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Case report

SURGICAL TREATMENT OF OBSTIPATION DUE TO METABOLIC BONE DISEASE IN A SAVANNAH MONITOR

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Summary

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Metabolic bone disease (MBD) syndrome is a common finding in reptiles kept in terrariums. This clinical case describes the diagnosis, surgical treatment and antibacterial therapy of obstipation resulting from MBD syndrome in a Savannah monitor (*Varanus exanthematicus*), referred to the Small Animal Clinic of the University Veterinary Hospital, Stara Zagora, Bulgaria. The monitor was presented with a history of ataxia, anorexia and lack of defecation from several months. MBD syndrome and a colon obstructed with faecoliths were confirmed clinically, by radiology and computed tomography. The surgical treatment comprised celiotomy, followed by colon enterotomy to remove the faecal masses and closure of the body wall. The post-operative period and the recovery of the patient were without complications.

Key words: intestinal obstruction, metabolic bone disease (MBD), Savannah monitor, surgery

The Savannah monitor (*Varanus exanthematicus*) is one of commonest monitor lizards in terraristics. It is preferred for keeping as a pet due to its easy rearing, fast domestication and relatively small size compared to other members of the genus (Weber, 2008).

The Savannah monitor is also active in the daytime, so it needs a UVB lamp (Bennett & Thakoordyal, 2003). The lack of such a lamp is often associated with development of Metabolic Bone Disease (Metabolic Bone Syndrome; MBD).

The intestinal obstruction of lizards with faecoliths is one of MBD signs (Wright, 2008). In addition, the adynamic ileus depends directly on systemic calcium concentrations. The pica and pelvic bone deformities associated with MBD may also result in constipation (Mitchell & Diaz-Figueroa, 2005).

Clinical signs are non-specific, and main diagnostic imaging techniques are radiography and computed tomography (Chaprazov, 2023).

Conservative treatment is aimed at evacuation of obstructing masses from the digestive tract is the treatment of choice (Bennett & Pye, 2021). In case of failure, paramedian celiotomy and colonotomy followed by post-operative antibacterial therapy are recommended (Alworth *et al.*, 2011).

The aim of this case report was to present in details the clinical signs, diagnostic approaches, surgical technique and the post-operative management of obstipation resulting from MBD in a Savannah monitor.

CASE DESCRIPTION

Patient's signalment and history

A 4-year-old male Savannah monitor (*Varanus exanthematicus*) weighing 1.8 kg was referred for diagnosis confirmation and treatment to the Small Animal Clinic of the University Veterinary Hospital, Stara Zagora, Bulgaria.

The body length of the lizard, the tail included, was 94 cm.

The animal was housed in an individual glass terrarium with size 160×80×60 cm. The temperature in the warm zone of the terrarium was maintained within 38-42 ^{o}C, and in the cold zone: 28−30 ^{o}C. The humidity did not exceed 50−60%. A commercial UV light source and a constant access to water for drinking and bathing was provided.

The patient's diet included raw meat (poultry, rabbit and beef), powdered with a calcium supplement. Reptile vitamins were also added to the food on a weekly basis. In addition to the diet, boiled eggs were also given.

The Savannah monitor was admitted with several-month history of ataxia, anorexia, refusal of food and abnormal faeces. The description made clear that released faecal masses consisted only of urine and urates. After radiography, a severe obstipation was diagnosed. The applied laxative and antibacterial drugs and change of diet did not give a positive result.

Evaluation and clinical findings

The Savannah monitor was apathetic, with visibly enlarged abdomen. The tail had an arc-shaped deformity (Fig. 1). On the dorsal body surface and legs, cicatrices from

Fig. 1. Clinical examination of the Savannah monitor (*Varanus exanthematicus*). Visible tail deformity and skin cicatrices from past thermal injuries are seen.

past thermal injuries were noticed. The scales on the back were harder than normal and have obviously lost their usual shape.

The palpation of the coelom showed several hard formations in both lateral regions. No signs of dehydration were found out.

Radiography

After the physical examination, radiographs of the patient were performed in lateral and dorsoventral views with a PHILIPS SUPER 50 CP-D (Hamburg, Germany) X-ray equipment and exposure data 50 kV and 10 mAs. Radiographic images were processed with iQ-VIEW/PRO version 2.7.0 INT EN003R software.

Lateral radiographs demonstrated multiple opacities with irregular shape and of various size in the dorsal third of the coelom. Among compacted faecoliths, the presence of a gas collection was seen in the intestinal lumen. Moreover, reduced serosal detail and an abnormal pattern of abdominal organs was noticed. X-ray of coelom showing ground glass appearance indicated free fluid in the abdominal cavity.

The radiological findings on the dorsoventral radiograph comprised widening of epiphyseal plates of long tubular bones and at the costochondral junction, as well as deformities with fusion in the area of coccygeal vertebrae. Radiological signs of the digestive system were similar to those seen in the lateral view (Fig. 2).

Computed tomography

CT scans were done with SIEMENS SOMATOM go. Now® VA40/11061610 (Siemens Healthcare GmbH, Computed Tomography (CT), Forchheim, Germany) scanner with the following parameters: Collimation: 16×0.7 mm; Scan time: 14 s;

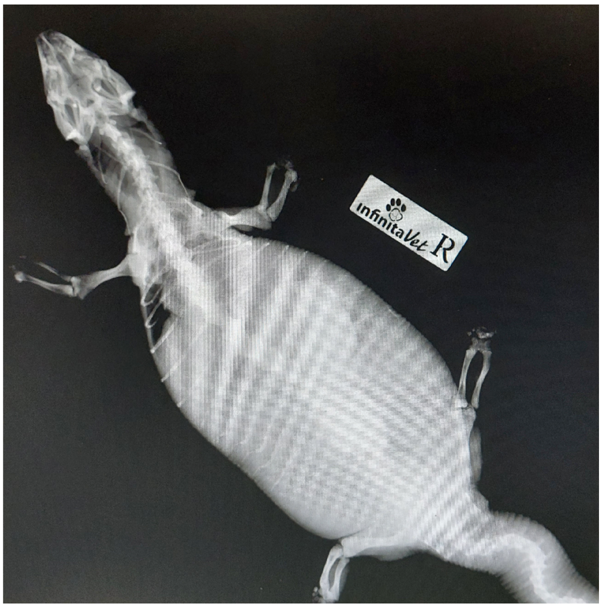

Fig. 2. Whole-body dorsoventral radiograph of the Savannah monitor – strong radiopacities of faecoliths, radiolucent gas collection and loss of detail of abdominal organs.

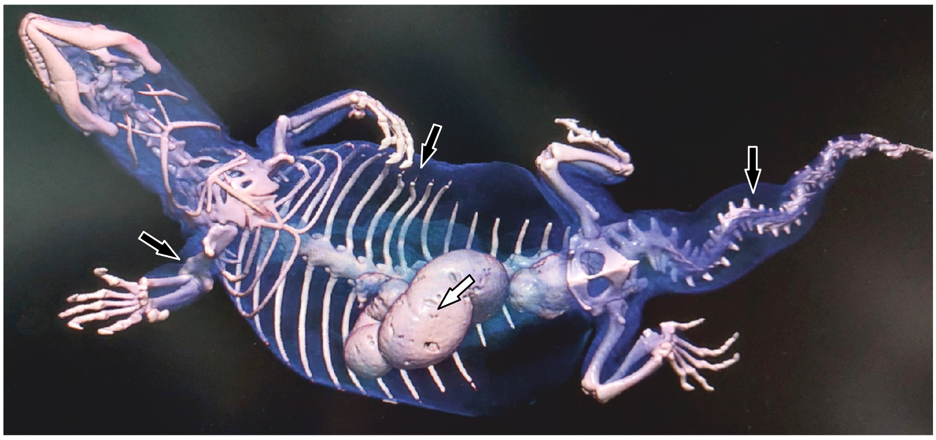

Fig. 3. CT scan with 3D image reconstruction. Optimum visualisation of faecoliths' number and location in colon (white arrow) and bone deformities in the epiphyses of the humerus, caudal spinal column segment and at the costochondral junction of coccygeal vertebrae (black arrows).

Fig. 4. Intubated Savannah monitor before the preparation of the operating field.

Scan length: 312 mm; Rotation time: 1.0 s; Pitch factor: 1.5; Scan parameters: 130 kV/101 mAs; CTDIvol: 5.29 mGy; DLP: 159 mGy.

Three-dimensional images for evaluation of coelomic content were reconstructed via the Sinogram Affirmed Iterative Reconstruction (SAFIRE) algorithm (Fig. 3).

Anaesthesia

Premedication was performed by intramuscular injection of tiletamine/zolazepam (Zoletil 50 mg/mL, 4 mg/kg, Virbac Santé Animale). For induction of anaesthesia, 5% isoflurane and 1 L/min oxygen were delivered via an anaesthesia mask. Following intubation, the patients was maintained with 2% isoflurane and 1 L/min oxygen with intermittent positive-pressure ventilation at a rate of three breaths/min (Fig. 4).

Surgical technique

In the operation room, the patient was placed on a warming pad for maintaining optimum body temperature. After positioning in dorsal recumbency, the ventral abdominal area was wiped twice with povidone-iodine. The operating field was isolated with polyethylene surgical drape, which facilitated the monitoring of the patient.

The coelom was approached via right paramedian laparotomy to avoid the ventral abdominal vein. The incision length was about 15 cm. After coelom opening, there was a transparent yellowish slightly viscous odourless effusion. The aspirated total fluid amount attained 20 mL (Fig. 5).

The intestinal wall had neither necrotic areas nor perforations. The length of obstructed area exceeded 20 cm. The attempts for manual fragmentation of the intestinal content were not successful. After isolation of the colonic segment, two separate colonic enterotomies, each with length of about 8 cm were performed. After removal of faecoliths, the incisions of intestinal wall were restored with dou-

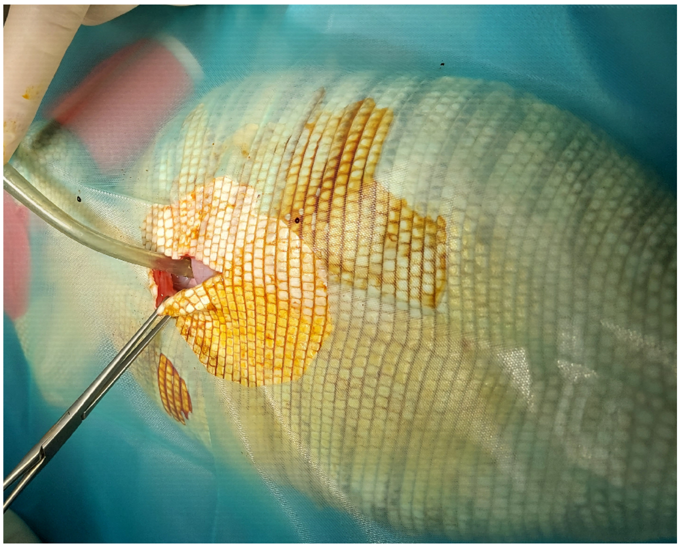

Fig. 5. Paramedian coelomotomy of the Savannah monitor and aspiration of coelomic content.

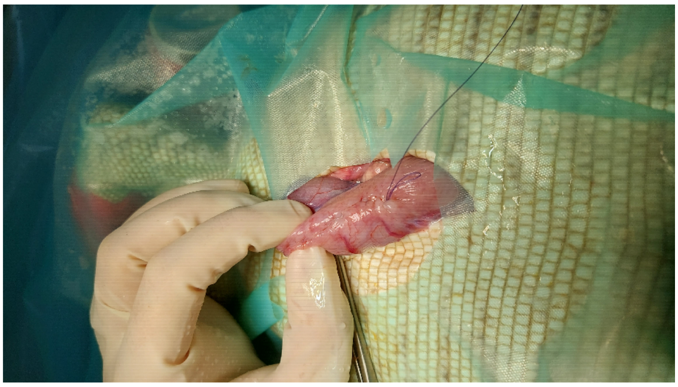

Fig. 6. Closure of enterotomy by double-layer seromuscular sutures.

Fig. 7. Removed faecoliths that have caused the intestinal obstruction. The surgical incision was closed.

ble-layer continuous 3-0 polyglycolic acid sutures (Fig. 6).

For coelomic lavage, warmed 0.9% sterile physiological saline was used. Pleuroperitoneum was closed with absorbable interrupted cruciate 3-0 polyglycolic acid suture. The second layer was placed on the muscular layer in a similar manner. The skin incision was closed with horizontal mattress 2-0 nylon suture (Fig. 7).

Post operative period

For recovery from the surgery, the patient was placed in a pet brooder with oxygen and controlled temperature. Post operative radiography showed complete removal of faecoliths obstructing the intestinal lumen.

Post operative antibacterial therapy consisted of single intramuscular injection of 5 mg/kg/day enrofloxacin, (Baytril, Bayer Healthcare LLC, Animal Health Division, Shawnee Mission, KS), followed by the same dose applied orally. Metronidazole at a dose of 15 mg/kg/day (Metronidazol i.v. Braun 500 mg/100 ml, Braun Melsungen AG, Germany) was administered orally as second antibacterial agent.

Lactulose at 0.3 ml/kg/day (Duphalac® 67 g/100 ml oral solution, Mylan Bulgaria, manufacturer Abbott Biologicals B. V., The Netherlands) was applied orally as laxative and means for liver function maintenance. For restoration of impaired calcium balance, Calcium gluconate syrup 10% (calcium gluconate lactate, 150 ml, Niksen Ltd, Bulgaria) was applied at 1 mL/kg/day. Pain control was achieved with intramuscular application of buprenorphine 0.02 mg/kg at 48-hour interval (Bupaq 0.3 mg/mL, Richter Pharma AG, Feldgasse 19, 4600 Wels, Austria) (Chaprazov, 2022).

One month after the surgery, the Savannah monitor was with normal appetite and without post operative complications.

The commonest pathologies in captive reptiles are associated with inadequate dietary regimen and continuous stress (Schmidt-Ukaj *et al.*, 2017). Metabolic bone diseases are among the most frequent conditions (Mader, 2006; Klaphake, 2010). MBD is caused by calcium, vitamin D deficiencies and phosphorus imbalance, or insufficient ultraviolet radiation (Girling, 2003), resulting in secondary hyperparathyroidism.

Early signs include swelling of joints and extremities, lameness, shortening and deformation of the mandible (Girling, 2003). Later, anorexia, constipation, long bone fractures, muscle tremor, spasms, paralysis and death are diagnosed (Mader, 2006). The Savannah monitor from this study had a similar clinical manifestation.

MBD often develops together with functional gastrointestinal and liver disorders (Schmidt-Ukaj *et al.*, 2017). Membrane excitability is increased by MBD-associated hypocalcaemia. This results in enhancement of nerve impulses' conduction and muscle contraction. Initially, muscle fasciculations are manifested as fine twitches of digits (Mader, 1996). At the background of continuously declining calcium concentrations, fasciculations and spastic tetany may occur. This is the mechanism of occurrence of ileus with subsequent constipation (Büker *et al.*, 2010).

Regardless of the apparently irreversible changes in bone structure and shape, affected structures are almost completely restored over several months with adequate therapy.

The size of faecoliths and the time from the onset of intestinal obstruction are essential for therapeutical decision-making of this condition (Doneley *et al.*, 2018). In chronic problems, the surgery is the only alternative (Bennett & Pye, 2021). Colonotomy should be done with particular care due to the thin intestinal walls and fast peristalsis, which may compromise the surgical approach.

In conclusion, the digestive system examination in lizards affected with metabolic bone disease should be always taken into consideration with regard to possible ileus and chronic intestinal impatency.

REFERENCES

Alworth L., S. Hernandez & S. Divers, 2011. Laboratory reptile surgery: Principles and techniques. *Journal of the American Association for Laboratory Animal Science,* **50**, 11–26.

Barten S., 2006. Lizards. Biology and husbandry. In: *Reptile Medicine and Surgery*, 2nd edn, ed D. R. Mader, Saunders Elsevier, St. Louis, p. 65.

Bennett, D. & R. Thakoordyal, 2003. The Savannah Monitor Lizard: The Truth about *Varanus exanthematicus*. Viper Press, UK, pp. 1–83.

Bennett, R. A. & G. W. Pye, 2021. Surgery of Exotic Animals, 1st edn, Wiley, pp. 108–111.

Büker, M., U. Foldenauer, S. Simova-Curd, S. Martig & J. Hatt, 2010. Gastrointestinal obstruction caused by a radiolucent foreign body in a green iguana (*Iguana Iguana*). *The Canadian Veterinary Journal*, **51**, 511–514.

Chaprazov, Ts., 2022. Exotic Animal Surgery, Ex-Press Publishing House, Gabrovo, Bulgaria (BG).

Chaprazov, Ts., 2023. Exotic Animal Radiography and Computed Tomography, Ex-Press Publishing House, Gabrovo, Bulgaria (BG).

Doneley, B., D. Monks, R. Johnson & B. Carmel, 2018. Reptile Medicine and Surgery in Clinical Practice, John Wiley & Sons Ltd, Hoboken, NJ.

Girling, S., 2003. Veterinary Nursing of Exotic Pets. Blackwell Publishing Ltd, Oxford, UK, pp. 152–171.

Klaphake, E., 2010. A fresh look at metabolic bone diseases in reptiles and amphibians. The *Veterinary Clinics of North America: Exotic Animal Practice,* **13**, 375–392.

Mader, D. R., 2006. Metabolic bone diseases. In: *Reptile Medicine and Surgery*. 2nd edn, ed D. R. Mader, Saunders Elsevier; St. Louis, pp. 841–851.

Mader, D., 1996. Reptile Medicine and Surgery. W.B. Saunders Co., pp. 385-392.

Mitchell, M. A. & O. Diaz-Figueroa, 2005. Clinical reptile gastroenterology. *Veterinary Clinics of North America: Exotic Animal Practice*, **8**, 277–298.

Schmidt-Ukaj, S., M. Hochleithner, B. Richter, C. Hochleithner, D. Brandstetter & Z. Knotek, 2017. A survey of diseases in captive bearded dragons: A retrospective study of 529 patients. *Veterinarni Medicina*, **62**, 508–515.

Weber, N., 2008. Savannah monitor lizard (*Varanus exanthematicus*) and white-throated monitor lizard (*Varanus albigularis albigularis*). *Exotic DVM*, **10**, 24–25.

Wright, K., 2008. Two common disorders of captive bearded dragons (*Pogona vitticeps*): Nutritional secondary hyperparathyroidism and constipation. *Journal of Exotic Pet Medicine*, **17**, 267–272.

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