

## A Case Report: Recurrent Cystitis in A Mare <sup>[1]</sup>

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#### Summary

A 20 year old Austrian Warmblood mare was presented at the clinic of Vienna Veterinary University for symptoms of polydipsia, polyuria and urinary incontinence and a repeated history of bladder infection. Sampled urine was light yellow, very cloudy, had a low specific weight (1016) and a pH of 9. The dip stick suggested very high hemoglobin concentration. The sediment showed medium numbers of rounded epithelial cells, low numbers of leukocytes. Furthermore, a remarkable quantity of calcium carbonate crystals was present. Urine and plasma chemistry and fractional clearance revealed the following: high blood urea and Ca concentration. The FE of Na and GGT/Creatinine ratio both were increased. These results suggested chronic renal insufficiency and co-existent urinary tract inflammation. Trans-abdominal ultrasound of the kidneys was performed. The left kidney was normal both in size and appearance of medulla, cortex and pyelum. The right kidney appeared morphologically modified such that the border between cortex and medulla could not be identified clearly. At cystoscopy the floor of urinary bladder could not be seen, due to the large quantities of sludge and grainy gravel deposited on it. However, cystic calculi were not identified. The apex vesicae was highly inflamed, with necrotic changes that were coated with gravel and fibrin. Both ureters were highly dilated (thicker than a finger) and appeared to secrete a cloudy fluid. The endoscopic diagnosis was advanced ulcerative sabalous cystitis, and dilated ureters. Because of the poor prognosis of the case the owner decided to have the mare be euthanized. The gross pathology showed a dilated pyelum in both kidneys. The pyelum was filled with gravel. Both ureters were dilated and filled with gravel too. The bladder wall was thickened and just in cranial to its opening, a soft conglomerate of gravel (7x5x0.5cm) was present. The urethra was also filled but not blocked with this gravel. Histopathology showed chronic interstitial nephritis, glomerulonephritis and pyelitis. The muscularis of the bladder was chronically inflamed. The final main diagnosis was chronic sabalous cystitis with subsequent chronic inflammation of the ureters and chronic interstitial nephritis.

**Keywords:** Mare, Chronic cystitis, Cystoscopy

## Olgu Sunumu: Bir Kısrakta Tekrarlayan Sistitis

#### Özet

Geçmişinde tekrarlayan sistitis tedavisi gördüğü bildirilen, 20 yaşlı Avusturya kısağı polidipsi, polüri ve idrar tutamama şikayeti ile Viyana Üniversitesi Veteriner Üniversitesine sevk edildi. İdrar örneği açık sarı, bulanık, özgül ağırlığı 1.016 ve pH'sı ise 9 olarak tespit edildi. İdrar analizinde yüksek konsantrasyonda hemoglobin varlığı ölçüldü. İdrar kalsiyum içeriği orta derecede olup, sedimentte yuvarlak epitel hücresi belirlendi ve düşük sayıda lökosit hücresi sayıldı. Ayrıca sediment analizinde belirgin derecede kalsiyum karbonat kristalleri mevcuttu. Kan üre, kalsiyum ve sodyum seviyelerindeki artış ile GGT/Kreatinin oranı kronik böbrek yetmezliği ve tekrarlayan sistitis ile uyumluydu. Böbreklerin transabdominal ultrasonografisi yapıldı. Sol böbrek normal büyüklükte olup medulla, korteks ve renal pelvisler de normal görünümdeydiler. Sağ böbrekte ise korteks ve medulla sınırı açıkça belirgin değildi. Kısağın sistoskopik incelemesi yapıldı. Fazla miktarda sediment oluşumundan dolayı kese alt duvarı görülemedi ve sistik kalkül oluşumuna rastlanmadı. Kesenin apeksi oldukça yangılı olup burada tortu ve fibrin ile kaplı değişimler gözlemlendi. Her iki ureter genişlemişti (bir parmağın eninden daha fazla). Bulgulara dayanarak bu vakaya ulseratif sistitis teşhisi koyuldu. Prognozun iyi olmamasından ötürü hasta sahibinin onayı ile ötenazi kararı alındı ve kısrak ötenazi edildi. Makroskopik muayenede, her iki böbreğin renal pelvisinde genişleme olup içinde idrar tortusu mevcuttu. Kese duvarı kalınlaşmış ve ön tarafında 7x5x0.5 cm ebadında yumuşak kum kitlesi tespit edildi. Üretra dolgundu fakat tıkanıklık mevcut değildi. Böbrek histopatolojisinde, kronik interstisyel nefrit, glomerulonefritis ve piyelit belirlendi. Kese duvarında kronik yangı mevcuttu. Teşhis kronik ureter yangısı ile birlikte seyreden kumlu sistitis ve kronik interstisyel nefritis olarak koyuldu.

**Anahtar sözcükler:** Kısrak, Kronik sistitis, Sistoskopi



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## INTRODUCTION

Cystitis commonly occurs secondary to urinary outflow disturbances caused by urolithiasis, bladder paralysis or tumour, anatomical defect, or iatrogenic trauma<sup>1-5</sup>. In male horses, cystitis is usually the result of calcium deposits in the bladder, commonly known as bladder stones. In mares vaginal infection may ascend and lead to cystitis. In some instances, if any injury has occurred, such as when the bladder or urethra is damaged in the course of a foaling, cystitis may occur. Repeated urinary catheterization is also a risk factor<sup>5-7</sup>. Horses grazing on pastures with sudan grass, sorghum or sorghum-sudan hybrid grass may develop cystitis too<sup>5,6,8</sup>. Some of the more obvious signs are excessive urination, hematuria, or dribbling of urine without full voiding of the bladder, urine scalding of the perineum in mares or the front of the hind limbs of male horses. Cystitis tends to affect mares more so than stallions<sup>3,5</sup>.

Diagnosis of cystitis is by physical examination, transrectal palpation, cystoscopy, ultrasonography, urinalysis, and culture of urine. Transrectal examination is helpful in case of cystolithiasis or bladder neoplasm. An internal examination is usually required, and this can be performed diagnostically by endoscopy, which uses a slender tube with an attached camera. X-ray or ultrasound imaging can also be useful for viewing the internal structure of the bladder, as the bladder stones can often be seen specialized equipment<sup>5,9,10</sup>. Cystoscopy is beneficial for visualizing mucosal irritation or masses in cystitis<sup>11</sup>.

## CASE HISTORY

A 20 year old, 568 kg weighing Austrian Warmblood mare was presented for symptoms of polydipsia, polyuria, incontinence and a repeated history of bladder infection. In the clinical examination, dermatitis, likely by urine contract, was revealed in the thigh area, as well as the presence of urine crystals on the hind limbs and the vulvar area. It was decided to perform a urinalysis completed with estimation of kidney function. Collected urine was light yellow, very cloudy and with a low specific weight (1016, RI: 1020-1050) and pH= 9.00. A dip stick test revealed a very high content of hemoglobin/myoglobin. Analysis of the sediment revealed medium number of rounded epithelial cells, a low leukocytes count and a high quantities of calcium carbonate. In [Table 1](#) the results of urine and plasma chemistry and the calculation of kidney function indices are given.

The high values of blood urea, blood Ca, FE of Na, high GGT/Creatinine ratio and low specific weight of the urine all lead to a diagnosis of a incipient, still compensated chronic renal insufficiency with tubular alterations, hydronephrosis, as well as recurrent cystitis.

By ultrasound of the urinary apparatus a closer diagnosis could be established. The left kidney seemed normal both

**Table 1.** Electrolyte composition and enzymatic activity of urine and blood taken at the simultaneously. The fractional excretion (FE) of various electrolytes is also given

**Tablo 1.** Aynı zamanda alınan kan ve idrar örneklerinin enzimatik aktivite ve elektrolit kompozisyonu. Çeşitli elektrolitlerin fraksiyonel salınımlarında verilmiştir

| Parameter                    | Value of Analysis | Reference Range |
|------------------------------|-------------------|-----------------|
| Sodium (Pl)                  | 140 mmol/L        | 126-157         |
| Potassium (Pl)               | 4.4 mmol/L        | 3.5-4.5         |
| Chloride (Pl)                | 101 mmol/L        | 98-107          |
| Phosphor (Pl)                | 0.96 mmol/L       | 3.5-4.5         |
| Urea (Pl)                    | 56.5 mg/dl        | 20-40           |
| Creatinin (Pl)               | 1.5 mg/dl         | <2              |
| Calcium (Pl)                 | 3.47 mmol/L       | 2.0-3.2         |
| FE Sodium                    | 1.16              | 0-0.7           |
| FE Potassium                 | 170               | 15-200          |
| FE Chloride                  | 3.20              | 0.7-2.1         |
| FE Phosphor                  | 0.51              | 0-0.2           |
| Urea index                   | 13.9              | renal           |
| GGT/ Creatinin ratio         | 0.62              | 0-0.25          |
| Creatinine clearance         | 1.28              | 1.24-2.59       |
| Urine Specific Gravity (USG) | 1016              | 1020-1050       |
| Urine pH                     | 9.00              | 7.5-8.5         |

Pl: Plasma, FE: Fractional excretion

in size and appearance of the medulla and cortex and the pyelum did not appear to be enlarged. The right kidney, however, appeared abnormal. There was low definition between cortex and medulla. The pyelum appeared strongly dilated and was filled with a hypoechogenic liquid. The dilated pyelum continued into a dilated ureter.

At cystoscopy, the bladder floor could not be visualized, due to large quantities of sludge and grainy gravel, one or more bladder calculi could not be identified. The apex vesicae was highly inflamed, with necrotic mucosa that was coated with gravel and fibrin. Furthermore, partially ulcerated and hemorrhagic lesions were seen, while the rest of the bladder wall was covered with large streaky erosions. Both ureters were highly dilated (thicker than a finger) and were secreting urine in a pulsating manner (> 6 x/min). This urine contained gravel particles. The diagnosis of an advanced ulcerative cystitis, with high urinary gravel content, as well as dilated ureters was established ([Fig. 1, 2](#)).

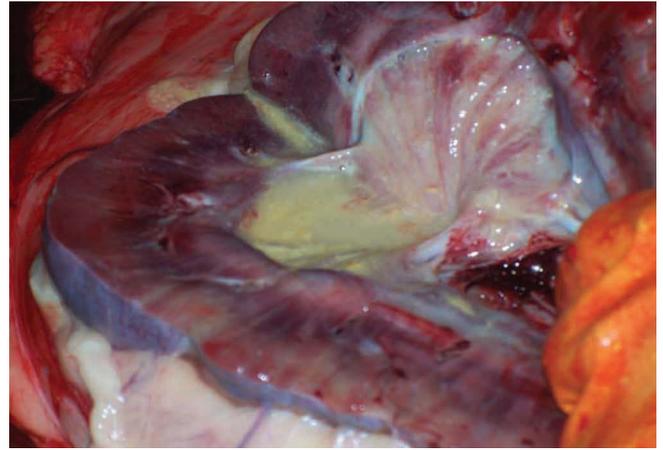
The end-result of these investigations was the diagnosis sabulous cystitis, with an ascending infection and incipient chronic renal failure. Based on the bad prognosis, the owner took the decision to have the mare euthanized.

Bilateral dilated pyelae with gravel were seen at necropsy. Both ureters were dilated and filled with gravel. Histologically chronic interstitial nephritis and medium membranous glomerulonephritis was present. Due to chronic inflammation the bladder wall was highly thickened. Directly in front of



**Fig 1.** Linear erosions in the bladder wall

**Şekil 1.** Kесе duvarında linear erozyon oluşumları



**Fig 3.** Sabulous urine in the pyelum and necrosis area in the cortex

**Şekil 3.** Pelvis renaliste kumlu idrar oluşumu ve böbrek korteksinde nekrotik alanlar



**Fig 2.** Ulcers and sever inflammation of the roof of bladder. At the bottom of the bladder sabulous urine was present

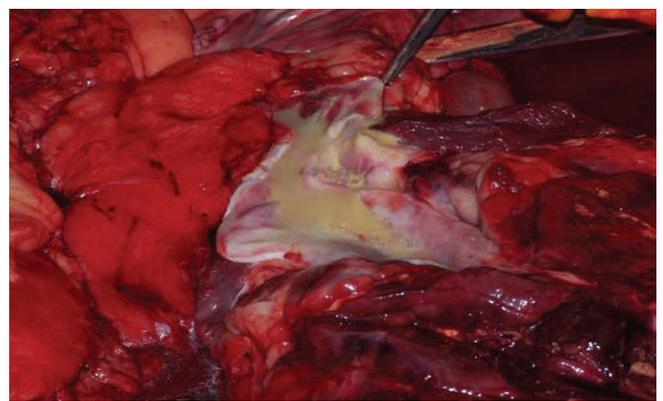
**Şekil 2.** Kесе üst duvarında şiddetli yangı oluşumu ve ülserli alanlar. Kесе alt duvarında kumlu idrar oluşumu

the bladder opening a soft conglomerate of urinary gravel (7x5x0.5 cm) was present. The urethra was partially filled with gravel. In the left uterine horn 20 cm large white mass was present, that later was characterized histologically as adenoma of the uterine glands. A discreet filamentous perihepatitis and a moderate level of lung stasis were seen. The final diagnosis was chronic cysto-urethro-pyelitis chronic interstitial nephritis and glomerulonephritis was made. Furthermore the mare suffered from uterine gland adenoma (Fig. 3-4).

## DISCUSSION

The observed skin abnormality, as well as the presence of urine crystals on the hind limbs and the vulvar area<sup>12-15</sup> was likely a urine-induced contact dermatitis.

In horses, urolith formation and cystitis often accompany each other. The most appropriate antibacterial agents for



**Fig 4.** Sabulous urine and dilated ureters

**Şekil 4.** Kumlu idrar ve dilate üreterler

treating this cystitis form can only be determined after bacteriological cultivation and subsequent sensitivity testing of aseptically collected urine samples. After invasive procedures, the irrigation of the bladder with nonirritating (antiseptic) solutions is a possibility to treat or prevent secondary cystitis<sup>16</sup>. The bacteria most commonly isolated from horses with ascending cystitis include *E coli*, *Proteus*, *Klebsiella*, *Enterobacter*, *Corynebacterium*, *Streptococcus*, *Staphylococcus*, and *Pseudomonas*<sup>17</sup>. The interpretation of a positive culture result is not straight forward since both in healthy horses and those with cystitis, it is not uncommon to isolate multiple organisms from the urine<sup>17,18</sup>. Bacteria in absence of cystitis symptoms is called bacteriuria and mostly disappear without treatment. In addition to the microorganisms commonly associated with ascending cystitis, growth of *Actinobacillus equuli*, *Streptococcus equi*, *Rhodococcus equi*, and *Salmonella* spp has been observed in septic foals and may presumably contribute to the incidence of septic nephritis of hematogenous origin<sup>18</sup>. Due to the transcriptional control that alters the temporal expression of fimbrial protein, uro-pathogenic *E coli* strains from cases of cystitis display different patterns of fimbrial expression that are those strains isolated in pyelonephritis<sup>19</sup>.

Horses suffering cystitis should be treated with antimicrobials that are excreted in high concentration in urine, such as penicillin, gentamicin, amikacin, enrofloxacin, or trimethoprim-sulfa, depending on the sensitivity pattern of the cultured microbes<sup>20</sup>.

To prevent iatrogenic urinary tract infection it is also important to clean and disinfect the penis or vulva as well as the endoscope before entering the urethra and the bladder<sup>21</sup>. Transurethral electrohydraulic lithotripsy has been used successfully to treat obstructive urolithiasis in horses. It may be contraindicated in long-standing cases of cystic calculi associated with chronic cystitis and cases where an inflammatory fibrinomuroid lattice, adherent to the bladder lining, is present<sup>22</sup>. In the cases of sabulous cystitis, apart from flushing the gravel out of the bladder and treating the cystitis with antimicrobials, other alternatives are not existent.

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