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CASE REPORT

# Cystitis and Bilateral Pyonephrosis in a Mixed Breed Goat

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**A B S T R A C T**

Pyonephrosis defined as suppurative destruction of the parenchyma of the kidney and rarely reported in domestic animals. The aim of this case report was to evaluate pyonephrosis in the goat by clinical, laboratory and ultrasonographic examinations. A 4-years-old mixed breed doe goat in 45 kg body weight, having complaints with abdominal distension, dysuria, strangury, abdominal pain, groaning, and lethargy, was used. General physical and laboratory examinations, ultrasonographic imaging, and microbiological analysis were performed. Goat was euthanized by the owner request because of bad clinical situation and prognosis. Pyonephrosis and cystitis were determined in this mixed breed goat in the light of clinical, laboratory, ultrasonographic imaging, and especially post-mortem examinations. In conclusion, the results of this case report will provide important insights into pyonephrosis less frequently seen in goats in the clinics.



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## INTRODUCTION

Diseases of the urinary system in sheep and goat have been less frequently reported in comparison to other ruminants (Kumar *et al.*, 2013; Benavides *et al.*, 2015). Clinically, kidney disease is rarely encountered as a major problem in small ruminant but coincidental renal disorders often can be detected at necropsy (Meredyth *et al*, 2012; Kumar *et al*., 2013; Benavides *et al*., 2015). Pyelonephritis is mostly uncommon in sheeps (Maxie and Newman 2006). Pyelonephritis cases can occur after catheterisation of the bladder for urine collection/ sampling and natural mating has been hypothesized to be another cause in cows (Radostits *et al.*, 2006; Braun *et al.*, 2008). Various bacterial agents have been identified in the urinary tract infections, although the reasons for infection are not known clearly (Braun *et al*, 2008; Kumar *et al.*, 2013; Benavides *et al.*, 2015). No previous case has been yet reported about pyonephrosis in goats in Turkey. Thus, the aim of this case report was to evaluate pyonephrosis seen rarely in goats with the aid of the clinical, laboratory, ultrasonographic and necropsy examinations.

**Case history:** The material of this case report was a 4-years-old mixed breed doe goat in 45 kg body weight, brought to the clinic complaints with abdominal distension, dysuria, strangury, abdominal pain, groaning, and lethargy. In the history, the doe goat was mated with the buck, approximately 70 kg body weight, ten days ago. And the complaints commenced after mating.

General physical examination was performed. Urine was collected, and urine analysis was applied by using urinalysis reagent test strips (CYBOW™ 10M urinalysis strips, DFI Co. Ltd., Gyun-Nam, South Korea). Haematological analysis (Diatron® Abacus Junior Vet, Budapest, Hungary) and biochemical analysis (using commercially diagnostic kits with available spectrophotometry according to the standard procedures, DraSys Diagnostic Systems) were performed. Ultrasonographic imaging was viewed with 5.0 mHz transducer via transabdominal examination (ESAOTE Pie Medical Aquila + probe 401788 OB/GYN Ultrasound, Czech Republic) (Fig. 1).

The goat was euthanized due to uncomfortable situation and bad prognosis. After necropsy, urine, urinary bladder and both kidney samples were used for microbiological isolation. The samples were streaked onto Blood Agar (supplemented with 7% defibrinated sheep blood), Mac Conkey's Lactose Agar and Sabouraud Dextrose Agar. Mixed colonies were sub-cultured in new agar plates for the obtained pure culture. These colonies were identified according to macroscopic and microscopic characteristics, and standard biochemical tests (Carter, 1990). For histopathological examination, kidney and urinary bladder were fixed in 10% neutral buffered

formalin, and samples were routinely processed and embedded in paraffin wax. The sections were cut at 5 µm in thickness, mounted on slides and stained with haematoxylin and eosin (Luna, 1968).

## DISCUSSION

In the physical examination, rectal temperature of the doe goat was determined as 39.8°C, and heart and respiratory rates (P: 80 beats/min; R: 24 breaths/min, respectively) were found in normal reference ranges (P: 70-90 beats/min; R: 15-30 breath/min) (Kahn, 2005). The presence of pain in the pelvic region palpation, urinary bladder fullness, increase of urination request, and tenesmus were detected as similar to those of Silva and Fabiano (2010). Increased body temperature was consistent with the determined high leucocyte as a result of hematological analysis and was a marker of urinary/renal infection.

**Fig. 1:** Transabdominal USG examination in doe goat.

**Table 1:** Changes in biochemical, heamotological, and urinary analyse results

| Biochemical and Heamotological Analyses | | | Urine Analyse | |
|---|---|---|---|---|
| WBC ($10^9$/L) | 16.6 x $10^9$/L | ↑ | SpG | 1010-1015 |
| RBC ($10^{12}$/L) | 2.14 x $10^{12}$/L | ↓ | Protein | +4 |
| HGB (g/L) | 730 g/L | ↓ | pH | 8.0-9.0 |
| HCT (%) | 4.0 % | ↓ | Nitrite | + |
| BUN (mmol/L) | 19.06 mmol/L | ↑ | Leukocyte | +1 |
| Creatine (µmol/L) | 297.91 µmol/L | ↑ | Erythrocyte | - |
| Cholesterol (mmol/L) | 0.962 mmol/L | ↓ | Urobilinogen | - |
| ALT (µkat/L) | 0.35 µkat/L | ↓ | Bilirubin | - |
| ALP (µkat/L) | 0.53 µkat/L | ↓ | | |
| Albumin (g/L) | 14.1 g/L | ↓ | | |
| Calcium (mmol/L) | 1.95 mmol/L | ↓ | | |
| Phospore (mmol/L) | 0.97 mmol/L | ↓ | | |
| Sodium (mmol/L) | 130 mmol/L | ↓ | | |
| Clor (mmol/L) | 91 mmol/L | ↓ | | |

In the laboratory findings; in urine dipstick analysis, proteinuria, isosthenuria, and also leukocyte and nitrite were detected (Table 1). Similar to the current case, Braun *et al*. (2008) reported that the specific gravity decreased (1.005 and 1.020) in cattle with pyelonephritis, and also reported that urinary protein and urinary leukocyte increased. In biochemical analysis of current case report, the increase in BUN and creatine were found similar to Silva and Fabiano (2010). The increase in BUN and creatine, and the decrease in specific gravity of urine indicate renal azotemia. On the other hand, it is thought that the anemia seen in the current case might be originated from the deterioration of hematopoiesis due to renal insufficiency.

In the ultrasonographic (USG) examination, urinary bladder enlargement, urinary stasis, increase in the magnitude of the right kidney and renal pelvis and calyces enlargement in the right kidney were detected. Light renal calyces enlargement was identified in the left kidney. Decrease in cortex and medulla separation in ultrasonographic examination was more severe in the right kidney comparing with the left (Fig. 2). The ultrasonographic findings were similar as reported by Braun *et al*. (2008).

In necropsy, there were not any abnormalities except the urinary system organs. Both kidneys and ureters, expecially right kidney were more enlarged. Unevenly distributed, pale yellowish-gray areas and petechiae were detected on both kidney capsules. Renal pelvis and calyces in both of kidneys were full of pus. Necrotic areas were seen quite intense in cortex and medulla. Enlarged urinary bladder was full of dirty and quite stench urine. The urinary bladder wall was thickened and there were much suppurative structures on the surface of mucosa (Fig. 2CD). All of necropsy findings were similar to previous studies (Silva and Fabiano, 2010). It is thought that pyonephrosis might be occurred by ascending infection due to contamination of damaged genitourinary system organs during the natural mating (Silva and Fabiano, 2010).

Microscopically, tubules lumen in cortex and medulla were enlarged due to suppurative exudate. Interstitial tissues, some glomeruli and the content of suppurative exudate was full of excessive neutrophils, as well as dilated with intensely pale eosinophilic fluid. Necrotic changes, degeneration and neutrophils were seen in tubular epithelial cells and the mucosa of bladder. The bacteria colonies were determined in some tubules and interstitial tissues. Glomerular atrophy was observed due to dense fluid accumulation. Glomeruli were less influenced than the tubules. There were haemorrhage areas in cortex and medulla. Fibrosis was sighted around some vessels, tubules and glomeruli in variable degree. Suppurative inflammation and necrotic debris dominated by neutrophil granulocytes were observed in the pelvis. The urinary bladder showed marked thickening in the mucosa because of neutrophil infiltration. Necrotic debris was detected in epithelium and mucosa of urinary bladder (Fig. 3). The histopathological lesions were detected most severe in the renal medulla by Kumar *et al.* (2013) and the cortex lesions were observed more severe than in renal medulla by Isling *et al*. (2010), although, in the current study were revealed almost same in renal cortex and medulla. And only tubular dilatation in renal medulla was more significant than the renal cortex.

Pyelonephritis in goats is caused by the bacterium, *Trueperella pyogenes*, other than *Corynebacterium renale* (Benavides *et al.*, 2015). In microbiological examination of current case, mycological growth was not seen in any of the samples. In the presented study compared with previous studies, bacterial growth was not detected from urine sample (Nourmohammadzadeh *et al.*, 2003; Braun *et al.*, 2008), but mixed culture growth like in the urine sample of Braun *et al*. (2008) study were shown in the bladder sample, and they were identified as *Micrococcus* spp., *Coagulase Negative Staphylococci* and *Streptococcus* spp. It is reported that *T. pyogenes* was isolated in 40% of

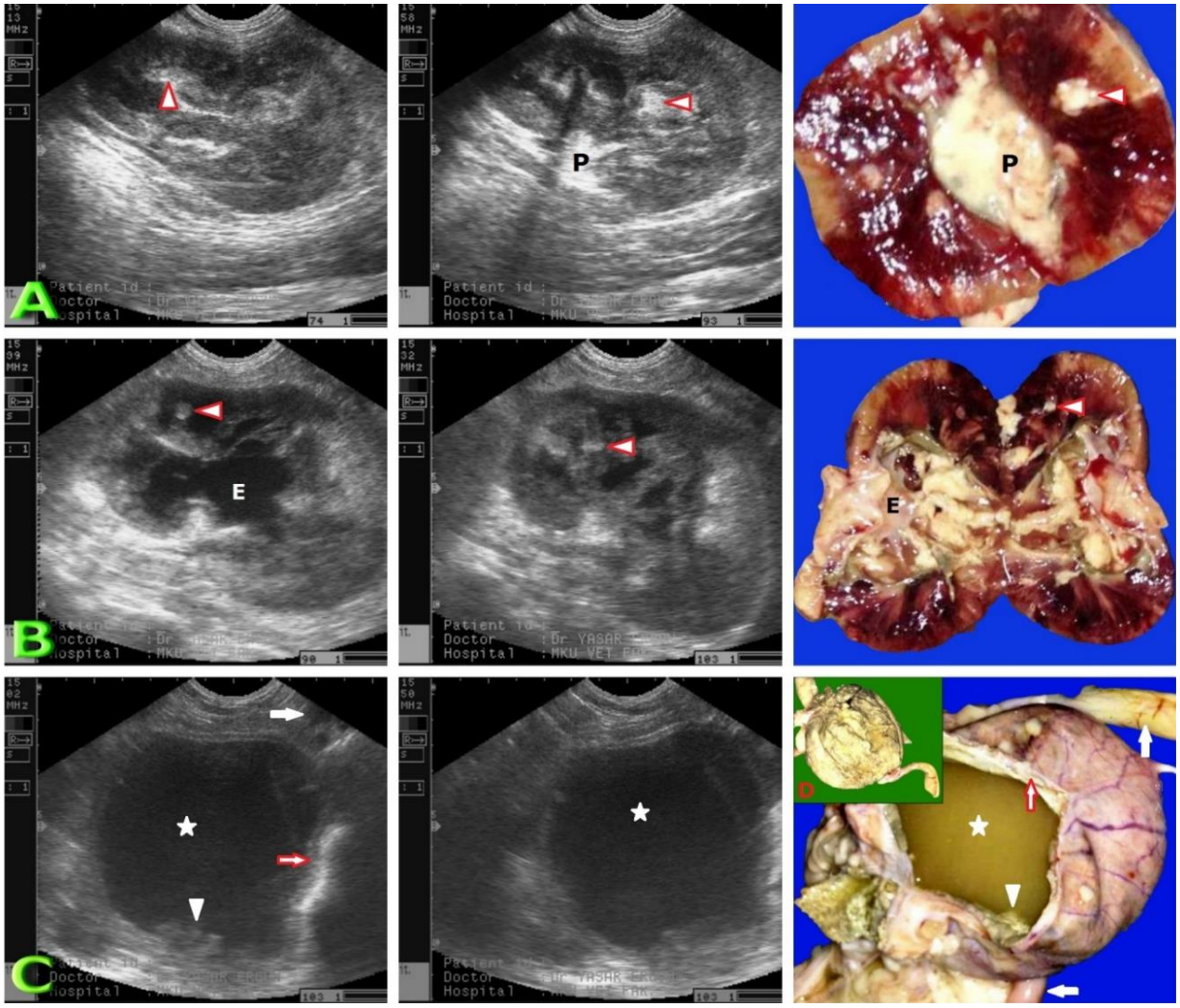


**Fig. 2: A**. Longitudinal appearances of the left kidney in USG. Pelvis (P) and calyces widely dilated with pus (arrow head). **B**. Longitudinal appearances of the right kidney in USG. Enlargement in pelvis (E), calyces full of pus (arrow head). **C.** Appearances of urinary bladder and ureter in USG. Ureter (arrows), pus (arrow heads), urine with pus (stars), thickening and inflammation in the bladder wall (red lined arrows). **D**. Appearance of bladder mucosa.

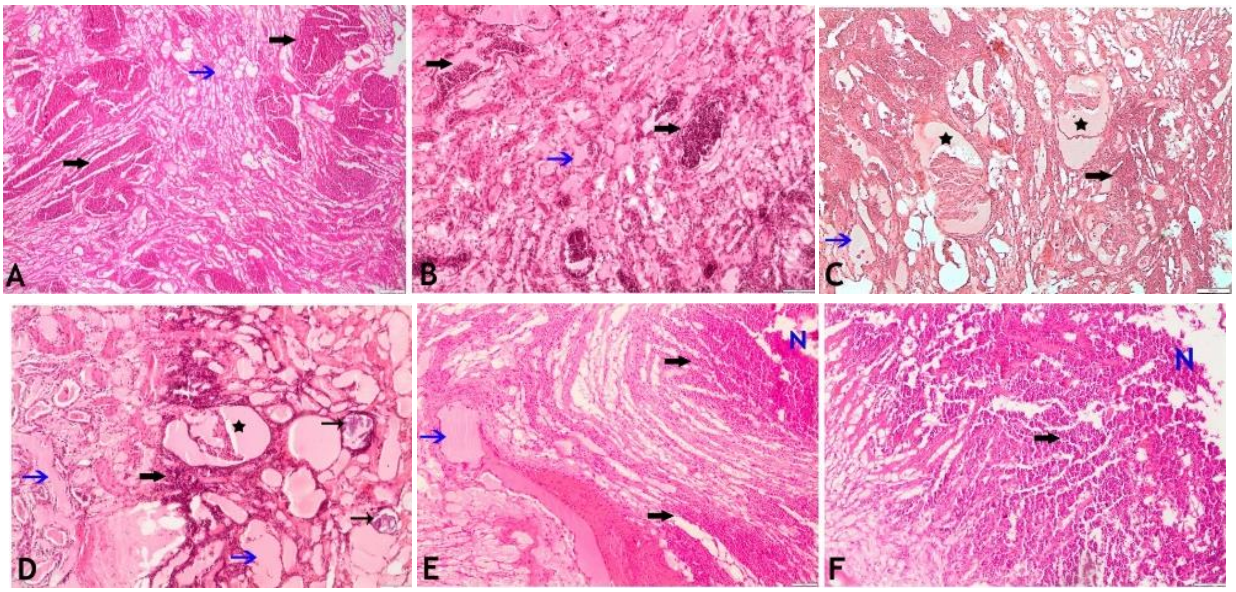


**Fig. 3: A-E.** Kidney. Neutrophils in interstitial tissues and tubulus (thick arrows), tubular filled with fluid (blue, thin arrows), **C-D.** Fill with fluid and glomerular atrophy (stars), **D.** Bacterial colonies in tubules (thin arrows), E. Neutrophils (thick arrow) and necrotic debris in pelvis (**N**), **F.** Urine bladder. Neutrophils (thick arrow) and necrotic debris in epithelial and mucosa of bladder (N). **A, E.** Bar: 200 µm and **B, C, D, F.** Bar: 100 µm.

renal samples taken from the cattle with renal abscess. And also *S. aureus* (6%), *E. coli* (5%) and *Streptococcus spp*. (2%) were isolated, except *T. pyogenes* (Ertaş *et al.*, 2005). In the present study different to Kumar *et al.* (2013), but similar to study performed by Ertaş *et al.* (2005), pure colonies, in the first isolation, were isolated in the kidney samples, and they were identified as *T. pyogenes*. As a result, generally, the isolated bacteria in the light of microbiological analyses were found compatible with previous studies (Braun *et al.*, 2008; Kumar *et al.*, 2013; Benavides *et al.*, 2015). It is considered that this bacterial growth may be due to either long time urine retention or the contamination of genitourinary system during artificial insemination or mating. In addition, the bacterial agents causing the urinary system disease may change due to environmental, geographic, and climatic differences from region to region. Pyonephrosis and cystitis were determined in this mixed breed goat according to ultrasonographic imaging, clinical, laboratory, and especially necropsy examinations.

These results revealed that pyonephrosis is important in goats. In addition, pyonephrosis in goats, incidentally encountered in the clinics, may be life-threatening for goats. Even if there are not any clinical signs, the urinary tract infections such as cystitis, pyelonephritis and pyonephrosis should be checked up after mating or artificial insemination. Being basic and reliable method, USG can be use in diagnosis of both lower and upper urinary tract infections and be eliminated the high treatment costs in the bad prognosis occurred in pyonephrosis. So, history, clinical signs, laboratory findings, and ultrasonographic imaging should be carefully evaluated with together for pyonephrosis diagnosis.

**Authors contribution:** SIK, ASO and AE took part in the examination of the patient and contributed in preparation of the manuscript. ZC performed and advised on microbiological examinations. OK carried out and advised on histopathological examination. The manuscript was prepared by SIK, and all authors critically revised the manuscript and approved the final manuscript.

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