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THERAPEUTIC EFFECTS OF ENROFLOXACIN ON PNEUMONIC AND DIARRHOEIC CALVES

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Pnömonili ve ishalli buzağılarda Enrofloxacin'in terapotik etkisi

Özet : *Enrofloxacin'in terapotik etkisi, Selçuk Üniversitesi Veteriner Fakültesi İç hastalıkları kliniğine getiren 60 pnömonili ve ishalli buzağıda denendi. Mikrobiyolojik muayeneler için pnömonili buzağılardan burun sıvabı ve trakeal yıkama örnekleri, ishalli buzağılardan ise rektal sıvap örneklerinden yararlandıldı. Örneklerin alınmasından sonra, Baytril ilk gün subkutan yolla (2.5 mg/kg canlı ağırlık, %10 sol.), takibeden 3 gün oral (2.5 mg/kg canlı ağırlık, % 10 sol.) yolla uygulandı. Pnömonili buzağılardan en çok izole edilen mikroorganizmalar, Pasteurella haemolytica (%70) ve mycoplasma ssp (%30) iken, ishalli buzağılarda en fazla izole edilen mikroorganizma E. coli (% 86.6) idi. 30 trakeal yıkama örneğinin 10'undan hiç bir mikroorganizma izole edilemedi. Pnömonili 3 buzağı ve ishalli 6 buzağının dışındaki tüm hayvanlar tedavi edildi. Sonuç olarak Baytril pnömonili ve ishalli buzağıların tedavisinde çok etkili bulundu.*

Summary : *The therapeutic efficacy of Enrofloxacin (Baytril;Bayer) against respiratory disease and diarrhoea in 60 neonatal calves was investigated in fieldtrial. Nasal and tracheal flushing samples from calves with pneumonia and rectal samples from calves with diarrhoea were taken for microbiologica examination. Microbiologic isolation from tracheal flushing samples could not be succed in 10 out of 30 pneumonic calves. After sampling, treatment of calves with baytril, initial subcutaneus application (2.5 mg/kg b.w., 10% sol.) followed by oral treatment (2.5 mg/kg b.w. 10% sol.) for three successive days was performed. P. haemolytica (70%) and mycoplasma ssp (30%) in calves with pneumonia and E.coli (86.6%) in calves with diarrhoea were the most common isolated bacteria. Except for 3 calves with pneumonia and 6 calves with diarrhoea, all calves cured by the treatment. In conclusion, Baytril was found to be highly effective in the treatment of pneumonic and diarrhoeic calves.*

Introduction

Enrofloxacin (Baytril; Bayer) is a new synthetic chemotherapeutic agent with broad spectrum bactericidal properties for oral and parenteral administration from the gruop of quinoline carboxylic acid derivative. Its spectrum of activity encompasses mainly the gram negative becteria and mycoplasmas althought it also exhibits an effect against gram positive bacteria. Infectious pneumonia and diarrhoea are the most common diseases entity in neonatal calves. Because multiple pathonges are commonly identified in natural breaks of both diseases, the value of antibacterial therapy is being increasing challanged.

In order to evaluate the effectiveness of Baytril in the treatment of infectious pneumonia and diarrhoea of calves admitted to the clinics of internal medicine, Faculty of Veterinary Medicine, University of Selçuk, this study was conducted.

Materials and Methods

Patients Materials

Thirty calves with pneumonia, 12 female and 18 male, aged 5 to 31 days, mostly Holstein fresian mix breed, and 30 calves with diarrhoea, 14 female and 16 male, aged 3 to 25 days mostly Holstein Fresian mix breed.

Clinical Picture

Calves with pneumonia; elevated respiratory frequency, increased bronchil tones, nasal dicharge, coughing, normal or eleated body tempareture (41.5 °C).

Calves with diarrhoea; mild or severe watery and partly blood stained feces, mild or severe dehydration, sunken ayes, dry mucouse membranes, normal or elevated body temperature (41.5 79°C).

Sampling

The nasal (**N**) samples with steril cotton swabs and tracheal (**T**) flushing samples from calves with pneumonia. Rectal (**R**) samples with steril cotton swabs from calves with diarrhoea.

Microbiological Examination

Cultures of N,T and R samples were made on 5% sheep blood agar (Difco), MacConkey agar (Oxoid), tripticase soy agar (Difco,), Saborraund dextrose agar (Difco) and PPLO agar (Oxqaid) enriched with horse sera and freshly prepared steril dough yeast. Final identification was carried out according to the methods described in Manual of Veterinary Investigation laboratory techniques of MAFF (7) and by Koneman et al. (5), and Lassen (6). Antibiotic susceptibility of isolates was conducted according to the method of Kirby-Bauer (2).

Antibiotic susceptibility test was performed with the bacteria isolated from T samples in case isolation was succeded, other wise, antibiogram test was performed with the bacteria isolated from N sample.

Therapy

Initial subcutaneus aplication of Baytril (2.5 mg/kg b.w., 10% sol.) followed by oral treatment (2.5 mg/kg b.w., 10% sol.) for three succesive days.

Additional Therapy

All calves with diarrhoea recieved adequate oral and/or parenteral fluid and electrolyte therapy.

Findings and Criteria for Assesment

All calves were given a through clinical examination daily, and the findings (general condition, fluid intake, fecal consistency, degree of exsiccosis, body temperature) were continuously recorded.

Calves presenting the following findings were considered cured: calves with pneumonia;temperature within normal range, normal respiratory frequancy, satisfactory appetite, unparied general health, no increased bronchial tones, slight seroz nasal discharge, rare soft coughing.

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Calves with diarrhoea;temperature within normal range, satisfactory appetite, unpaired general health, physiological faecal consistency, adequate fluid intake.

Results

Microbiologic isolation from T samples could not be succed in 10 out of 30 calves with pneumonia. Five of which had had various antibiotic injection before sampling. No microorganisms could be isolated from T and N samples in a calf. *Pasteurela haemolytica* (70%) and *Mycoplasma ssp* (30%) were the most common isolated microorganisms from T samples. Mycoplasma ssp. was isolated in 6 cases of pneumonia together with *P. haemolytica*. In these cases, antibiotic sensitivity test was performed ağainst P. haemolytica strains. Isolated microorganisms from T samples and tehir antibiotic sentivity charactres are shown in table 1. Microorganisms isolated from N samples and tehir antibiotic sensitivity characters in case microbiological isolation could not be succed from T samples are shown in table 2. The microorganisms isolated from two calves with pneumonia were resistant to Baytril.

At the end of the treatment, 3 (10%) pneumonic calves could not be treated succesfilly, while the rest of the calves (90%) with pneumonia showed obvious recovery. The calf from which no microorganism could be isolated from both T and N samples was one of the untreated calves. Microorganisms isolated from the other two untreated calves were resistanst to Baytril.

In all the diarrhoeic calves, microbiologic isolation could be secced, in spite of 5 of which had had various antibiotic injection before sampling. *Escherichia coli* (86.6%) was the most common bacteria. Isolated microorganisms from R samples and their antibiotic sensitivity characters are shown in table 3. Microorganisms isolated from R samples of 3 calves treated unsuccesfilly were resistant to baytril, Three calves died during the treatment. Of the calves with diarrhoea treated with baytril, 24 (80%) out of 30 calves were cured succesfully. Calves died during the treatment had severe acid-base and electrolyte abnormalities. Congestions and haemorrhagies in the entire digestive tract including mesenteric lymph nodes were diagnosed at their autopsy.

Table 1. Isolated microorganisms from tracheal flushing (T) samples and their antibiotic characters.

		Antibiotic sentivity (*)								
Microorganisms	n	Enr	Aml	E	Chl	Cf	Ct	T	Ts	Ne
P. haemolytica	14	14	4	4	2	1	2	6	0	1	3
C. pyogenes	3	3	3	3	2	1	2	1	0	0	0
Staph. aureus	1	0	0	0	0	0	0	0	0	1	0
Shigella ssp.	1	1	1	1	0	0	0	0	1	0	1
K. pneumonia	1	1	1	1	1	0	0	0	0	0	0
Gen. results (**)	95	45	45	25	10	20	35	5	10	20	

(*) : Enr : Enrofloxacin (5mcg) Amp : Ampicillin (10 mcg)
Aml : Amoxycillin (20 mcg) E : Erythromycin (15 mcg)
Chl : Chloramphenicol (30 mcg) Cf : Cefoperazone (30 mcg)
Ct : Chlortetracycline (30 mcg) T : Oxytetracycline (30 mcg)
Ts : trimethoprime + sulphamethoxazole (1.25 + 23.75 mcg)
Ne : neomycine (30 mcg)

(**) : The percentage of sensitivity of all microorganisms

Table 2. Isolated microorganisms from nasal (N) samples and their antibiotic sensitivity characters in case microbiologic isolation could not be succed from treacheal (T) samples.

		Antibiotic sensitivity (*)								
Microorganisms	n	Enr	Amp	Aml	E	Chl	Cf	Ct	T	Ts	Ne
P. haemolytica	3	3	3	3	2	0	1	2	1	2	2
Staph. aureus	3	3	2	3	2	0	0	1	0	0	2
Corynabacterium ssp.	1	1	0	1	0	0	1	0	0	0	1
Salmonella ssp.	1	0	0	0	0	0	0	0	0	1	0
K. pneumonia	1	1	0	0	0	0	0	0	0	0	0
Gen. results (**)	89	56	77	44	0	22	33	11	33	55	

(*) : Enr : Enrofloxacin (5mcg) Amp : Ampicillin (10 mcg)
Aml : Amoxycllin (20 mcg) E : Erythromycin (15 mcg)
Chl : Chloramphenicol (30 mcg) Cf : Cefoperazone (30 mcg)
Ct : Chlortetracycline (30 mcg) T : Oxytetracycline (30 mcg)
Ts : Trimethoprime + sulphamethoxazole (1.25 + 23.75 mcg)
Ne : neomycine (30 mcg)

(**) : The percentage of sensitivity of all microorganisms

Table 3. Isolated microorganisms from rectal (R) samples and their antibiotic characters

		Antibiotic sensitivity (*)									
Microorganisms	n	Enr	Amp	Aml	E	Chl	Cf	Ct	T	Ts	Ne
E. coli	26	24	5	6	1	0	7	0	0	3	2
K. pneumonia	2	1	1	3	1	1	1	1	0	0	0
Salmonella ssp.	1	0	0	0	0	0	0	0	0	0	0
E. aeorogenosa	1	1	0	0	0	0	0	0	0	0	0
Gen. results (**)	90	20	27	7	3	27	3	0	10	7	

(*) : Enr : Enrofloxacin (5 mcg) Amp : Ampicillin (10 mcg)
Aml: Amoxycillin (20 mcg) E 0 Erythromycin (15 mcg)
Chl : Chlorampencol (30 mcg) Cf : Cefoperazone (30 mcg)
Ct : Chlortetracycline (30 mcg) T : Oxytetracycline (30 mcg)
Ts : Trimethoprime + sulphamethoxazole (1.25 + 23.75 mcg)
Ne : Neomycine (30 mcg)

(**) : The percentage of sensitivity of all microorganisms

Discussion

Absorbtion after parenteral and oral application with high bioavailability in body fluid and organs of Baytril has been reported (1,10). This allows the user to select the appropriate method of administration. An initial subcutaneus application of Baytril followed by subsequent oral treatment was found to be convinient route of administration in this study because of its application facilities. Bauditz (1) and Yariadi and Subronto (12) have also stated thad by this route of administration of baytril could be achieved better results in calves with pneumonia and diarrhoea.

Scheer and Bauditz (10) reported that the subcutaneus aplication of baytril did not produce lower activity levels in the blood of calves and irritations in the region of the subcutis at the injection site occured sporadically only without effecting the muscles underneath. In the present study, any adverse effect after subcutaneus and oral administration of Baytril was not observed and Baytril was well tolerated by the calves.

Bauditz (1) reported that baytril were highly effective in the treatment of calves experimentally induced pneumonia with *P.haemolytica* and *Mycoplasma bovis*, when administered 3 to 5 times by the oral and parenteral route at dose rate 2.5 mg/kg b.w. However Törnquist and Franklin (11) have found to be effective in the respiratory diseases of young calves received in their milk substitute a daily dosage of 2.5 mg/kg b.w. during 8 days. In this study, a four-day treatment achived good results in calves with pneumonia. Clinical symptoms of calves with pneumonia disappeared 24-48 h after onset of tretament in uncomplicated cases. However, increased bronchial tones and coughing in some cases were stili present 48-72 h after onset of the treatment.

It has been reported that in fieldtrial the recommended dose of 2.5 mg/kg b.w. administrated on 2 to 3 successive days produced a succesfull results in the treatment of diarrhoea (8,9). In the present study, in calves with diarrhoea without fever and no more than slight *deterioration* in general health, Baytril complely prevented deterioration of general health at 12-48 h after onset of treatment ad prevented the development of irtercurrent infections. In the rest of the calves, treatment with baytril dose of 2.5, mg/kg b.w. administered on 4 succesive days pruduced succesfull result. Three calves with diarrhoea died during the treatment and isolated microorganisms from rectal swab were sensitive to Baytril. This result may be explaned by the severe acid-base and electrolyte disturbance. Because the crucial factor for succesfull treatment of neonatal calf diarrhoea is early and systematic oral and/or parenteral fluid and electrolyte replacement. *Salmonella* ssp. was isolated from one of the death calves. Another explanation for this calf may be the low dose of Baytril. Because Bauditz (1) reported that the dose of Baytril could be increased to 5 mg/kg b.w. in the cases of salmonellosis. Espinasse at al. (3) have succested that a daily oral dose of 5 mg/kg Baytril b.w. for 6 days protected calves experimentally infected a highly pathogenic strain of *S. typhyimurium*. Isolated microorganism from calves with diarrhoea was mostly *E.coli* in this study. And Baytril at the dose rate 2.5 mg/kg b.w. durgn 4 days was found to be highly effective in the treatment of these cases. This result is agreement with Rademacher and Dirksen (9).

Identification of the microorganisms causing the respiratory and gastrointestinal syndrome and detection of the sensitive antibiotics are the first main objective of the treatment. However, this is time consuming procedure and sampling is quite difficult in fieldtrial. For that reason, initial treatment is started with broad spectrum antibiotics. The result of this study showed that Baytril may be first chemotherapeutic agent of choice because of its very broad antibacterial activity spectrum against gram negative and gram positive bacteria as well as mycoplasmas and application facilities.

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