

A CASE OF A SIMPLE SOLITARY RENAL CYST IN A SHIH TZU

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Abstract

In this report, a clinical case of a solitary renal cyst in a Shih Tzu dog is described. On the basis of clinical and laboratory examinations, and ultrasonographic and radiologic visualizations, provisional and differential diagnoses were made. The Shih Tzu dog described in this report was referred to the Small Animal Hospital of the Faculty of Veterinary Medicine, Selçuk University, for further work-up after a one-week treatment in a private veterinary clinic. In our hospital, a simple solitary renal cyst was detected and was treated successfully with ultrasound-guided percutaneous drainage. The dog was followed-up during two months' post procedure with renal ultrasonography and four months by phone calls with the owner. The initial complaints such as anorexia and lethargy disappeared after the treatment. The ultrasonographic appearance of the cyst changed from an ovoid anechoic structure into a vague, slightly hyperechoic scar lesion.

Key words: dog, percutaneous drainage, renal cyst, ultrasound

INTRODUCTION

Renal cysts are epithelium-lined cavities filled with liquid of various compositions (Gülersoy et al., 2019; Akinci et al., 2005). Renal cysts can be classified as solitary or multiple and genetic or acquired. The simple cysts do not contain cells, bacteria or fungi (Zatelli et al., 2007; Nyland et al., 2002). Simple cysts have been defined by

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Agut et al. (2008) as cysts that are not associated with decreased renal function. In human medicine, 75% of the renal cyst cases are reported to be solitary, cortical and unilateral (Van Dyck et al., 2018; Watermann, 2014). Although the etiology is not elucidated exactly, ischemia and tubular obstruction have been suggested. Renal cysts can also develop secondary to chronic nephropathies. However, it was reported that accumulation of fluid may be caused by metabolically active epithelial cells (Park et al., 2019). In humans, simple renal cysts can be concomitant with findings such as abdominal pain, urinary tract obstruction and systemic hypertension (Van Dyck et al., 2018; Zatelli et al., 2005).

In veterinary medicine, renal cysts are diagnosed more often in cats than in dogs. Renal cysts in dogs and cats can be congenital, such as polycystic kidney disease, described in Persian cats and Cairn and Bull terriers. Also, cysts can be seen in familial nephropathy of Shih Tzus and Lhasa Apsos, and as hereditary multifocal renal cystadenomas or cystadenocarcinomas that are usually seen in German shepherd dogs. Hematomas and abscesses should be considered in the differential diagnoses. In cats, polycystic kidney disease has also been observed to be more common and has a greater incidence in long-haired than in short-haired breeds (Gülersoy et al., 2020; Park et al., 2019; Paskalev et al., 2012; Lulich, 1988; Crowell, 1979; Rendano and Parker, 1976; Battershell and Gareia, 1969).

In both human and veterinary medicine, simple renal cysts often are encountered during necropsy or abdominal ultrasonography performed for unrelated clinical manifestation (Risdon and Woolf, 1998). During ultrasonographic examination, simple renal cysts are observed as oval lesions with anechoic content and a thin hyperechoic wall. They are variable in size, and renal deformation may occur depending on their dimensions. It was reported that the metabolically active epithelium covering the internal surface of the cystic cavity is responsible for progressive fluid accumulation (Zatelli et al., 2005). Although most of the renal cysts are of benign nature and are subclinical, abdominal distention, weight loss, vomiting, anorexia, polyuria, polydipsia and systemic hypertension, especially in cats, may be observed (Paskalev et al., 2012; Northington and Juliana, 1977). Hypertension, which is more common in cats, occurs as a result of pressure applied by the cyst on the vascular structures of the parenchyma, resulting in activation of the renin-angiotensin-aldosterone system (Zatelli et al., 2005).

Although there is no consensus on optimal timing for intervention, treatment indications depend on clinical signs such as severity of hypertension, presence of urinary tract obstruction and the size of the renal cyst. In human medicine, renal cysts that are larger than 4 cm in diameter and with a risk of malignancy require intervention (Park et al., 2019). Treatment options include percutaneous drainage, sclerotherapy, cysto-retroperitoneal shunting, percutaneous fulguration and marsupialization and surgical fenestration. Symptom relief and prevention of recurrence are treatment goals (Park et al., 2019; Zatelli et al., 2005).

CASE PRESENTATION

Signalment, history and clinical findings. A six-year-old intact male Shih Tzu weighing 7.1 kilograms was admitted for examination at the Small Animal Hospital of the Faculty of Veterinary Medicine, Selçuk University with a history of loss of appetite, lethargy and stranguria. The dog was treated with antibiotics for possible urinary tract infection in a private veterinary clinic for a week before admission to the hospital. It was learned that the defecation was normal, but urination was painful. The physical examination revealed a good body condition but abdominal distension. The rectal body temperature was 39.3 °C, heart rate was 136 beats/minute, respiratory rate was 52 breaths/minute, systemic blood pressure was 130 mmHg and visible mucous membranes were slightly pale. Additional diagnostic analyses consisted of laboratory blood tests including complete blood count (CBC) (MS4 CFE 279® autoanalyzer, France), blood gas (Radiometer ABL 90® Automatic analyzer, Model 5700, USA) and serum biochemistry (BT 3000 Plus®, Biotechnical Inc. SPA, Italy), urinalysis (URIT-31®, India), radiography (Fujifilm FCR Prima, Japan) and ultrasonography (Mindray DC-3®, USA).

Laboratory and diagnostic imaging findings. At admission, CBC and serum biochemistry profile including electrolyte measurements revealed mild metabolic acidosis, hyperlactatemia, hypoglycemia, base excess, leukocytosis, hyperphosphatemia, hypercalcemia and elevation in blood urea, creatinine and albumin levels. The other hematological parameters were within the reference ranges. The results of laboratory blood tests are shown in Table 1. Complete urinalysis, urine protein:creatinine (UPC) ratio, and urine sediment analysis (Olympus®, USA, light microscope x40 magnification) were performed on the urine that was collected by cystocentesis. Urinalysis revealed leukocytes (+1), proteinuria (+2), blood (-/+) and UPC 0.10 (reference: <0.50). As a result of examination of the urinary sediment, epithelial cells and erythrocytes were identified. No crystalluria was observed. The laterolateral abdominal radiography revealed an abnormal oval shadow over the spleen. The abdominal ultrasonography revealed an oval, anechoic cystic structure about 5.3 cm in diameter in the left kidney. The cyst had a thin hyperechoic wall with distal acoustic enhancement accompanied by dilatation of the renal pelvis. The right kidney had normal echo structure and was normal in size (Figure 1). The results of clinical examination and diagnostic imaging suggested a cystic structure in the left kidney.

Treatment. The dog was premedicated with dexmedetomidine (3 µg/kg, Dexdomitor®) and butorphanol (0.2 mg/kg, Dolorex®). Induction and maintenance of anesthesia were obtained with alfaxalone (2 mg/kg, Alfaxan®). Aseptic preparation of the skin was performed before drainage. Ultrasound-guided percutaneous drainage of the cyst was performed by using 23-gauge spinal needle. A portion of the drained material was submitted for cytological examination. In total 15 mL of transparent fluid were aspirated from the cyst cavity without complications. Another portion of collected cystic fluid was sent for bacterial culture. Cytological examination of the cystic fluid

Table 1. Blood gas, CBC and serum biochemistry findings at first admission.

Parameters	Value (first admission)	Value (60 days follow up)	Ref. range	Parameters	Value (first admission)	Value (60 days follow up)	Ref. range
pH	7.33	7.38	7.35-7.45	BUN (mg/dl)	22.1	8.1	5.6-11.8
K (mmol/L)	3.6	3.7	3.4-5.6	Crea (mg/dl)	1.6	0.6	0.5-1.5
Na (mmol/L)	158	151	150-165	AST (U/L)	17	29	10-88
Cl (mmol/L)	116	115	104-128	ALT (U/L)	7	102	10-88
Lac (mmol/L)	2.5	1.8	0-2	ALP (U/L)	40	218	20-150
Glucose (mg/dl)	73	83	80-120	Glucose (mg/dl)	82	97	60-110
BE (mmol/L)	-6.3	-4.5	-4-4	Amylase (U/L)	639	187	300-2000
HCO ₃ (mmol/L)	19.0	20.0	19-24	LDH (U/L)	78	150	50-495
WBC (m/mm ³)	22.7	10.95	6-17	T. bil (mg/dl)	0.3	0.5	0.1-0.6
Lym (m/mm ³)	3.32	4.45	0.6-5.1	D. bil (mg/dl)	0.1	0.3	0-0.3
Monocyte (m/mm ³)	0.41	1.60	0.1-1.7	Phosphorus (mg/dl)	6.3	3.9	2.2-5.5
Gra (m/mm ³)	19.6	5.00	3-13.6	Cholesterol (mg/dl)	168	268	125-270
RBC (M/mm ³)	6.98	8.10	5.5-8.5	Albumin (g/dl)	4.7	2.8	2.3-3.8
MCV (fl)	79.8	72.9	58-73	Calcium (mg/dl)	14.0	11.1	8.6-11.2
MCH (pg)	15.3	24.1	19.5-24.5	Triglyceride (mg/dl)	76	38	20-112
Hb (g/dl)	10.7	20.4	14.1-20	C/PK (U/L)	51	152	20-200

Ref. range: Reference range, pH: Power of hydrogen, K: Potassium, Na: Sodium, Cl: Chlorine, Lac: Lactate, BE: Base excess, HCO₃: Bicarbonate, WBC: White blood cells, Lym: Lymphocyte, Gra: Granulocyte, RBC: Red blood cells, MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, Hb: Hemoglobin, BUN: Blood urea nitrogen, Crea: Creatinine, AST: Aspartate aminotransferase, ALT: Alanine aminotransferase, ALP: Alkaline phosphatase, LDH: Lactate dehydrogenase, T. Bil: Total bilirubin, D. Bil: Direct bilirubin, CPK: Creatine phosphokinase

revealed the presence of epithelial cells but no evidence of inflammatory or neoplastic cells. The animal was hospitalized for 24 hours after the procedure to continuously monitor the patient by clinical examination and abdominal ultrasonography, and ultimately, no evidence of short-term complications was found.

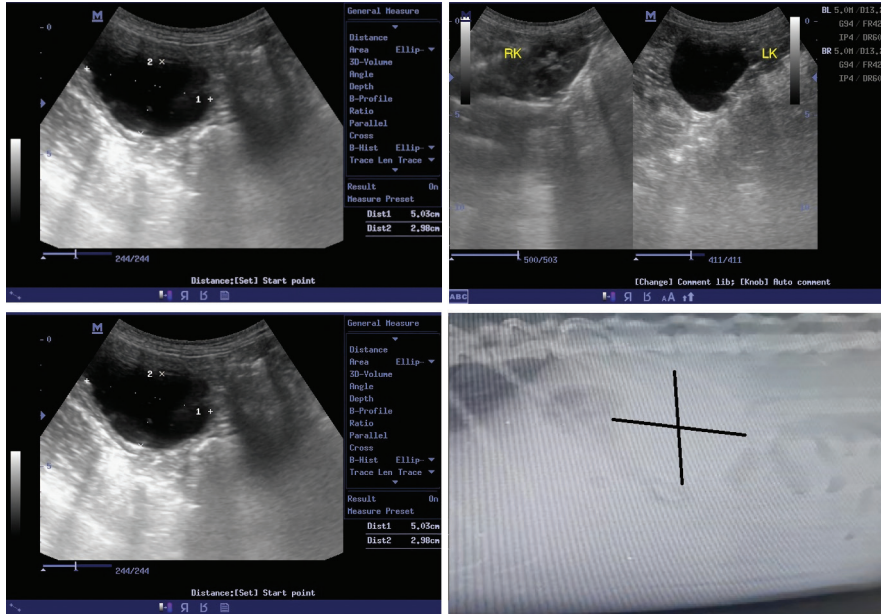


Figure 1. Ultrasonographic and radiographic findings at first admission

Follow-up findings. At two-month follow-up, the dog was re-evaluated. Neither were clinical abnormalities observed nor complaints reported from the owner. The dog was asymptomatic, and systolic blood pressure was determined to be 120 mmHg. Also, blood gas, CBC and serum biochemistry parameters were within the reference ranges

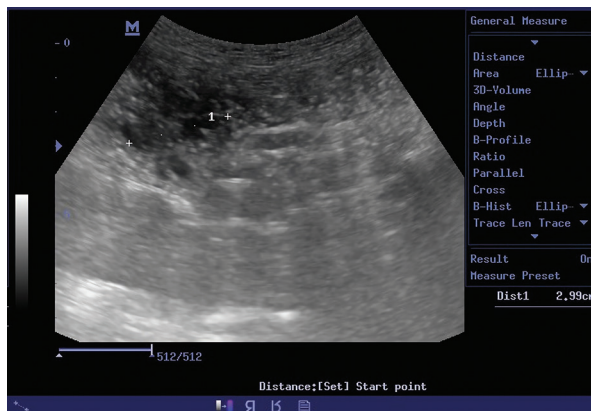


Figure 2. Ultrasonographic findings on 60-day follow-up

(Table 1). UPC was 0.05 (reference: <0.50). Abdominal ultrasonography revealed a slightly hyperechoic scar lesion in the left kidney and no abnormalities detected in the right kidney (Figure 2).

DISCUSSION

In veterinary medicine, simple renal cysts are rare and their pathophysiology has not yet been described. Moreover, there is no determined prevalence of renal cysts in veterinary medicine (Zatelli et al., 2002). While there is an abundance of information regarding incidence, treatment or prognosis of renal cysts in humans (Park et al., 2019), except for polycystic kidney disease, the information in dogs is limited. Similar to the majority of human renal cysts (Waterman, 2014), the present case consisted of a simple solitary, unilateral renal cyst. Simple renal cysts have a particular ultrasonographic appearance such as oval shape, anechoic content, thin hyperechoic wall and strong distal acoustic enhancement (Nyland et al., 2015). In the presented case, the content of the cyst was acellular, no bacteria were seen in direct smear, and the result of the bacterial culture was negative. Hereby, the diagnosis of simple cyst was made, according to the definition proposed by Zatelli et al (2007). The ultrasonographic appearance of the renal cyst in the dog presented in this report was compatible with all previously mentioned features (Van Dyck et al., 2018; Paskalev et al., 2012).

Ultrasound- or computed tomography-guided percutaneous drainage or sclerotherapy are simple, alternative and non-invasive techniques (Park et al., 2019; Baysal and Soylyu, 2009). As the recurrence rate is high after the percutaneous drainage, it is always important to follow up patients (Agarwal and Hernal, 2011) so that new medical decisions, such as proceeding to sclerotherapy or repeating the percutaneous drainage, can be made for the patient in timely manner. In human medicine it is recommended that sclerotherapy is the initial therapy in cases of simple solitary cyst or for diagnostic sampling and for pain relief as the recurrence rate after sclerotherapy (0% to 78%) is lower compared to after percutaneous drainage (up to 80%) (Park et al., 2019; Agarwal and Hernal, 2011). The possible complications of the technique performed in the present case were bleeding or rupture of the cyst. In cases of sclerotherapy, the most common complication is the leakage of the sclerosing solution. Although the single drainage recurrence rate has been reported to be between 33-80% (Van Dyck et al., 2018; Hanna and Dahniya, 1996), in the present case, no recurrence was observed over a 60-day period.

CONCLUSION

Features such as low cost, nominal hospitalization time and low risk of complications make percutaneous aspiration an important treatment of choice for simple renal cysts. In this case, achieving the size reduction of the cyst, the percutaneous drainage was considered successful. Normal UPC, blood urea and creatinine levels after the

procedure indicated that the kidneys were functioning normally. Only a hyperechoic lesion without demarcation was detected in the left kidney on the last ultrasonographic examination. The slightly hyperechoic lesion was interpreted as a scar tissue.

Although the reported rate of sclerotherapy complications such as ischemia, necrosis and bleeding is low, with percutaneous drainage alone, they were avoided altogether. In conclusion, the procedure in the present case provided complete resolution of the renal cyst and improvement of the renal function. Further studies are needed to evaluate the success and recurrence rate of single percutaneous drainage in comparison to single or multiple sclerotherapy of renal cysts in veterinary medicine using a larger number of cases and long-term follow-up.

The facts that symmetric dimethylarginine was not assessed in the evaluation of kidney function and that the cause of the renal cyst could not be determined are both limitations in this case report.

Authors' contributions

EG performed the clinical and ultrasonographic examinations and the treatment procedure; EG and EOU participated in the data analysis and interpretation and also manuscript writing; EOU and BBE contributed to the radiological examination, data analysis and interpretation.

Competing interests

The authors declare that they have no competing interests.

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SLUČAJ SOLITARNE BUBREŽNE CISTE KOD ŠI-CUA

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Kratak sadržaj

U ovom radu opisan je slučaj solitarne bubrežne ciste kod ši-cua. Na osnovu kliničkih i laboratorijskih pregleda, ultrazvučne i radiološke dijagnostike, postavljene su diferencijalne dijagnoze. Pas je poslat na Kliniku za male životinje Fakulteta veterinarske medicine, Univerziteta Slečuk na dalji pregled nakon jednonedeljnog lečenja u privatnoj veterinarskoj klinici. Na klinici fakulteta otkrivena je bubrežna cista koja je uspešno lečena ultrazvučno vođenom perkutanom drenažom. Stanje psa je praćeno dva meseca nakon procedure, tokom kojih je rađen ultrazvuk bubrega, a dalje stanje je praćeno putem telefonskih razgovora sa vlasnikom. Početne tegobe, kao što su anoreksija i letargija su nestale posle tretmana. Ultrazvučno posmatrano izgled ciste se promenio od ovoidne anehogene strukture u blago hiperehogenu leziju ožiljka.

Ključne reči: pas, perkutana drenaža, bubrežna cista, ultrazvuk