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Short Communication

Application of various diagnostic techniques for the detection of cystitis in a Persian cat

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ABSTRACT

A 10-year-old male cat, presented with symptoms of bloody urine, off-feeding, and weight loss at the Teaching and Training Pet Hospital and Research Center in Purbachal, Dhaka. Abdominal distention and dehydration were discovered upon clinical examination. To rule in suspected case of cystitis, a blood sample was taken and sent to the lab for evaluation of hematological and biochemical profiles. Additionally, a urine sample was collected for estimation of pH, specific gravity, protein, and a microscopic examination to determine the presence of RBCs. Ultrasonography was performed to investigate the condition of the bladder wall to confirm the diagnosis of cystitis. .Evaluation of the hematology and blood chemistry revealed lymphocytosis (48%), elevated SGPT (92 u/l), and serum creatinine (2.1 mg/dl). Analysis of the urine revealed pH 6.0, presence of leukocytes and blood +, absence of ketone, bilirubin, nitrite and urobilinogen, protein 200 g/l, specific gravity 1.03, and glucose 19 mmol/l. Urine was dense and hazy when viewed macroscopically, and considerable red blood cells were visible when viewed microscopically. Cystitis was definitely indicated by the thickening of the wall observed during the ultrasound examination of the vesica urinaria.

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1. INTRODUCTION

The practice of raising and keeping pets at home rather than treating them only as street animals was not common in Bangladesh until recently (Runa et al., 2016). In Bangladesh, pet owners, especially those with young children, have been raising these animals in urban areas recently to promote their physical, social, and mental health. Worldwide, the most common household pets are dogs and cats. Like humans, cats experience several health problems, including liver, heart, and renal diseases, among others (Robertson et al., 2000; William et al., 2002). One of the illnesses that are frequently seen in veterinary practice is Feline Lower Urinary Tract Disease (FLUTD). The fact that Feline Cystitis is still frequently responsible for Feline Lower Urinary Tract Symptoms (FLUTS) is partly due to its imprecise diagnosis (Gerber et al., 2005; Saevik et al., 2011). FLUTD is known to have a 1.5–8% morbidity rate all over the world, where feline cystitis, which causes

inflammation of the bladder, accounts for about 2/3 (two-thirds) (Dorsch et al., 2014; Forrester and Towell., 2015; Piyarungsri et al., 2020). Pets frequently have cystitis, or bladder inflammation, which is a sign of hematuria, periuria, and behavioral changes (Gunn-Moore, 2003). Thickening of the bladder wall also results in cystitis (Widmer et al., 2004). Factors associated with cat husbandry, lifestyle, and other cat-related aspects influence the risk factors for cystitis differently in different countries (Buffington et al., 2006; Chew, 2011). Male gender, neuter status, middle age (2–7 years old) and obesity are reported to be the factors linked to cystitis. Stress may also contribute to the development of cystitis, according to numerous studies (Defauw et al., 2011; Lund et al., 2016). Cats may get cystitis as a result of prolonged or brief exposure to stresses such as unusual outside encounters and erratic circumstances that induce anxiety and dread. Cystitis is also linked to environmental factors like indoor housing (Forrester and Towell, 2015).

Clinical manifestations of cystitis include increased frequency of urination, dysuria (straining), vocalization or agitation, excessive grooming of the ventral abdomen (perhaps due to pain), weight loss, aggressiveness, etc. (Gunn-Moore, 2003; Little, 2012). Cystitis can be diagnosed by anamnesis, physical examination, clinical symptoms, abdominal palpation, hematology and blood chemistry tests, urine analysis, and ultrasonography (USG) (Prasetyo and Darmono, 2018). The confirmation of cystitis is attributed by elevated lymphocyte counts and creatinine levels in the blood, proteinuria, and leukocyte counts on a urine dipstick, and RBCs seen in urine under a microscope (Dadi et al., 2019). Regarding cystitis, a limited study has been carried out in Bangladesh (Mahim, 2018). The statistical data on clinical cystitis and their subsequent annual mortality is unknown. The incidence of cystitis in cats in Bangladesh remains undocumented due to the absence of diagnostic tools. Clinical manifestations and USG, which are frequently performed in Bangladesh, are tentative criteria for the diagnosis of cystitis. However, this does not imply a diagnosis of cystitis with absolute certainty. To navigate the scenario, this report details the diagnostic procedures employed to achieve an accurate diagnosis in a Persian cat presenting with symptoms of cystitis.

2. CASE PRESENTATION

Tomy, a male short hair Persian cat, was 10 years old with a history of off-feeding, weight loss, and bloody urine was brought to the Teaching and Training Pet Hospital and Research Center, Purbachal, Dhaka Bangladesh. After a thorough examination, the cat was discovered to be dehydrated, had a sunken eyeball, and had a body temperature of 99^{o} F. The cat was initially suspected of having cystitis based on his history and clinical symptoms. To confirm the diagnosis, the doctor sent it to the lab for analysis of the blood's biochemical profile and urine as well as microscopic examination (staining). Additionally, ultrasound was used to ensure a proper diagnosis.

Blood collection

The cat's medial saphenous vein was used to collect blood after the skin was sterilized with 70% alcohol and with the aid of a butterfly needle (Promixco scalp vein set, 23G) (Figure 1). The blood was then stored in two different vacutainers: one with an anticoagulant (BD Vacutainer Plastic Blood Collection Tube with K_2EDTA: Hemogard) and one without (Plain Vacutainer Tube). Following the collection of blood, a biochemical analyzer (Humalyzer 3000) was used to estimate various blood parameters, such as phosphorus, glucose, total protein, ALT, and AST.

Figure 1. Collection of blood sample from medial saphenous vein.

Hematological and Biochemical test of blood

The laboratory examination results for hematology (Table 1) and blood chemistry (Table 2) are shown below.

Table 1. Complete blood count of cystitis cat.

Test Name	Result	Reference value
Hemoglobin (g/dl)	9.	9.0-15.0
Total WBC Count (per cu. mm)	16,600	5000-19000
Neutrophils (%)	42	40-70
Lymphocytes (%)	48	10-45
Monocytes (%)	07	2-8
Eosinophiles (%)	03	01-04
Basophiles (%)	00	00-01
RBC Count (m/ul)	6.01	6.00-10.00
HCT/PCV (%)	31.4	32.0-55.0
MCV (fL)	46.2	39.0-55.0
MCH (pg)	13.2	13.0-18.0
MCHC (g/dl)	28.5	30.0-36.0
Platelet Count (per cu.mm)	1,65,000	150000-500000

Lymphocytosis was found in the Complete blood cell count. The remaining parameters such as monocytes, eosinophils, basophils, MCV, MCH, MCHC, and Platelets were essentially typical.

Table 2. Biochemical analysis of the blood of cystitis cat

Parameters	Test value	Reference value
Phosphorus (mg/dl)	7.2	2.4-8.2
Potassium (mEq/l)	3.6	3.4-5.6
Total protein (g/dl)	6.4	5.2-8.8
Albumin (g/dl)	3.3	2.5-3.9
Bilirubin (mg/dl)	0.3	0.1-0.4
ALT/SGPT (u/l)	92	10-100
BUN (mg/dl)	31	14-36
Serum creatinine (mg/dl)	2.1	0.6-1.6

Regarding blood biochemistry, serum creatinine (2.1 mg/dl) and ALT or SGPT (92 u/l) were both higher than normal.

Urine DIPSTICK test

The cat was catheterized to obtain urine (Figure 2) for the urinalysis, and a urine dipstick test (SG 10100)was used to measure the urine's specific gravity, pH, protein, and leukocyte content (Table 3). The outcome indicates that the existence of blood cells is accompanied by a higher quantity of leukocytes and protein (Figure 3)

Table 3.Biochemical analysis of urine of cystitis cat

Parameters	Test results	Reference
pH	6.0	6.0-7.5
Specific gravity	1.03	1.036-1.060
Protein (g/l)	Present (200)	Trace
Leukocyte (cacells/ul)	Present (500)	Trace
Blood	Present	Absent

Figure 2. Collection of urine sample.

Figure 3. Urine dipstick test for cystitis diagnosis.

Microscopic test of urine

After centrifugation of the collected urine sample at 1500rpm for 5 min, sediment was collected to check for any solid materials under a microscope.Microscopically (after Giemsa staining), microorganisms (cocci shaped bacteria) and an increased red cell count were observed (Figure 4).

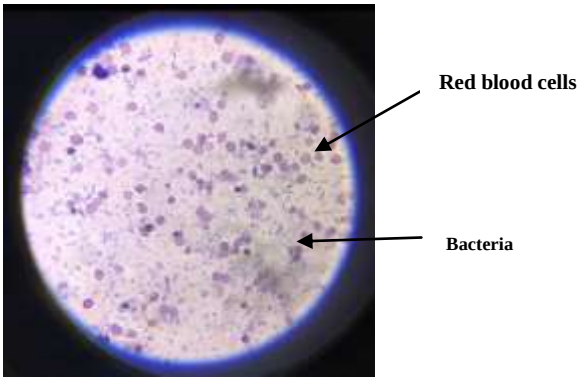

Figure 4. Microscopic slide preparation for urine

Ultrasonography

Urinary tract ultrasonography (USG) is the initial diagnostic technique for urinary tract issues (by using Digital Ultrasound Diagnostic Device, Model N5 Vet). It is a straightforward, easy-to-use, and very dependable approach for treating cystitis. The results of the USG reveal a thick bladder with an uneven surface (Figure 5).

3. DISCUSSION

It has been asserted that effectively expressing the issue is already a significant step towards resolving it, particularly when it comes to confirming the diagnosis of cystitis. Hematology and blood chemistry analyses revealed increased levels of lymphocytosis and serum glutamic oxaloacetate transaminase (SGPT) in this study. Elevated lymphocyte blood counts suggest the presence of a virus, bacterium, or other microorganism-induced infection or inflammatory state. Increased SGPT levels are linked to renal impairment (Prasetyo and Darmono, 2018). The kidneys eliminate creatinine a waste product of muscle metabolism. Creatinine retention is caused by a significant reduction in the glomerular filtering rate (Hall et al., 2014). In addition to offering crucial information regarding the urinary system, urinalysis can serve as a disease state indicator. A complete urinalysis involves microscopic inspection, a dipstick, urine-specific gravity measurement, and visual inspection. Urine that is dense and turbid suggests the presence of bacteria and cells. Certain compounds may be reabsorbed more readily in the kidneys if there is a disturbance in the control of reabsorption. As a result of the decrease in the substances excreted and a decrease in urine-specific density (Graham, 2017)). Proteinuria may be a sign of glomerular membrane damage leading to a breakdown in protein filtration, resulting in the presence of protein in the urine. Felines that have suffered hemorrhagic outcomes from trauma or inflammation are invariably linked to periuria and proteinuria (Harley et al., 2012). Elevated red blood cell counts and leuko-cyte overabundance, along with bacteriuria, suggest inflammation or infection of the urinary bladder (Alleman and Wamsley, 2017). Leukocytes suggest bacterial infection-related inflammation of the kidney or urinary tract (Bartges, 2018), while red blood cells (RBCs) are indicative of bleeding disorders, injuries, and other conditions (Piech and Wyscilo, 2019). The ultrasound examination revealed that the bladder's walls had thickened. An inflammatory response brought on by trauma or disease can thicken the walls of the bladder and urine sediments during an ultrasound of the bladder (Vörös et al., 1997). Similar findings were found by Widmer et al. (2004), who found that cystitis can cause the wall of the bladder to thicken.

Figure 5. USG examination: Thickening of the bladder wall.

4. CONCLUSION

This case report emphasizes the significance of a comprehensive diagnostic approach in

managing complex urinary tract disease in feline patients. Combining physical examination findings, laboratory investigations, and imaging techniques can aid in accurate diagnosis and subsequent treatment planning for cystitis. Ultimately, this case report contributes to the existing knowledge base of feline urinary tract disorders and provides valuable insights for veterinary practitioners when dealing with similar cases.

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