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Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

SHORT COMMUNICATION

MEDETOMIDINE MAY CAUSE HEART MURMUR IN COUGARS AND JAGUARS: CASE REPORT

Thiago Cavalheri Luczinski, Gediendson Ribeiro de Araújo, Matheus Folgearini Silveira, Murillo Daparé Kirnew, Roberto Andres Navarrete, Jorge Aparecido Salomão-Jr, Letícia Alecho Requena, Jairo Antonio Melo dos Santos, Marcell Hideki Koshiyama, Cristiane Schilbach Pizzutto & Pedro Nacib Jorge-Neto

26 October 2020 | Vol. 12 | No. 14 | Pages: 17000–17002

DOI: [10.11609/jott.6098.12.14.17000-17002](https://doi.org/10.11609/jott.6098.12.14.17000-17002)



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Medetomidine may cause heart murmur in Cougars and Jaguars: case report

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Abstract: We report heart murmur in Jaguars and Cougars found during reproductive procedures for semen and oocyte collection. Two male Cougars (n=2) and three female Jaguars (n=3) were examined. Anesthesia was performed with ketamine and medetomidine in males. Females also received propofol and were maintained with isoflurane. The animals were evaluated during anesthetic monitoring with multiparameter monitor alongside clinical examination, ambulatory electrocardiogram and echocardiogram. All animals presented mitral

valve regurgitation under anesthesia, but without morphological changes in the cardiac structure or hemodynamic changes. Medetomidine may cause transitory heart murmur in healthy Jaguars and Cougars.

Keywords: α -2 adrenoceptor agonist, mitral valve regurgitation, trivial tricuspid valve regurgitation.

Editor: R.G. Jani, College of Veterinary Science & Animal Husbandry, Anand, India.

Date of publication: 26 October 2020 (online & print)

Citation: Luczinski, T.C., G.R. de Araujo, M.F. Silveira, M.D. Kirnew, R.A. Navarrete, J.A. Salomão-Jr, L.A. Requena, J.A.M.D. Santos, M.H. Koshiyama, C.S. Pizzutto, P.N. Jorge-Neto (2020). Medetomidine may cause heart murmur in Cougars and Jaguars: case report. *Journal of Threatened Taxa* 12(14): 17000–17002. <https://doi.org/10.11609/jott.6098.12.14.17000-17002>

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Funding: This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001 (MD Kirnew); and Instituto Reprocon (TC Luczinski; GR Araujo; LA Requena; CS Pizzutto and PN Jorge-Neto).

Competing interests: The authors declare no competing interests.

Ethic statement: The present study was conducted with authorization for scientific activities issued by SISBIO/ICMBio/MMA under no. 57293-2 and approved by the Ethic Committee on Animal Use of the School of Veterinary Medicine and Animal Science of the University of São Paulo (CEUA/ FMVZ/USP) under protocol no. 6249300517.

Acknowledgements: The authors acknowledge the following institutions and persons: NEX - No Extinction; NEX Santa Rosa and Mr. Pedro Camargo; and Fazenda Talisman.



OBJECTIVE

The objective of the present short communication is to report heart murmur as a secondary clinical finding in Jaguars *Panthera onca* and Cougars *Puma concolor* anesthetized for reproductive procedures with the association of ketamine and medetomidine.

STUDY DESIGN

This study was conducted in Brazil at NEX Santa Rosa (Amparo – SP; -22.588°S–46.786°W) with authorization for scientific activities issued by SISBIO/ICMBio/MMA under no. 57293-2 and approved by the Ethic Committee on Animal Use of the School of Veterinary Medicine and Animal Science of the University of São Paulo (CEUA/FMVZ/USP) under protocol nº. 6249300517. The experiment was conducted in conjunction with efforts to collect oocytes by laparoscopic ovum pick-up (LOPU) and pharmacological semen collection for different projects. Data partially shown for Jaguars (Jorge-Neto et al. 2020) and for semen biobank (Miranda et al. 2019).

Animals

To perform the reproductive procedure (semen and oocyte collection) five adult animals (n=5) from two different species were used: two male Cougars (n=2) and three female Jaguars (n=3), aged between one and 10 years old, weighing between 35 and 80 kg, all healthy, with good corporal score and no clinical signal of diseases.

METHODS

Animals were fasted for 12h for water and 24h for food before procedures. Weights were estimated and chemical restraint was performed for both males and females using anesthetic darts fired with a blowpipe and containing Ketamine (5.0mg/kg; im) and Medetomidine (0.1mg/kg; im) (Araujo et al. 2018, 2020). Females also received intravenous administration of Propofol (2.0 to 3.0 mg/kg) (Jorge-Neto et al. 2020) for anesthetic induction and intubating were maintained with Isoflurane, as females were submitted to LOPU procedure (Jorge-Neto et al. 2020).

The procedure was performed at NEX Santa Rosa, where the two male Cougars and the three female Jaguars were evaluated during anesthetic monitoring with multiparameter monitor alongside clinical examination, ambulatory electrocardiogram and transthoracic echocardiogram (Figure 1 & 2). Electrocardiography recordings were performed during a five-minute period on lateral recumbency during chemical restraint and heart rate, rhythm and morphology were analyzed.

Echocardiograph examinations were performed by three operators equipped with several phased-array transducers (GE Vivid IQ; General Electrics, Chicago, IL, USA) that matched the size of the animal. Echocardiograph assessment criteria included two-dimensional, M-mode and Doppler examinations using recommended imaging planes and adaptations for proper cardiovascular diagnostic purpose. The same standardized imaging protocol was used for each examination.

After all procedures – none less than 40 minutes due to Ketamine action – anesthesia was reverted using Yohimbine (0.4 mg/kg; im) (Araujo et al. 2015).

RESULTS AND DISCUSSION

During cardiovascular evaluation two animals – one Jaguar and one Cougar – presented grade II/VI and III/VI left apical systolic heart murmur under anesthesia, auscultated on mitral focus. A six-year-old female Jaguar weighing 59kg presented mitral valve insufficiency with mean 5.46m/s velocity on color doppler flow measurement within 4.9cm² area of regurgitation on a 12.6cm² left atrium planimetric measurement in echocardiographic evaluation. A six-year-old male Cougar weighing 47.5kg presented mean 7.06m/s mitral valve insufficiency velocity on color doppler flow measurement within 0.9cm² area of regurgitation on a 10.6cm² left atrium planimetric measurement. The other animals, a male Cougar and two female Jaguars, presented mitral valve regurgitation during echocardiographic examination within a low range pressure gradient, without either morphological changes in the cardiac structure or hemodynamic changes.

Trivial tricuspid valve regurgitation was observed in one male Cougar with murmur and one female Jaguar with no apparent structural cause in the echocardiographic study. Those findings were reported on normal cats within dexmedetomidine use on anesthetic protocol (Carvalho et al. 2019). In a study conducted by Romagnoli et al. (2016), the preload increased, as expressed by increased left ventricular diastolic dimensions and atrial area. Considering left ventricular systolic function, cardiac output appeared reduced and left ventricular posterior wall thickness in systole decreased after sedation due to the medetomidine effect. The left ventricular dilation could have produced a mitral annulus stretch with the subsequent loss of complete closure of the mitral leaflets during left ventricular contraction.

In domestic cats, an insidious mitral murmur finding on cardiac auscultation is reported and is related to stress due to transient catecholaminergic stimulation

in myocardial tissue. Associated with this physiological finding, dynamic right (Rishniw & Thomas 2002) and/or left outflow tract obstruction occurs, resulting in low grade murmur auscultated in left apical mitral focus (Cote et al. 2004). During late recovery, the murmur was not reevaluated in those animals.

All animals were stable during anesthesia, maintaining a heart rate of 75 ± 10 bpm; peripheral oxy-hemoglobin saturation (SpO₂) >97%; systolic blood pressure (SBP) between 110 and 125 mmHg; and mean arterial pressure (MAP) between 75 and 85 mmHg. The pressure tended to get a little higher due to peripheral vasoconstriction.

Both Cougars and Jaguars returned safely from the anesthesia, with no changes – such as excitement and delirium stage – and returned to the enclosures, normally receiving food and water.

It is interesting to consider these parameters – heart murmur, mitral valve reflux and trivial tricuspid valve regurgitation – in order to make the procedure safer. In clinical procedures with anesthesia using alpha-2-adrenergic agonists, researchers frequently observe the occurrence of heart murmurs in apparently healthy cats. After recovery from anesthesia, they have no symptoms of heart disease. A comparative study with an anesthetic protocol without alpha-2-agonist will be conducted by this group for further clarification.

CONCLUSION

Medetomidine in large neotropical felids may cause heart murmur in healthy animals as a side effect, but without clinical or anesthetic concerns. Heart murmur showed no risk to the animal in this situation, as it is a transitory event.

Clinical relevance

The clinical relevance of these changes – heart murmur, mitral valve reflux, and trivial tricuspid valve regurgitation – is just to show that it can occur with use of medetomidine and without damage to the

health of healthy animals. With the doses used, these changes are transient without compromising the cardiac hemodynamics of these individuals.

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

October 2020 | Vol. 12 | No. 14 | Pages: 16927–17062

Date of Publication: 26 October 2020 (Online & Print)

DOI: 10.11609/jott.2020.12.14.16927-17062

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