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Effect of enrofloxacin on hematological and biochemical parameters in dogs

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Abstract

A total of ten dogs (n=10) with body weight varying from 15-20 kg approximately, diagnosed with respiratory and gastrointestinal tract infection presented to clinics have been selected for the present study. The dogs were administered with Enrofloxacin antibiotic, at the dose rate of 2.5 mg /kg body weight, intramuscular, once a day for five days. Blood samples were collected before and after the treatment at the interval of 1st, 3rd and 5th day for the estimation of various biochemical and hematological markers. Results of the study revealed that, enrofloxacin did not cause change in above mentioned parameters significantly.

Keywords: Enrofloxacin, hematology, biochemical profiles, dogs

1. Introduction

Fluoroquinolones are the quinolones with fluorine atom attached to the central ring system, typically at the C-6 position or C-7 position. These are bactericidal drugs that inhibit the bacterial enzymes DNA gyrase and topoisomerase IV and possess a broad spectrum of antibacterial activity against a range of bacteria, including the ones resistant to other antimicrobial drugs [1]. Mammalian DNA gyrase is of a completely different shape and remains unharmed.

Despite the basic similarity in the core structure of these molecules, their physiochemical properties, pharmacokinetic characteristics, and antimicrobial activities vary markedly across compounds [2]. Enrofloxacin, a 6- fluoro-7-piperazinyl-4-quinolone approved for veterinary use, has been evaluated as a method to eliminate *Salmonella* infections in cattle and poultry and manage several bacterial diseases in lagomorphs, from *Pasteurella multocida* to *Mycoplasma* spp [3]. Oral dosing with enrofloxacin does not appear to develop antibiotic dysbiosis, which is common with penicillins and cephalosporins [3].

A multicentric clinical study, gathering 10 dogs of different breeds, ages and both genders was carried out. All dogs were affected with respiratory tract infections *i.e.*, either one or both these diseases: acute tracheobronchitis and pneumonia. Tolerance, defined as the absence of clinical adverse reactions and hematological changes, and clinical efficacy, assessed as the absence of clinical signs, were recorded. Enrofloxacin has become a popular choice among clinicians, because its outstanding activity *in vitro* and because it has been shown to possess potentially good clinical efficacy for the treatment of respiratory infections in dogs [4]. Enrofloxacin is an antibiotic used to treat difficult bacterial infections in pets. It is effective against both Gram-negative and Gram-positive bacterias. Enrofloxacin (Baytril; Mobay Corporation, Animal Health Division, Shawnee, Kans.), an analog of ciprofloxacin, was selected for study because it is being used with increasing frequency by veterinarians for treating dogs with respiratory disorders.

2. Materials and Methods

2.1 Experimental design

A total of ten dogs (n=10) with body weight varying from 15-20 kg approximately, diagnosed with respiratory infection presented to APMC clinics of Veterinary college Bidar had subjected for the present study.

Dose of enrofloxacin: Enrofloxacin (QuinIntas®, 100 ml vial, 100mg/ml) 2.5 mg/kg intramuscularly at 24-h intervals; Monitoring. Physical examinations, including rectal temperature measurements were carried out.

The study was conducted in 10 cases of dogs. Blood samples (5 ml) were collected by cephalic vein puncture just before drug administration (normal/control), 30 minutes after drug administration and on 3rd and 5th day. Little quantity of collected blood samples were transferred to vials containing heparin as anticoagulant in order to estimate RBC, WBC, haemoglobin, PCV, PLT, HCT, MCH and MCV. Remaining blood samples were kept in clean dry wide mouthed tubes in slanting position at room temperature to separate serum for estimation of Serum glutamic oxaloacetic transaminase (SGOT), Serum glutamic pyruvic transaminase (SGPT), blood urea nitrogen and creatinine parameters.

2.2 Estimation of biochemical and hematological properties:

Standard procedures were followed for quantitative determination of biochemical and hematological properties. Haematological parameters like RBC count, WBC count, PLT, Hb, MCV, MCH and HCT were estimated. Biochemical analyses of samples were performed to measure Serum glutamic oxaloacetic transaminase (SGOT), Serum glutamic pyruvic transaminase (SGPT), blood urea nitrogen and creatinine.

Dogs were also monitored for the evidence of any systemic adverse drug reactions and local tissue reactions. Statistical analysis was carried out by Bonferroni *t* test.

3. Results and Discussion

Total 10 dogs were used in this trial. Age ranged from 4 to 7 years old. Results of hematological parameters were mentioned in the table 1 and biochemical parameters mentioned in the table 2. There was no significant ($p>0.05$) changes in hematological and biochemical parameters.

Due to the unfavorable cost: benefit ratio derived from developing new antibacterials for veterinary medicine, research on this field tends to focus on agents for human medicine. Hence, no new antibacterials agents have been introduced for small animal clinic in a long time. In contrast, cefotaxime has a lower apparent volume of distribution at steady state (0.48 L kg^{-1})^[5] and yet its clinical efficacy was somewhat comparable to that of enrofloxacin. Other variables most be taken into account, such as the biocide activity of these antimicrobial agents in the milieu generated by bacterial respiratory infections. It has been shown that biological fluids can affect the antibacterial action of many agents^[6]. An important feature of this agent is that no signs of arthralgia, as part of the clinical signs of cartilage erosion, were observed, a feature closely related to fluoroquinolones^[7, 8]. Enrofloxacin also possesses high apparent volume of distribution in dogs^[9]. An important feature of this agent is that no signs of arthralgia, as part of the clinical signs of cartilage erosion, were observed, a feature closely related to fluoroquinolones^[7, 8].

Table 1: Row statistics for hematology parameters

Days	SGPT(U/L)	SGOT (U/L)	BUN(mg/dl)	Creatinine(mg/dl)
1	42.77±1.10	10.09±0.49	31.9±0.87	0.30±0.018
3	42.54±0.98	10.12±0.63	32.1±0.40	0.301±0.012
5	42.70±1.05	11.18±0.46	32.8±0.69	0.306±0.012

Values are mean ± SE, *** $P<0.001$, ** $P<0.01$, n = 10

Table 2: Row statistics for biochemical parameters

Days	RBC (x10 ⁶)	WBC (x1000)	PLT (x1000)	Hb (g/dl)	MCV (fl)	HCT (%)	MCH (pg)
1	7.54±0.27	13.29±0.62	219.40±3.62	16.17±0.64	62.87±1.00	50.83±1.32	19.38±0.78
3	7.53±0.25	14.98±0.89	226.70±3.83	16.30±0.58	63.76±1.12	51.47±0.95	19.89±0.61
5	7.71±0.22	14.33±0.85	226.60±3.37	16.81±0.47	65.23±0.94	52.54±0.99	20.00±0.70

Values are mean ± SE, *** $P<0.001$, ** $P<0.01$, n = 10

4. Conclusion

In summary, results obtained could be taken to indicate that Enrofloxacin drug is potentially useful in dogs for the treatment of respiratory infections

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