CASE REPORT

Acute Pyelonephritis in a Dog: A Case Report

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Ind J Vet Sci and Biotech (2024): 10.48165/ijvsbt.20.2.28

Pyelonephritis describes inflammation of the renal pelvis as well as adjacent renal parenchyma. Although ascending infection of the lower urinary tract (LUT) is the primary cause of most episodes of pyelonephritis, hematogenous spread of infection can also occur but less frequently. The disease can be acute or chronic, and unilateral or bilateral (Parry, 2005). About 75% of infections are caused by a single bacterial pathogen; 20% of UTIs are caused by two coinfecting species; and roughly 5% are caused by three species (Olin and Bartges, 2015). In both dogs and cats, the bacteria that most frequently result in UTIs are *Escherichia coli, Staphylococcus*, and various others like *Proteus*, *Klebsiella*, *Pasteurella*, *Pseudomonas*, *Corynebacterium*, and several more infrequently reported genera (Ling *et al*., 2008).

Naturally occurring pyelonephritis is often associated with cystitis, prostatitis, or obstructive urinary tract disease. Pyelonephritis may be part of a complex infection, lower urinary tract obstruction, and reflux from a damaged bladder. The kidneys are normally highly resistant to infection due to their rich blood supply that can detect infectious agents by immune cells and high fluid flow which can promote pathogen elimination (Robertson, 1986). Acute pyelonephritis in dogs typically manifests as systemic, nonspecific symptoms like fever, lumber pain, and symptoms of uremia which include anorexia, lethargy, vomiting, and diarrhea. Canines and felines with chronic pyelonephritis may not exhibit systemic symptoms, making the diagnosis more difficult. Chronic infections can lead to kidney damage and eventually result in renal failure (Bouillon *et al.,* 2018). Urinary tract infections are diagnosed with history, physical examination, ultrasonography (USG), urinalysis, and urine culture and sensitivity. Cystocentesis or urethral catheterization is the best method for collecting urine samples, especially if urine culture is planned (Smee *et al.,* 2013). This communication reports successful management of a case of acute pyelonephritis in a dog.

Case History and Observations

A 7 year and 6 months old male Labrador dog weighing 40 kg was brought to the OPD of State Veterinary Hospital cum Polyclinic at Abhoynagar, Agartala, Tripura (India) on 24th April 2022 having a history of fever, anorexia, vomiting, diarrhea, swelling of both forelimbs and dribbling of cloudy urine for last three days. Clinical examination was done and found that animal was in lateral recumbency, depressed with pale pink mucous membrane and rectal temperature was 104 ºF. The animal was not having any respiratory and auscultation deficits. Symptomatic treatment was done with Inj. Ondansetron @ 4 mL OD IM, Inj. Multivitamin @ 2.5 mL OD IM, Inj. Ranitidine @ 2 mL OD IM and Inj. Meloxicam @ 2 mL IM SOS.

The very next day (2nd day) the animal was presented without much improvement in the condition. Blood was collected for haemato-biochemical analysis. The values of total leukocyte count (TLC), neutrophils, BUN and creatinine were very high, with low values for total erythrocyte count (TEC), lymphocyte and packed cell volume (PCV) (Table 1). Blood smear examination revealed presence of numerous immature neutrophils (Fig. 1). Moreover, the serum bilirubin (total, direct & indirect) and globulin were found to be greater with reduced albumin and A:G ratio than the normal physiological limits, although serum aspirate & alanine amino transferases, alkaline phosphatase and total protein were in normal range. The case was tentatively diagnosed as of acute pyelonephritis.

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How to cite this article: Kar, P., Rajesh, J. B., Das, M., & Kar, D. (2024). Acute Pyelonephritis in a Dog: A Case Report. Ind J Vet Sci and Biotech. 20(2), 124-127.

Source of support: Nil

Conflict of interest: None.

Submitted 19/10/2023 **Accepted** 01/12/2023 **Published** 10/03/2024

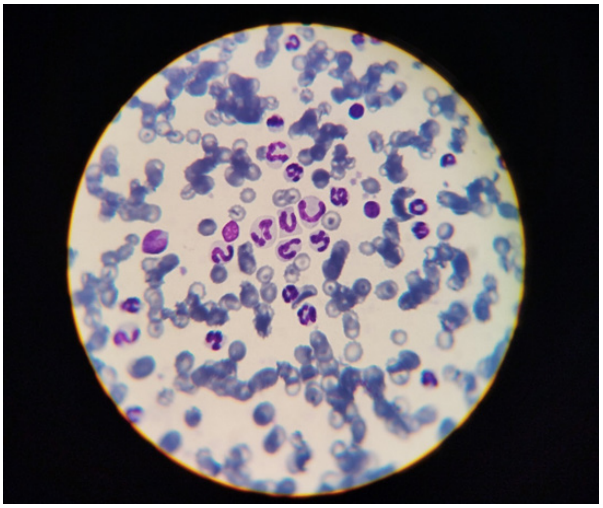

Fig. 1: Immature neutrophils in blood smear

Table 1: Haemato-biochemical profile of a dog with pyelonephritis during the course of treatment

Haemato-biochemical Parameters	2nd day	7th day	12th day
Haemoglobin (g/dL)	7.80	5.70	9.70
Total RBCs (10^6/µL)	3.31	2.56	4.00
Total leucocytes (10^3/µL)	105.00	63.30	22.40
Haematocrit value (%)	19.80	17.10	29.90
Platelets (10^5/µL)	218.00	468.00	275.00
Neutrophil (%)	95	75	80
Lymphocytes (%)	5	15	14
BUN (mg/dL)	92	143.2	29.1
Creatinine (mg/dL)	3.7	6.37	1.63

Treatment and Discussion

From the second day onwards, the animal was treated with Inj. RL @ 300 mL IV BID, Inj. Amoxicillin @ 600 mg IV BID, Inj. Pantoprazole @ 40 mg IV BID, Inj. Ondansetron @ 4 mL IV BID, Inj. Multivitamin @ 2.5 mL IV BID, Inj. @ Furosemide 6 mL slow IV BID and vitamin supplement for five days. After 5 days of treatment haemato-biochemical analysis was done (7th day) and it was found that haemoglobin, TEC, PCV, TLC were reduced, Platelet had increased, while BUN and creatinine levels were increased drastically (Table 1).

Ultrasonography findings on 7th day showed that urinary bladder (UB) size was markedly distended and the bladder wall was stretched and appeared thin (Fig. 2). Kidney size and shape were normal, renal cortex normal, and pelvis was mildly dilated (4.0-4.5 mm) (Fig. 3 & 4). No abnormality detected in spleen and liver, but gall bladder was distended. Stomach wall was normal with normal peristalsis, but distended with gas. Bladder atony with cystitis and renal pelvis dilation confirmed it as pyelonephritis.

Fig. 2: Distended and atonic bladder filled with urine (sagittal view)

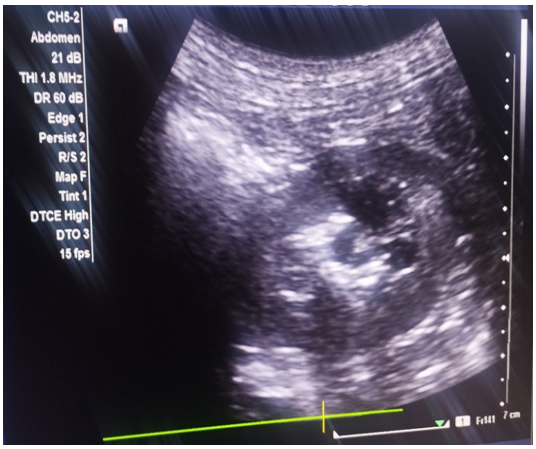

Fig. 3: Renal pelvis dilatation (sagittal view)

Fig. 4: Anechoic and dilated pelvis (4.0-4.5 mm)

Cloudy turbid urine was seen in urinalysis with pH 6.34, protein negative, glucose negative, sodium 147.7 mEq/L, potassium 4.44 mEq/L, chloride 89 mEq/L, and presence of few squamous and transitional epithelial cells and pus cells (11 cells/HPF). Urinary catheterization was done to remove the urine from the bladder. Urine culture revealed mixed infection with few staphylococci and many *Escherichia coli.* Antibiotic sensitivity test recorded enrofloxacin with a clear zone of inhibition.

From the seventh day onwards, animal was treated with Inj. RL @ 300 mL IV BID, Inj. Mannitol 20 % @ 150 mL slow IV BID, Inj. Enrofloxacin @ 1.5 mL IM BID, Inj. Erythropoietin @ 2000 IU OD SC at 3 days interval twice, Tab. Amoxicillin @ 1 tab PO BID, Syr. Urinary alkaliser @ 2 TSP PO BID, Tab. Multivitamin @ 1 tab PO OD for five days.

On the twelfth day the haemato-biochemical analysis revealed all the values to near normal range (Table 1). The condition of the dog improved and medicines were continued orally for another week with Tab. Enrofloxacin @ 1 tab. PO BID, Tab. Amoxicillin @ 1 tab. PO BID, Syr. Urinary alkalizer @ 2TSP PO BID, Tab. Multivitamin @ 1 tab PO BID, Prebiotic & Probiotic capsules @ 1 cap. PO BID.

Pyelonephritis in canines manifests with systemic and non-specific symptoms in most of the cases. Kogika *et al*. (1995) reported that pyelonephritis is the most frequently reported disease in male dogs. In a retrospective study of pyelonephritis in canines by Bouillon *et al*. (2018) the common symptoms of anorexia, vomiting, lethargy, and dehydration were recorded. But Dunaevich *et al*. (2020) observed that dogs may have symptoms of weight loss, haematochezia, ocular discharge, generalized lymphadenopathy, dyspnea, tenesmus, epistaxis, regurgitation, ataxia, and haematuria.

The high WBC count recorded on the 7th day was probably due to distended bladder filled with urine as it provides a suitable environment for rapid multiplication of organisms. The creatinine and BUN levels were further increased on day 7 after symptomatic treatment as exact diagnosis was not made earlier and the bladder was distended and atony was there, which favors the constant growth of microorganisms. High BUN and creatinine values indicate decreased renal function and usually hypercreatininemia. Azotemia is not an abnormal finding in dogs with pyelonephritis. Le Boedec *et al*. (2012) reported that greater than 3-fold increase in BUN or creatinine concentration can be a sign of acute kidney failure.

Escherichia coli is a very common finding in pyelonephritis cases in canines. Workers like Veni *et al*. (2018) also isolated *E. coli* in samples collected from pyelonephritis cases in canines at Madras Veterinary College. Garcia *et al*. (1988) opined that the virulence factors like production of colicines, production of siderophores like aerobactin and production of haemolysin help *E. coli* in establishing infection in urinary tract of canines.

Ultrasonography findings revealed a distended and atonic bladder filled with urine, renal pelvis dilatation and anechoic and dilated pelvis, as were observed by Kim *et al*. (2020). Atonic bladder refers to failure of muscles to fully contract which leads to dribbling of urine as seen in this case. D'Anjou *et al*. (2011) recorded increased renal pelvic dilation sonographically in dogs with pyelonephritis and renal insufficiency.

Urinary catheterization was done to remove the urine as the dog was unable to pass the urine voluntarily. This is a common finding in pyelonephritis as the distension and atony cause difficulty in passage of urine. Kogika *et al*. (1995) also reported the usage of catheterization in their study at Brazil. Enrofloxacin was the antibiotic used in this case and the selection was done after antibiotic sensitivity test. Westropp *et al*. (2012) also recorded good efficacy of enrofloxacin in treatment of urinary tract infections in dogs. As the kidney function is disturbed, erythropoietin needs to be supplemented and the same opinion was shared by Ritthikulprasert *et al*. (2011).

In conclusion, pyelonephritis is one of the common urinary tract infections in canines. Symptoms, haemato-biochemical analysis, urinalysis and USG help in diagnosis of the condition. Antibiotic therapy as per AbST results of urine along with erythropoietin supplementation and multivitamin therapy can cure the condition completely.

Acknowledgement

Authors are thankful to Animal Resource Development Department, Tripura and College of Veterinary Sciences and Animal Husbandry, Selesih, Aizawl, Mizoram for providing facilities for the study.

References

Bouillon, J., Snead, E., Caswell, J., Feng, C., Hélie, P., & Lemetayer, J. (2018). Pyelonephritis in dogs: Retrospective study of 47 histologically diagnosed cases (2005-2015). *Journal of Veterinary Internal Medicine*, *32*(1), 249-259.

D'Anjou, M.A., Bedard, A., & Dunn, M.E. (2011). Clinical significance of renal pelvic dilatation on ultrasound in dogs and cats. *Veterinary Radiology & Ultrasound*, *52*(1), 88-94.

Dunaevich, A., Chen, H., Musseri, D., Kuzi, S., Mazaki-Tovi, M., Aroch, I., & Segev, G. (2020). Acute on chronic kidney disease in dogs: Etiology, clinical and clinicopathologic findings, prognostic markers, and survival. *Journal of Veterinary Internal Medicine*, *34*(6), 2507-2515.

Garcia, E., Bergmans, H.E.N., Van den Bosch, J.F., Ørskov, I., Van der Zeijst, B.A.M., & Gaastra, W. (1988). Isolation and characterisation of dog uropathogenic *Escherichia coli* strains and their fimbriae. *Antonie Van Leeuwenhoek*, *54*, 149-163.

Kim, H., Lee, K., Chung, J., Ahn, J., Park, I., & Choi, S. (2020). Imaging diagnosis of emphysematous pyelonephritis in a non-diabetic dog. *Journal of Veterinary Clinics*, *37*(4), 231-234.

Kogika, M.M., Fortunato, V.A.B., Mamizuka, E.M., Hagiwara, M.K., Pavan, M.D.F.B., & Grosso, S.N.A. (1995). Etiologic study of urinary tract infection in dogs. *Brazilian Journal of Veterinary Research and Animal Science*, *32*(1), 31-36.

Le Boedec, K., Heng, H.G., Snyder, P.W., & Pressler, B.M. (2012). Pulmonary abnormalities in dogs with renal azotemia. *Journal of Veterinary Internal Medicine*, *26*(5), 1099-1106.

Ling, G.V., Norris, C.R., Franti, C.E., Eisele, P.H., Johnson, D.L., Ruby, A.L., & Jang, S.S. (2008). Interrelations of organism prevalence, specimen collection method, and host age, sex, and breed among 8,354 canine urinary tract infections (1969–1995). *Journal of Veterinary Internal Medicine*, *15*(4), 341-347.

Olin, S.J., & Bartges, J.W. (2015). Urinary tract infections: Treatment/comparative therapeutics. *Veterinary Clinics: Small Animal Practice*, *45*(4), 721-746.

Parry, N.M. (2005). Pyelonephritis in small animals. *UK Veterinarian, 10*(6), 1-5.

Ritthikulprasert, S., Rodphol, M., Nimrotham, A., Sattayatham, S., Komolvanich, S., Trisiriroj, M., & Buranakarl, C. (2011). Effects of erythropoietin on blood pressure, renal function and red blood cell production in dogs with chronic kidney disease with and without angiotensin converting enzyme inhibitor. *The Thai Journal of Veterinary Medicine*, *41*(2), 227-234.

Robertson, J.L. (1986). Spontaneous renal disease in dogs. *Toxicologic Pathology*, *14*(1), 101-108.

Smee, N., Loyd, K., & Grauer, G.F. (2013). UTIs in small animal patients: part 2: diagnosis, treatment, and complications. *Journal* of the *American Veterinary Medical Association,* 49(2), 83-94.

Veni, M., Rao, G.V.S., Sridhar, R., Hemalatha, S., Senthilkumar, T.M.A., Chandrasekar, M., & Rajalakshmi, S. (2018). Pyelonephritis caused by *Escherichia coli* in a dog. *Indian Veterinary Journal*, *95*(8), 51-53.

Westropp, J.L., Sykes, J.E., Irom, S., Daniels, J.B., Smith, A., Keil, D., & Chew, D.J. (2012). Evaluation of the efficacy and safety of high dose short duration enrofloxacin treatment regimen for uncomplicated urinary tract infections in dogs. *Journal of Veterinary Internal Medicine*, *26*(3), 506-512.