

## Renal Subcapsular Abscess Associated with Pyometra in a Dog

Tae Sung Hwang\*, Soyon An\*, Moonyeong Choi\*\*, Joong Hyun Song\*, Dong-in Jung\* and Hee Chun Lee\*<sup>1</sup>

\*Institute of Animal Medicine, College of Veterinary Medicine, Gyeongsang National University, Jinju 52828, Korea

\*\*Yangsan S animal Medical Center, Yangsan 50614, Korea

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**Abstract :** A 12-year-old intact female Pomeranian dog was presented with vulvar discharge, lethargy, polyuria, and polydipsia. A complete blood count revealed leukocytosis and anemia. The serum biochemical analyses showed elevated serum alkaline phosphatase activity and blood urea nitrogen. Survey abdominal radiography revealed an enlarged left kidney. Abdominal ultrasonography identified multiple rounded hypoechoic subcapsular lesions in the left kidney. The bilateral uterine horn was enlarged, and contained echogenic fluid. Percutaneous ultrasonographic-guided aspiration of the renal subcapsular lesions was performed on the left kidney. Cytological examination revealed bacterial cocci, degenerated neutrophils, and suppurative inflammation. Bacterial culture produced growth of *Escherchia coli*. Left nephrectomy and ovariohysterectomy were performed. Dilated uterine fluid was also evaluated for bacterial culture, and showed growth of *E. coli*. Urine was examined by bacterial culture, and showed negative results. The treatment consisted of antibiotic therapy according to the antibiotic sensitivity test. Based on these findings, the diagnosis was renal subcapsular abscess associated with pyometra. This study suggests that pyometra should be considered as the cause of renal abscess.

**Key words :** renal abscess, subcapsular, pyometra, dog.

### Introduction

Renal subcapsular abscess (RSA) is defined by a suppurative process between the renal parenchyma and the renal capsule (8). RSA is a rare finding in veterinary medicine (3,8) and human (7). RSA is known to develop from hematogenous systemic infection, or ascending infection of the urinary tract (6,7). Nephrolithiasis and obstruction of the urinary tract are also known to cause RSA (1,6). Clinical signs were unspecific, such as abdominal pain, depression, fever, and loss of appetite (3,4).

Abdominal radiography could identify renomegaly and loss of detail in the retroperitoneum (5,14). Ultrasonography is an excellent examination for evaluating renal parenchyma and renal subcapsular fluid in veterinary medicine (3,5,8). A sampling of renal subcapsular fluid using ultrasonic guidance is important to differentiate abscess, hemorrhage, urine leakage, and neoplasia (10). In human, computed tomography is a reliable tool to diagnose renal abscess (2).

Antibiotic therapy is not effective, and percutaneous abscess drainage under ultrasound guidance or surgical treatment have shown better results (6). Nephrectomy was required for treatment in cases with unilateral RSA (1,9). The prognosis of RSA is poor (1).

This report describes the rare case of treatment using unilateral nephrectomy and ovariohysterectomy, to treat RSA and pyometra in a dog.

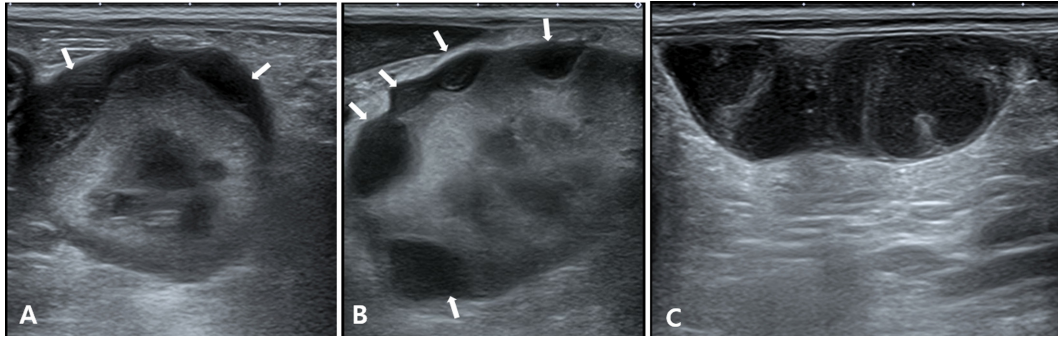
### Case

A 12-year-old intact female Pomeranian dog, weighing 3 kg, was examined for signs of vulvar discharge, lethargy, polyuria, and polydipsia. On physical examination, the respiratory rate was 30 breaths/min, heart rate was 110 beats/min, rectal temperature was 37.6°C, capillary refill time was delayed, and mucous membranes were pale. Enlarged vulva and yellow-gray vaginal discharge were identified.

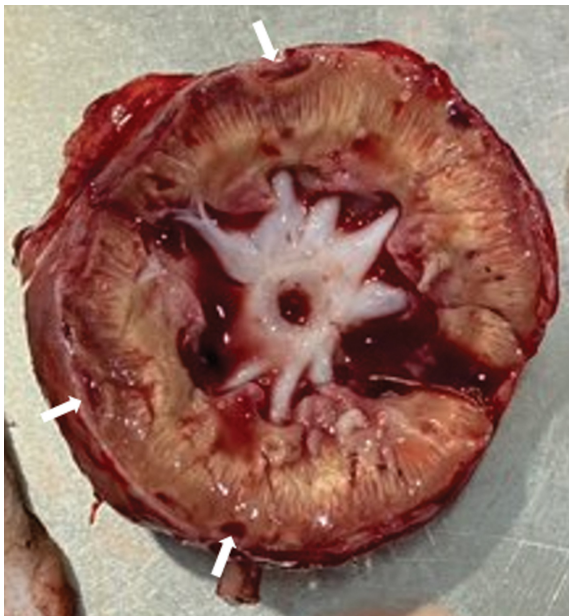
A complete blood count (CBC) revealed leukocytosis ( $22.4 \times 10^9/L$ , reference range:  $6.0-12.0 \times 10^9/L$ ), anemia (hematocrit 12.4%, reference range: 37.0-55.0%), and increased platelet count ( $1,077 \times 10^9/L$ , reference range:  $200-500 \times 10^9/L$ ). The serum biochemical analyses showed elevated serum alkaline phosphatase activity (1,083 U/L, reference range: 47-254 U/L) and blood urea nitrogen (31.1 mg/dL, reference range: 9.2-29.2 mg/dL). Creatinine and total protein were normal.

Survey abdominal radiography revealed enlarged left kidney. Abdominal ultrasonography identified multiple rounded hypoechoic subcapsular lesions in the left kidney (Figs 1A and B). The renal cortex was hyperechoic with normal corticomedullary junction. Bilateral uterine horn was enlarged, and contained echogenic fluid (Fig 1C). Percutaneous ultrasonographic-guided aspiration of the renal subcapsular lesions was performed on the left kidney. Sample was sent for cytologic examination, bacterial culture, and antibiotic sensitivity tests. Cytological examination revealed bacterial cocci, degenerated neutrophils, and suppurative inflammation. Bacterial culture produced growth of *Escherchia coli* (*E. coli*), which was sensitive to most antibiotics tested, excluding erythromycin and clindamycin. Urine was examined by antibiotic sen-

<sup>1</sup>Corresponding author.  
E-mail : lhc@gnu.ac.kr



**Fig 1.** Ultrasonographic images of the left kidney and left uterine horn. Transverse (A) and sagittal (B) views of the left kidney, showing multiple hypoechoic subcapsular fluid that contained echogenic debris (arrows). Sagittal view of the enlarged uterine horn (C) contains echogenic fluid.



**Fig 2.** Surgically removed left kidney. Suppurative hemorrhagic fluid was shown in the subcapsular space (arrows).

sitivity tests and bacterial culture, which showed negative results. Based on these findings, RSA with pyometra was the tentative diagnosis.

Before surgical access, blood transfusion of fresh whole blood was performed after cross-matching. There were no complications, and after transfusion, packed-cell volume was 21.5%. Left nephrectomy and ovariohysterectomy were performed. Suppurative inflammatory fluid was shown in the left renal subcapsular space (Fig 2). The fluid of dilated uterus was also evaluated for bacterial culture, which showed growth of *E. coli*. The dog recovered unremarkably after surgery. The treatment consisted of amoxicillin-clavulanic acid (12.5 mg/kg, IV, twice a day) according to the antibiotic sensitivity test for 10 days. After 10 days, the dog got well and discharged from hospital at the client's request.

## Discussion

The exact incidence of RSA in veterinary medicine is not known. In human, renal abscesses are classified as perirenal

or intrarenal. Perirenal abscess develop from hematogenous infection or ruptured intrarenal abscess (7). Intrarenal cortical abscesses are thought to develop secondary to hematogenous bacterial infection, whereas corticomedullary abscesses are considered to result from an ascending infection of the urinary tract (7). One of the causes of the elevated incidence of ascending infection of the urinary tract in human with diabetes mellitus is considered to be impaired leucocyte function (11). Increased progesterone concentration may be further immunosuppressive in dog (13). However, in our case, progesterone concentration was not measured. Our case was subcapsular abscess, and therefore intrarenal. *E. coli* was cultured from the uterine and intrarenal abscess except urine. We considered bacterial spread along the blood from the uterus to the kidney.

Survey abdominal radiography may in some cases reveal renomegaly (3,8,14). Abdominal ultrasonography identified subcapsular hypoechoic lesions and renal parenchymal echogenicity change (3,8,14). The differential diagnosis of renal subcapsular lesion includes urine collection, hematoma, abscess, and neoplasia. A sampling of renal subcapsular lesions using percutaneous ultrasonographic-guidance is useful to differentiate other renal diseases (10). In human medicine, the diagnosis rate of renal abscesses was increased by advanced imaging, such as CT and MRI (7). The CT helps differentiate other mass-like lesions, and allows the detection of small sized renal abscesses. MRI is more specific and sensitive than CT to differentiate renal abscess from other renal diseases (7).

In human medicine, in small abscess (< 3 cm), medical treatment using antibiotics is recommended; whereas for large abscess (> 5 cm), percutaneous or surgical drainage is advised (12). Antibiotic treatment is maintained until radiological and complete clinical recovery (12). Most study describes nephrectomy for the treatment of unilateral renal abscess in veterinary medicine (1,9). Surgical procedure to drain using capsulotomy with omentopexy may be considered for the dog with bilateral renal abscess (4). We performed the left nephrectomy and antibiotics therapy.

The limitation in our case is that histopathologic examination was not performed. However, suppurative inflammation and *E. coli* were confirmed by cytology and bacterial culture in renal subcapsular fluid.

## Conclusion

This case described RSA associated with pyometra in a dog. While the RSA is rare, various primary causes, such as hematogenous and urinary tract infection, should be considered if diagnosed. Among them, pyometra should also be considered.

## References

1. Agut A, Laredo F, Belda E, Soler M, Seva J. Left perinephric abscess associated with nephrolithiasis and bladder calculi in a bitch. *Vet Rec* 2004; 154: 562-565.
2. Alcina EL, Guzman SA, Monfort JJ, Escriva AF, Cruz FJ. Renal and perirenal abscess. *Actas Urol Esp* 1999; 23: 135-139.
3. Faucher MR, Theron ML, Reynolds BS. Renal abscesses in cats: six cases. *J Feline Med Surg* 2017; 19: 484-492.
4. Guedes RL, Dornbusch PT, Costa BN, Froes TR, Sousa MG, Oliveira ST. Renal capsulotomy associated with omentopexy for treatment of bilateral perinephric abscess in a bitch: case report. *Semin Cienc Agrar* 2018; 39: 2301-2306.
5. Hess R, Ilan I. Renal abscess in a dog with transient diabetes mellitus. *J Small Anim Pract* 2003; 44: 13-16.
6. Hutchison FN, Kaysen GA. Perinephric abscess: the missed diagnosis. *Med Clin North Am* 1988; 72: 993-1014.
7. Lee BE, Seol HY, Kim TK, Seong EY, Song SH, Lee DW, Lee SB, Kwak IS. Recent clinical overview of renal and perirenal abscesses in 56 consecutive cases. *Korean J Intern Med* 2008; 23: 140-148.
8. Lee H, Chang J, Jung J, Oh S, Kim J, Kim W, Yoon J, Choi M. Unilateral renal subcapsular abscess associated with pyelonephritis in a cat. *J Vet Clin* 2010; 27: 79-82.
9. Lewis DC, Adamson DR, Jacobs, KA, Lamb WA. Pyelonephritis, nephrolithiasis and perinephric abscessation in a dog. *Aust Vet J* 1988; 65: 195-196.
10. Nyland TG, Widmer WR, Mattoon JS. Urinary tract. In: *Small Animal Diagnostic Ultrasound* 3<sup>rd</sup> ed. St. Louis, Missouri: Saunders, Elsevier. 2015; 578-580.
11. Patterson JE, Andriole VT. Bacterial urinary tract infections in diabetes. *Infect Dis Clin North Am* 1995; 9: 25-51.
12. Siegel JF, Smith A, Moldwin R. Minimally invasive treatment of renal abscess. *J Urol* 1996; 155: 52-55.
13. Siiteri PK, Febres F, Clemens L, Chang RJ, Gondos B, Stites D. Progesterone and maintenance of pregnancy: is progesterone nature's immunosuppressant? *Ann N Y Acad Sci* 1977; 286: 384-397.
14. Zatelli, A, D'Ippolito P. Bilateral Perirenal Abscesses in a Domestic Neutered Shorthair Cat. *J Vet Intern Med* 2004; 18: 902-903.