DIAGNOSTIC AND COMPLEX THERAPY OF CATS, SICK WITH PYELONEPHRITIS

Kushnir V.Yu., Anvari I.B.

Odesa state agrarian university, faculty of veterinarian medicine, Odesa, Ukraine

Abstract

Nephritis are common nowadays. The main causes of nephritis are toxins in food and water, use of some medication without control. Also, there are a lot of kinds of salt that may cause nephritis. Today there are a lot of methods of diagnostic and treatment of cats, sick with nephritis. However, these methods are not always effective. That is why the purpose of our work was to create the algorithm of diagnostic and complex treatment of cats, sick with nephritis.

Materials for the study were 30 cats, sick with pyelonephritis. Each cat was under exploration for 40 days. In this period every day, we made clinical exploration. Also on the first, twentieth, and fortieth day, we spent laboratory examinations of blood and ultrasound test. Cats were divided into three groups. In the first group, we used amoxiclav 12,5 mg/kg, stop-cystitis 2-3 ml orally twice a day for 30 days, liquid of Ringer 40 ml/kg intravenously once a day for 30 days. In the second group instead of stop-cystitis, we used canephron 1/2 - 1/3 of tab once a day. In the third group, we used canephron 1/2 of tab once a day and fytokit 3 ml orally twice a day.

The results of treatment showed, that complex therapy, which was used for the animals of the third group is the most effective.

Keywords: Pyelonephritis, cats complex therapy, canephron, fytokit

Introduction

The organs of the urinary system, which includes the kidneys and urinary tract, play a critical role in the body's ability to maintain homeostasis - the dynamic constancy of the internal environment. They regulate water-salt, acid-base, and mineral metabolism, excrete metabolic end-products and foreign substances products and synthesize biologically active substances [1].

Diseases of the urinary system are common in dogs and cats. The emergence of non-infectious kidney diseases is associated with the influence of genetic factors, the conditions of keeping animals, the completeness and balance of diets. In recent years, the leading role in the pathogenesis of diseases of the urinary system has been attributed to immunopathological reactions [2,3]. In case of ineffective treatment, these diseases take on a chronic course in which clinical signs are absent or mild, and therefore often go unnoticed by animal owners. Pathological processes lead to irreversible accruing changes in organ tissues, the development of renal failure, and the death of animals [3-5].

Today there are a lot of methods of diagnostic and treatment of cats, sick with nephritis. However, these methods are not always effective. That is why the purpose of our work was to create the algorithm of diagnostic and complex treatment of cats, sick with pyelonephritis.

Materials and methods

Materials for the study were 30 cats, sick with pyelonephritis. Each cat was under exploration for 40 days. In this period every day, we made clinical exploration. Also on the first, twentieth, and fortieth day, we spent laboratory examinations of blood and ultrasound test. Ultrasound tests were determined with the equipment of brand “Mindray” and microconvex chip. Explorations of morphological blood figures end content of hemoglobin were spent with using the analyzer “Mindray evolusion 3000”. Biochemical figures were determined with using the automagical analyzer “Cormay accent 300”, which works on base of photometry. The photometric analysis method can be used for a large range. Determined concentrations. It

is used both for determining the main components of various complex substances, and for determining the trace impurities in the objects. Combination with some methods of separation and enrichment - chromatographic, extraction - allows increasing the sensitivity of photometric methods by several orders of magnitude. The photometric properties of the solute are characterized by the transmittance T (τ), the reflection coefficient R (ρ), and the absorption coefficient A (α), which for the same substance are related by the relation T + R + A = 1. The determination of the dimensionless quantities T, R and A is performed using photometers (instruments for measuring a photometric value) by recording the reactions. Receiver of optical radiation on the corresponding radiation fluxes. In routine laboratory practice, it is customary to designate devices that detect the absorption of light by matter, photometers, and reflection by reflective photometers.

Sick cats were divided into three groups, 10 cats each. In the first group we used amoxiclav 12,5 mg/kg, stop-cystitis 2-3 ml orally twice a day for 30 days, liquid of Ringer 40 ml/kg intravenously once a day for 30 days.

In the second group we used amoxiclav 12,5 mg/kg, canephron ½-1/3 of tab once a day, liquid of Ringer 40 ml/kg intravenously once a day for 30 days.

In the third group we used amoxiclav 12,5 mg/kg, canephron ½-1/3 of tab once a day, fytokit 3 ml orally twice a day, liquid of Ringer 40 ml/kg intravenously once a day for 30 days.

Canephron.

Active substances:

1 tablet contains dried herbs in powder form:

yarrow (Herba Centaurii) 18 mg,

lovage root (Radix Levistici) 18 mg,

rosemary leaves (Folia Rosmarini) 18 mg.

Excipients: corn starch, colloidal anhydrous silica, lactose monohydrate, povidone, magnesium stearate, iron oxide red (E 172), riboflavin (E 101), calcium carbonate, dextrin, glucose syrup, wax, shellac, talc, titanium dioxide (E 171).

Dosage form - tablets.

Main physical and chemical properties: round biconvex tablets, coated with an orange color with a smooth surface.

Pharmacodynamics. The components of the herbal medicine show a complex activity, which is manifested in anti-inflammatory, antioxidant, antispasmodic and analgesic effects. Canephron also has antibacterial and diuretic effects, which are due to the substances contained in the plant components of the medication.

Fytokit.

1 ml of the medication contains 0.5 ml of aqueous extract (1:10) from a mixture of medicinal plant raw materials:

bird's-foot trefoil herb (knotweed) 12.5 mg

horsetail grass 7.5 mg

leaves of bearberry (bearberry) 5.0 mg

grass erva grass (pol-pala) 25.0 mg

Excipients: propylene glycol, methylparaben, propylparaben, purified water.

Pharmacological properties

The mechanism of action of the drug Phytokit is due to the activity of biologically active substances of medicinal plants in the drug. Phytocit has diuretic (diuretic), saluretic (saline) and anti-inflammatory action; dissolves stones (except oxalates).

Bird's-foot trefoil (Polygonum aviculare L., knotweed) - contains a complex of flavonoids; tannins; vitamins; silicic acid compounds, has diuretic properties; promotes the excretion of stones in urolithiasis; acts anti-inflammatory; improves the condition of the capillary walls.

Horsetail (Equisetum arvense L.) - contains water-soluble forms of silicic acid (up to 25%) and its complexes with organic compounds; flavonoids; triterpene saponins; has a diuretic; hemostatic; pronounced anti-inflammatory effect.

Common bearberry (Arctostaphylos uva-ursi L.) - contains glycosides, methylarbutin, arbutin, hydroquinone, halothanins; ursolic, gallic and ellagic acids, has a diuretic, antiseptic, anti-inflammatory, saluretic effect. Increases diuresis, has antibacterial properties in the alkaline reaction of urine.

Erva woolly (Aerva lanata L., pol-pala) - contains flavonoids, polysaccharides, mucus, organic acids, tannins, coumarins, saponins; has a diuretic and saluretic effect, accompanied by an increase in the release of sodium and potassium ions, a decrease in urea in blood plasma.

Results and discussion

During the clinical exploration we noticed such figures as pain in the land of kidneys, weakness, dysuria, pain during the diuresis. During the ultrasound explorations we saw increase in size of kidneys, swelling, uneven contours. During the treatment we saw the normalization of clinical conditions of animal. The most significant it was in the third group: in this group we noticed the shortest duration of treatment, the biggest percent of recovered animals and absence of mortality (table 1).

Table 1. Result of complex therapy

Group of animals	Duration of treatment (days)	Results		
		Total recovery	Came to chronic condition	dead
I (n=10)	30-37	5 (50%)	3 (30%)	2 (20%)
II (n=10)	27-33	7 (70%)	2 (20%)	1 (10%)
III (n=10)	25-31	8 (80%)	2 (20%)	-

During the explorations of morphological figures of blood and content of hemoglobin we noticed the increase of total number of leucocytes and the figure of erythrocyte sedimentation race. Also, we noticed the decline of the number of erythrocytes and content of hemoglobin. During the treatment we noticed the normalization of these indicators. The most significant normalization was in the group, where we used canephron and fytokit (table 2).

Table 2. Dynamic of morphological indicators and content of hemoglobin (M±m)

Indicator	1-st day			20-th day			40-th day		
	I group (n=10)	II group (n=10)	III group (n=10)	I group (n=10)	II group (n=10)	III group (n=10)	I group (n=10)	II group (n=10)	III group (n=10)
Number of leucocytes (G/l)	28 ±0,67*	23 ±0,54	21 ±0,77	17 ±0,22	14 ±0,33	12 ±0,25	12 ±0,34***	10 ±0,22***	8 ±0,31***
Number of Erythrocytes (T/l)	3,8 ±0,33◊	4,4 ±0,44*	6,2 ±0,52*	3,6 ±0,32**	5,5 ±0,21**	6,7 ±0,31*	3,7 ±0,27***	5,9 ±0,39***	6,9 ±0,42***
ESR (mm/h)	6 ±1,11	4 ±1,13	3 ±1,15	7 ±1,11	3 ±2,12	2 ±1,71	7 ±1,55	2 ±1,22	2 ±1,36
Content of hemoglobin (g/l)	56 ±3,77◊	78 ±2,63**	99 ±3,19	55 ±2,72◊	87 ±2,14	111 ±3,19◊	58 ±2,71**	96 ±2,44**	132 ±2,55**

Note ◊p<0,1; *p<0,05; **p<0,01 ***p<0,001, compared with clinically healthy animals.

During the exploration of biochemical indicators we noticed the race of creatinine, urea and a slight increase in activity of alpha-amylase ALT, AST and GGT. These changes in the biochemical figures mean, that violation of water metabolism led to a complete imbalance of metabolism and the accumulation of toxins in the organism. During the treatment we noticed tendention to normalization the biochemical figures. The most significant changes were detected in the third group (table 3).

Table 3. Dynamic of biochemical indicators and content of hemoglobin (M±m)

Indicator	1-st day			20-th day			40-th day		
	I group (n=10)	II group (n=10)	III group (n=10)	I group (n=10)	II group (n=10)	III group (n=10)	I group (n=10)	II group (n=10)	III group (n=10)
Content of glucose (mmol/l)	5,2 ±0,25	5,3 ±0,33	5,4 ±0,26	4,8 ±0,11	4,9 ±0,22	4,6 ±0,21	5,0 ±0,33	5,1 ±0,21	5,4 ±012
content of creatininum (mcmol/l)	360 ±23,7*	375 ±19,7**	353 ±17,6**	212 ±11,6	198 ±18,3	177 ±17,5***	167 ±23,3	152 ±12,6	146 ±11,4***
content of Urea (mcmol/l)	32,0 ± 2,04*	22,7 ±1,66**	12,3 ±2,38	34 ±1,66	18,6 ±1,53	10,9 ±2,17***	34 ±1,67	15,4 ±3,33	7,6 ±2,44***
Activity of Alcaline phosphatase (nkat/l)	650 ±23,13	665 ±31,12	681 ±26,22	663 ±23,46	652 ±25,13	700 ±33,42	675 ±32,15	642 ±22,12	622 ±21,11
Activity of alpha-amylase (nkat/l)	20133,33 ±76,12	20189,12 ±82,11	20165,01 ±73,12	18700,04 ±66,11	18612,07 ±44,11	18232,11 ±45,11	7212,22 ±33,22◊	7122,12 ±44,37◊	7787,32 ±33,21◊
Content of total protein (g/l)	61,6 ±3,12	62,8 ±2,22	63,6 ±1,66	64,2 ±3,12	65,5 ±2,17	63,4 ±1,44	62,5 ±2,22	64,4 ±1,66	66,2 ±1,54
content of Albuminum (g/l)	27,3 ±0,65	26,4 ±0,32	25,4 ±0,44	26,6 ±0,32	27,3 ±0,27	29,1 ±0,26	28,7 ±0,32	27,7 ±0,34	29,3 ±0,35
content of Globulinum (g/l)	34,3 ±1,88	36,4 ±2,32	38,2 ±2,65	37,6 ±3,12	38,2 ±1,12	34,3 ±2,99	33,8 ±1,71	36,7 +2,21	36,9 +1,21
a/g coefficient (units)	0,80 ±0,06	0,73 ±0,05	0,66 ±0,04	0,71 ±0,03	0,71 ±0,07	0,85 ±0,08	0,85 ±0,06	0,75 ±0,04	0,79 ±0,07
Content of total billirubinum (mcmol/l)	3,7 ±0,62	3,4 ±0,33	3,5 ±0,23	3,1 ±0,25	2,6 ±0,23	2,3 ±0,21	2,8 ±0,22	2,2 ±0,33	1,9 ±0,31
Activity of AST (nkat/l)	702,2 ±123,1◊	700,3 ±85,4	707,2 ±22,2	677,7 ±34,6	673,3 ±28,4	654,2 ±26,6	661,1 ±27,32**	455,5 ±25,12**	321,12 ±21,32**
Activity of ALT (nkat/l)	883,33 ±23,45	884,12 ±21,12◊	883,55 ±32,11◊	755,12 ±22,12	695,11 ±33,21	511,22 ±23,11◊	542,11 ±21,12**	245,12 ±28,12**	167,23 ±29,33**
Activity of GGT (nkat/l)	201,33 ±21,11◊	204,12 ±22,12◊	203,21 ±21,12◊	116,12 ±26,11**	110,22 ±23,11**	86,33 ±25,14	83,32 +23,71***	76,34 ±21,11***	66,67 ±32,11***

Note ◊p<0,1; *p<0,05; **p<0,01 ***p<0,001, compared with clinically healthy animals.

Conclusions

The results of our research explorations showed, that complex therapy, used for animals of third group, is the most effective. That is why in future for treatment of cats, sick with pyelonephritis we recommend to use complex therapy, which contains amoxiclav 12,5 mg/kg, canephron ½-1/3 of tab once a day, fytokit 3 ml orally twice a day, liquid of Ringer 40 ml/kg intravenously once a day for 30 days.

Reference

1. Kelly D.F., Lucke V.M., McCullagh K.G. (1979) Experimental pyelonephritis in the cat: Gross and histological changes. Journal of Comparative Pathology. Volume 89, Issue 1. P. 125–139.
2. Parry, N. M. (2005). Pyelonephritis in small animals. UK Vet, 10(6), 1-5.
3. Coldrick, O., Brannon, C. L., Kydd, D. M., Pierce-Roberts, G., Borman, A. M., & Torrance, A. G. (2007). Fungal pyelonephritis due to Cladophialophora bantiana in a cat. Veterinary Record, 161(21), 724-728.
4. Moon, R., Biller, D. S., & Smee, N. M. (2014). Emphysematous cystitis and pyelonephritis in a nondiabetic dog and a diabetic cat. Journal of the American animal hospital association, 50(2), 124-129.
5. Jessen, L. R., Nielsen, L. N., Kieler, I. N., Langhorn, R., Reezigt, B. J., & Cirera, S. (2020). Stability and profiling of urinary microRNAs in healthy cats and cats with pyelonephritis or other urological conditions. Journal of veterinary internal medicine, 34(1), 166-175.