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CASE REPORT

# Stent placement for palliation of cor triatriatum dexter in a dog with suspected patent foramen ovale<sup>☆</sup>



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## KEYWORDS

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**Abstract** An 11 month old spayed, female dog presented with exercise intolerance and cyanosis upon exertion. Echocardiography revealed an imperforate cor triatriatum dexter with mild tricuspid valve dysplasia, an underfilled right ventricle and significant right to left shunting across a presumptive patent foramen ovale. Balloon dilation of the abnormal atrial membrane was initially successful in creating a communication between the right atrial chambers, but stenosis of the original perforation and persistent clinical signs prompted a second intervention. A balloon expandable biliary stent was placed across the abnormal partition, improving caudal venous return to the right ventricle and reducing the right to left shunt. Three months after stent placement, resting oxygen saturation had normalized. Six months after stent placement, exercise tolerance had improved and exertional

<sup>☆</sup> A unique aspect of the Journal of Veterinary Cardiology is the emphasis of additional web-based images permitting the detailing of procedures and diagnostics. These images can be viewed (by those readers with subscription access) by going to <http://www.sciencedirect.com/science/journal/17602734>. The issue to be viewed is clicked and the available PDF and image downloading is available via the Summary Plus link. The supplementary material for a given article appears at the end of the page. Downloading the videos may take several minutes. Readers will require at least Quicktime 7 (available free at <http://www.apple.com/quicktime/download/>) to enjoy the content. Another means to view the material is to go to <http://www.doi.org> and enter the doi number unique to this paper which is indicated at the end of the manuscript.

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cyanosis had resolved. Long term follow up will be necessary to assess for remodeling of the right ventricle with improved venous return. Stent placement can be considered as a palliative treatment option for cor triatriatum dexter, especially for stenosis post-balloon dilation.

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### Abbreviations

CrRA	cranial right atrium
CaRA	caudal right atrium
CS	coronary sinus
CTD	cor triatriatum dexter
PFO	patent foramen ovale

## Introduction

An 11 month old, 24.7 kg, spayed female mixed breed dog presented to the University of Minnesota Veterinary Medical Center for evaluation of extreme exercise intolerance characterized by transient cyanosis and orthopnea, noted since adoption three months prior. Physical examination revealed a grade II/VI left and right basilar systolic murmur and cyanosis of the tongue and oral mucous membranes with exertion. Lung sounds were unremarkable and the patient was eupneic with pink mucous membranes at rest. There was no evidence of ascites or hepatomegaly.

Echocardiography revealed normal left atrial and ventricular chamber dimensions, with normal left ventricular systolic and diastolic function parameters. The right ventricle appeared subjectively underfilled with a small chamber size. Right ventricular wall thickness was subjectively normal. The tricuspid valve leaflets appeared thickened and dysplastic with mild tethering of the septal leaflet to the interventricular septum and decreased diastolic excursion. Doppler studies revealed no evidence of tricuspid stenosis, and only trivial regurgitation was noted. A thin membrane of tissue separated the right atrium into cranial (CrRA) and caudal (CaRA) chambers, with a dilated coronary sinus (CS) communicating with the CaRA (Fig. 1). No color or spectral Doppler flow could be identified between the two right atrial chambers. There was no visible defect in the proper atrial septum noted.

Upon injection of agitated saline into the saphenous vein, there was complete opacification of the CaRA, followed by the left atrium and

ventricle, consistent with a right to left shunt at the atrial level. No contrast was seen crossing the abnormal atrial membrane into the CrRA (Video 1). A cranial injection revealed opacification of the CrRA and right ventricle with no contrast noted in the CaRA. Aortic peak velocity was increased at 2.63 m/s with no evidence of anatomic stenosis, suggesting volume overload caused by right to left shunting at the atrial level. The dog was diagnosed with cor triatriatum dexter (CTD) with an imperforate atrial membrane, significant right to left shunting across a suspected patent foramen ovale (PFO), a small, underfilled right ventricle with possible hypoplasia and tricuspid valve dysplasia. No additional tests were performed and no medications were prescribed as the owners were considering surrendering the dog to a rescue group.

Three months later, after being surrendered to a foster home, the patient presented for balloon dilation of the abnormal atrial membrane. Pre-operative complete blood count, chemistry panel, urinalysis and urine culture were unremarkable. Calculated hematocrit was at the upper limit of the normal range at 58.5% (37.5–60.3%) at that time. The patient was premedicated with acepromazine (0.01 mg/kg IM) and hydromorphone (0.56 mg/kg IM) and general anesthesia was induced with etomidate (0.49 mg/kg) and maintained with isoflurane. The dog was placed in right lateral recumbency. Surgical cut down of the right femoral and left jugular veins were performed with placement of 10-French vascular introducer sheaths<sup>d</sup> via a modified Seldinger technique. A pull back pressure tracing through the right heart was performed using an end-hole balloon wedge pressure catheter<sup>e</sup> and hemodynamic monitoring system<sup>f</sup> through the jugular vein. Pulmonary artery and right ventricular systolic pressures were 20 mmHg, and the CrRA pressure was 7–8 mmHg. The CaRA pressure was measured at 10 mmHg by

<sup>d</sup> Arrow International Inc, Reading, PA, USA.

<sup>e</sup> Balloon wedge pressure catheter, Arrow International Inc, Reading, PA, USA.

<sup>f</sup> Biopac Systems MP150 and AcqKnowledge 4.1 software, Biopac Systems, Inc, Goleta, CA, USA.

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