

## Urinary Calculus in A Guinea Pig

Banu DOKUZEYLÜL \*  Abdullah KAYAR \*  
Damla HAKTANIR \*\* M. Erman OR \*

\* Department of Internal Medicine, Faculty of Veterinary Medicine, Istanbul University, TR-34320 Istanbul - TURKEY  
\*\* Department of Pathology, Faculty of Veterinary Medicine, Istanbul University, TR-34320 Istanbul - TURKEY

Makale Kodu (Article Code): KVFD-2012-8304

### Summary

Guinea pigs (*Cavia porcellus*) are susceptible to formation of urinary tract calculi. Uroliths can be located anywhere in the urinary tract and are typically composed of calcium salts. A pet, female guinea pig, aged 5 years and weighing 0.5 kg was referred to Internal Medicine Department Clinics for stranguria and recurrent haematuria over 15 days. The guinea pig was emaciated, dehydrated and hypothermic, also demonstrated pain on caudal abdominal palpation and a small thickened bladder wall was discovered. Gastric dilatation and urinary calculus was detected with thoracoabdominal radiography. 2 days later death was learned and then it was brought for necropsy to Department of Pathology. Necropsy revealed calculus in the lumen of urinary bladder with the dimensions of 0.7x0.5 cm though no distinct changes were grossly evident in the urinary tract. The bladder was empty and the mucosa was moderately thickened suggestive of fibrosis and edema resulting from a possible chronic condition. Physical and chemical analysis of the calculus was done by laboratory. Calcium and oxalates are the main risk factors for stone formation, but the calculus of this guinea pig included calcium carbonate and oxalate in combination with other minerals; including struvite. To the authors' knowledge, it was the first guinea pig including urinary signs and calculus, presented in Turkey.

**Keywords:** Hematuria, Stranguria, Guinea pig

## Bir Kobayda İdrar Kesesi Taşı

### Özet

Kobaylar (*Cavia porcellus*) idrar yolu taşlarını oluşturmaya yatkındırlar. İdrar taşları idrar yolu kanalının herhangi bir yerinde lokalize olabilirler ve genellikle kalsiyum tuzlarından oluşurlar. Pet hayvanı olarak bakılan dişi, 5 yaşlı, 0.5 kg ağırlığındaki kobay 15 günden fazladır süregelen strangüri ve tekrarlayan hematüri nedeniyle İç Hastalıkları Anabilim Dalı Polikliniği'ne getirildi. Klinik muayenede kobayın zayıflamış, dehidre ve hipotermik olduğu belirlenirken, ayrıca kaudal abdominal palpasyonda ağrı tespit edildi. İdrar kesesi duvarının küçülmüş ve kalınlaşmış olduğu saptandı. Torakoabdominal radyografi ile gastrik dilatasyon ve idrar kesesi taşı saptandı. 2 gün sonra hayvanın ölmüş olduğu öğrenildi ve ardından nekropsi için Patoloji Anabilim Dalı'na getirildi. Nekropside idrar kesesinin lümeninde 0.7x0.5 cm boyutlarında idrar kesesi taşı tespit edilirken, idrar yolu kanalında gözle görülür belirgin bir değişim saptanamadı. İdrar kesesinin boş olduğu ve idrar kesesi mukozasının muhtemel bir kronik durum sonucu şekillenen fibrozis ve ödeme bağlı olarak kalınlaşmış olduğu belirlendi. İdrar taşının fiziksel ve kimyasal analizi laboratuvar tarafından yapıldı. Kalsiyum ve okzalatlardan oluşan temel risk faktörleri olarak kabul edilmektedir. Buna rağmen, bu vakayı oluşturan hastanın idrar kesesi taşı kalsiyum karbonat, okzalatlardan ve strüvitten oluşan bir mineral kombinasyonundan oluşmaktadır. Olgunun Türkiye'de üriner belirtiler gösteren ve idrar kesesi içerisinde taş tespit edilen ilk kobay olduğu saptanmıştır.

**Anahtar sözcükler:** Hematüri, Strangüri, Kobay

## INTRODUCTION

Urinary tract disease is relatively common in pet rodents. Diagnostic principles and management regimens for these species are essentially the same as those used for dogs and cats with urinary disease <sup>1</sup>. Guinea pigs (*Cavia porcellus*) and rabbits are susceptible to formation of urinary tract calculi.

Urinary calculi may occur in guinea pigs, but it's a rather uncommon incidental finding. Clinical signs are observed if there is an obstruction or inflammation occurs. These clinical signs can include uremia, anuria or oliguria, pyuria, depression and anorexia. Hematuria may be observed even



### İletişim (Correspondence)



+90 212 4737070/17131



b9eylul@istanbul.edu.tr, bdokuzeylul@gmail.com

without obstruction<sup>2</sup>. Uroliths can be located anywhere in the urinary tract and are typically composed of calcium salts: calcium phosphate, calcium oxalate. The etiopathogenesis of uroliths in these species is poorly understood<sup>3,4</sup> but it is related to the urinary concentration of ions and crystals and crystal aggregation<sup>3</sup>.

## CASE HISTORY

A pet female guinea pig aged 5 years and weighing 0.5 kg was referred to Internal Medicine Department Clinics for inappetence, stranguria and recurrent haematuria over 15 days (Fig. 1). The guinea pig was emaciated, dehydrated and hypothermic (T: 33°C, reference range: 37.2-39.4°C). The patient also demonstrated pain on caudal abdominal palpation and a small thickened bladder wall was discovered. Because of these findings, thoracoabdominal radiography was taken in laterolateral (LL) view. Gastric dilatation and urinary calculus was detected with radiography (Fig. 2). Diagnosis was based on radiographic findings. Ultrasound could be inconclusive in this patient because there was a large amount gas in the gastrointestinal tract and the bladder was empty in palpation. Urine sample couldn't also be taken because the bladder was empty. General condition status was not also good enough to collect blood. Because of hypothermia, guinea pig was supported with fluid therapy and vitamins in intensive care unit of our department. Lactated Ringer solution were administered subcutaneously (SC) in a dosage of 10

ml, Vitamin B<sub>12</sub> (0.1 ml SC) and Vitamin C (0.1 ml SC) were also administered intramuscularly (IM). After two hours, the body temperature was elevated (T: 36.0°C). After these therapies, it was learned that the guinea pig started to move and turned in a normal condition at the first day, but 2 days later, death was learned and it was brought for necropsy. Necropsy was done at the Department of Pathology. Necropsy revealed calculus in the lumen of urinary bladder with the dimensions of 0.7x0.5 cm though no distinct changes were grossly evident in the urinary tract (Fig. 3). The bladder was empty and the mucosa was moderately thickened suggestive of fibrosis and edema resulting from a possible chronic condition. The kidneys were slightly enlarged with subtle border irregularity and mottled surface beneath the capsule. The stomach was



Fig 1. Guinea pig

Şekil 1. Kobay

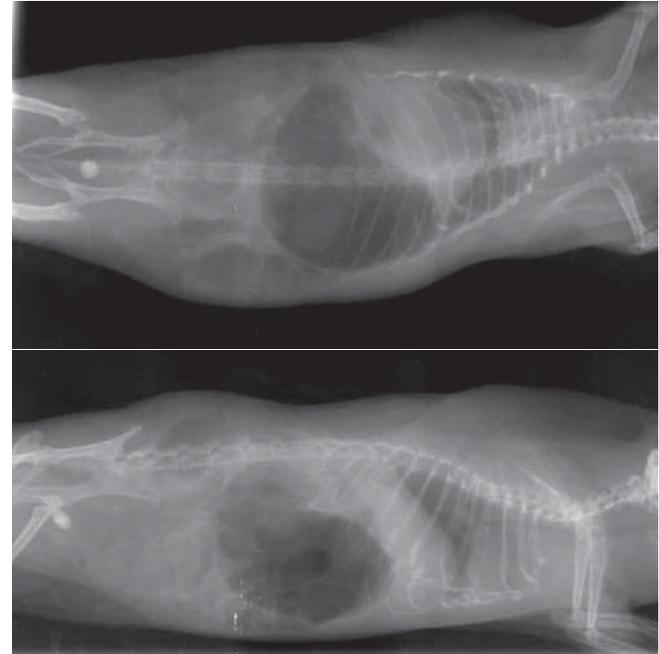


Fig 2. LL and VD radiographies of the patient where the calculus was clearly seen inside the urinary bladder

Şekil 2. Hastanın idrar kesesi içerisinde kalkülün belirgin olarak görüldüğü LL ve VD radyografileri

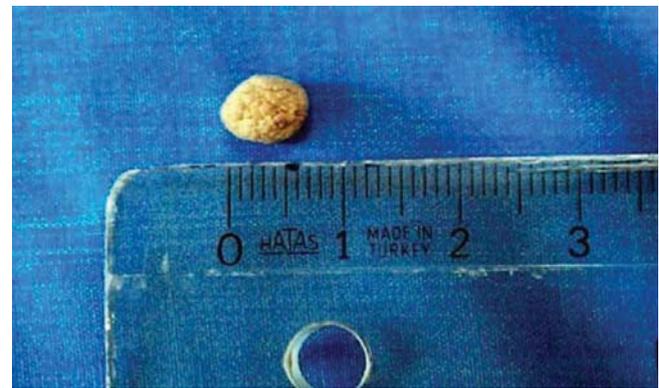


Fig 3. Urinary calculus of the guinea pig

Şekil 3. Kobayın üriner kalkülü

greatly enlarged though empty and filled with yellowish mucous fluid and the wall was observed to become quite thin suggestive chronic atrophic gastritis. The liver, lungs and the spleen were markedly congested (Fig. 4). Tissue samples were collected from all visceral organs and particularly from the urinary tract and submitted for histopathology for further evaluation of the lesions. Physical and chemical analysis of the calculus was done at veterinary laboratory. Calculus material was submitted to the laboratory of Vetlab, Veterinary Analysis Laboratory, Avclar, Istanbul for chemical analysis which was revealed ammonium, magnesium, phosphate, calcium, carbonate and oxalate reactions gave positive result. The urinary calculus was beige colored and its surface was rough.



**Fig 4.** An in situ gross pathological examination of guinea pig revealed severely congested vital organs (the liver, the heart and the lungs), distended stomach and intestines

**Şekil 4.** Kobayın doğal durumunda bütün patolojik muayenesinde hayati organların (karaciğer, kalp ve akciğerler) konjeste olması, mide ve bağırsaklarda şişme

## DISCUSSION

Urolithiasis is a common health problem in many species including guinea pigs. Historically, middle-aged to older females are believed to be overrepresented among affected guinea pigs<sup>4</sup>. Our patient was female and 5 years old.

In a retrospective study, they were systematically examined the organs of deceased or euthanized guinea pigs<sup>5</sup>. With this way, they found urinary calculi in 1 male and 5 female of 170 (74 male, 96 female) guinea pigs. It could correspond to an incidence of about 1.3-5.2%<sup>5,6</sup>. However, the reasons why females are predisposed to cystitis remain poorly understood. Most investigators believe that it is related to the difference in anatomical structure of the urinary tract between female and male. In female guinea pigs, the urethra is close to the anus, so that intestinal bacteria, especially gram-negative organisms, are more likely to enter the urethra and the urinary bladder where they may cause disease if conditions are appropriate<sup>5</sup>.

Diet is also likely to play a role in calculi formation<sup>1</sup>. Our patient was being fed with a diet high in calcium and supplemented with greens rich in calcium. Intestinal hyperabsorption of dietary calcium may lead to excessive excretion of calcium in the urine. Calcium and oxalates are the main risk factors for stone information in the guinea pig<sup>1</sup>. These calculi are radiodense and easy to identify radiographically. The calculus of the guinea pig was seen clearly with radiography.

The stones consisted of two or more minerals in examinations. Against this in dogs more than 60%, in humans only 28% of the stones are monomineralic. The components of stones agree with those, described in literature, similar to rabbits, minerals containing calcium are predominant<sup>6</sup>. Our case's calculus consisted different types of minerals: ammonium, magnesium, phosphate, calcium, carbonate and oxalate.

In addition, this region is often ignored in physical examination and clinical symptoms are often missed. Female guinea pigs with urinary clinical symptoms should be exactly examined. Most of the bacteria are normally washed away before they invade the urethral mucosa with urine passage. The injury of mucosa and stagnation of urine are the important predisposing factors<sup>5</sup>. Urolithiasis can be very subtle and should be on the differential diagnosis list for any guinea pig that presents "sick"<sup>7</sup>.

Although it is known that calcium and oxalates are the main risk factors for stone information in guinea pigs, the calculus of the guinea pig included calcium carbonate and oxalate in combination with struvite. Finally, urinary tract disorders in guinea pigs may show the same symptoms like many of our pet species. Diagnostic tools and general therapies used in small animal practice are appropriate for the pet rodent.

## REFERENCES

- Johnson-Delaney CA:** Disease of the urinary system of commonly kept rodents diagnosis and treatment. *Seminars in Avian and Exotic Pet Med*, 7 (2): 81-88, 1998.
- Terril LA, Clemons DJ, Wagner JE. Guinea pigs:** Noninfectious diseases. In, Van Hoosier GL (Ed): *Laboratory Animal Medicine and Science Series II for American College of Laboratory Animal Medicine*. Seattle, WA: University of Washington Health Sciences Center for Educational Resources, p. V-9026, 1992.
- Hoefler HL:** Urolithiasis in rabbits and guinea pigs. *NAVC Proceedings*, 20, 1735-1736, 2006.
- Hawkins MG, Ruby AL, Drazenovich TL, Westropp JL:** Composition and characteristics of urinary calculi from guinea pigs. *JAVMA*, 2, 214-220, 2009.
- Peng X, Griffiths JW, Lang CM:** Cystitis, urolithiasis and cystic calculi in ageing guineapigs. *Lab Anim*, 24, 159-63, 1990.
- Fehr M, Rappold S:** Urolithiasis bei meerschweinchen. *Tierarztl Prax*, 5, 543-547, 1997.
- Hoefler HL:** Guinea Pig Urolithiasis. *Exotic DVM*, 6 (2): 23-25, 2004.