

POST-OVULATORY DYSTOCIA IN TWO SMALL LIZARDS: LEOPARD GECKO (*Eublepharis macularius*) AND CRESTED GECKO (*Correlophus ciliatus*)

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Submitted December 5, 2015

Two geckos were presented with post-ovulatory dystocia. Reproductive disorders are common in nocturnal and crepuscular geckos kept and bred in captivity, and they are often related to nutritional disorders and/or improper housing conditions. The diagnosis was achieved by radiography and the treatment consisted in an ovariosalpingectomy. This surgery is often performed in big lizards, while percutaneous oovocentesis has been suggested to treat dystocia in small geckos such as *Eublepharis macularius*. An Ovariosalpingectomy may be a viable treatment option not only for big lizards, but also for small reptiles and it represents a definitive treatment for pre-ovulatory follicular stasis and post-ovulatory dystocia in small geckos.

Keywords: reptiles; egg binding; gecko; ovariosalpingectomy; reproductive pathologies; dystocia.

INTRODUCTION

The leopard gecko is one of the most common ground geckos bred in captivity, while the crested gecko is one of the most common captive arboreal geckos. Although reproductive problems are more frequently reported in turtles and snakes than in lizards, many lizards suffer from these diseases when kept in captivity (DeNardo, 2006a).

Both pre-ovulatory follicular stasis and post-ovulatory dystocia are often caused by common management mistakes such as overfeeding, an improper diet, excessive inbreeding, precocious breeding, inadequate light, and the absence of a nesting box (DeNardo, 2006a; Sykes, 2010). These mistakes must be corrected before starting any medical treatment. Increasing the calcium intake can help the formation of the egg shell and decrease bone demineralization. Certain species of geckos have two endolymphatic glands where calcium is stored. These are located either on the roof of their mouth on the side of their neck, depending on the species. In species where they are present, their development can be used as an indicator of the calcium reserve of the body, especially

in females prior to breeding. Reptiles usually show an increased abdominal volume some weeks before laying their eggs and they refuse to eat because the follicles and eggs take up so much space within their coelomic cavity that there is no room left for stomach contents (DeNardo, 2006b).

In the case of pre-ovulatory follicular stasis or post-ovulatory dystocia the fasting period can be prolonged, which aggravates the condition of the animal. Radiography can be used to determine the development stage of the eggs by assessing the density and thickness of the egg shell. Ultrasound is often necessary in the case of pre-ovulatory follicular stasis because follicles are not usually visible on radiographs (DeNardo, 2006b; Sykes, 2010). The simple injection of air into the coelom of a lizard can greatly improve the visualization of pre-ovulatory follicles and other masses (Hernandez-Divers, 2006). In the authors' experience, illuminating the animal from behind can some time allow the visualization of eggs or follicles through the abdominal wall in small lizards, whose skin is very thin. In geckos that present the endolymphatic glands, they can be radiographically investigated to assess the calcium reserve of the body.

In cases of post-ovulatory dystocia refractory to medical treatment, the percutaneous aspiration of the yolk was described in snakes in order to reduce the size of the eggs and facilitate the natural oviposition. In some cases it is still necessary to treat the animals with oxytocin after the percutaneous aspiration of the yolk (DeNardo,

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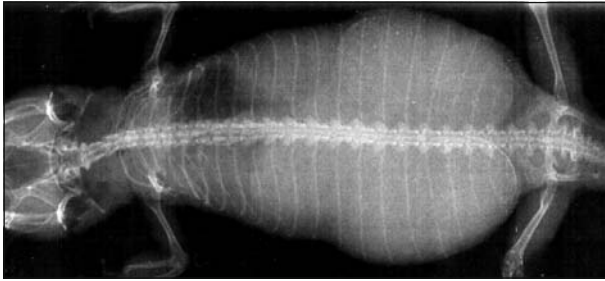


Fig. 1. Dorso-ventral radiograph of the leopard gecko showing post-ovulatory dystocia. The eggs are too big in diameter to pass through the pelvis and the caudal pole of each egg is in contact with the other one, making it difficult for one of them to move into the cloacae.

2006a, 2006b). This technique has also been described in a leopard gecko (Hall and Lewbart, 2006).

Salpigotomy and ovariosalpingectomy were recently described for the treatment of obstructive and non-obstructive dystocia in reptiles (Sykes, 2010).

CASE REPORT

A leopard gecko (*Eublepharis macularius*) and a crested gecko (*Correlophus ciliatus*) were presented with post-ovulatory dystocia. Both animals were captive-born adult females (over one year old) and they were housed alone. In both cases no UVB-light was installed in the terrarium. In literature is often stated that these nocturnal geckos seem not to need UVB, although Metabolic bone disease is not rare in these species. For this reason, nocturnal geckos kept without an UVB-light need a calcium and vitamin D₃ supplementation. At the same time it is well known that an excess of UVB exposure can cause keratitis especially in nocturnal geckos (Funk, 2002).

Both geckos were presented with an increase in coelom volume and two months of anorexia. The owners reported multiple unsuccessful attempts of laying eggs. The palpation of the abdomen revealed the presence of two firm egg-like structures. The endolymphatic glands were visible on the roof of the mouth of the crested gecko. Both animals were still active and alert.

A dorsal-ventral radiograph confirmed post-ovulatory dystocia and showed the presence of two eggs. In both cases the eggs were too big in diameter to pass through the pelvis and the caudal pole of each egg touched the other one making it difficult for one of them to move into the cloacae (Figs. 1 and 2). The two endolymphatic glands of the crested gecko were radiopaque and well developed, showing a good calcium reserve of



Fig. 2. Dorso-ventral radiograph of the crested gecko showing dystocia. The eggs are too big in diameter to pass through the pelvis and the caudal pole of each egg is in contact with the other one, making it difficult for one of them to move into the cloacae. Radiopaque and well developed endolymphatic glands in the palate, radiolucent foreign body in the stomach and spinal defect at the base of the tail.

the body. The radiograph showed also the presence of a bone-density foreign body in the stomach indicating pica (ingestion of stones due to natural lithophagy), and a spinal defect at the base of the tail (Fig. 2).

Hematology and biochemistry tests were not performed due to financial reasons and the medical treatment was not possible in both cases because of the size and the position of the eggs so that an ovariosalpingectomy was performed.

Morphin (Morfina cloridrato 10 mg/ml, Molteni Italia) 0.1 mg/kg i.m. and Meloxicam (Metacam 0.5 mg/ml, Boehringer Ingelheim Italia S.p.a.) 0.2 mg/kg *per os* were used to provide analgesia. Alfaxolon (Alfaxan, Vétotoquinol U.K.) 5 mg/kg i.m. was administered 30 min afterwards to induce anesthesia and allow intubation.

A venous catheter was used as a tracheal tube (a 16-gauge catheter for the leopard gecko — weighing 78 g — and a 18-gauge catheter for the crested gecko — weighing 36 g).

The anesthesia was maintained with isoflurane (Isoflo, Esteve S.p.a.) 2–3% and oxygen 100% (0.5 liters/min) through a Bain anesthesia circuit with open waste gas valve. Manual ventilation was performed when necessary with a 0.5 liter breathing bag. A Doppler device was the only monitoring instrument used in both cases and the plate was placed on the chest to monitor the heart rate. Microstream capnography was used but could not detect etCo₂ because of the small tidal volume.

The animals were positioned in dorsal recumbence. After the surgical scrub was performed with chlorhexidine 2% on the ventral aspect of the body, a sterile plastic transparent surgical drape was placed on the animals.

A paramedian incision was performed with a No. 15 blade a few mm from the linea alba to avoid the risk of damaging the abdominal vein (Alworth, 2011; Mader,



Fig. 3. Surgical view of the crested gecko in dorsal recumbence. A small blepharostat is used as an abdominal retractor. The salpinx is exposed using a forceps.

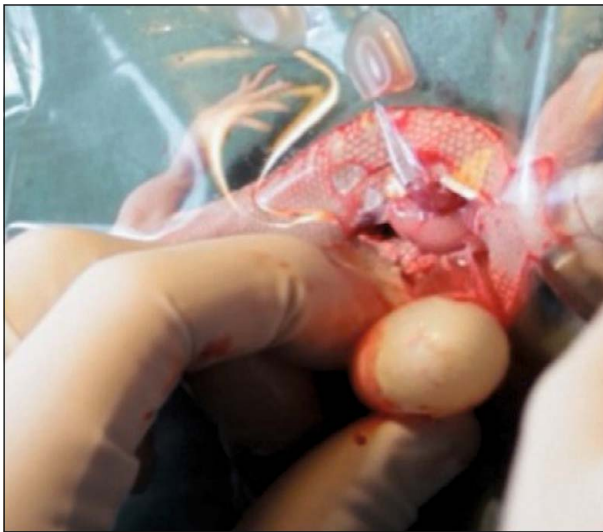


Fig. 4. Surgical view of the leopard gecko in dorsal recumbence. Removal of the egg from the incision in the salpinx wall.

2006). The incision was then enlarged with blunt scissors to avoid damaging the visceral organs, and a small blepharostat was used as an abdominal retractor (Fig. 3).

Once a salpinx containing the egg was exposed, it was decided to perform an incision in the salpinx wall and remove the egg in order to make room for the surgical procedure (Fig. 4). The same procedure was performed on the opposite side. Follicles in different maturation stages were visible on both sides.

The hemostasis was done using small and micro hemoclips, one for each ovary artery and one for each insertion of the salpinx in the urodeum (Fig. 5). In the case of the crested gecko both micro and small hemoclips were too small to close the salpinx, so that a transfix suture with 4/0 absorbable suture (Monocryl, Ethicon

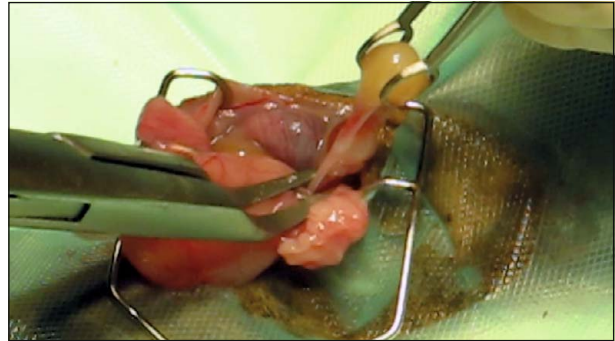


Fig. 5. Surgical view of the crested gecko in dorsal recumbence. Application of a micro hemoclip to close the ovary artery.

Johnson & Johnson Medical S.p.a. Italy) had to be performed (Fig. 6).

The surgical excision was closed with a mattress suture including muscles and skin with 4/0 adsorbable suture (Monocryl, Ethicon Johnson & Johnson Medical S.p.a. Italy). Meloxicam (Metacam 0.5 mg/ml, Boehringer Ingelheim Italia S.p.a.) 0.2 mg/kg was continued per os every 24 h for five more days for pain control and enrofloxacin (Baytril 2.5%, Bayer S.p.a.) 10 mg/kg per os every 24 h for seven days was also administered to prevent any possible infection.

Outcome

The day after surgery the animals were already active. They started to eat by themselves after only one week. The leopard gecko presented wound dehiscence after the surgery, which was monitored and healed completely within three months (Fig. 7).

DISCUSSION

The medical treatment for post-ovulatory dystocia consists in the use of oxytocin in order to stimulate the oviductal contraction. The administration of calcium to stimulate the oxytocin receptors is recommended before starting the hormone treatment. Oxytocin is not effective in some species and its use can lead to oviductal rupture and increase the incidence of retained eggs falling into the urinary bladder in reptile species that present this structure (Thomas et al., 2001; Knotek et al., 2009). The radiographic measurement of the pelvic diameter is important before administering oxytocin in order to determine if the eggs can pass through the pelvis. Arginine vasotocin is the natural reptilian oxytocin and it is therefore more effective than oxytocin. However, arginine

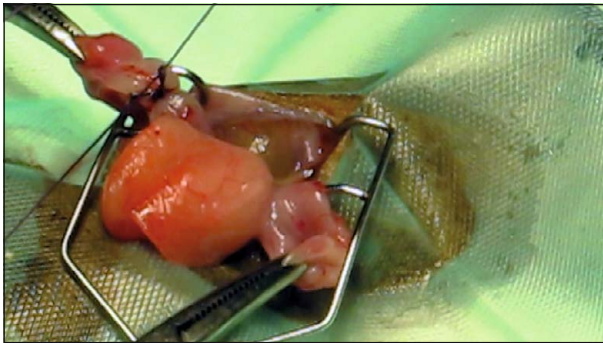


Fig. 6. Surgical view of the crested gecko in dorsal recumbence. Transfix suture of the salpinx.

vasotocin is available only as a research drug and it is quite more expensive than oxytocin (Lloyd, 1992).

One study and several anecdotal reports indicate that prostaglandins may be useful to induce oviposition in lizards and snakes (Gross et al., 1992; Innis, 1996; Nathan, 1996). Reported dosages are experimental or extrapolated from mammalian dosages, therefore prostaglandins must be used with caution. Moreover, Innis (1996) reported that the use of PGF_{2a} and propranolol in a gravid green iguana resulted only in nesting behavior but not in oviposition.

According to the authors, the ovariosalpingectomy is a viable treatment option not only for big but also for small reptiles and should be taken into consideration when a medical treatment is not possible. Some anesthetic and surgical considerations may be necessary in small lizards in order to increase the success rate of this surgery:

- intravenous access can be difficult and an intramuscular induction of general anesthesia may be preferable;
- a transparent plastic surgical drape is useful to visually monitor the animal during the anesthesia;
- a venous catheter can be used as a tracheal tube, since the size of the trachea is too small for a common tracheal tube;
- a magnification surgical loupe, microsurgery instrumentation and a small blepharostat used as an abdominal retractor may be useful;
- the use of hemoclips instead of traditional sutures to prevent bleeding reduces the time of surgery. Other possibilities are electro- or radiosurgical units or laser.

Radiosurgery is the best option because it reduces collateral tissue damage in comparison to electrosurgery and laser (Hernandez-Divers, 2008). Bipolar electrosurgical units need less power than monopolar ones and for this reason the associated collateral tissue damage is smaller



Fig. 7. Leopard gecko: surgical suture three months after surgery.

(Tucker et al., 1989). The same should occur with radiosurgery. A cotton tip applicator can be used in all cases to control bleeding;

- special care must be taken during the manipulation of the follicles, because they can be easily damaged and cause yolk coelomitis (Mader et al., 2006);
- an inverted pattern suture improves the healing process in small lizards (Mader et al., 2006).

According to the authors a percutaneous ovocentesis is contraindicated in small lizards because it increases the risk of yolk celomitis and oviduct adherence, although it may preserve the possibility of future reproduction. Moreover, a percutaneous ovocentesis may be impossible to perform if the eggs do not have a liquid yolk because they are too old and dried. Furthermore, all the animals showing any reproductive pathology not related to a bad diet or improper housing should not be allowed to reproduce and should be spayed in order to reduce the incidence of reproductive problems in the future. Anecdotal evidence suggests that snakes that retained eggs in the past are more likely to retain eggs in the future (DeNardo, 2006a). Considering all the potential problems associated with the reproduction tract, female lizards should be spayed if they are kept as pets. Ovariectomy and ovariosalpingectomy are in fact the only treatment options to inhibit reproduction. Tamoxifen was experimentally used on leopard geckos to prevent and inhibit reproductive activity but its clinical value remains untested (DeNardo and Helminski, 2001). A GnRH-agonist was also used to suppress the endocrine reproduction activity in reptiles, but the results are still inconclusive and show differences in the response depending on species and gender (Kirchgessner et al., 2009; Grundmann and Knotek, 2013).

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