CRITICAL CARE AND MANAGEMENT OF EHRLICHIOSIS-INDUCED PANCYTOPENIA IN DOG

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In this study, a three month old Labrador dog was presented with symptoms of a distended abdomen, excessive panting, and depression. Initial examination revealed *Ehrlichia canis* infection in blood smear and critically low hematologic indices. The dog underwent intensive care, including blood transfusion, a 21-day course of doxycycline, and supportive therapy. The interventions proved beneficial, leading to significant recovery in the pup's health.

Keywords: Anemia, Blood transfusion, Critical care, Leukemia, Pancytopenia.

Ehrlichiosis is a serious tick-borne disease affecting canines, caused by Gram-negative obligate intracellular bacteria *Ehrlichia canis* of the genus Ehrlichia, family Anaplasmataceae (Aziz *et al*., 2022) It is a vector-borne disease of dogs in tropical and sub tropical tropical and subtropical countries and transmitted by the brown dog tick, *Rhipicephalus sanguineus*, through both transstadial and intrastadial routes (Iatta *et al.,* 2021). It exhibits syndromic pathogenic effects, manifesting as broad clinical and laboratory alterations that range from mild illness to life-threatening (myelosuppressiv) conditions. Notably, a severe reduction in red blood cells and thrombocytopenia are considered the most crucial abnormalities (Aziz *et al.,* 2022; Mylonakis and Theodorou, 2017). Understanding the critical and life-threatening complications in infected dogs is of paramount importance for veterinarians and dog owners to effectively manage the emergencies. This case report emphasizes a challenging instance of Ehrlichiosis-induced pancytopenia in a dog and emphasis is on highlighting the significance of early diagnosis, comprehensive critical assessment, and effective management strategies through a multi-disciplinary approach, as well as appropriate treatment interventions.

Materials and Methods

History and Clinical assessment:

A three months old young Labrador dog was presented at TVCC, Kothari DUVASU, Mathura, with abdominal enlargement, anorexia, and excessive panting with deep breathing. On day 0, clinical examination was performed on the basis of critical assessment of manifestations as shown in Table -1.

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TABLE - 1

. S.No.	Clinical parameters	Clinical assessment of manifestations			
		Initial	Moderate	Severe	Critical
1	Rectal temperature	104	105	<105	>100
2	Mucus membrane	Pink	Pale	White	Whitish
3	Nasal bleeding	Absent	Absent	Yes/No	Present
4	Ascetics'	Absent	Absent	Present	Present

5	Breathing pattern	Normal	Normal	Deep	Hunger
6	Eye reflexes	Present	Present	Delayed	Absent
7	Dehydration	5	6	7	<7%
Prognosis		**Better**	**Good**	**Poor**	**Bad**

Diagnosis and Laboratory Assessment and Therapy:

Whole blood and serum samples were collected for hematological and serum biochemical studies on day 0 ,14 and 21 after treatment, respectively. Blood smears were prepared and stained with Giemsa to rule out hemoprotozoan infections. Whole blood was used to assess complete RBC, WBC, and platelet indices using an automated hematology analyzer, the severity of pancytopenia was assessed, as mentioned in Table 2.

S.No.	**Hematological parameters**	**Laboratory assessment of Pancytopenia**			
		Initial	**Moderate**	**Severe**	**Critical**
1	RBC ($10^{6/}$/μL)	3-4	2-3	1-2	1
2	Hb g/dl	8-10	4-5	2-3	1-2
3	Hematocrit < 25%	30-40	25-30	15-25	< 12%
4	WBC 10 10^3 /μL	8000	3000- 4000	2000-3000	< 1000
5	Platelets count lakh /μL	1 - 1.4 lakhs	1 lakh-50 thousand	< 50,000	<10,000
Prognosis		**Better**	**Good**	**Poor**	**Bad**

Serum biochemistry analysis was performed to evaluate enzymatic reactions of the liver, kidney, and heart, including ALP, ALT, Creatinine, BUN, and Cardiac Troponin-I. Microscopic fecal examination was conducted to rule out endoparasitic infestations. Physicochemical assessment of ascitic fluid via abdominocentesis suggested the suspicion of peritonitis. Additionally, imaging techniques, including radiography and sonography, were used to assess the abdominal mass etc. by Ultrasonography to detect any other complications or secondary involvement.

Strategy for critical care: The primary aim was to reduce the oxygen demand, the strategy prioritized maintaining adequate oxygen levels due to reduced RBC count. This approach safeguarded vital organs from potential damage, emphasizing the importance of managing hyperthermia and reducing abdominal pressure. Implementation of timely blood transfusion with the donor's owner consent and detailed examination of the hemato-biochemical blood parameters, including major and minor cross-matching, approximately 100 ml of fresh blood was collected from a compatible donor into a fresh heparin glass vial. After mixed properly transfusion was initiated at a rate of 2-3 ml per minute for the first 15 minutes, followed by 5 ml per minute to promptly restore deficient blood parameters and prevent systemic failure. Abdominocentesis, therapy by Tab-Doxycycline at a dose of 10 mg/kg body weight orally for 21 days., along with liver tonic along with other supportive and dietary intervention contributed to the positive response and significant recovery observed over the 21-days of period**.**

Results and Discussion

In a critical case presentation, the clinical assessment of a severely ill dog revealed life-threatening manifestations such as a soaring rectal temperature of 105.0°F, white mucus membrane(Fig-2 and 3), distended abdomen (Fig4), deep thoraco-abdominal respiration, absent eye reflexes, and nasal bleeding. Laboratory assessments further unveiled severe anemia, leucopenia, and marked thrombocytopenia, detailed in Table-1. Giemsa-stained blood smears disclosed morulae bodies of *Ehrlichia canis* within monocytes, as illustrated in Fig-1.

Serum biochemistry analysis exhibited no significant alterations in liver, kidney, and cardiac markers (Table-3) Microscopic fecal examination ruled out endoparasitic infestations, and 20 ascitic fluid assessment suggested a clear fluid, indicating no peritoneal inflammation. Advanced imaging techniques, including radiography, revealed a glass-like appearance of the abdomen while sonographic abdominal scans displayed floating organs, as depicted in Fig-5 and 6.

Parameters	**Follow up duration**		
	0 day	**14 days**	**21 days**
Rectal Temp(^{0}F)	105	102	102
Mucus membrane	Whitish	Pale	pink
Nasal bleeding	Present	Absent	Absent
Ascitic	Present	Reduced	Absent
Breathing pattern	Deep	Normal	Normal
Bleeding time	<8 mints	>8 mints	Normal /4-5 min
Black faeces	Present	Brown	Normal
Appetite	Anorexia	Inappetance	Normal
Hb (g/dl)	2.1	7 .8	16 .2
RBC (10^6)	1.3	3.45	7. 1
WBC(10^3)	1000	3000	7000
Platelets (lakh)	0.3	1 .3 lakh	4.56 lakhs
ALT (U/L)	40	42	41
AST (U/L)	30	33	35
BUN(mg/dl)	80	40	20
Creatinine(mg/dl)	1.23	1.13	1.13
Cardiac Troponin (ng/mL)	Negative	Negative	Negative

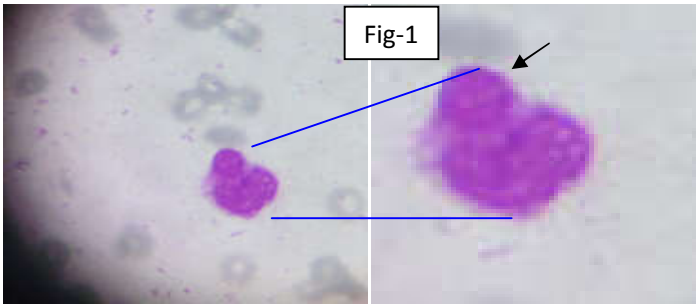

Fig 1: BLOOD SMEAR SHOW MORULA BODY OF *E. CANIS* IN MONOCYTE

Fig-2-3: WHITISH MUCUS MEMBRANE OF EYE AND MOUTH AND FIG-4 DISTENDED ABDOMEN OF DOG

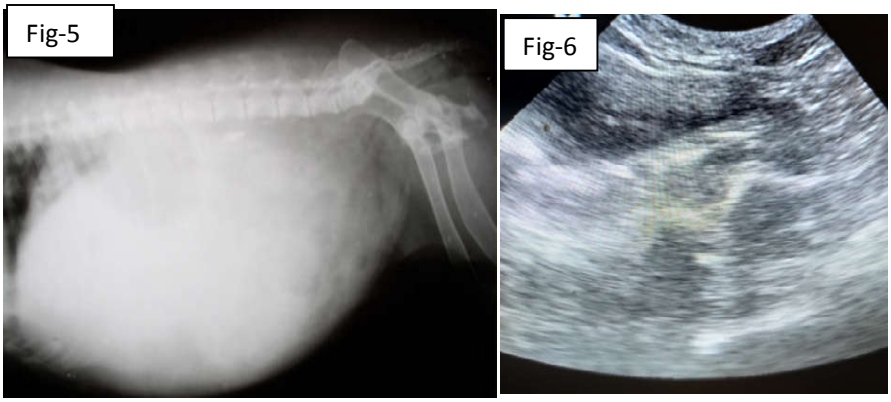

Fig. 4-5: LATERAL VIEW OF ABDOMINAL RADIOGRAPHY AND SONOGARPHY

Clinical signs reported by various authors range from nonspecific to life-threatening manifestations as also reported by Mittal *et al.,* 2017. The clinical manifestations and laboratory findings of the present case confirmed that the dog is in a critical condition, as outlined in Table-3. After, *Ehrlichia canis* infection and the identification of critical clinical indicators, including reduced RBC count and hemoglobin levels leading to systemic oxygen deficiency, the pancytopenic and hyperthermic condition prompted immediate emergency intervention to safeguard the dog's life. The dog was placed in a ventilated and calm environment with minimal manipulation and stress, aiming to provide adequate oxygen and reduce further oxygen demand. Subsequently, prompt restoration of deficient blood parameters and prevention of systemic failure were achieved through blood transfusion, as also recommended by Kasondra *et al.,* 2017, and Sainz, Á 2015. To control hyperthermia, which reached 105°F, a cooling method involving cold water-soaked cotton on the head was employed until the temperature lowered to 103.5°F. Subsequently, to alleviate diaphragmatic pressure, abdominocentesis was performed to slow drain the ascitic fluid. Another essential intervention involved for reducing abdominal pressure through abdominocentesis to allow unrestricted movement of the diaphragm. Antibiotic therapy prevent septic shock along with additional supportive therapies included Syp-Sarcoferal Pet (1 teaspoonful twice daily for 15 days), Syp-Platopet (1 teaspoonful twice daily for 15 days), and Tab-Pantaprazole @20 mg orally on an empty stomach in the every morning for 5 days along with administration of repulse enterogemina @ 2 ml bid. Dietary intervention commenced on the third day of therapy. The dog's diet consisted of curd, followed by the introduction of one boiled white egg and 2-3 slices of Paneer twice daily, along with bread and chicken soup. Case was following on 14 days and 21 days after the therapy. The dog showed positive responses to therapy, with restored reflexes and movement within an hour. Complete recovery occurred over the next 21 days without complications in clinical and laboratory parameters.

Conclusion

In conclusion, timely diagnosis and comprehensive management are crucial for addressing Ehrlichiosis-induced pancytopenia in dogs, emphasizing the significance of proactive veterinary care. Early intervention enhances the likelihood of positive outcomes in such challenging cases.

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