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CASE REPORT

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Multiple Renal Cyst Case in a Dog: Evaluation of Resistive Index

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S U M M A R Y

A male, 6 months aged, crossbred dog which was brought to Kocatepe University, Animal Hospital with dysuria complain formed the presented case material. A mild abdominal pain was identified in the clinical examination. Whole blood values and serum biochemistry findings were all within the reference range. In the performed abdominal ultrasonographic examination, inflammatory rashes and wall thickening were identified in the bladder whereas multiple parenchymal cysts with an unknown etiology were identified in the right kidney. Measured resistive index was above the reference values reported in the literature. Presented case results emphasize that the resistive index alone, measured by doppler ultrasonography in multiple renal cyst cases in young dogs, may not be a sufficient diagnostic parameter to assess parenchymal injury. And, in case of parenchymal damage, serum biochemical parameters must be compatible with resistive index.

Key Words
Doppler
Hematuria
Kidney Failure
Renal Function

ÖZET

Bir Köpekde Multiple Renal Kist Olgusu: Rezistif İndeksin Değerlendirilmesi

Sunulan vaka materyalini; Afyon Kocatepe Üniversitesi, Hayvan Hastanesi'ne dizüri şikayeti ile getirilen, altı ay yaşlı, melez ırk erkek köpek oluşturdu. Hastanın klinik muayenesinde hafif derecede abdominal ağrı belirlendi. Tam kan değerleri ve serum biyokimya ve idrar analiz bulguları referans sınırlar içerisinde ölçülmüştür. Gerçekleştirilen abdominal ultrasografik muayenede idrar kesesinde döküntü ve kese duvarında kalınlaşma, sağ böbrekde ise, etiyolojisi belli olmayan, multiple parankim kisti tespit edildi. Rezistif indeks (Rİ = 0.85), literatürde belirtilen referans değerlerin üzerinde ölçülmüştür. Sunulan vaka sonuçları; genç köpeklerde multiple renal kist olgularında doppler ultrasonografik olarak ölçülen rezistif indeks parametresinin renal paranşimal hasarın değerlendirilmesinde tek başına yeter diagnostik bir parametre olmadığına vurgu yapmaktadır. Paranşimal hasar olgularında, ölçülen rezistif indeks değeri biyokimyasal ölçüm sonuçları ile uyumlu olmalıdır

Anahtar Kelimeler
Doppler
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Renal Fonksiyon

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INTRODUCTION

Renal cyst can be congenital or acquired, solitary or multiple, in one of the kidneys or in both kidneys (Finn-Bodner 1995, Greco 2001). Renal cysts are rarely seen in dogs (Kitshoff et al. 2011) whereas more common in cats (Karabagli and Kaymaz 2009, Paskalev et al. 2012). Renal cysts that are seen in dogs are small, solitary and insignificant in contrast to those seen in cats (Finn-Bodner, 1995). Renal cysts develop particularly in long-haired cats, especially in the Persian breed (Biller et al. 1996). Polycystic kidney disease in cats is a genetic disease. In dogs, on the other hand, polycystic kidney disease is reported to be common in Terriers (O'Leary et al. 1999). Symptoms related to cysts usually present at older ages in cats (Karabagli and Kaymaz, 2009). As well as in dogs, the clinical course of the disease is generally non-specific. Strain, vomiting, anorexia, polydipsia, polyuria and weight loss can be seen (Biller et al. 1996). The disease is usually diagnosed during the abdominal ultrasonography or X-ray performed for various reasons. Ultrasonography is a non-invasive method which can be used for identifying cysts. Cysts, wherever they localize, are viewed as round, well-shaped, anechoic structures with thin borders (Paskalev et al. 2012).

In recent years, the use of doppler ultrasounds in the diagnosis of kidney diseases have become more common as the sonographic technologies improved. Doppler is a non-invasive method used for identifying the perfusion of major organs (Platt et al. 1991).

Resistive index (RI) is a measurement parameter obtained by determining the arterial vascular resistance by using pulsed-wave Doppler (Morrow et al. 1996). It is particularly very important in assessing blood circulation in parenchymal diseases. RI shows changes in various parenchymal diseases including uremic syndrome, interstitial nephritis, diabetic nephropathy and polycystic disease. In glomerulonephritis RI may not change (Platt et al. 1991). In human studies suggested that RI may change depending on age (Bude et al. 1992). However, there are also reports which suggest that age does not affect RI (Morrow et al. 1996). Threshold RI value for adults is accepted as 0.70 (Platt et al. 1991, Morrow et al. 1996). Moreover, Morrow et al. (1996) made measurements on 22 healthy kidneys in a study they conducted using dogs and calculated the mean RI value as 0.61 (SE=0.06). The same study also reported that there was no correlation between clinical parameters (hematuria, crystal and cast presence, proteinuria, BUN, Creatinine) and RI.

CASE HISTORY and CLINICAL EXAMINATION

A male, 6 months of aged, crossbred dog which was brought to Kocatepe University, Animal Hospital, Afyonkarahisar, Turkey with dysuria complain formed the presented case material. A mild abdominal pain was identified in the clinical examination. Whole blood count, serum biochemistry and urine analysis findings are presented in Tables 1-3.

Table 1: Haematological Analysis Results.

Parameters	Measured Value	Reference Range
WBC(x10³µL)	13.6	6-17
Lymphocyte(%)	16.3	12-30
Monocyte(%)	4.4	2-9
Granulocyte(%)	79.3	60-83
RBC(x106µL)	5.85	5.5-8.5
Hct	40.5	39-56
Hb(g/dl)	12.4	11-19
MCV(pg)	69.4	62-72
MCHC(g/dl)	30.6	30-38
Platelets(x109/L)	419	11-15.5

Table 2: Serum Biochemical Analysis Results.

Parameters	Measured Value	Reference Range
ALT(U/L)	22	5-60
AST(U/L)	46	5-55
ALP(U/L)	113	10-150
Urea(mg/dl)	25.9	18.8-55.6
Creatinine(mg/dl)	0.81	0.5-1.7
Total protein(g/dl)	5.66	5.5-7.5
Glucose(mg/dl)	82	60-125

Table 3: Urine Analysis Results.

Parameters	Measured value
Colour	Amber
Glucose	Neg
Bilirubin	Neg
Ketones(mg/dl)	2.5
Specific gravity	1.025
RBC(/µl)	250
pH	6
Protein(mg/dl)	75
Urobilinogen(mg/dl)	1
Nitrit	Neg
WBC(/µl)	25

In the performed abdominal ultrasonographic examination of the patient, inflammatory rashes and wall thickening (thickness of the full bladder=0.23 cm) were identified in the bladder whereas multiple parenchymal cysts (Figure 1) were identified (two different cysts with dimensions=0.47x1 cm and 0.26x0.41 cm) in the right kidney (kidney dimensions=2.22x6.10 cm). RI was determined as 0.85 in the pulse wave Doppler measurement. During RI measurement, the dog's nostrils and mouth was closed for approximately 5 seconds following inspiration in order to minimize the artefact that forms due to patient's breathing and to prevent possible measurement errors. During the routine abdominal ultrasonographic assessment, no pathological findings were detected in the examination of the liver and other abdominal organs.

Fig 1: Renal Cysts on The Right Kidney.

DIAGNOSIS

Abdominal and Doppler ultrasonography were performed with Esaote-MyLab Five Vet machine. Hair was clipped and acoustic gel was applied to the skin. The animals were fasted for 12 h and they were in supine recumbency to scan the kidney. 5 MHz multifrequency microconvex trancuder was used. Color Doppler was used to visualize the intrarenal vasculature. Subsequent pulsed wave Doppler interrogation from the arteries was obtained with SV size 2-11 mm on 45^{o} degree angle and a frequency of 5 MHz for depth of 8 cm. The RI was calculated automatically by the software of the ultrasound machine [RI=(peak systolic velocity)-(end diastolic velocity)/(peak systolic velocity)].

DISCUSSION

The patient that is the subject of the presented case report is 6 months old and displays non-specific clinical symptoms. The patient's hematologic and biochemical analysis results were assessed as within the reference range. While the reports regarding renal cysts in dogs are limited (Kitshoff et al. 2011, Karabagli and Kaymaz 2009), in a study they conducted on cats with polycystic renal cyst, measured the hematologic values as within the normal range whereas they detected an increase in the serum urea and creatinine levels. Similarly, a positive correlation between serum urea level and RI was determined in another study conducted with cats (Novellas et al. 2007). Koenhemsi et al. (2013) reported that the hematologic and biochemical measurement results were within the normal range in a cat with polycystic kidney disease. Novellas et al. (2007) on the other hand, detected a negative correlation between RI value and erythrocyte in a study they made using dogs.

Trace amounts of leukocyte, erythrocyte (250/µl) and 75mg/dl protein was detected in the whole urine analysis in the presented case. When the analysis findings are evaluated together with the ultrasonographic examination findings of the bladder (inflammatory rashes inside the bladder and wall thickening) this condition can be related to cystitis.

RI value was measured as 0.85 in the presented case. When the threshold value for RI is accepted as 0.70 (Platt et al. 1991, Morrow et al. 1996), the measured value can be related to a possible parenchymal injury. However, the measured RI value of the presented case not coincides with the general positive condition of the patient and the hematology and serum biochemistry parameters that are within the reference range. Koenhemsi et al. (2013) measured the RI value as 0.74 in a cat with polycystic kidney disease whereas Karabagli and Kaymaz (2009) determined the resistive index as 0.62 in a cat with a polycystic kidney. In a study that is conducted on 50 dogs, RI value was detected to be significantly higher compared to control group (Novellas et al. 2007). Morrow et al. (1996) determined the RI threshold value for the dogs as 0.70 in their study whereas they reported the RI value of 13 dogs with interstitial nephritis, tubular degeneration and renal cyst as > 0.70. As it is seen, different results are obtained in different studies conducted on renal cyst cases.

In conclusion, when the general positive condition of the patient and the serum urea and creatinine levels that are measured within the reference range together with the hematologic parameters that are within the normal values are all

taken into consideration for the presented case, we came to conclusion that calcd increased value of RI may not be accepted as a clear diagnostic parameter that gives exact results and which may not be used by itself in the process of evaluating the parenchymal injury in the renal cyst cases for the young dogs.

REFERENCES

Biller DS, DiBartola SP, Eaton KA, Pflueger S, Wellman ML, Radin MJ. 1996. Inheritance of polycystic kidney disease in Persian cats. J Hered. 1996; 87(1): 1-5.

Bude RO, Di Pietro MA, Platt JF, Rubin JM, Miesowicz S, Lundquist C. Age dependency of the renal resistive index in healthy children. Radiology. 1992; 184: 469–473.

Finn-Bodner ST. The Kidneys, In: Practical Veterinary Ultrasound, Ed; Cartee RE, Selcer BA, Williams and Wilkins, Philadelphia, USA. 1995; pp; 157-185.

Greco DS. Congenital and inherited renal disease of small animals. Vet Clin North Am Small Anim Pract. 2001; 31(2): 393-399.

Karabagli M, Kaymaz AA, A Case of polycystic kidney disease in a persian cat. İstanbul Univ Vet Fak Derg. 2009; 35(2): 51-56.

Kitshoff AM, McClure V, Lim CK, Kirberger RM. Bilateral multiple cystic kidney disease and renal cortical abscess in a Boerboel. J S Afr Vet Assoc. 2011; 82(2): 120-124.

Koenhemsi L, Gonul R, Or E. Renal doppler findings in a cat with polycystic kidney disease. Proc 10th National Veterinary Internal Medicine Congress, Urgup, Nevsehir, Turkey, 27-30th June, 2013, pp; 99.

Morrow KL, Salman MD, Lappin MR, Wrigley R. Comparison of the resistive index to clinical parametres in dogs with renal disease. Vet Radiol Ultrasound. 1996; 37(3): 193-199.

Novellas R, Espada Y, Ruiz De Gopegui R. Doppler ultrasonographic estimation of renal and ocular resistive and pulsatility indices in normal dogs and cats. Vet Radiol Ultrasound. 2007; 48: 69-73.

O'Leary CA, Mackay BM, Malik R, Edmondston JE, Robinson WF, Huxtable CR. Polycystic kidney disease in bull terriers. An autosomal dominant inherited disorder. Aust Vet J. 1999; 77(6): 361-366.

Paskalev M, Lazarov L, Atanasov A. A case of solitary renal cyst in a dog. BJVM. 2012; 15(1): 62-67.

Platt JF, Rubin JM, Ellis JH. Acute renal failure. Possible role of duplex doppler US in distinction between acute prerenal failure and acute tubular necrosis. Radiology. 1991; 179: 419–423.