Case Report

A Rare Anomaly: Advanced Congenital Hydronephrosis in a Cat

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Abstract

Hydronephrosis; is an abnormal condition that is the structures of the kidney, characterized by atrophy of the renal parenchyma and dilatation of the renal pelvis. It can occur due to congenital or acquired reasons. A 2-month-old female, mixed breed cat was admitted to our outpatient clinic with complaints of loss of appetite and vomiting for a week, which did not improve despite being treated in different clinics. The patient was applied for general physical examination, complete blood count, serum biochemistry analysis, urinalysis, and abdominal ultrasonography. In the general physical examination of the patient, it was determined that the kidneys were smaller than usual and had irregular borders. Nonregenerative, normochromic, and normocytic anemia were found in the complete blood count. In the serum biochemistry analysis, urea and creatinine values were much higher than usual. Proteinuria was found in urine analysis, and Urine Specific Gravity was determined as 1010. As a result of ultrasonographic imaging performed on our patient, it was determined that both kidneys were grade IV hydronephrotic. Nephrectomy or pyelography was not considered necessary. The owner was informed that the prognosis would be poor and euthanasia was recommended. The patient's owner refused euthanasia.

Keywords: Antibiogram, Anomaly, cat, congenital

Introduction

Hydronephrosis is an abnormality characterized by atrophy of the renal parenchyma, the structures of the kidney, and dilatation of the renal pelvis. It is rarely encountered in cats. It may be a congenital anomaly of development (ectopic ureter, stenotic ureters, torsion) or acquired (calculus causing urethral obstruction, ureter ligation during ovariohysterectomy operation, compression due to mass conditions). These occlusions can be partial or complete, as well as unilateral or bilateral. Urine accumulating in the kidneys by blocking the passage will cause nephropathy with the effect of increased pressure and ischemia, and the renal parenchyma will atrophy. The dilated and expanding parenchyma structure in the initial phase will increase the kidney size. In the chronic state, renal atrophy will be observed. In the diagnostic phase, In addition to the patient's anamnesis, palpable kidneys in the general clinical examination of the patient are suspicious (North, 1978; Ragni&Fews, 2008). There is no specific situation in the complete blood count. Anemia due to renal insufficiency may be seen. Symmetric dimethylarginine (SDMA), urea, and creatinine values higher than normal in serum biochemistry analysis indicate renal damage. In urine analysis, proteinuric and less concentrated urine are other results documenting renal parenchymal

impairment (Sparkes et al., 2016). Ultrasonography is an easy-to-use and non-invasive method used in definitive diagnosis. There is an international grading system in human medicine for hydronephrosis. The patient's further examination and surgical procedure indication is based on this system. In addition, clinical findings, primary etiology of obstruction, and unilateral or bilateral renal involvement should be considered (Onen, 2020).

Case Presentation

A 2-month-old female, a mix-breed cat who did not recover despite being treated in different clinics for a week with complaints of loss of appetite and vomiting, was admitted to our polyclinic (Figure 1).

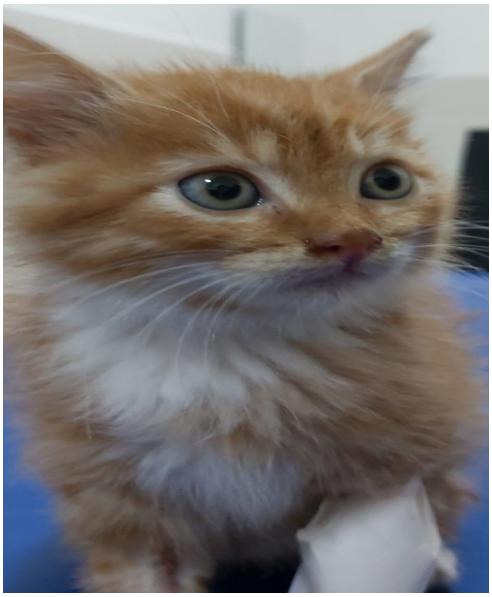

Figure 1: Two month years old, mix-breed cat with bilateral hydronephrosis.

According to the owner of the patient, the patient had no problem urinating. The patient was applied for general physical examination, complete blood count, serum biochemistry analysis, urinalysis, and abdominal ultrasonography.

In the general examination of the patient, he was markedly dehydrated and had submandibular lymphadenopathy. Abdominal palpation revealed distension; the kidneys were smaller than normal and had irregular borders. The complete blood count analysis found normocytic, normochromic, and nonregenerative anemia. In the serum biochemistry analysis, all values were normal except for urea (605.90 mg/dl), creatinine (5.69 mg/dl), and phosphorus (24.06 mg/dl). Hyperbilirubinemia was not found. In the urine analysis of the patient, it was observed that the urine was proteinuric and isostenuric. As a result of the ultrasonography examination, the renal parenchyma of the patient has disappeared; It was observed that it had an irregular, thin and hyperechoic cortex borderline. There was no proximal ureteral dilatation or ectopic ureter finding. No calculus or shadow artifacts abnormality was observed in the renal pelvis region. Renal dimensions: Left kidney length: 3.31 cm, height: 1.97 cm, right kidney length: 3.65 cm, height: 1.95 cm in the sagittal plane. The patient was diagnosed with bilateral Grade IV hydronephrosis. The hydronephrosis classification of the patient was made according to the Onen (2016) system. Pyelography was not applied because the Hydronephrosis Grade was too high (Grade IV). The patient was informed that the prognosis was poor, irreversible bilateral renal atrophy had occurred, and therefore the indication for surgery would not be positive. Euthanasia was recommended for the patient.

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Discussion

Hydronephrosis is a rare anomaly in cats. In kittens, it may occur due to a ureteral developmental abnormality in the embryonic period. It usually occurs unilaterally and allows the patient's condition to be improved by compensating the other kidney. However, bilateral hydronephrosis is irreversible if its degree is advanced. Patients develop chronic renal failure, and the general condition deteriorates rapidly. It is essential to identify the primary etiology. Two conditions cause Ureteropelvic Junction Type Hydronephrosis. The first of these is pelvis flexibility or resistance, the second is the degree of stenosis. While the flexibility of the pelvis increases and renal protection increases, hydronephrosis progresses with the increase in the severity of stenosis. Destruction of more than half of the cortex is characterized by irreversible damage. Decreased renal cortex and renal size mean completely dysfunctional kidneys. Renal parenchymal loss is an important indicator. Although the renal longitudinal size increases initially, atrophy afterward indicates chronic

destruction. Hydronephrosis is a condition that requires rapid diagnosis. The elapsed time may increase nephron destruction (Lee et al., 2014; Ioannidi et al., 2019; Kim et al., 2021; Kwon et al., 2022). Ultrasonography is the most beneficial non-invasive method for diagnosing hydronephrosis. With ultrasonography, kidney dimensions, renal parenchyma structure, ureteral dilatation, and degree of hydronephrosis can be examined. Our patient's renal sizes were smaller than usual, and there was severe parenchymal destruction. In patients with renal destruction, the leukocyte count may differ if the damage is due to infection. Anemia is encountered due to insufficiency of erythropoietin hormone due to renal impairment. Complete blood count does not show specific values. Our patient had anemia. High urea, creatinine, phosphorus, and SDMA in serum biochemistry analyses of patients indicate renal damage. In the serum biochemical analysis of our patient, urea, creatinine, and phosphorus values were high (Griffin, 2020), (Table 1).

Table 1: Some Haematologic Parameters from our patient

WBC 10^3/ mm3	7,18	HGB g/dl	8,10
NEU (%)	0,49	HCT (%)	23
LYM (%)	0,46	UREA (mg/dL)	605,90
MON (%)	0,01	CREA (mg/dL)	5,69
RBCX (10^6 / µ/l)	5,92	P (mg/dL)	24,06

(WBC: White Blood Cell, Neu: Neutrophil, Lym: Lymphocyte, Mon: Monocyte, RBC: Red Blood Cell, HGB: Haemoglobine, HCT: Haematocrit, Crea: Creatinine, P: Phosphorus.)

According to the classification made by the International Renal Interest Society (IRIS), our patient has Grade IV renal failure. A lower than average urine concentration and the presence of protein in the urine are indicators of renal failure. (Sparkes et al., 2016) The patient requires antegrade, intravenous, and retrograde pyelography in most cases. It reveals the imaging of the renal pelvic structures, the cause, and degree of obstruction, if any. If necessary, primary etiology is determined by using advanced examination tools such as pyelography, magnetic resonance, and tomography. Accordingly, the surgical indication is determined. The purpose of the surgical expression; is to initiate renal regeneration by eliminating the etiological factor in the kidney that has just been partially destroyed or to ensure the continuation of life with a single kidney by removing the destroyed kidney. All these planning are done within the scope of classified hydronephrosis (North, 1978; Lee et al., 2014; Ioannidi et al., 2019; Kwon et al., 2022). Although there is a classification system for chronic renal failure in veterinary medicine, there is no classification for hydronephrosis. There are different classification systems in human medicine. The Onen Classification System , accepted by other disciplines, is widely used. In our case, it was classified according to this system. The One method, which has already been blended from different systems until today, is widely used in pediatric urology, the operator is independent, and variations are minimized. Anteroposterior diameter (AP) is not considered in this classification system because there are variations in AP diameter due to dilatation of the pelvicocalisial region, which misleads the physician. There are two main points in this system. The first is the degree of pelvicalyceal dilatation, and the second is renal parenchymal degeneration. In other words, parenchymal echogenicity of cystic or mass structures is investigated together with cortical and medullar thicknesses (Onen, 2020). Our patient has severe hydronephrosis, Grade IV in the Open Classification. In our patient, dilatation of the pelvis and calyx was severe, total loss of the medulla occurred, and the cortex was thinned. Calyx structures are unclear (Figure 2).

Figure 2: Hydronephrosis in left kidney and right kidney. Sagittal plane length and height measurement. (Left Kidney:3.31*1.97cm, Right Kidney: 3.65*1.95 cm)

The corticomedullary border has disappeared. Considering this situation, It was understood that pyelography application was unnecessary in our two-month-old patient. There is no indication for surgery because of bilateral, irreversible destruction.

Since our patient had severe bilateral hydronephrosis and irreversible damage was formed, euthanasia was recommended. The patient's owner did not accept the euthanasia decision. The patient was treated for chronic renal failure (fluid therapy, gastroprotective agents, antiemetic therapy, antibiotic, etc.) (Sparkes et al., 2016). There was no news from the patient after the first day. Congenital bilateral hydronephrosis of grade IV is a rare case diagnosed. No such advanced case has been found in world literature. It also emphasizes the importance of the multisystemic examination approach toward the patient.

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