CASE REPORT

Conservative treatment of lumbar vertebral injury in green iguana

Tratamento conservativo de luxação de vértebra lombar em iguana-verde

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Abstract

In reptile practice, alterations in the spine are usually related to osteometabolic disease. Although polytrauma in reptiles is common, publications about traumatic vertebral lesions in saurians and their clinical resolution are scarce. The objective of this case report was to describe the conservative treatment used on a young, female, free-living green iguana (*Iguana iguana*) that was attended by the Wild and Exotic Animals Sector of the Veterinary Medicine Hospital Renato Rodemberg de Medeiros Neto (Universidade Federal da Bahia), with diagnose, through physical and radiographic examination, of luxation of the spine at the lumbar level, which resulted in compression of the spinal cord. Conservative therapy was performed with the use of external immobilization, pain control and anti-inflammatory, in addition to support and acupuncture sessions. In this case, the therapy used proved to be successful, with the patient being discharged after four weeks.

Keywords: Lizard. Spinal cord. Trauma.

Resumo

*Na clínica de répteis, as alterações da coluna vertebral normalmente estão relacionadas às doenças osteometabólicas. Apesar do politraumatismo em répteis ser comum, as publicações acerca de lesões vertebrais de origem traumática em sáurios e a sua resolução clínica são escassas. O presente relato de caso descreve o tratamento conservativo realizado em uma iguana-verde (*Iguana iguana*), fêmea, jovem, de vida livre, que foi atendida pelo Setor de Animais Silvestres e Exóticos do Hospital de Medicina Veterinária Renato Rodemberg de Medeiros Neto (Universidade Federal da Bahia), diagnosticada com luxação da coluna vertebral a nível lombar através de exame físico e radiográfico. O referido trauma promoveu lesão neurológica por compressão da medula espinhal. A terapêutica conservativa foi realizada com o uso de imobilização externa, controle de dor e anti-inflamatório, além de suporte e sessões de acupuntura. Neste caso, a terapêutica utilizada foi bem-sucedida, com a paciente recebendo alta após quatro semanas.*

Palavras-chaves: *Lagarto. Medula espinhal. Trauma.*

Introduction

The green iguana (*Iguana iguana*) is a Saurian species frequently housed as a pet in Brazil (Bauer and Bauer, 2014); as such, they are increasingly presented in veterinary clinics. Acute spinal cord injury is a common problem encountered in pet clinics (Olby, 2010). In Saurian medicine, alterations in the vertebral column are primarily caused by osteometabolic diseases of nutritional origin, such as scoliosis and kyphosis, which are caused by secondary nutritional hyperparathyroidism (DiGeronimo and Brandão, 2019). Further, spinal cord abnormalities of traumatic origin, such as vertebral column dislocations or fractures, have been commonly reported in testudines and snakes (Dillberger, 1979; O'Malley, 2017).

This paper reports the clinical therapy of spinal cord compression due to lumbar vertebral injury in a green iguana.

Case report

A free-living specimen of *I. iguana*, female, young, weighing 0.551 kg, with a history of trauma in the vertebral column was sent to the Wild and Exotic Animals Sector of the Veterinary Medical Hospital (Universidace Federal da Bahia) by the Zoonosis Control Center for clinical evaluation and treatment.

Physical examination revealed that the animal was hypoactive, apathetic, and showed vertebral column deviation, in addition to non-ambulatory paraparesis (Figure 1A). Initially, tramadol hydrochloride (11 mg/kg IM) and prednisolone (5 mg/kg PO) were administered as a single dose.

Radiographic examination was subsequently performed in both the dorsoventral and laterolateral views, revealing a lateralized dislocation to the right of the 3rd lumbar vertebrae, in addition to significant fecal retention in the gastrointestinal tract (Figures 1D and E). Conservative therapy was performed comprising external immobilization of the vertebral column using Micropore® tape and a wooden toothpick without points, space restriction (Figure 1B), and acupuncture and moxibustion sessions once a week for four weeks.

The points selected for acupuncture were the bilateral B11 (Dazhu), transfixation of R3 (Taixi) to B60 (Kunlun), bilateral F3 (Taichong), and VG20 (Baihui) (Figure 2). Moxibustion was performed bilaterally at R3 + B60 and B23 (Shenshu) without needles. Lactulose (0.5 ml/kg; VO; SID), mineral oil (0.5 ml/kg; VO and via enema; SID), metoclopramide hydrochloride (0.1 mg/kg; VO; q48h) were used to stimulate defecation. As supportive therapy, lactated ringer fluid therapy (10 ml/kKg; SC; q72h), B vitamins (Bionew - Vetnil); 0.2 ml/kg; IM; SID; 10 days), energy supplement (Glicopan Gold - Vetnil®; 0.5 ml/kg; VO; SID; 10 days), and forced feeding (1% of live weight; VO; q72h; until medical discharge) in the form of porridge containing cabbage, arugula, carrot, chard, beets and bananas, and calcium (2 ml/kg; VO; q72h; four administrations) were performed.

During treatment, daily follow-ups were performed, and the patient's clinical evolution was recorded. A summary of the patient's clinical evolution is presented in Table 1.

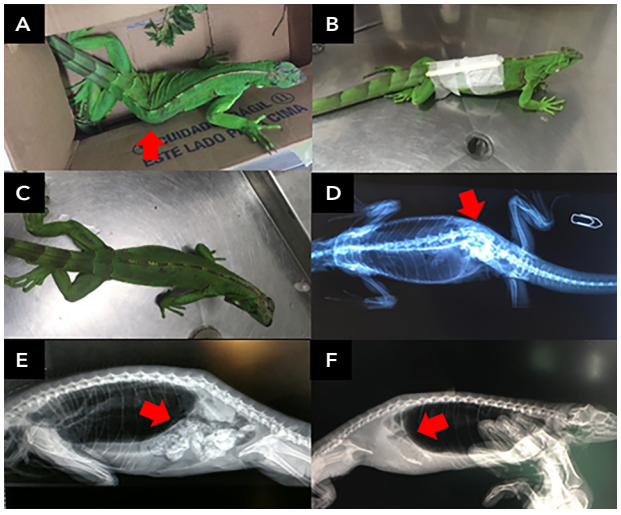

Figure 1 - Evolution of the clinical case over the four-week treatment period.

Note: (A) Deviation of the vertebral column; (B) External immobilization of the vertebral column with Micropore® adhesive and wooden toothpicks without points; (C) Alignment of the vertebral column achieving resolution of the dislocation; (D) Radiography imaging performed in dorsoventral view on the first day of treatment showings a lateral dislocation to the right of the 3rd lumbar vertebrae; (E) Radiography imaging in the right laterolateral view performed on the first day of treatment showing a large amount of fecal retention; (F) Radiography in the left laterolateral view after the 14th day of treatment, showing the resolution of intestinal stasis.

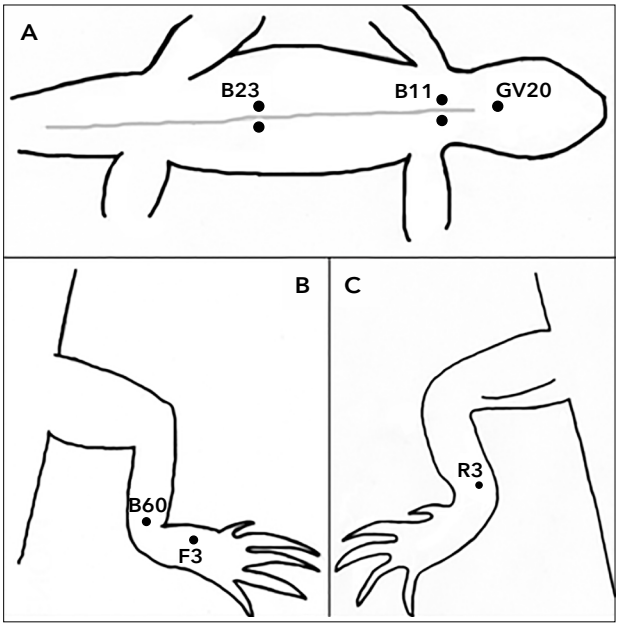

Figure 2 - Schematic representation of acupoints used in patient this study.

Note: (A) Dorsal view of the body showing points VG20, B11 and B23; (B) Lateral view of the right pelvic limb showing points B60 and F3; (C) Medial view of the right pelvic limb showing the R3 point.

Table 1 - The summary of clinical progression of the patient

Day	Notes
1st	Hypoactive and apathetic animal, deviation of the vertebral column, non-ambulatory paraparesis. Radiological evaluation - lateral dislocation to the right of the 3rd lumbar vertebrae. Treatment starts with immobilization and therapy.
8th	Active patient. Feces and urine were found in the enclosure. Blood collection was performed for evaluation of the total proteins (6.0 g/dL) and their fractions (albumin was 2.2 g/dL), calcium (13 mg/dL) and phosphorus (8 mg/dL). The chemistry was normal.
14th	A new radiographic exam was performed (latero--lateral and dorsoventral views), showing resolution of intestinal stasis (Figure 1F).
20th	Animal presented voluntary movement in the pelvic limbs and deep pain sensation present.
30th	Removal of immobilization, dislocation conservatively corrected (Figure 1C).
40th	Active animal with visualization of locomotion (walking and climbing) and feeding. The animal was discharged.

Results and discussion

Lateral vertebral dislocation can occur concurrently with articular facet fractures (Hettlich, 2018). Thus, in this case, it can be assumed that a fracture of the left caudal articular facet of the 2nd lumbar vertebra was the cause of the dislocation. Fractures and dislocations of the vertebrae can generate severe permanent neurological deficits arising from the compression or contusion of the neural tissue, thus affecting motor, sensory, and autonomic functions (Jeffery, 2010; Olby, 2010), which explains the non-ambulatory paraparesis and intestinal stasis in the reported case.

Intestinal stasis in apathetic and/or hypoactive saurians is common and can indicate the absence of voluntary defecation over a long period, which can result in fecaloma due to increased fecal water absorption (Mans, 2013). In the present case, intestinal stasis lasted eight days, and metoclopramide, lactulose, and mineral oil were required to ensure relief.

The use of anti-inflammatory drugs has been reported in similar cases, such as steroids for the treatment of trauma-induced neuropathies in reptiles (Keeble, 2004). The effects of corticosteroids in improving local blood flow and eliminating free radicals are among the mechanisms proposed to support their use in the treatment of acute spinal cord injury (DiFazio and Fletcher, 2013). However, there is little evidence to support the use of glucocorticoids, despite their traditional role in treating trauma to the central nervous system (Dewey, 2000).

Tramadol, used in this case, is a centrally acting mu (μ) receptors agonist analgesic, similar to morphine, which is used in patients who require treatment for mild to moderate pain (Górniak, 2011). The supplements administered in this case contained B vitamins that can help to maintain the integrity of nervous tissue and participate in appetite stimulation, muscle contraction, energy production, and blood vitality (Paulino, 2011). As such, B vitamins can aid in the recovery of the nervous system and assisted in the recovery of the present patient.

The serum calcium and phosphorus values identified in biochemical analysis were within the parameters reported by Gibbons et al. (2013), suggesting that the reported spinal lesion was not caused by nutritional osteometabolic disorders. This contrasts with previous reports in which secondary

nutritional hyperparathyroidism was the main cause of spinal changes in prior cases (DiGeronimo and Brandão, 2019).

Acupuncture and moxibustion are Traditional Chinese Medicine (TCM) techniques that have been performed on animals for over 3,500 years (Schwartz, 1996). The effects of acupuncture include increased speed of recovery from injuries, activation of the nervous system in neurological traumas, increased immune function, and pain control (West and Ferguson, 2019). Moxibustion helps in healing by increasing blood flow and the number of macrophages at the treatment site (Sun et al., 2011, 2012).

Over the past 50 years, several researchers have sought to understand the functions of TCM on the acupuncture point/meridian from a "Western" medical perspective, mainly because of findings indicating histological particularities that could distinguish the acupuncture points from the surrounding tissue (Ernest and White, 2001; Xia et al., 2010). Diverse structures, such as neurovascular bundles (Rabischong et al., 1975; Senelar, 1979; Bossy, 1984), neuromuscular attachments (Liu et al., 1975; Gunn et al., 1976; Dung, 1984), and various types of sensory nerve endings (Ciczek et al., 1985), have also been described in acupuncture points.

According to West and Ferguson (2019), the use of the acupoints R3 (Taixi), B60 (Kunlun), F3 (Taichong), and VG20 (Baihui) have been described in reptiles and amphibians with positive clinical results. According to Xie and Trevisanello (2008) and West and Ferguson (2019), acupuncture at B23 (Shenshu), B60 (Kunlun), R3 (Taixi), and F3 (Taichong) exert analgesic effects. In addition, points R3 (Taixi) and F3 (Taichong) indicate changes in the urogenital tract and locomotion of the pelvic limbs, respectively. Acupuncture at point VG20 (Baihu) exerts a calming action, while B11 (Dazhu) is related to changes in locomotion. Use of these factors improved the patient's clinical condition.

Jeffery (2010) reported that in some cases, the patient's neurological deficit is minimal, and function can be recovered using exclusively conservative therapy, providing stability to the spine. Further, this approach yielded excellent results in the present case.

There have been several reports of treatment using conservative methods for fractures of a non-pathological origin in reptiles (Raftery, 2011), as well as the use of light-weight materials to achieve immobilization of the vertebral column (Keeble, 2004). Thus, in the present study, a wooden toothpick without a point or micropore tape guaranteed spinal cord immobilization, stabilization, and decompression for 30 days.

There are locomotor control centers in the central nervous system (Keeble, 2004; O'Malley, 2017). In addition, studies on lizards have shown that the spinal cord of some saurians has a regenerative capacity, demonstrated by the sprouting of nerve fibers after trauma (Srivastava et al., 1994; Szarek et al., 2016). This regeneration is more prominent in the lumbar spinal cord than in the thoracic segment (Szarek et al., 2016). This phenomenon, at the sub-order level, justifies the rapid recovery of pelvic limb movements. However, in the case of this iguana, it was not possible to employ other techniques to assess the level of spinal cord trauma.

Conclusion

Conservative therapy using immobilization and complementary techniques such as acupuncture and moxibustion, combined with supportive therapy and continuous veterinary assistance, can provide good results in the treatment of spinal dislocation in lizards. However, further research needs to be conducted on the occurrence of stem cells and regenerative activities in the spinal cords of reptiles to subsidize and elucidate the effectiveness of conservative treatments for spinal cord injuries in these species.

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