

## A large urolith in an eight year-old mare: a case report

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**ABSTRACT:** A micturition problem appeared in an eight year-old mare at the third month of pregnancy. Symptoms intensified during the course of pregnancy and, at the end of the tenth month, the foetus was aborted. Labour was ordinary with normal presentation, position and posture, yet there was a formation about the size of an ostrich egg. The structure was spontaneously pushed out of the genital tract during expulsion of the foetus. Examination of the structure showed that it was a urolith which measured  $13 \times 10 \times 7$  cm (circumference measured along the long axis amounted to 31.5 cm, and along the transverse axis to 26 cm) and weighed 803 g.

**Keywords:** horse; abortion; urolith; urinary tract; urine

In horses, uroliths are more frequently noted in geldings and less frequently in stallions and mares, and as a rule, they are observed in middle-aged or older horses (Holt and Pearson, 1984; Mair and Obsborn, 1986; Diaz-Espineira et al., 1995). The lower incidence in mares can probably be explained by the fact that a mare has a short, easily dilatable urethra through which a small calculus can pass unnoticed (Lowe, 1961). Diaz-Espineira et al. (1995) found on the basis of an analysis of 2025 equidae that the percentage of animals with uroliths amounted to 0.7% (1073 horses – 0.8%, 521 donkeys – 0.6% and 431 mules – 0.7%). Clinical symptoms associated with uroliths are as follows: hematuria, dysuria, stranguria, oliguria, tenesmus and incontinence. Sometimes hematuria is more noticeable after exercise; other signs include colic, reluctance to exercise, stiffness of the hindquarters, painful micturition and penile protrusion from the sheath (Holt and Pearson, 1984).

### Case description

The case concerns an eight-year-old crossbred mare. The mare was first covered at the age of eight. During the course of its pregnancy (from the third month) a micturition problem appeared, the symptoms of which increased as pregnancy proceeded. The owner of the mare, becoming more and

more anxious about these symptoms, called a vet, who performed rectal palpation only, confirming pregnancy and informed the owner that the mare's symptoms resulted from pregnancy and would disappear after labour. However, at the end of the tenth month, the mare's foetus was aborted. The owner of the horse was present at this time. According to his account, the abortion proceeded like ordinary labour with a normal presentation, position and posture, yet there was a structure about the size of an ostrich egg on the forelimbs of the foetus. The structure was spontaneously pushed out of the genital tract during expulsion of the foetus. The dead fetus was also expelled without any assistance. Following this, the owner immediately contacted the Department of Reproduction and Clinic of Farm Animals, Faculty of Veterinary Medicine in Wrocław.

Examination of the structure showed that it was a urolith which measured  $13 \times 10 \times 7$  cm (circumference measured along a long axis amounted to 31.5 cm, and along a transverse axis to 26 cm). The calculus weighed 803 g and its surface was smooth on one side (a flat part) whereas the remaining part of the calculus was rough (a cauliflower type of structure) (Figure 1 and 2). Chemical analysis showed that the calculus was composed of calcium carbonate – 95% and calcium phosphate – 5%.

Within a few hours of the abortion, general examination of the mare was performed and samples



Figure 1. Smooth surface of the calculus



Figure 2. Rough surface of the calculus

of urine and blood were collected directly from the bladder and jugular vein, respectively. Rectal and ultrasound (USG) examination of the genital tract and bladder were performed. The general state of the mare was very good (temperature, pulse, respiratory rates and colour of the mucous membranes were within normal limits). The USG examination revealed that the uterus had a diameter of 10–15 cm and was filled with fluid (foetal membranes were expelled within 30 min after abortion). The USG examination did not show any other uroliths in the bladder. In addition, palpation of the vagina was performed (with a naked hand). During this examination, evident dilation of the urethral meatus was found (a whole hand could be easily put into the urethra). Additionally, the urethra and the vestibule of the vagina were rough to the touch (scattered with sand) whereas the proper vagina was even to the touch. Leucocytosis was found in the peripheral blood (18.3 g/l), and the remaining blood values were within normal limits, including calcium concentrations. The urine was bright yellow with a gravity of 1.010, pH 8.0, and in addition protein (2.7 g/l) and blood were found in urine. The bacteriological urine analysis showed numerous bacteria (*Streptococcus zooepidemicus*, *Escherichia coli*, and coagulase-negative staphylococci), which were susceptible to a number of antibiotics, including the applied penicillin 10 000 IU/kg and streptomycin 10 mg/kg intramuscularly every 24 h for four days.

The mare started to urinate normally from the moment of abortion, and its state of health did not arouse any fears in its owner. Four and eight weeks after abortion, blood and urine samples were collected again for analysis; rectal and USG examination of the genital tract and bladder were also

performed. Four weeks after abortion a USG examination showed an image typical for oestrus (the uterus did not show any pathological changes), and little urine was detected in the bladder. Leucocytosis (16.4 g/l) was again found. The urine was yellow with a gravity of 1.014, pH 8.0, and blood cells were still observed. After the above-mentioned examination, no other therapy was carried out. Eight weeks after abortion USG examination of the genital tract showed a dioestrus, and an image of the bladder was normal. All haematology results and urine parameters were within normal limits.

## DISCUSSION AND CONCLUSIONS

In the mare studied, pollakiuria was a symptom noticed by the owner (an experienced breeder with long experience of working with horses), which occurred only from the third month of pregnancy onwards, increasing in severity from then onwards. The urolith was not found when the mare was examined (*per rectum* examination in the third month of pregnancy). The vet who performed the examination probably did not take into account that a urolith could be the reason for pollakiuria; instead, he concentrated on a pregnancy diagnosis. Perhaps, one of the reasons for the infrequent detection of uroliths in mares is less intense symptoms, which may occur only during pregnancy and may be wrongly associated with it. In addition USG examinations are more focused on the genital tract than the bladder to which less attention is usually given during pregnancy diagnosis.

The chemical composition of the studied calculus included 95% of calcium carbonate with a small

admixture of calcium phosphate, which is in accordance with the chemical compositions of uroliths studied by other authors (Kaneps et al., 1985; Mair and Obsborn, 1986; Dyke and Maclean, 1987; Diaz-Espineira et al., 1995). Diaz-Espineira et al. (1995) report the case of a big urolith in which they observed organic matter, constituting a nucleation matrix, situated in the centre of the stone. The urolith described in this paper was cut along its long axis, but a nucleation matrix was not found inside and the surface of the stone cross-section was uniform. Many authors suggest (see Diaz-Espineira et al., 1995), that the organic matter, which is normally present in equine urine, can act as a nucleus of uroliths and/or as a binding agent for crystals, as occurs in other species. However, the causes of the formation of uroliths in horses have not been conclusively elucidated so far. Mair and Obsborn (1986, 1990) showed that uroliths in horses are formed from the same type of crystals which can be found in normal equine urine. According to Divers (1996), the factors that predispose to the formation of uroliths in horses are as follows: abnormalities in calcium metabolism, abnormal calcium solubility factors caused by diet, bacterial infections, neoplasia, toxins or drugs (nonsteroidal antiinflammatory drugs). Ehnen et al. (1990) suggested that calculi in horses may be formed because of a predisposing nidus, such as renal papillary necrosis. Information obtained from the owner of the horse indicated that the mare has never suffered from urinary system diseases and has never received nonsteroidal antiinflammatory drugs. In general, the mare had not had any health problems until the problems with urination appeared; therefore, it is difficult to draw any conclusions regarding the causes of urolith formation in this mare.

What seems to be most interesting about this case is the size of urolith (weight – 803 g; it is probably the biggest urolith in horses that has been described so far) and the way of its expulsion from the bladder. Therapeutic procedures in the case of uroliths in horses are based on surgical methods of removal of the calculi that includes either abdominal (cystotomy) or urethral (urethrotomy) approaches (Wright and Neal, 1960; Lowe, 1961, 1965; Williams, 1964; Mair and McCaig, 1983; Holt and Pearson, 1984; Dyke and Maclean, 1987; Textor et al., 2005). Effective electrohydraulic lithotripsy for the treatment of cystic calculus in geldings (Eustace and Hunt, 1988) and failure of holmium:yttrium-aluminum-garnet laser lithotripsy (May et al., 2001)

have also been described. In a mare, uroliths can be removed through the urethra without a urethrotomy or after a urethrotomy (Lowe, 1961; Holt and Pearson, 1984). Wright and Neal (1960) described the case of a mare in which a calculus with a size of  $7 \times 6 \times 3.5$  cm (weight 110 g) was removed by manipulation per urethra. Kaneps et al. (1985) emphasized that removal of uroliths is easier when a urolith is smooth and more difficult when it is rough and friable.

In this case, a urolith weighing 803 g was spontaneously expelled during abortion. It seems that the foal mechanically “pushed out” the urolith through its pressure on the bladder and urethra. The action of hormones, which initiates labour, contributes to relaxation of the external genitals, which enables expulsion of the foetus. It is possible that the processes which accompanied the abortion also led to relaxation of the urethra enabling it to expand to such an extent that the urolith could be expelled through the urethra.

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