

## RESEARCH CASE REPORT

# MANUAL REMOVAL OF A RARE CYSTIC CALCULUS CONCURRENT WITH RECURRENT HEMORRHAGIC CYSTITIS IN AN ARABIAN MARE: A CASE REPORT

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## ABSTRACT

A nine-year-old Arabian mare was presented with symptoms of frequent hematuria, dysuria, pollakiuria and urine dribbling. This report describes a manual removal procedure of a cystic urolith in an Arabian mare. A complete blood count showed a slight reduction in hemoglobin. Renal function tests showed high normal ranges in BUN. The urine sample was very cloudy and had a specific gravity of (1.019) with alkaline pH. The chemical examination showed high hemoglobin concentration with glucose traces. The microscopic examination showed a high number of pus cells and red blood cells with few numbers of rounded epithelial cells. Bacterial culture revealed *Klebsiella* spp and as a result of the sensitivity test, sensitivity to amoxicillin/clavulanic acid, amikacin and gentamicin was determined. Cystoscopy revealed a large cystic urolith cranioventrally on the left wall of the urinary bladder. The *apex vesicae* was inflamed, with blood sludge. The definitive diagnosis was chronic hemorrhagic cystitis caused by a large cystic urolith. As a result, it was concluded that the removal of relatively large calculi through the urethra in the mare, while providing some protection to the bladder neck and urethral mucosa, has been effective with minimal complications.

**Keywords:** Cystic urolith, hemorrhagic cystitis, mare, manual removal

## INTRODUCTION

In equine practice, urinary bladder disorders are fairly encountered problem; cystitis is a bladder inflammation that is mostly of secondary nature in the equine (Abd El Kader et al., 2018). The inflammation of the bladder in the equine is mostly consequent to cystic calculi, paralysis of bladder, tumor, congenital abnormalities, spinal cord injury or trauma that disrupt urine outflow (Reed et al., 2004; Ramiro, 2007; Gore et al., 2008). In mares, vaginal infection or an injury during the course of foaling may lead to cystitis (Schumacher et al., 2002; Gore et al 2008), therefore, mares tend to be more prone to cystitis than stallions. The affected animal is usually presented with signs of dysuria, hematuria, and even urine scalding (Frye, 2006).

The females are more susceptible to cystitis than males, but cystic urolith formation is seen more in males (Auer and Stick, 2012). The risk factors for urolithiasis are numerous, and infection as well as increased mineral contents of consumed water might play a significant role in urolithiasis development (Auer and Stick, 2012). Samples collected from these animals may show various bacterial involvements like *Escherichia coli*, *Streptococcus* spp. and *Staphylococcus* spp., however, the role of these bacteria in urolith formation is yet to be established (Rocken et al., 2006).

Establishing cystitis and cystic calculi diagnosis is a combination of physical and rectal examination and other diagnostics; urinalysis, ultrasonography, and cystoscopy are of particular importance (Onmazet al., 2013). A treatment plan for urolithiasis usually involves interference to remove it. The removal may be done via manual manipulation, urethrotomy, or lithotripsy (Duesterdieck-Zellmer, 2007), though some cases require more invasive methods (Williamson and McKinnon, 2017).

Various procedures and techniques were proposed for removal of a urolith such as laparocystotomy, laparoscopic cystotomy, urethrotomy, pararectal cystotomy and fragmentation techniques (Duesterdieck-Zellmer, 2007). Manual removal of a urolith in mares was described in an earlier report (Holt and Pearson, 1984). This procedure is feasible in mares owing to wide shorter urethra, though it is greatly influenced by the urolith size and could be traumatic (Williamson and McKinnon, 2017). The choice of a technique to be used should be linked to the location and size of calculi, availability of equipment, sex, and familiarity of operator with the technique, also, economic factor play a role (Coleman, 2015). Whichever the technique used, the primary goal is to remove the urolith from the urinary tract (Duesterdieck-Zellmer, 2007).

Therefore, a less traumatic removal technique is of a clinical importance. In the present case report, we demonstrate a recurrent cystitis in Arabian mare caused by cystic urolithiasis, with the documentation of a treatment plan and outcomes of this plan.

## CASE DESCRIPTION

A nine- year- old non-pregnant Arabian mare weighing approximately 450 kg was presented to the clinic with recurrent symptoms of hematuria, pollakiuria, dysuria and urine dribbling. Dermatitis, probably caused by urine, was seen in the hindquarters previously treated with 1ml/ 25 kg/, deep IM, q24h of procaine penicillin and dihydrostreptomycin sulphate (Pen and Strep®, Norbrook, UK) for 5 days with normal saline solution and vitamin C.

### Physical and diagnostics findings

A trans-rectal examination was performed to confirm the clinical suspicion. It revealed a large firm structure with an ovoid shape, cranioventrally

to the bladder. The next diagnostic step involved trans-rectal ultrasonography (Mindray dp20 power rectal probe, China, 7.5 MHz). The ultrasound examination showed a hyperechoic structure with acoustic shadow (Figure 1). A white light cystoscopy (Pentax fiberoptic colonoscopy, Germany) was deployed next to confirm the nature of the structure, and it revealed a large urolith located in the left cranioventral wall of the bladder, inflamed *Apex vesicae*; and the area around the urolith showed an ulcerative hemorrhagic lesion with multiple erosions seen in the rest of the bladder wall.

### Laboratory findings

Whole blood and urine samples were obtained from the mare to perform laboratory analysis. The venous blood sample (10 cc) was separated into two tubes, the first in an EDTA containing tube to perform a complete blood count using a veterinary hematology analyzer. The second in the plain tube was used for serum separation to estimate BUN and creatinine levels. Urinalysis and microbial culture were performed. Blood sample analysis revealed a slightly decreased hemoglobin (Hb),

while blood urea nitrogen (BUN) showed values in the higher range of normal reference (Table 1). Urinalysis showed yellowish, very turbid alkaline urine with 1.019 specific gravity. Urine sample was collected via catheterization after applying full aseptic precautions. Urine sample was centrifuged at 2000 rpm/5 minutes; the resultant supernatant was carefully discarded leaving very small portion for resuspension of cell pellet by gentle shaking followed by placing a small volume on a glass slide and covering gently by a cover slip without staining and examination under microscope (Sharkey, 2017).

Urine also showed elevated numbers of RBCs, WBCs and high levels of oxalates (Table 2). Microbiology revealed the involved microorganism to be *Klebsiella* spp., C/S showed this bacteria was sensitive to amoxicillin/clavulanic acid, amikacin and gentamycin.

Based on combined information from the signs, rectal findings, laboratory, ultrasound and cystoscopy examination, recurrent hemorrhagic cystitis caused by cystic urolithiasis was suspected.

**Table 1** Selected blood analysis findings in 9-year-old Arabian mare with suspected recurrent hemorrhagic cystitis caused by cystic calculi

Parameters	Results	Reference range
RBCs ( $\times 10^{12}/L$ )	6.07	6.0 - 10.4
Hemoglobin (g/L)	98	101 - 161
PCV%	27	27 - 43
WBCs ( $\times 10^9/l$ )	6.20	5.6 - 12.1
MCV(fl)	44.4	37 - 49
MCH (pg)	16.1	13.7 - 18.2
MCHC (g %)	36.2	35.3 - 39.3
BUN (mg/dl)	27	11 - 27
Creatinine (mg/dl)	1.53	0.4 - 2.2

RBCs: red blood cells; PCV: packed cell volume; WBCs: white blood cells; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; BUN: blood urea nitrogen.

**Table 2** Urinalysis findings in 9-year-old Arabian mare with suspected recurrent hemorrhagic cystitis caused by cystic calculi

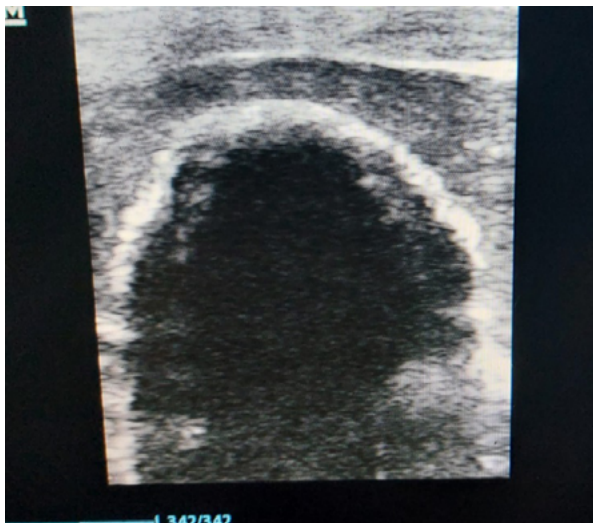
Parameters	Results	Reference range
Urine Specific Gravity	1.019	1.015 -1.025
Urine pH	Alkaline	
Albumin	Nil	Absent
Glucose	Traces	Absent
Blood	+++	Absent
Pus cells	25 -30/ HPF with clusters	Absent
RBCs	40 -50 / HPF	Absent
Epithelial cells	Few	Absent
Amorphous	Oxalates ++	Absent

HPF: high power field

### Treatment plan

Food was withheld, and the mare was sedated with a mixture of 0.5 ml of detomidine hydrochloride (Domidine® 10 mg/ml, Dechra) IV and 1 ml of butorphanol tartrate (Torbugesic® 10 mg/ml, Zoetis). Tail was gauze-wrapped and secured followed by an intensive washing of the perineal

and vaginal area. Urethral sphincter was palpated, followed by two (5 minutes apart) 50 ml lidocaine hydrochloride solution application, assisting in manual widening of the sphincter. A manual gentle pressure was applied on the urinary bladder to help in urine evacuation. The urethral sphincter was then steadily distended until a calculus



**Figure 1** Finding of the urinary calculi by transrectal ultrasonography (7.5 MHz)



**Figure 2** Large, brownish, irregular firm urolith

became palpable on the bladder neck. A finger guide manipulation of the cystic calculi was carried out through the vagina by the lubricated fingers to dislodge the calculus. Owing to the large urolith size (Figure 2), lithotomy was performed, and the fragment was removed gently with the lubricated finger. Bladder lavage with warm saline was carried out using a nasogastric tube designed for neonatal foal (4.7mm in diameter). The eliminated urolith was firm, reddish-brown in color, with an irregular margin. The method was a modified technique from the one described by Williamson and McKinnon (2017). The procedure time was about 30 min.

Post - procedural urethral palpation did not display any symptoms of apparent tearing. Post-procedural treatment involved 1ml/50 kg/q 24hrs/IV of meloxicam (Metacam®, 20mg/ml, Boehringer Ingelheim, Germany) and 1 ml/ 50kg, IM, q24for 7 days of gentamicin sulfate (Gentacure 10®, 100mg/ml, Pharma Swede, Egypt) and 1ml/ 25 kg/, deep IM, q24h of procaine penicillin and dihydrostreptomycin sulphate (Pen and Step®, Norbrook, UK) for 3 days. Follow-up was done to ensure the absence of mucosal tear.

## DISCUSSION AND CONCLUSION

Unlike in stallions, uroliths are infrequent in mares; multiple techniques were described for their removal, from manual removal to laparoscopic specimen pouch technique that was recently described (Williamson and McKinnon, 2017). In this case, we opted for manual removal of calculi by gentle digital manipulation. This technique is feasible in mares due to the wide short urethra (Williamson and McKinnon, 2017). This technique requires patience and gentle manipulation to avoid complications.

The mare presented with the signs consistent with cystitis, and examination revealed that the cystitis

was likely associated with a urinary bladder urolith. Cultures revealed *Klebsiella* spp.

Bacterial agents involved in cystitis are numerous, such as *Enterobacter*, *Pseudomonas*, *Escherichia coli*, *Corynebacterium*, *Staphylococcus*, *Streptococcus* and *Klebsiella* (Schott, 2004). Bladder lavage was done as a preventive measure and to aid in the treatment of secondary cystitis (Beard, 2004; Rocken et al., 2006). Microbial sensitivities were used to determine the most appropriate antibiotic (Schumacher et al., 2002; Onmazet al., 2013).

Urinalysis showed a large number of RBCs and WBCs; these findings can be seen in horses with cystitis as well as numerous other conditions (Abd El Kader et al., 2018). Urine samples in horses should be analyzed as soon as possible for fear of bacterial overgrowth and decomposition of cellular components (Sharkey, 2017a). In the present case, BUN was elevated but remained within normal reference range. The degree of BUN increase at time of admission is not firmly extrapolative for reversibility or etiology of condition in horses as there is a nonlinear relationship between the increase in BUN and reduction in GFR (Sharkey, 2017b). Urolith may cause an irritation of bladder mucosa and hemorrhage with subsequent hematuria (Schott II, 2015). In the present case, hematological parameters were within normal reference range despite a slight reduction in hemoglobin content, as this was a case of recurrent hemorrhagic cystitis, the later may be involved.

Several aspects are involved in the decision-making of calculi removal in mares, among them financial consideration, clinician's preference, calculi size, calculi number, and horse temper (Williamson and McKinnon, 2017). The manual removal technique was described in horses and has been successful in obstructive calculi in mares (Williamson and McKinnon, 2017). The technique was done with

optimum care to avoid complications associated with the manual removal technique. Sedation and topical local anesthetic technique were sufficient in providing satisfactory analgesia without the need for an epidural (Williamson and McKinnon, 2017). Alternative methods of removal include cystotomy and removal via forceps (Judy and Galuppo, 2002; Onmaz et al., 2013). Manual removal procedure is feasible in mares owing to the wide shorter urethra, though it is greatly influenced by the urolith size and could be traumatic (Williamson and McKinnon, 2017). Manual removal of urolith in mares was described in the previous report (Holt and Pearson, 1984).

To help in the calculus dislodgment process, gentle manipulation of the calculus was done, lithotomy with the lubricated finger, gently till complete removal of calculus through the urethra. The extent of urethral dilation could limit usage of manual removal method, though this limitation could be mitigated by application of a topical local anesthetic agent as previously described by Williamson and McKinnon (2017). Very large urolith may require

an alternative intervention as laparoscopy and cystotomy (Duesterdieck-Zellmer, 2007). These methods came with a set of complications such as peritonitis (Ragle, 2000; Rocken et al., 2006). The general anesthesia may be required with its own complication set (Johnston et al., 2002). The manual removal method could be associated with trauma (Williamson and McKinnon, 2017).

In conclusion, manual removal, albeit has its cons, was done in our case with minimal complication, and this was confirmed by examination 24 h after the extraction. Mixture of sedation and local anesthesia with manual retrieval methods also improves anesthesia outcomes. The low cost and the fact that this method is effective are added merits for cystic urolith removal in mares.

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#### CONFLICT OF INTEREST

The authors declared that there is no competing of interests.

#### REFERENCES

- Abd El Kader NA, Farghali HA, Abu-Seida AM, Salem NY, Khattab MS. 2018. Evaluation of chromocystoscopy in the diagnosis of cystitis in female donkeys. *PLoS One*, 13(8), e0202596.
- Onmaz A, Atalan G., PavaloIU A, Güneş V, van den Hoven R. 2013. A case report: recurrent cystitis in a mare. *Kafkas Univ Vet Fak Derg*, 19(Suppl-A): A203-A206.
- Auer J, Stick J. 2012. *Equine surgery*. 4<sup>th</sup> ed. Saunders, Elsevier Inc.: St Louis, Missouri.
- Beard W. 2004. Parainguinal laparocystotomy for urolith removal in geldings. *Vet Surg*, 33 (4), 386-90.
- Coleman MC. 2015. Urolithiasis. In Robinson's *Current Therapy in Equine Medicine* (pp. 453-5). WB Saunders.]
- Duesterdieck-Zellmer KF. 2007. Equine urolithiasis. *Vet Clin North Am Equine Pract*, 23, 613-29.

- Frye MA. 2006. Pathophysiology, Diagnosis, and Management of Urinary Tract Infection in Horses. *Vet Clin North Am Equine Pract*, 22, 497-517.

- Gore T, Gore P, Giffin JM. 2008. The Urinary System. In Adelman B (Eds). *Horse Owner's Veterinary Handbook* (3rd ed., pp. 333-340). Willey Publishing, Inc., Hoboken: New Jersey.

- Holt PE, Pearson H. 1984. Urolithiasis in the horse: a review of 13 cases. *Equine Vet J*, 16, 31-34.

- Johnston GM, Eastment JK, Wood JLN, Taylor P. 2002. The confidential enquiry into perioperative equine fatalities (CEPEF): mortality results of Phases 1 and 2. *Vet Anaesth Anal*, 29, 159-70.

- Judy CE, Galuppo LD. 2002. Endoscopic-assisted disruption of urinary calculi using a holmium: YAG laser in standing horses. *Vet Surg*, 31, 245-50.

- Ragle CA. 2000. Dorsally recumbent urinary endoscopic surgery. *Vet Clin North Am Equine Pract*, 16, 343-50.
- Ramiro ET. 2007. Essentials of equine renal and urinary tract physiology. *Vet Clin Equine*, 23, 533-56.
- Reed SM, Bayly WM, Selton D. 2004. *Equine Internal Medicine*. Philadelphia: WB Saunders Company: pp 1253-89.
- Rocken M, Stehle C, Mosel G, Rass J, Litzke LF. 2006. Laparoscopic-assisted cystotomy for urolith removal in geldings. *Vet Surg*, 35, 394-7.
- Schott H. 2004. Urinary tract infections. In Reed S, Bayly W, Sellon Y (Eds), *Equine Internal Medicine* (2nd ed., pp. 1253-8). WB Saunders, Philadelphia.
- Schott II, HC. 2015. Hematuria. In Robinson's *Current Therapy in Equine Medicine* (pp. 456-459). WB Saunders.
- Schumacher J, Schumacher J, Schmitz D. 2002. Macroscopic hematuria of horses. *Equine Vet Educ*, 14, 201-10.
- Sharkey L. 2017a. Urine analysis. Interpretation of Equine Laboratory Diagnostics, 383-6.
- Sharkey L. 2017b. Kidney function test. Interpretation of Equine Laboratory Diagnostics, 39-43.
- Williamson AJ, McKinnon AO. 2017. Transurethral removal of a cystic urolith in a mare using a laparoscopic specimen pouch. *Aust Vet J*, 95, 174-7.

## MANUALNO UKLANJANJE RIJETKOG KALKULUSA MOKRAĆNOG MJEHURA PRAĆENOG HEMORAGIČNIM CISTITISOM KOD ARAPSKO KOBILE - PRIKAZ SLUČAJA

### SAŽETAK

Prikazan je slučaj devetogodišnje arapske kobile sa simptomima česte hematurije, dizurije, polakiurije i urinarne inkontinencije. Ovdje se opisuje procedura manualnog uklanjanja urolita mokraćnog mjehura kod arapske kobile. Kompletna krvna slika je pokazala blago sniženje hemoglobina. Testovi renalne funkcije su pokazali visoke normalne vrijednosti uree i kreatinina. Uzorak urina je pokazao замуćen urin sa specifičnom težinom od (1.019) alkalnog pH s visokom koncentracijom hemoglobina i tragovima glukoze. Mikroskopski pregled je pokazao gnoj s velikim brojem upalnih stanica i eritrocite uz veliki broj okruglih epitelnih stanica. Bakterijske kulture su pokazale *Klebsiella* spp, a kao rezultat testa osjetljivosti dokazana je osjetljivost na amoksisilin/klavulonsku kiselinu, amikacin i gentamicin. Cistoskopija je pokazala veliki cistični urolit smješten kranioventralno na lijevom zidu mokraćnog mjehura. *Apex vesicae* je bio inflamiran s krvavim talogom. Postavljena je definitivna dijagnoza hroničnog hemoragičnog cistitisa uzrokovanog velikim urolitom mokraćnog mjehura. Zaključeno je da je uklanjanje relativno velikih kamenaca kroz uretru kod kobilica, a uz istovremenu zaštitu vrata mokraćnog mjehura i uretralne sluznice, uspješna procedura sa minimalnim komplikacijama.

**Ključne riječi:** Hemoragični cistitis, kobilica, manualno uklanjanje, urolit mokraćnog mjehura