

Unilateral renal subcapsular abscess associated with *Escherichia coli* infection in a Dog

Rohini B.G.¹, Arun George², U. N. Pillai³, M. Unny⁴, Ambily R⁵.

¹MVSc Scholar, ²Assistant Professor, ³Professor and Head, ⁴Associate Professor, ⁵Assistant Professor
^{1,2,3}Department of Veterinary Clinical Medicine, Ethics and Jurisprudence, ⁵Department of Veterinary Microbiology, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala-680651.

Abstract

Occurrence of renal abscess is uncommon in canine practice. A sixteen month old female Saint Bernard dog was presented to the medicine unit of University Veterinary Hospital, Kokkalai, Kerala with a complaint of anorexia, fever, reduced urination and black coloured watery faeces for the past 3 days. On clinical examination, dog was found dull, dehydrated, emaciated and evinced pain on palpation of sub-lumbar region. Blood picture showed leucocytosis, anaemia and azotemia. Ultrasonogram revealed a round hypoechoic structure within the capsule of right kidney suggestive of abscess. On ultrasound-guided percutaneous aspiration, a blood-tinged purulent material was obtained which on culture revealed *Escherichia coli* organisms. The case was diagnosed as unilateral renal subcapsular abscess due to *Escherichia coli* infection. Antibiotic treatment and supportive therapy were unsuccessful in saving the patient. This report describes a rare case of renal failure and unilateral renal subcapsular abscess associated with *Escherichia coli* infection in a dog.

Key words: Dog, Renal subcapsular abscess, *E. coli*, Ultrasonography

In dogs, occurrence of renal and perirenal abscess are uncommon. Renal subcapsular abscess could develop from hematogenous systemic infection, or from ascending infection of the urinary tract (Hutchison and Kaysen, 1988). Clinical signs were usually non-specific, such as abdominal pain, depression, fever, and loss of appetite (Faucher *et al.*, 2017).

Renal subcapsular abscess in dogs had been reported by Cola *et al.*, (2020) in Italy and by Hwang *et al.*, (2020) in Korea. But, on a through literature review and to the best of author's knowledge, this is the first report in dogs in India.

Case History and Observations

A 16 months old female Saint Bernard weighing 30 kg was presented to the University Veterinary Hospital, Kokkalai with a complaint of anorexia, fever, reduced urine output and black coloured watery faeces for past 3 days. Clinical examination revealed dehydration, dullness, pale mucous membranes, tachypnea (56 breaths/min), tachycardia (136 beats/min), pyrexia (103.2°F) and pain on palpation of the sub-lumbar region. Complete blood count, serum biochemistry, blood gas analysis (Table 1-2) revealed leucocytosis with lymphocytosis and monocytosis, anaemia, thrombocytopenia, an elevation in serum creatinine, BUN and phosphorus and a reduction

in blood pH and HCO₃⁻ level. Urine dipstick test revealed the presence of proteinuria and high level of RBCs and WBCs (Table.3). The urine protein-creatinine ratio was 0.63.

Abdominal ultrasonography revealed rounded hypoechoic subcapsular lesions in the right kidney (Fig. 1) though poor corticomedullary differentiation and loss of architecture in both the kidneys. Renal resistive index (RRI) of left and right kidney detected by doppler ultrasonography was 0.78 and 0.76, respectively and is shown in Fig.2 (Reference interval: 0.56-0.67).

Table 1: Complete blood count

Parameters	Measured Value	Reference Range
WBC (x10 ³ /μL)	20.4	6-17
Lymphocyte (x10 ³ /μL)	9.2	0.7-5.1
Monocyte (x10 ³ /μL)	3.0	0.2-1.7
Granulocyte (x10 ³ /μL)	8.3	4.4-12.6
RBC (x10 ⁶ /μL)	2.30	5.5-8.5
Hct (%)	18.6	37-55
Hb (g/ dL)	6.1	11-19
MCV (pg)	69.4	62-72
MCHC (g/ dL)	30.6	30-38
Platelets (x10 ³ /μL)	169	160-525

*Corresponding author: rohiniganagadhar27@gmail.com

Table 2: Serum biochemical results

Parameters	Measured Value	Reference Range
Urea(mg/dl)	59.53	9.2-29.2
Creatinine (mg/dL)	10.37	0.5-1.7
Phosphorus (mg/ dL)	16.09	2.5-6
Blood pH	6.58	7.36-7.44
HCO ₃ ⁻ (mmol/L)	5.3	24.0-26.0
Potassium (mmol/L)	2.1	3.9-4.9
ALT (U/L)	38.44	10-109
ALP (U/L)	46	5-55

Percutaneous ultrasound-guided aspiration of renal subcapsular lesion on the right kidney (Fig. 3) revealed a thick, blood-tinged purulent fluid (Fig. 4). Cytological examination of aspirated sample revealed bacterial cocci, numerous pus cells and few RBCs (0-2/HPF). Bacterial culture of both aspirated sample and urine produced heavy growth of *E. coli*. Azotemia was considered renal due to a lack of response to diuresis by fluid therapy and frusemide administration. Based on these findings, the case was diagnosed as renal failure and unilateral renal subcapsular abscess due to *E. coli* infection. Prognosis of the case was grave.

Treatment and Discussion

Treatment was initiated with intravenous injection of amoxicillin-sulbactam @ 12.5 mg/kg BW twice a day, pantoprazole @ 1 mg/kg BW, once a day and ondansetron @ 0.5 mg/kg BW, once a day and intramuscular injection of 2 ml polybion (B-complex). Though treatment was continued the next day, the dog passed away even before the bacterial culture results arrived. The owner was unwilling for a post mortem examination.

Renal subcapsular abscess is defined as a suppurative process between the renal parenchyma and the renal capsule (Lee *et al.*, 2010). A renal subcapsular abscess differs from a renal abscess in which the latter is located in the cortical or cortico-medullary parenchyma (Demby and Adriole, 1997). Intrarenal cortical abscesses develop secondary to hematogenous bacterial infection, whereas corticomedullary abscesses are considered to result from an ascending infection of the urinary tract (Lee *et al.*, 2008). The pathogenesis of the unilateral renal subcapsular abscess in this case remains less clear. The concomitant positive culture for *E. coli* of the urine

Table 3: Urinary dipstick and physical examination findings

Parameters	Measured value
Colour	Yellow
Consistency	Turbid
Protein (g/ dL)	1.0
Specific gravity	1.015
pH	Acidic
RBC(/ μ l)	200
WBC (/ μ l)	125
Urine spot protein (mg/ dL)	49.5
Urine spot creatinine (mg/ dL)	78.9
UPC	0.63

and subcapsular pus possibly suggests an ascending UTI. Anderson and McAninch (1980) reported a high correlation between organism grown in urine culture and the abscess and repeated urine cultures were positive for the causative organism in almost all cases. In this case both renal subcapsular abscess and urine yielded heavy growth of *E. coli* organisms which were similar to the findings of Hess and Ilan (2003). *Staphylococcus* spp. was isolated by Cola *et al.* (2020) in dog with renal subcapsular abscess.

Clinical signs were non-specific. Fever, lethargy, anorexia and diarrhoea were similar to the findings of Lewis *et al.* (1998) and Hess and Ilan (2003).

Sampling of renal subcapsular fluid using ultrasonic guidance was important to differentiate abscess, haemorrhage, urine leakage, and neoplasia. Percutaneous abscess drainage under ultrasound guidance or surgical treatment had shown better results (Hwang *et al.*, 2020).

Treatment of renal abscess in humans required at least 4 weeks of antibiotics depending on the etiological agent or an empirical therapy for gram negative bacteria when the causative agent is not isolated. A sub-optimal response to antibiotics required surgical intervention. In dogs, nephrectomy was indicated in renal or perirenal abscess owing to severe damage to the kidney parenchyma or the deep location of the lesion (Lewis *et al.*, 1988; Agut *et al.*, 2004).

Conclusion

Renal abscess is a rare renal pathology in dogs. Abdominal ultrasound and ultrasound guided aspiration of the abscess are helpful in establishing an early diagnosis.

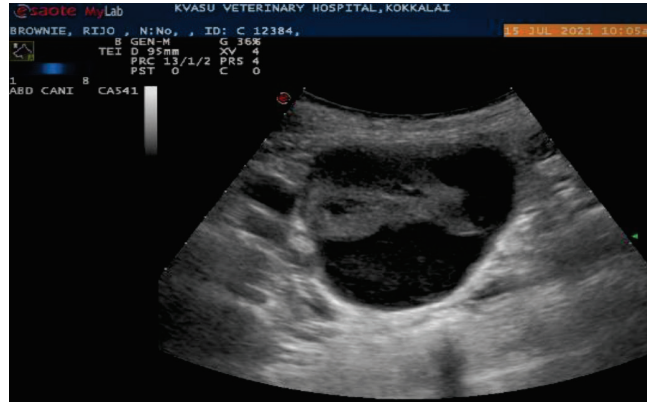


Fig. 1. Ultrasonogram of right kidney with a hypoechoic subcapsular lesion suggestive of abscess

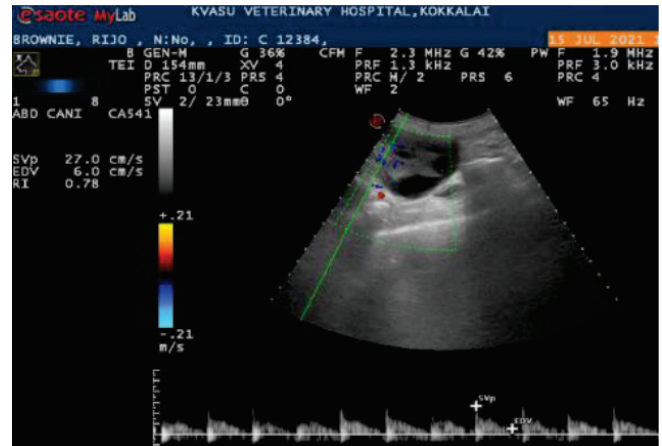
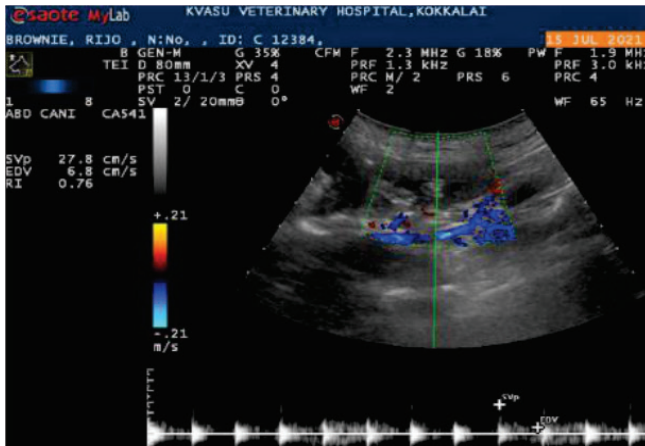


Fig.2. Doppler ultrasonogram showing high RRI in both kidneys.



Fig. 3. Percutaneous ultrasound-guided aspiration of the renal subcapsular abscess.



Fig. 4. Blood-tinged purulent material (left) and yellowish turbid urine (right)

This article reports a case of renal failure and unilateral renal subcapsular abscess due to *E.coli* infection in a Saint Bernard.

References

- Agut, A., Laredo, F.G., Belda, E., Soler, M. and Seva, J. 2004. Left perinephric abscess associated with nephrolithiasis and bladder calculi in a bitch. *Vet. Rec.* **154**: 562-65.
- Anderson, K.A. and McAninch, J.W. 1980. Renal Abscesses: Classification and review of 40 cases. *Urology.* **16**: 333-38.
- Cola, V., Foglia, A., Pisoni, L., Dondi, F., Avallone, G., Gruarin, M., Zanardi, S., Rinnovati, R. and Del Magno, S. 2020. Kidney-Sparing Surgery for Renal Subcapsular Abscess Caused by *Staphylococcus pseudintermedius* in a Dog. *J. Am. Anim. Hosp. Assoc.* **56(4)**: 242-47.
- Faucher, M.R., Theron, M.L. and Reynolds, B.S. 2017. Renal abscesses in cats: six cases. *J. Feline Med. Surg.* **19**: 484-92.
- Hwang, T.S., An, S., Choi, M., Song, J.H., Jung, D.I. and Lee, H.C. 2020. Renal Subcapsular Abscess Associated with Pyometra in a Dog. *J. Vet. Clin.* **37(6)**: 360-362.
- Hess, R. S. and Ilan, I. 2003. Renal abscess in a dog with transient diabetes mellitus. *J. Small Anim. Pract.* **44**: 13-16.
- Hutchison, F. N. and Kaysen, G. A. 1988. Perinephric abscess: the missed diagnosis. *Med. Clin. N.* **72 (5)**: 993-1014.
- Lee, B.E., Seol, H.Y., Kim, T.K., Seong, E.Y., Song, S.H., Lee, D.W., Lee, S.B., Kwak, I.S. 2008. Recent clinical overview of renal and perirenal abscesses in 56 consecutive cases. *Korean J. Intern. Med.*, **23**: 140-48.
- Lee, H., Chang, J., Jung, J., Oh, S., Kim, J., Kim, W., Yoon, J., Choi, M. 2010. Unilateral renal subcapsular abscess associated with pyelonephritis in a cat. *J. Vet. Clin.*, **27**: 79-82.
- Lewis, D.C., Adamson, D.R., Jacobs, K.A. and Lamb, W.A. 1988. Pyelonephritis, nephrolithiasis and perinephric abscessation in a dog. *Aust. Vet. J.*, **65**: 195-96.

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