

Application of Various Diagnostic Techniques for the Detection of Cystitis in a Persian Cat



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List of Acronyms Symbols Used:

Abbreviation	Elaboration
%	Percentage
et.al	And his association
ALT	Alanine Aminotransferase
BUN	Blood-urea-nitrogen
CVASU	Chattogram Veterinary and Animal Sciences university

Statement of Author

I, **Salma Akter Papiya**, hereby attest that I have satisfactorily completed all the responsibilities listed in this report. Books, regional and worldwide publications, and other sources were used to collect the data. The required citations have all been made. As a result, I am entirely accountable for gathering, processing, maintaining, and disseminating all information gathered for this report.

The Author

Abstract

A male cat, about 10 years old, 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. Because of a suspicion of cystitis, a blood sample was taken and sent to the lab for evaluation of hematological profiles like WBC, platelets, etc., as well as biochemical profiles like AST, total protein, BUN, and serum creatinine etc. Additionally, a urine sample was collected for estimation of pH, specific gravity, protein, and a microscopic examination to determine whether RBCs were present. USG was performed to see the condition of the bladder wall in order to confirm the diagnosis. Examinations of the hematology and blood chemistry reveal lymphocytosis (48%), elevated SGPT (92 u/l), and serum creatinine (2.1 mg/dl). Analysis of the urine reveals pH (6.0), leukocytes (+), nitrite (-), urobilinogen (-), protein (200 g/l), blood (+), specific gravity (1.03), ketone (-), bilirubin (-), and glucose (19). Urine is dense and hazy when viewed macroscopically, and considerable red blood cells are visible when viewed microscopically. Cystitis was definitely indicated by the thickening of the wall observed during the ultrasound examination of the vesica urinaria.

Keywords: Cystitis, Vesica Urinaria, Diagnosis.

Introduction

The practice of treating pets as street animals rather than keeping them as pets was not common in Bangladesh until recently. In Bangladesh, pet owners, especially those with young children, have been raising these animals in urban areas recently with the intention of promoting 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 is 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, that signs of hematuria, periuria, and behavioral changes (Gunn-Moore, 2003). Thickening of bladder wall also results in cystitis (Widmer et al., 2004). Factors associated to the 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 risk factors linked to cystitis. Stress may also contribute to the development of cystitis, according to numerous research (Defauw et al.,2011; Lund et al., 2016). Cats may get cystitis as a result of prolonged or brief exposure to stresses such as peculiar outside happenings 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). The confirmation of cystitis is provided 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. The number of cats who have cystitis annually or pass way subsequently is unknown. The incidence of cystitis in cats in Bangladesh has not been published which is a result of the lack of diagnostic equipment in Bangladeshi clinics. Clinical manifestations and USG, which is frequently performed in Bangladesh, are tentative criteria for the diagnosis of cystitis. However, it does not indicate 100% accuracy for cystitis diagnosis. 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.

Case Presentation

Tomy a male short hair Persian cat that 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. The cat was evaluated by the doctor. After a thorough examination, the cat was discovered to be dehydrated, had a sunken eyeball, and a body temperature of 99° F. The cat was initially suspected of having cystitis based on his history and clinical symptoms.

In order 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. 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 buffer fly needle (Figure 1). The blood was then stored in two different vacutainers: one with an anticoagulant (BD Vacutainer Plastic Blood Collection Tube with K2EDTA: Hemogard) and one without (Plain Vacutainer Tube). Following the collection of several blood parameters, such as phosphorus, glucose, total protein, ALT and AST, a detailed estimation was performed using the biochemical analyzer Humalyzer 3000.



Figure 1: Collection of blood sample

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 (Hb%)	9.0 g/dl	9.0-15.0 g/dl
Total WBC Count	16,600/cumm	5,000-19,000/cumm
Neutrophils	42%	40-70%
Lymphocytes	48%	10-45%
Monocytes	07%	2-8%
Eosinophiles	03%	01-04%
Basophiles	00%	00-01%
RBC Count	6.01 m/ul	6.00-10.00m/ul
HCT/PCV	31.4%	32.0-55.0%
MCV	46.2 fL	39.0-55.0 fL
MCH	13.2 pg	13.0-18.0 pg
MCHC	28.5 g/dl	30.0-36.0 g/dl
Platelet Count	1,65,000/cumm	150000-500000

Lymphocytosis was found in the Complete blood count, with 16,600 white blood cell/cumm. The remaining parameters such as monocytes, eosinophils, basophils, MCV, MCH, MCHC, and Platelets are essentially typical.

Table 2: Biochemical analysis of the blood of cystitis cat

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

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

Urine DIPSTICK Test:

The cat was catheterized to obtain urine (Figure 2) for the urinalysis, and a urine dipstick test was used to measure the urine's specific gravity, pH, protein, and leukocytes content (Table 3). The outcome indicates that the existence of blood cells is accompanied with 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	Present (200 g/l)	Trace
Leukocytes	Present (500 cacells/ul)	Trace
Blood	Present	Absent

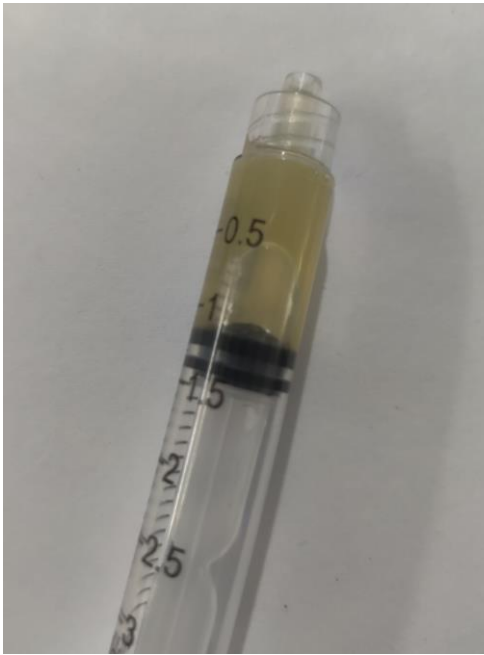


Figure 2: Collection of urine sample.

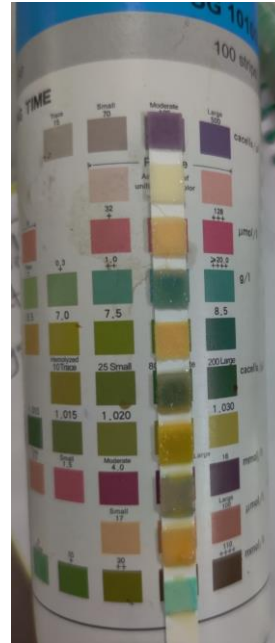


Figure 3: Urine dipstick test for cystitis diagnosis.

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, microorganisms and an increased red cell count are observed (Figure 4).

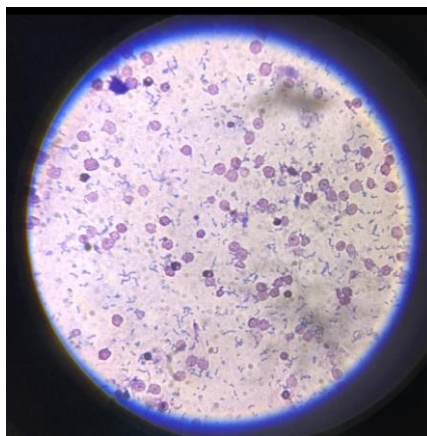


Figure 4: Microscopic slide preparation for urine

Ultrasonography:

Urinary tract ultrasonography is the initial diagnostic technique for urinary tract issues. 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).



Figure 5: USG examination: Thickening of the bladder wall

Discussion

It's been stated that half the battle is won when the issue is clearly articulated, which mentions the confirmatory diagnosis for cystitis. Hematology and blood chemistry analyses revealed increased levels of lymphocytosis and serum glutamic oxaloacetate transaminase (SGPT). 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 creatine, 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 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. Cats who have experienced hemorrhagic outcomes from trauma or inflammation are invariably linked to periuria and proteinuria (Harley et al., 2012). An elevated red blood cell counts and leukocyte 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 Wycilo, 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.

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, 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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Biography of author

This is Salma Akter Papiya, the daughter of Md Abdur Rahman and Shahnaz Parvin, doing her graduation on Doctor of Veterinary Medicine (DVM) at Chattogram Veterinary and Animal Sciences University under Faculty of Veterinary Medicine. She passed the Secondary School Certificate Examination (SSC) in 2014 from B N School and College, Chattogram and got GPA 5.00 and then Higher Secondary Certificate Examination (HSC) in 2016 from B N School and College, Chattogram and got GPA 4.75 out of 5.00. Currently she is doing her yearlong internship. She has a great enthusiasm in her study area to develop day one skills and gain more practical knowledge to be prepared for the modern era of science.