

## DOUBLE VALVULAR INSUFFICIENCY IN A BURMESE PYTHON (*PYTHON MOLURUS BIVITTATUS*, LINNAEUS, 1758) SUFFERING FROM CONCOMITANT BACTERIAL PNEUMONIA

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**Abstract:** Ultrasonography, and, to a lesser extent, echocardiography are now well-established, noninvasive, and painless diagnostic tools in herpetologic medicine. Various cardiac lesions have been previously described in reptiles, but valvulopathy is rarely documented in these animals and, consequently, is poorly understood. In this report, sinoatrial and atrioventricular insufficiencies were diagnosed in a 5-yr-old captive dyspneic Burmese python (*Python molurus bivittatus*) on the basis of echocardiographic and Doppler examination. This case report is the first to document Doppler assessment of valvular regurgitations in a reptile.

**Key words:** Burmese python, Doppler examination, pneumonia, *Python molurus bivittatus*, valvular insufficiency.

### BRIEF COMMUNICATION

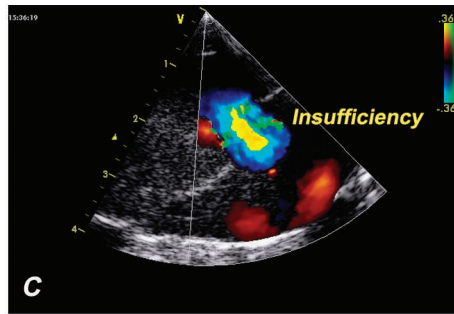
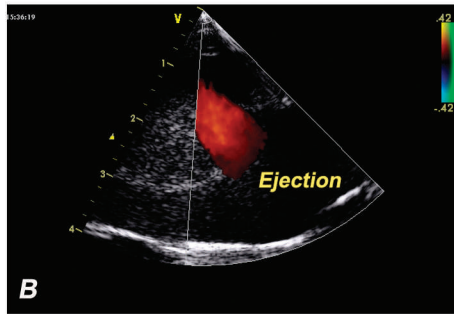
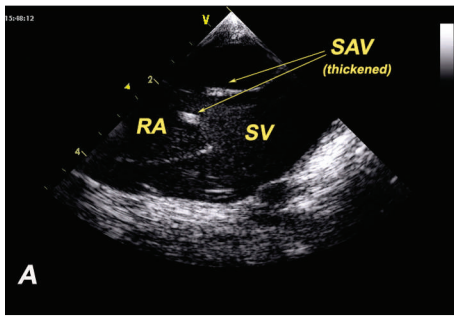
A 5-yr-old captive-born female albino Burmese python (*Python molurus bivittatus*) weighing 16.5 lbs (7.5 kg) presented with a 5-wk history of anorexia, apathy, weight loss, dyspnea, and pus expectorations. The animal, which had never been dewormed, was purchased in an exotic pet store and had always lived in isolation in a terrarium. The room in which the cage was kept was barely warmed with a small radiator (24–25°C). The wooden floor of the enclosure was 21°C and devoid of any heating system. For several months, the animal had been used periodically in a Parisian cabaret show, where it was immersed in a glass cage with a swimmer who kept the python's head underwater while she performed an aquatic ballet. The animal's diet was unbalanced, consisting essentially of chicken drumsticks, with occasional small rabbits.

Physical examination revealed apathy, respiratory distress, and poor body condition. The snake was slow to right itself, presumably because of the generalized weakness. No ocular or integumentary abnormalities were noted. The oral cavity was healthy, without any sign of stomatitis, but the glottis was partially filled with mucoid purulent secretions that induced a noisy whistling sound. Pulmonary auscultation revealed crackles

and wheezings, especially in the cranial third of the right lung (caudally to the heart) when the snake opened its mouth to breathe. Cardiac auscultation revealed a normal heart rate (20 bpm), a regular rhythm, but also a very audible systolic murmur.

*Pseudomonas aeruginosa* and *Aeromonas hydrophila* were isolated from a transtracheal lung wash, and the python was treated with ceftazidime (Glazidim®; Glaxosmithkline, 78163 Marly-le-Roi cedex, France; 20 mg/kg i.m. q72h) for 20 days. An echocardiography and a Doppler examination were performed according to previously published guidelines.<sup>2,14</sup> The snake was not anesthetized, placed on its back, and held in position by two assistants. The ultrasound examination was carried out by placing the probe ventrally in relation to the heart, which made it possible to view the organ from the caudal ventricular apex to the cranial atria and examine the sinus venosus, the atrioventricular junctions, and the three arterial trunks. The right transatrial short-axis section, obtained by moving the probe slightly toward the right from a transverse section of the three large arterial trunks, showed irregular and thickened sinoatrial valves (Fig. 1A). A similar thickening was found on the right monocuspid atrioventricular valve using the right atrioventricular long-axis section, obtained by orienting the ultrasound plane ventrodorsally from the left to the right (Fig. 2A). Color-flow Doppler examination of both valves confirmed marked sinoatrial and atrioventricular regurgitations (Figs. 1C, 2B, respectively) with, however, normal ejection flows (Fig. 1B) and normal right atrial and sinus venosus forms. Continuous-wave

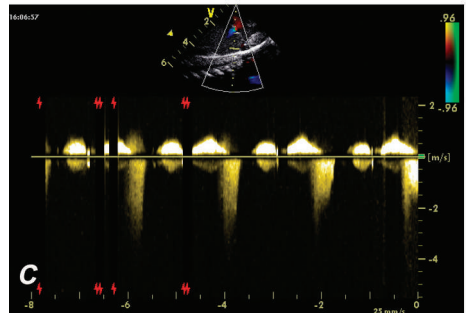
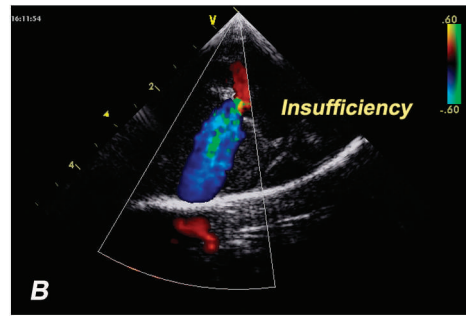
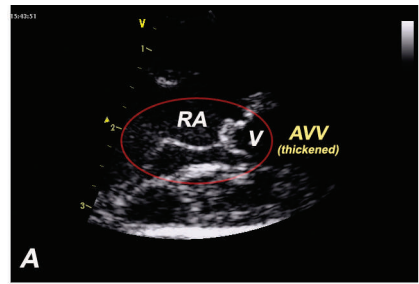
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**Figure 1.** **A.** Two-dimensional echocardiography (right transatrial short-axis view) showing the abnormal sinoatrial valves (SAV) during atrial diastole. RA, right atrium; SV, sinus venosus. **B.** **C.** Color Doppler examination of the sinoatrial valve showing a normal ejection flow colored in red (**B**) and an abnormal regurgitation with aliasing (**C**) during atrial systole.

Doppler mode confirmed a high-velocity atrioventricular regurgitation (peak velocity of 4 m/sec; Fig. 2C), explaining the systolic heart murmur detected on cardiac auscultation. No regurgitation was observed between the left monocuspid atrioventricular valve and the left atrium. No abnormality concerning the myocardium itself or the pericardial space was observed.

The patient was discharged after 9 days of medical care (three injections of ceftazidime), and the treatment was performed by the owner for 11



**Figure 2.** **A.** Two-dimensional echocardiography (right atrioventricular long-axis view) showing the abnormal right atrioventricular valvular leaflet (AVV). RA, right atrium; V, ventricle. **B.** Color Doppler examination of the atrioventricular valve showing a marked aliased regurgitation in the right atrium during ventricular systole. **C.** Continuous-wave Doppler mode examination confirming a high-velocity regurgitant jet (peak velocity of 4 m/sec, arrowheads).

additional days at home. At the time of writing (4 mo after the end of medication), because the snake was considered clinically normal, the owner did not want to undertake a follow-up echo-Doppler examination to check evolution of valvular regurgitations.

Continuous-wave Doppler and pulsed-wave Doppler echocardiography have been recently used to analyze normal cardiac function and

normal patterns of blood flow in the ball python (*Python regius*).<sup>16</sup> However, this report is the first to document sinoatrial and atrioventricular valvular insufficiency in a reptile by Doppler examination.

The reptilian heart can be subject to various lesions: cardiomyopathy, septic endocarditis, myocarditis, pericardial effusion, infarction, aneurysms, arteries calcifications, thrombus, parasitic infestation, congenital heart defects, or even tumors.<sup>1,3-7,10-13,15</sup> Few reports of valvulopathies have been published in these animals.<sup>6,10,12</sup> In most situations, diagnosis is obtained postmortem, and heart failure is related to infectious diseases.<sup>5,6,10,15</sup>

In this case, the concomitant finding of a double valvular insufficiency and bacterial pneumonia makes the diagnosis of bacterial endocarditis highly likely. However, because neither blood culture nor postmortem histopathologic examination of the valves was performed, it is not possible to establish the causality between cardiac abnormalities and the concomitant pneumonia. Independent cases of pneumonia and congenital valvular dysplasia cannot be ruled out.<sup>9</sup> Similarly, because the medial part of atrioventricular valves have recently been shown to become thicker as pythons increase in mass,<sup>8</sup> it could be questionable whether the reported thickening of the atrioventricular valve is here actually abnormal. However, in the present case, the whole atrioventricular valve was irregular and involved in the thickening process, which is in favor of a pathologic remodeling rather than "normal" morphology.

#### LITERATURE CITED

1. Barten, S. L. 1980. Cardiomyopathy in a king snake (*Lampropeltis calligaster rhombomaculata*). *Vet. Med. Small Anim. Clin.* 75: 125-129.
2. Chetboul, V., L. Schilliger, D. Tessier, and F. L. Frye. 2004. Specific features of echocardiographic examination in ophidians. *Schweiz. Arch. Tierheilkd.* 146: 327-334.
3. Frye, F. L. 1991. Characteristics of cardiomyopathy in two pythons: aortic valvular stenosis and secondary cardiomyopathy in a children's python, *Liasis Childreni*, and ventricular wall hypoplasia, first-degree heart block, and plasmacytic pericarditis in a juvenile Burmese python, *Python molurus bivittatus*. *Proc. IV Int. Coll. Path. Reptiles Amph. Bad Nauheim, Germany.*
4. Hruban, Z., E. Vardiman, T. Meehan, F. L. Frye, and W. E. Carter. 1992. Hematopoietic neoplasms in zoo animals. *J. Comp. Pathol.* 106: 15-24.
5. Jacobson, E. R., J. M. Gaskin, and J. Mansell. 1989. Chlamydial infection in puff adders (*Bitis arietans*). *J. Zoo Wildl. Med.* 20: 364-369.
6. Jacobson, E. R., B. Homer, and W. Adams. 1991. Endocarditis and congestive heart failure in a burmese python (*Python molurus bivittatus*). *J. Zoo Wildl. Med.* 22: 245-248.
7. Jacobson, E. R., J. C. Seely, M. N. Novilla, and J. P. Davidson. 1979. Heart failure associated with unusual hepatic inclusions in a Deckert's rat snake. *J. Wildl. Dis.* 15: 75-81.
8. Jensen, B., J. R. Nyengaard, M. Pedersen, and T. Wang. 2010. Anatomy of the python heart. *Anat. Sci. Int.* (In Press)
9. Jensen, B., and T. Wang. 2009. Hemodynamic consequences of cardiac malformations in two juvenile ball pythons (*Python regius*). *J. Zoo Wildl. Med.* 40:752-756.
10. Obendorf, D. L., J. Carson, and T. J. McManus. 1987. *Vibrio damsela* infection in a stranded leatherback turtle. *J. Wildl. Dis.* 23: 666-668.
11. Redrobe, S. P., and C. L. Scudamore. 2000. Ultrasonographic diagnosis of pericardial effusion and atrial dilatation in a spur-thighed tortoise (*Testudo graeca*). *Vet. Rec.* 146: 183-185.
12. Rishniw, M., and B. P. Carmel. 1999. Atrioventricular valvular insufficiency and congestive heart failure in a carpet python. *Aust. Vet. J.* 77: 580-583.
13. Rush, E. M., T. M. Donnelly, and J. Walberg. 2001. What's your diagnosis? Cardiopulmonary arrest in a Burmese python. *Aortic Aneurysm Lab. Anim. (NY).* 30: 24-27.
14. Schilliger, L., D. Tessier, J. L. Pouchelon, and V. Chetboul. 2006. Proposed standardization of the two-dimensional echocardiographic examination in snakes. *J. Herp. Med. Surg.* 16: 90-102.
15. Schilliger, L., D. Vanderstylen, J. Pietrain, and V. Chetboul. 2003. Granulomatous myocarditis and coelomic effusion due to *Salmonella enterica arizonae* in a Madagascarian Dumeril's boa (*Acrantophis dumerili*, Jan. 1860). *J. Vet. Cardiol.* 5: 43-45.
16. Starck, J. M. 2009. Functional morphology and patterns of blood flow in the heart of *Python regius*. *J. Morphol.* 270: 673-687.

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