clinical and ultrasonographic findings it was diagnosed to have hyperadrenocorticism. The dog was treated

**Keywords:** Cabergoline, Comedones, Dog, Hyperadrenocorticism.

Cushing disease (Hyperadrenocorticism) referred to an endocrine disease of dogs with excessive circulatory glucocorticoids (Ettinger *et al.*, 2017) owing to excessive endogenous cortisol production (Adrenal adenoma / Pituitary adenoma) or excessive exogenous cortisol administration (Iatrogenic) (Palui *et al.*, 2018). Naturally occurring hyperadrenocorticism was common in dogs, of which 80-85% of cases have pituitary dependent hyperadrenocorticism and 10-12% cases were due to adrenal dependent hyperadrenocorticism (Sanders *et al.*, 2018). Dogs with Cushing's disease exhibit polyuria, polydipsia, polyphagia, pendulous abdomen, muscle weakness, bilateral alopecia, obesity, comedones, calcinosis cutis, excessive panting and thin skin (Kooistra and Galac, 2010). Diagnosis of endogenous hypercortisolism can be made through Low Dose Dexamethasone Test (LDDT), High Dose Dexamethasone Test (HSST) and Urine Cortisol Creatinine Ratio (UCCR) (Peterson, 2007). Mitotane, Trilostane and Ketoconazole were used as standard treatment of choice for canine Cushing disease (Sanders *et al.*, 2018), Cabergoline could be used as effective therapy for dogs with Cushing disease (Palui *et al.*, 2018). Cabergoline has a long-acting dopamine agonist action, mostly used for treatment of prolactinoma (Sanders *et al.*, 2018). Canine corticotroph adenoma express dopamine D2 receptor, which inhibits ACTH secretion and decrease the circulating blood cortisol level (Castillo *et al.*, 2008). So, the present dog with hyperadrenocorticism was treated with cabergoline.

### Case History and Clinical Observations

Canine patient name Oreo, a 9 Years old male Labrador dog was presented with a history of chronic

skin infection and treated locally for the past 6 months. The owner had witnessed bilateral swelling of ventral abdomen with gradual decline in the body condition, especially in term of physical activity. Physical examination revealed obese, generalized alopecia, skin thinning, Comedones (fig. 1a), calcinosis cutis (fig.1b) on ventral abdomen along with testicular atrophy. Rectal temperature, pulse rate, heart rate and respiratory rate were found to be within normal range. Haematology was revealed neutrophilia (88%) and increased WBC (16,500/cmm) counts. Serum biochemical analysis was showed hyperglycemia (194mg/dl), increased alkaline phosphatase (871 U/L) and alanine transaminase (121 U/L), whereas BUN (24mg/dl) and creatinine (1.3 mg/dl) level were found to be normal. Abdominal ultrasonography revealed hepatomegaly (fig. 2a) and bilateral enlargement of adrenal glands (fig. 2b). The above clinical signs and ultrasonographic findings were highly suggestive of hyperadrenocorticism.

### Treatment and Discussion

The dog was treated with cabergoline @ 0.07 mg/kg P.O for every 3 days for a period of 3 months. Mild clinical improvement was noticed from first month of treatment. On subsequent months of treatment comedones, calcinosis cutis and ventral abdomen distension were disappeared. Hair growth was evidenced and the dog was returning to full physical activity after 3 months of treatment. Pendulous abdomen could be due to combination of muscle weakness, fat redistribution and hepatomegaly. Catabolic effect of cortisol causes muscle weakness. Cortisol causes breakdown of dermal protein (hypocollagenosis) which causes the skin to appear almost thin paper like. Calcinosis cutis would be due to crystalline deposition of calcium and

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phosphorous in dermal collagen. Comedone was due to excess follicular keratin (Bruin *et al.*, 2008). Increased alkaline phosphatase (871 U/L) could be due to the result of glycogen accumulation and hepatocellular vacuolation. Alanine transaminase (121U/L) was also increased owing to hepatocyte damage. Hepatomegaly could be due to excess glycogen accumulation in the hepatocyte (Boatright, 2021). Present case was successfully managed by using Cabergoline. This is long-acting dopamine receptor agonist. Corticotroph cells of pituitary adenoma have dopamine receptor (80% D2 receptor). Cabergoline bind to dopamine receptor

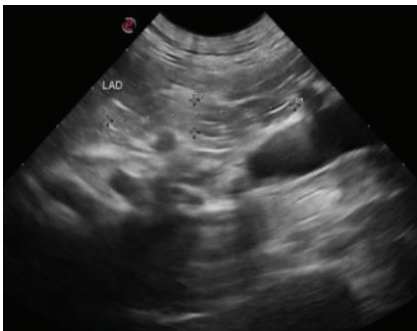
D2 and inhibit ACTH. Oral administration, low cost and good tolerability of cabergoline makes it an attractive treatment option for Cushing's disease (de Bruin *et al.*, 2009 and Palui *et al.*, 2018). But only a few small observational studies has been done with cabergoline against Cushing's disease. In future, expanded use of cabergoline could help to increase the survival inturn helps to lead quality of life in dogs. The aim of this case was to determine the efficacy and safety of cabergoline monotherapy in dog with Cushing's disease. In future, studies comparing cabergoline with other standard treatments were needed to get conclusive evidence.



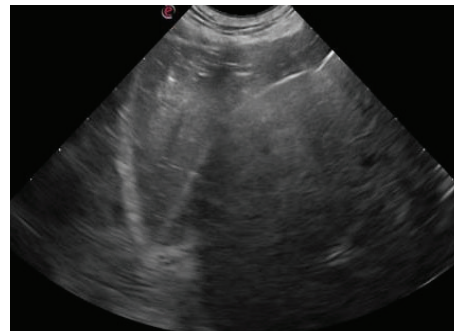
**Fig. 1a.** Clinical signs showed comedones on ventral abdomen.



**Fig. 1b.** clinical signs showed calcinosis cutis on ventral abdomen



**Fig. 2a.** Ultrasonography of adrenal gland (left) showing hyperplasia



**Fig. 2b.** Ultrasonography of liver showing hepatomegaly



**Fig. 3.** Clinical recovery after 3 months of therapy

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## Dystocia Due to Breech Presentation with Cranio -Skeletal Malformations in A Cross Bred Cow

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### Abstract

A third calving full term pregnant Jersey cross bred cattle was presented to Veterinary Poly Clinic with the history of calving difficulty. All the vital sign parameters of the Dam were within the normal limits. The animal is on sternal recumbency. Upon vaginal examination, it was found that the cervix was fully dilated. Additionally, a breech presentation was observed. Detailed vaginal examination and manipulations the calf was brought to extended position of hind legs. Then by careful assistance hind limb was dragged outside but the hip and thigh region of the calf were locked at the pelvic brim of the dam, making delivery difficult. Despite ample lubrication, a bulldog calf with cranio-skeletal malformations was delivered. These malformations are attributed to hereditary causes, primarily driven by recessive autosomal genes. The communication highlights the importance of understanding genetic predispositions and conducting thorough examinations during pregnancy to detect such anomalies early. It also emphasizes the need for careful breeding practices to minimize the risk of inherited disorders in livestock populations.

**Keywords:** Bull dog, Congenital, Cranio skeletal malformation, Dystocia

### Introduction

Reproduction plays a crucial role in cattle production and directly impacting profitability. Dystocia poses a significant challenge in cattle production (Rao, 1989). Recently, there has been a rise in the proportion of dairy calves requiring assistance at birth, resulting in a notable increase in the number of calves being born either weak or dying within 48 hours of birth due to challenging deliveries or dystocia (Mee, 2008). Congenital anomalies are one of the major causes of dystocia in cows. Among Various kinds of anomalies or monstrous, cranio skeletal malformations are rare condition in domestic animals (Sara Albarella *et al*, 2017). Bulldog anomalies are uncommon and rarely reported in bovines (Prabhakaran *et al*, 2013). It is a congenital defect in newborn calves, featuring craniofacial and skeletal malformations resembling a bulldog appearance of calf. These include shortened or flattened skulls, facial deformities and skeletal issues in limbs and spine, impacting calf health and survival. Factors contributing to these conditions may involve genetics, environment, or a combination thereof. The present case study reports the rare case of Bull dog with incomplete cranial bones development in a calf.

### Clinical observation and treatment

A Third calving crossbred jersey cow was referred to to Veterinary Polyclinic, Udumalai by a field veterinarian with a history of unable to expel the

foetus for more than 10 hours. Per vaginal examination revealed that the foetus had posterior presentation and complete breach position with both hind limbs extended (Hinnenberg *et al.*, 2019 and Schlaeger *et al.*, 2018). After conducting a thorough vaginal examination, 4 ml of 2% Lignocaine was administered epidurally and traction was applied to the hind limbs of the fetus. Both hind limbs were carefully pulled out through the vagina. However, the hip joint and thigh region of the calf was locked at the pelvic brim of the dam, complicating the delivery process. The vaginal passage was then lubricated with liquid paraffin and the pelvic part of the fetus was extracted with forced traction without complications. Examination of the fetus revealed cranial bone malformations, including the absence of nasal bones and nostrils, incomplete growth of eye orbits and incomplete development of maxillary bones, resulting in a protruded tongue and abnormal hard palate formation (Fig. 1). Further to address the dam condition, rehydration fluids were administered, including inj. Dextrose Normal saline 1 lit IV, inj. Ringer's Lactate 1 lit IV and inj. Calcium Magnesium Borogluconate 450 ml IV and additionally, the dam received treatment consisting of inj. Meloxicam (@0.3 mg/kg, IM), inj. Ceftriaxone (@15 mg/kg, IM) and inj. Pheneramine malate (@0.5 mg/kg, IM) for three days.

### Discussion

Congenital malformation is defined as a defect of morphogenesis, which developed during intrauterine

life, and is observed at birth (Tomasz *et al.*, 2020). The present communication reported the one of major anomalies in Bovines. Prevalence of Congenital malformation was about 2-3 percent globally (Giovanni and Mario, 2012). The Bull dog calf was reported in India (Kumar *et al.*, 2007; Bhattacharya *et al.*, 2012). But the present case was reported that the bulldog calf with absence of nasal cavity and bifurcation of maxilla. Artificial insemination in bovines is the major drive to increase the bovine population. Studies on congenital malformations inevitable to reduce the risk of farmers livelihood. The present communication reported that calf had Cranio skeletal malformation without nasal cavity.



**Fig. 1 cranial bone malformations in a calf**

### Conclusion

This communication reported the foetal anomalies in crossbred cows.

### Acknowledgement

The Author was very much thankful to Clinician, Veterinary Poly Clinic, Udumalpet, Tiruppur District for the opportunity given.

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## Blood Transfusion as an Adjunct Therapy in a Foal Affected with Trypanosomiasis

Balusupati Indhu Teja, J. Jyothi, A. Sangeetha, A. Balakrishna and K. Satish Kumar\*

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### Abstract

Trypanosomiasis is an infectious haemo protozoan disease that affects various domestic and wild animals. A 9-month-old foal was presented to Veterinary Clinical Complex of the College of Veterinary Science, Rajendranagar, Hyderabad with a complaint of reduced appetite, red-colored urine, and rapid loss of weight over a period of one week. Pale conjunctival and buccal mucous membranes were noticed with tachycardia and body temperature of 97.2° F. Hematological examination revealed anaemia, with pleomorphism of RBCs, microcytosis and a few acanthocytes. Wet film examination and Giemsa-stain smear examination revealed the presence of intercellular spindle-shaped *Trypanosoma evansi*. The foal was treated with Diminazene aceturate (@ 3.5mg/kg body weight), cyanocobalamin, along with blood transfusion. The foal was successfully revived following a blood transfusion.

**Keywords:** Trypanosomiasis, foal, blood transfusion

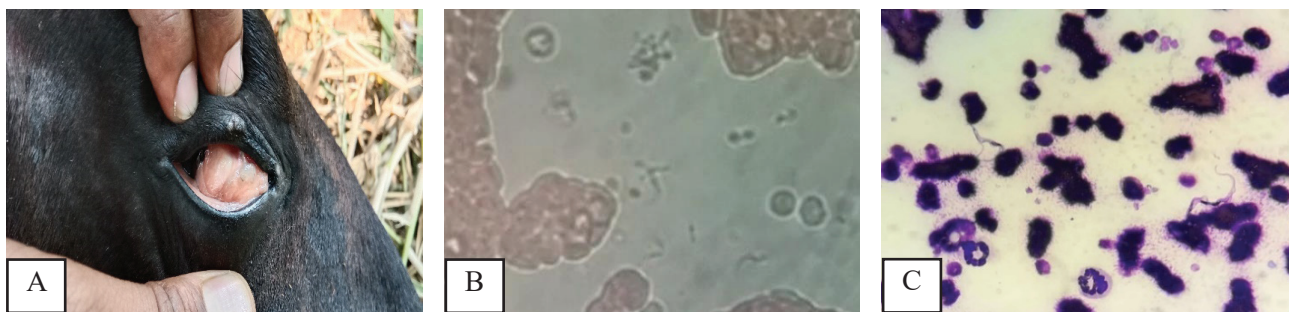
### Introduction

Trypanosomiasis is an infectious protozoan disease caused by several species of *Trypanosoma*. Trypanosomiasis is of critical importance because of its destructive effects on animal health (Singh *et al.*, 2013). As there is no vaccine, Trypanosomiasis is primarily prevented and controlled using prophylactic drugs (Kumar *et al.*, 2021). Severe infection may also cause anaemia resulting in fatal outcomes, particularly in young animals (Radwanska *et al.*, 2008). The present paper puts on record about the management of trypanosomiasis in a foal with an adjunct blood transfusion.

### Case History and Observations

A 9-month-old foal was presented with a complaint of reduced appetite, red colored urine and

rapid loss of weight for a week. Clinical examination revealed pale and blanched conjunctival and buccal mucous membranes with intermittent fever. The clinical signs presented in the present case are in accordance with Greif *et al.* (2018), and Rodrigues *et al.* (2015) who documented that emaciation, oedema, cachexia, abdominal pain, head pressing and paddling movements as common manifestations of trypanosomiasis in domestic animals. Peripheral blood smear stained with Giemsa stain revealed several intercellular organisms with flagellum suggestive of *Trypanosoma* (fig.1). Haematology revealed anaemia with pleomorphism, microcytes and few acanthocytes.



**Fig. 1. Blanched conjunctival mucosa (A); Spindle-shaped organisms (yellow arrow) in between RBC in wet film(B) and stained smear (C).**

## Treatment and Discussion

The foal was treated with diminazene aceturate (@3.5mg/kg body weight intramuscular). The drug is an aromatic diamidine and is primarily employed as a curative drug for *T. evansi*. However, its application in horses and dogs is restricted due to suboptimal efficacy and tolerance within these species (Halder *et al.*, 2019). The foal was also treated with cyanocobalamin 5 ml i/m for 4 days. Anaemia is a prominent character in the pathology of surra, with horses and dogs exhibiting more pronounced levels of anaemia compared to other animals (Jaimes-Dueñez *et al.*, 2017). During the acute stage, the

trypanosomes release extracellular vesicles filled with intracellular parasite cargo as well as variable surface glycoprotein that can fuse with RBCs. This causes a change in the physical properties of the RBC membrane, which enhances erythrophagocytosis resulting in anaemia and haemoglobinuria (Stijlemans *et al.*, 2018). After a thorough compatibility test, 1000 ml of blood was collected from the healthy horse and transfused to the affected foal. Following transfusion, foal showed clinical improvement and haematology examination showed near normalization of RBC parameters. Further, microscopic examination of peripheral blood smear also confirmed the absence of *T. evansi* organisms.

**Table. Hematological parameters of foal before and after therapy**

Hematological parameter's	PCV (%)	Platelets ( $\times 10^5/\text{ul}$ )	Hb (g/dl)	RBC ( $\times 10^6/\text{ul}$ )	WBC ( $\times 10^3/\text{ul}$ )
<b>Before therapy (day 0)</b>	18.5	$8.7 \times 10^4$	5.9	5.65	15
<b>After therapy (day7)</b>	38	$1.8 \times 10^5$	9.6	8.9	9

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## Retroperitoneal Mullerian Cyst of Renal Origin in A Cat - A Case Report

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Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu

### Abstract

Retroperitoneal cysts can be categorized into lymphatic cysts, mesothelial cysts, enteric cysts and urogenital cysts based on embryological origin and histogenesis. A twelve months old intact female domestic short hair cat was presented with a history of progressive abdominal distension, anorexia, lethargy and oliguria. On abdominal palpation, an extensive globular mass was palpable in the cranial abdomen. A survey radiography revealed a soft tissue contour at the cranial abdomen at the left renal position. Hematobiochemical profiles and preoperative assessment were done. Renal functional status was ascertained with intravenous pyelography which revealed unilateral cystic dysgenesis of left kidney and agenesis of left ureter. To rule out general organ health Exploratory laparotomy confirmed the cystic renal distension that was excised through an unilateral nephrectomy had an uneventful recovery.

**Keywords:** Mullerian cyst, Renal Cyst, Nephrectomy and Cat

### Introduction

Renal cysts are fluid-filled, epithelial-lined, benign cystic structures within the renal cortex or medulla. Renal cysts in dogs and cats can be congenital, such as polycystic kidney disease (PKD) in Persian cats or bull terrier dogs, with an autosomal dominant trait; Renal cysts can also be acquired, developing secondary to chronic nephropathies (Beck and Lavelle, 2001)

Extreme rarely reported mullerian cysts of the retroperitoneum are considered to be a subtype of urogenital cysts. Retroperitoneal cysts can be categorized into lymphatic cysts, mesothelial cysts, enteric cysts and urogenital cysts based on embryological origin and histogenesis. Urogenital cysts are further sub classified into pronephric, mesonephric, metanephric and Mullerian types (Yohendran *et al.*, 2004).

### Case History and Observation

A twelve months old intact female domestic short hair cat was presented with a history of progressive abdominal distension, anorexia, lethargy and oliguria. General examination revealed dehydration, pale mucous membrane and tachycardia. On abdominal palpation, an extensive globular mass was palpable in the cranial abdomen. Survey radiography of abdominal lateral revealed the presence of a considerable radio dense homogeneous space occupying lesion with sharp regular margins in the cranial abdomen (Fig.1). The density of the shadow was similar to that of parenchymal organs.

In ventro-dorsal view, the mass was delineated rather in the left and contacted the left abdominal wall (Fig.2). Abdominal ultrasonography demonstrated severe anechoic enlargement of left kidney with smooth borders measuring  $8.5 \times 5.0$  sq.cm. The right kidney was normal in size with echotexture, measuring  $4.1 \times 2.0$  sq.cm. Liver, spleen, gastrointestinal tract and uterus showed normal echotexture and size. For further diagnosis, an intravenous pyelography was performed using Iohexol positive contrast. There was no clear demarcation between the infundibular and calyceal structures upon excretory urography, which led to tentative diagnosis of unilateral cystic dysgenesis of left kidney and agenesis of left ureter (Fig.3).

### Treatment and Discussion

An exploratory laparotomy was performed after routine hematobiochemical profile. The patient was premedicated with Butorphanol @ 0.2 mg/kg and Midazolam @ 0.2 mg/kg intravenously. The patient was administered intravenous crystalloids (0.9% Sodium chloride @ 4 ml/kg/h) preoperatively and intravenous antibiotics (Amoxicillin- cloxacillin) @ 20 mg/kg intravenously. Anaesthesia was induced with Propofol @ 3 mg/kg intravenously and maintained under inhalant anaesthesia with 2% Isoflurane in 100 percent Oxygen with non-rebreathing circuit. Cranial midventral laparotomy was performed, massive cystic fluid filled mass was identified, isolated from adhesions if any, and exteriorized from the retroperitoneal region (Fig.4). From meticulous dissection, the development of cyst was identified to be originated from the left kidney and

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complete agenesis of left ureter was noticed. Absence of renal function in the left kidney with absence of adjoined ureter warranted unilateral nephrectomy. The cystic kidney was freed from sub-lumbar attachments and renal artery was double ligated with Polydioxanone (2-0) close to abdominal aorta. Renal vein was ligated separately, avoiding the left ovarian vein and the left kidney was removed. Laparotomy incision was closed as per standard operating procedures. Post-operatively parental fluid therapy and antibiotics were administered for 7 days and evaluated for any recurrence or any abnormalities through radiography (Fig.5). Adequate postoperative care and periodic review with appropriate advice resulted in an uneventful recovery.

The pathogenic mechanism for the development of Mullerian epithelium-lined cysts in the retroperitoneum is not clear. Retroperitoneal tissue may include aberrant

embryologically-derived Mullerian duct remnants that might have the capacity to grow in later life under the influence of abnormal hormonal stimuli. Paskalev *et al.*, (2012). Alternatively, the coelomic epithelium or peritoneum may undergo differentiation to become serous/tubal-type epithelium, later invaginating into the underlying tissue and eventually lost its connection with the surface, thereby producing a cystic structure. The present case study reveals an acquired Mullerian cyst due to renal origin for which surgical intervention was the only recommended option. Post Unilateral nephrectomy contralateral right normal kidney compensated the renal function that was evident through abnormal anatomical and physiological disruptions and progressive clinical status of the pet. Prompt presentation, early diagnosis and surgical intervention favored good prognosis in renal cyst.



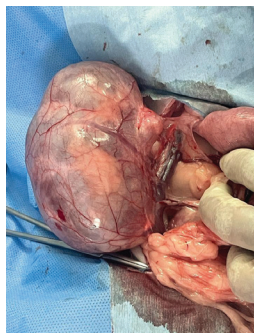
**Fig. 1: Plain radiography of abdomen lateral with globular mass**



**Fig. 2: Ventro-dorsal radiography reveals the large mass in the left side-IVP**



**Fig. 3: Contrast radiography reveals the agenesis of left kidney-IVP**



**Fig. 4: Left side - Retroperitoneal Mullerian Cyst**



**Fig. 5: Post-operative radiography**

**Conclusion**

Surgical management of retroperitoneal mullerian cyst of renal origin by unilateral nephrectomy in a cat was performed with nil recurrence during the observation and periodical reviews.

**Acknowledgement**

The authors are thankful to The Dean, Madras Veterinary College, Chennai and The Director of Clinics, TANUVAS, Chennai for the facilities provided.

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Meter	m	Centimeter	cm	Microlitre	μl
Counts per minute	cpm	Milligram	mg	Cubic centimeter	cm <sup>3</sup>
Millilitre	ml	Degree centigrade	°C	Minute(s)	min
Degree Fahrenheit	°F	Once a day	od	Decilitre	dl
Parts per million	ppm	Gram	g	Percent	%
Hour(s)	hr	Picogram	pg	Inch	in
Revolution per min	rpm	Intramuscular	im	Seconds(s)	sec
Intraperitoneal	ip	Square centimeter	cm <sup>2</sup>	Intravenous	iv
Subcutaneous	sc	Kilo calories	kcal	Thrice a day	tid
Kilogram	Kg	Year(s)	yr	Twice a day	bid
Volts	V				

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