Urolithiasis in Rabbits

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Several diseases may cause urolithiasis in rabbits. Common causes may be nutritional, infectious, or metabolic in origin. Common urinary diseases are cystitis, bladder polyps, kidney conditions and urolythiasis/hypercalciuria.

Cystitis is more common in females and urethritis in males. Symptoms may include pollakiuria, dysuria, stranguria, haematuria, urine turbidity and malodour. The bladder may feel small and thickened on examination. Cystitis may also predispose to calculi formation and vice versa. *Pseudomonas* spp. and *Escherichia coli* are frequently isolated. Various factors predispose to calculi in rabbits: nutrition, such as the excess of vitamin D or minerals, obesity, anatomy and infection/inflammation. When a large amount of urinary sediment appears to cause irritation, the process is named hypercalciuria. Hypercalciuria is observed in the bladder, while urolithiasis can affect the urinary tract from the kidney to the urethra. The diagnostic suspicion is confirmed by radiology or ultrasonography. An excretory pielography can be performed (meglumine diatrizoate 600–800 mg/kg IV) to assess the kidney function and to target the treatment.

Medical treatment includes pain relief (non-steroidal anti-inflammatory drugs (NSAIDs) may be used), antibiotic therapy (based on culture and sensitivity results) and muscle-tone depressants, such as midazolam (0.2–0.5 mg/kg). It is advisable to catheterise the bladder, to flush the bladder and remove the accumulated sediment. Calcium carbonate and oxalate calculi, often seen in rabbits with urolithiasis, are insoluble in an alkaline environment, and therefore the preferred treatment is surgical removal (nephrotomy, ureterotomy, cystotomy or urethrostomy, depending on their anatomical location in the urinary tract). Urolithiasis has also been associated with chronic inflammatory conditions of the urinary tract, such as encephalitozoonosis. *Encephalitozoon cuniculi* causes chronic interstitial nephritis and fibrosis blocking the renal flow, which, along with an incorrect diet, may worsen the problem and favour urolithiasis.

It is useful, as prophylactic measure, to reduce the dietary calcium and vitamin D intake, and to use hay varieties with a low calcium content. The European Pet Food Industry Federation (FEDIAF) recommends 1000 IU of vitamin D per kg of feed.

Alternative treatments have been explored but currently there are no studies on the effectiveness of drugs used for treatment of calcium oxalate calculi in rabbits. Therefore, the following drugs are used empirically and off-licence:

- Thiazides: Increase the reabsorption of calcium and sodium in the proximal tubules. In dogs, hydrochlorothiazide is recommended (2 mg/kg q12h orally).
- Potassium citrate: Only recommended when the pH is below 7.5. Herbivores notoriously have a basic urine pH which may explain why this drug may not be effective in these species. Dog doses are 50–75 mg/kg q12h orally.
- Vitamin B6: The recommended dose is 2–4 mg/kg q24–48h orally in dogs.
- Nifedipine, verapamil and diltiazen: Calcium-channel blockers. Dosage is 30 mg/person/day, so in rabbits is 0.51 mg/kg q8–24h, together with the administration of corticosteroids.
- Tamsulosin: An alpha-1 blocker which decreases the ureters, urethra and prostate smooth muscle tone. Tamsulosin has been used in humans for treatment of prostatic benign hyperplasia and in dogs at 0.3–300 µg/kg/day.
- Aminotriptilin: Depresses the urinary smooth muscle tone. In pigs and cats it is used at doses of 1 mg/kg/day orally.
- Glucagon: In cats with oliguria, it was observed to improve the urine excretion but information on cases where blockage occurs is not available. A dose of 0.1 mg/cat q12h IV is recommended, up to four times.

KEY LEARNING OBJECTIVES

- Understand that a thorough diagnostic plan is important to rule out the many diseases that can cause urolithiasis in rabbits.
- Be aware that *E. cuniculi* causes chronic interstitial nephritis and fibrosis blocking the renal flow, which, along with an incorrect diet, may favour urolithiasis.
- Consider dietary recommendations, especially vitamin D requirements, which are important in the prophylaxis of urolithiasis.

MULTIPLE CHOICE QUESTIONS

1. What are the main aetiologies of infectious cystitis in rabbits?

    a. *Pseudomonas* and *Escherichia coli*

    b. *Pasteurella multocida*

    c. *Encephalitozoon cuniculi*

    d. Salmonella

2. In rabbits, what can encephalitozoonosis cause?

    a. Urolithiasis

    b. Kidney fibrosis

    c. Interstitial chronic nephritis

    d. All of the above

3. What is the recommended dose of vitamin D in a rabbit diet?

    a. 500 IU/kg food

    b. 1000 IU/kg food

    c. 1500 IU/kg food

    d. 2000 IU/kg food

Answers to multiple choice questions are available in the answer key.

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