

Deforming Spondylosis in a Burmese python (*Python bivittatus*)

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ABSTRACT

Background: Deforming Spondylosis (DS) is a lesion often attributed to changes in the spine. It is a degenerative disease characterized by the presence of one or more osteophytes in the vertebral bodies at different degrees of development. When severe, it causes dorsal stiffness, lameness, gait alterations and pain. Domestic and wild animals can develop this disorder due to management failures, exposure to pathogens, or aging. This pathology may also appear adjacent to a degenerated, protruded, or normal intervertebral disc, associated with a site of spinal instability, but its etiology is often idiopathic. The diagnosis is confirmed by characteristic radiographic findings, such as loss of definition of vertebral endplate margins, narrowing or collapse of the intervertebral disc space, varying degrees and/or combinations of endplate lysis, sclerosis, and bone proliferation. This paper describes the 1st report in Brazil of a case of Spondylosis Deformans in a Burmese python, an exotic snake.

Case: An approximately 16-year-old male adult Burmese python (*Python bivittatus*), kept in captivity at the Arruda Câmara Zoobotanical Park (BICA) in João Pessoa, Paraíba state, showed episodes of apathy and lethargy within the enclosure. The serpent is from abandonment, suspected of being a trafficking animal due to the absence of a microchip and a history of irregular delivery. For diagnostic support, the following procedures were performed in addition to physical, radiographic, cytopathological, and histopathological examinations. The cytopathological analysis revealed a hypocellular content immersed in a background containing red blood cells and thrombocytes. The content was characterized by heterophiles, monocytes, osteoblasts, occasional lymphocytes and mast cells, as well as rare eosinophils, being compatible with an active chronic inflammatory process. No infectious and/or parasitic agents were evidenced. The radiographic examination revealed altered vertebral alignment, decreased intervertebral spaces, and bone tissue proliferation. Histopathological analysis of the lesion revealed proliferation of reactive bone tissue, characterized by immature bone trabeculae (osteoid). Based on the analysis of the requested tests associated with the animal's clinical condition, it was found that the snake had a case of deforming spondylosis. The animal was monitored, maintaining the management previously adopted by the veterinarians at the facility until the clinical condition stabilized.

Discussion: The clinical, cytological, and radiographic study of the lesion allowed the visualization of physical and cellular alterations similar to those described in the literature, confirming a case of deforming spondylosis, one of several diseases that affect the spine. Although the pathology may be present in other snakes kept in captivity, its occurrence may be underdiagnosed due to the absence of routine radiographic examinations and a lack of knowledge of the clinical signs compatible with the disease. The hypothesis is raised that, in this animal, deforming spondylosis was related to factors of inadequate management before the snake's referral to the zoo. This report emphasizes the importance of clinical monitoring and continuous complementary examinations in captive snakes, allowing for the early diagnosis of osteoarticular diseases and the adoption of preventive measures that improve the quality of life of these animals.

Keywords: serpent's lesions, snake's lesions, radiographic findings, osteometabolic problems.

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INTRODUCTION

Deforming spondylosis (DS) is a degenerative disease characterized by one or more osteophytes on the vertebral bodies. It is a lesion frequently attributed to mechanical stress applied to the spine, with different degrees of development, bridging the lateral and/or ventral cortex of adjacent vertebrae. This condition has an idiopathic etiology; regardless, premature aging of the intervertebral discs predisposes to the development of deforming spondylosis [6].

Domestic and wild animals can develop spondylosis deformans. The main factors involved in its development are failures in management practices, exposure to pathogens and/or even due to aging [10]. The captive environment is considered to induce important modifications to animals' homeostatic balance that can lead to numerous diseases. Somatic factors, such as temperature changes, contact with other animals or strange people, unknown noises, inadequate handling, odors, thirst and hunger, can lead the animal to immunosuppression [4]. Diagnosis is confirmed by characteristic radiographic findings, such as loss of vertebral endplate margins, narrowing or collapse of the intervertebral disc space, varying degrees and/or combinations of endplate lysis, sclerosis, and bone proliferation. Treatment is based on promoting analgesia and functional recovery of the intervertebral joints [1].

This paper describes a case of spondylosis deformans in an elderly *Python bivittatus*, performing a clinical, cytopathological, radiographic, and histopathological analysis of the pathology.

CASE

An approximately 16-year-old male adult Burmese python (*Python bivittatus*), kept in captivity at the Arruda Câmara Zoobotanical Park (BICA) in João Pessoa, Paraíba state, showed episodes of apathy and lethargy inside the enclosure. The serpent is from abandonment, suspected of being a trafficking animal due to the absence of a microchip and circumstances suggesting illegal possession. Upon physical examination, nodular deformities were observed along the length of the spine.

The enclosure was evaluated following assessment of the animal's clinical condition and it presented characteristics suitable for housing large reptiles, offering adequate dimensions to allow controlled movement, although without fully simulating the natural conditions of the species. The environment contained

logs and rocks, providing hiding places and surfaces for thermoregulatory behaviors, as well as humidity and temperature control within the parameters recommended for the species, a bathing and hydration area, consisting of a water container, large enough to allow the animal to immerse itself voluntarily, contributing to its hydration and well-being. Artificial lighting supplemented natural light exposure, maintaining an adequate photoperiod. The diet consisted mainly of rodents, provided regularly according to the zoo's feeding protocol. However, no specific records were found regarding vitamin and mineral supplementation, which may be a relevant factor for the clinical evaluation of the case.

During the physical examination, nodules of varying sizes were observed along the spine, with irregular margins, firm consistency, lack of mobility, and strong adherence to the vertebral structures (Figure 1A & B), suggesting significant alterations. Samples of the lesions were collected for cytopathological examination. The procedure was guided by ultrasound (Figure 1C) and capillary techniques (25 x 0.7 mm) and Fine-Needle Aspiration Biopsy (FNAB) (25 x 0.7 mm and 40 x 12 mm + 10 mL) were used. In the cytological analysis, hypocellular content was observed immersed in a background containing red blood cells and thrombocytes. The content was characterized by heterophils, monocytes, osteoblasts, occasional lymphocytes and mast cells, as well as rare eosinophils, consistent with an active chronic inflammatory process. No infectious or parasitic agents were found (Figure 2). An X-ray examination of the spine was performed, revealing significant structural changes, including deviation in vertebral alignment, reduction in joint spaces between the vertebrae, and evidence of bone proliferation along the vertebral margins (Figure 3). The formation of bone bridges between adjacent vertebrae was observed. Based on the cytological evaluation, a histopathological analysis was requested, and a lesion sample was collected via incisional biopsy, revealing proliferation of reactive bone tissue, characterized by trabeculae of immature bone (osteoid), chronic lymphoplasmacytic inflammatory infiltrate, and areas of intertrabecular fibrosis. These findings support the diagnosis of deforming spondylosis with a chronic inflammatory component, suggesting a progressive degenerative process, possibly aggravated by systemic factors such as infection and/or inadequate management.



Figure 1. Burmese python (*Python bivittatus*). A- Nodular deformations in the 1st third of the spine with various increases in volume and irregular edges, firm consistency, without mobility, adhered to the vertebral processes. B- Extent of nodular lesions in the spine. C- Ultrasound-guided cytological examination.

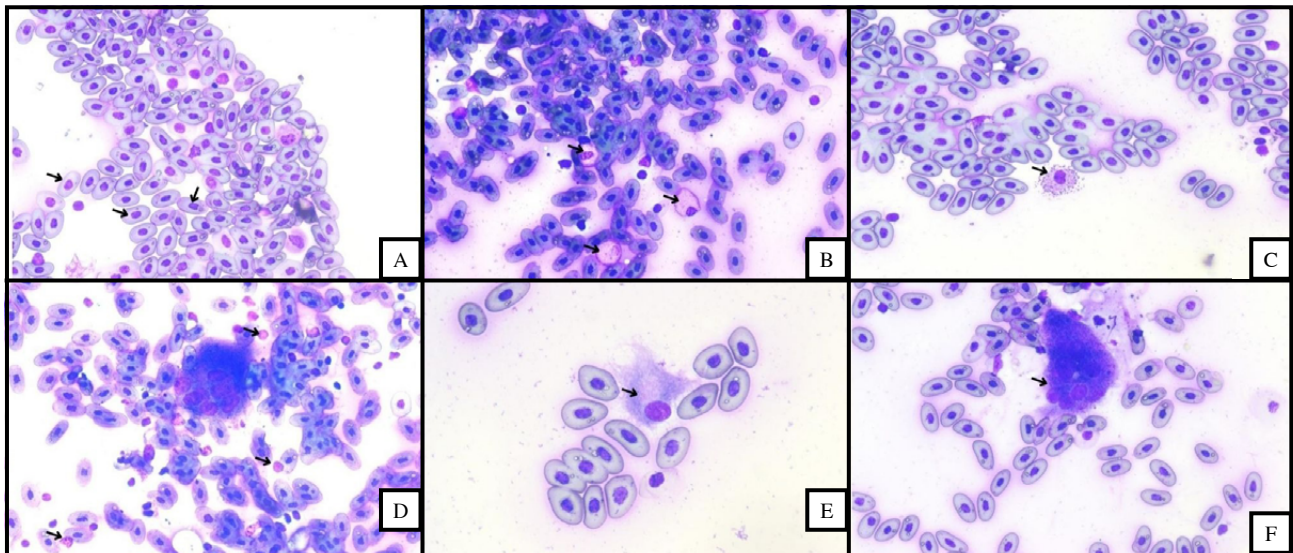


Figure 2. Cytopathological examination of a Burmese python (*Python bivittatus*). Active chronic inflammatory process. A- Hypocellular content immersed in the background containing red blood cells. B- Thrombocytes. C- Heterophile. D- Monocyte. E- Osteoclast. F- Osteoblast.

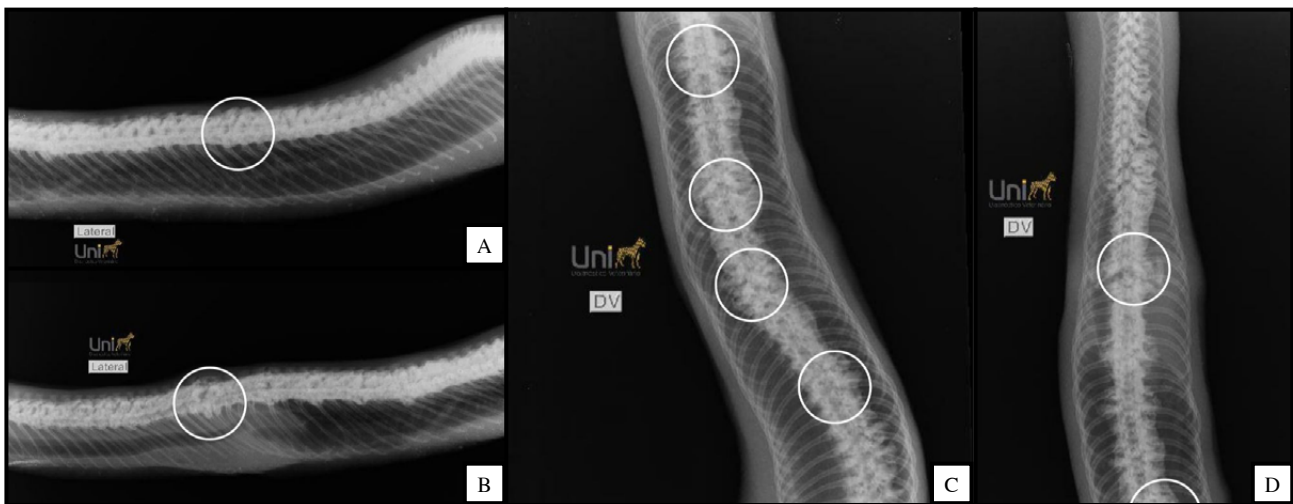


Figure 3. Radiograph of nodular deformities of the spine in a Burmese python (*Python bivittatus*). Altered vertebral alignment, with reduced intervertebral spaces and proliferation of bone tissue. A- Laterolateral image of the thoracic portion. B- Laterolateral image of the abdominal portion. C- Dorsoventral image of the thoracic portion. D- Dorsoventral image of the abdominal portion.

The combination of clinical, cytopathological, radiographic, and histopathological data corroborates the hypothesis of a chronic osteometabolic disorder with insidious progression. To date, the serpent remains alive with no changes in its pathological condition.

DISCUSSION

Deforming spondylosis is one of several conditions that affect the spine in various animal species. In this case, the clinical, cytopathological, radiographic, and histopathological study of the lesion allowed the visualization of physical, structural, cellular, and tissue changes similar to those described in the literature, distinguishing it from other osteoarticular conditions previously described in snakes and confirming a case of deforming spondylosis [12,14]. Although the disease may be present in other snakes kept in captivity, its occurrence may be underdiagnosed due to the absence of routine radiographic examinations and unfamiliarity with the clinical signs of the disease [8].

The hypothesis is raised that, in this animal, deforming spondylosis is related to inappropriate management factors prior to the snake being sent to the zoo, supporting the hypothesis that the animal was a victim of wildlife trafficking, having been subjected, for example, to space restriction, inappropriate substrate, and nutritional deficiencies, which can compromise the snake's bone development and mobility [2]. In addition, advanced age is considered a predisposing factor for the chronic development of this condition. The animal showed clinical signs, such as weight loss and lethargy inside its enclosure, which corroborate those described in the literature [1], common in cases of osteoarticular disorders in snakes. However, the absence of signs such as fever, often observed in other similar cases such as osteitis and spondylitis, associated with infectious processes, drew attention to the possibility that the captive environment may have played an important role in the manifestation of the disease, associating this pathology with habitat and age.

Predisposing environmental factors, such as chronic stress, are common factors that affect captive snakes, which, due to their reserved nature, may not show obvious clinical signs of discomfort [3,7]. In the case of this snake, it is important to note that ignorance of management failures before it arrives at the zoo can be considered a considerable risk factor for the onset of the development of DS. This scenario of prolonged stress, combined with the animal's advanced age,

seems to have favored the emergence of chronicity of the pathology, manifesting later due to the silent nature of snakes.

Cytological analysis of the lesion revealed hypocellular content immersed in a background containing red blood cells and thrombocytes, indicating a possible degree of hemodilution of the sample. This phenomenon may be common when collecting content from species such as the Burmese python, due to the presence of small local blood vessels. However, the observation of heterophiles, monocytes, osteoblasts, lymphocytes, mast cells, and rare eosinophils evidenced an active chronic inflammatory process [6], as previously reported in cases of osteitis deformans in snakes, where toxic heterophils, reactive monocytes, and immature blood cells were identified. The absence of infectious agents in the sample led to a diagnosis of a chronic inflammatory condition, possibly related to environmental factors or inadequate management.

Radiographically, altered vertebral alignment, decreased intervertebral spaces, and bone tissue proliferation were observed, characteristics that allowed for a diagnosis of Deforming Spondylosis. These findings are characteristic of this condition [6], suggesting that similar imaging changes can be conclusive for diagnosis in cases of bone degeneration in snakes. The formation of osteophytes in the vertebral bodies is a frequent change associated with advancing age, resulting from processes that resemble chondrogenesis and endochondral ossification observed during embryogenesis [8]. Although often asymptomatic, osteophytes are clinically relevant, as they can cause pain and functional impairment depending on their location [1].

Evidence indicates that the risk of developing these structures increases progressively with age [13]. In this context, histological analysis becomes a valuable tool for characterizing the process of bone formation, allowing differentiation from other changes such as neoplastic formations. The identification of these radiographic signs, combined with cytological and histopathological analysis, reinforced the accuracy of the diagnosis and understanding of the pathology, allowing the institution of more targeted monitoring.

Differing from other pathologies already described in the literature, such as osteitis deformans and spondylitis, an acute inflammatory infiltrate associated with systemic conditions such as *Salmonella* spp. is

observed [9]. According to the literature, treatment with analgesics is effective in the management of Deforming Spondylosis (DS) in elderly animals, especially for controlling pain associated with bone degeneration. The use of nonsteroidal anti-inflammatory drugs (NSAIDs) is commonly indicated to reduce inflammation and joint discomfort, providing significant relief [6].

The administration of meloxicam can improve the quality of life of animals affected by DS, reducing pain and stiffness in the joints. However, in the present case, it was decided not to use NSAIDs in the therapeutic regimen, considering the risks associated with this drug class in geriatric snakes, including potential drug accumulation and renal or gastrointestinal toxicity [6]. In view of this, it was decided to prioritize management measures to reduce potential adverse effects and preserve the animal's quality of life. In addition, appropriate management practices, such as environmental adjustments and stress control, have shown

good results in functional recovery and overall animal welfare. The effectiveness of this treatment in older animals is related to its ability to relieve symptoms without causing significant side effects, allowing for a more comfortable recovery [6].

The adoption of appropriate therapeutic strategies is, therefore, essential for the effective control and management of Spondylosis Deformans. This paper describes the 1st case of Deforming Spondylosis recorded in a Burmese Python in Brazil. Complementary tests were essential for defining the condition and choosing the appropriate therapy. This report emphasizes the importance of clinical monitoring and continuous complementary tests in captive serpents, allowing the early diagnosis of osteoarticular diseases and the adoption of preventive measures that improve the quality of life of these animals.

Declaration of interest. The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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